Conference Agenda

Session

Poster Session Tuesday

Time: **Tuesday, 02/Sept/2025: 5:15pm - 6:45pm**

Location: **Studium2000 Building5**

V.le San Nicola corner, Via di Valesio, 73100 Lecce LE

Presentations

PO2: 1

Switching regimes in fire plumes: regional implications

Eleni Dovrou[1,2], Apostolos Voulgarakis[1,2]

[1]School of Chemical and Environmental Engineering, Technical University of Crete, Greece; [2]Leverhulme Center for Wildfires, Environment and Society, Imperial College London, London, UK

Wildfire events present a rising frequency in recent years, especially in warm climate regions. During such events, the generated fire plume contains a mixture chemical species, driving the chemical processing during the initial and aging stage. Organic aerosols comprise a large portion of the available species and their fate is primarily determined by two competing regimes. In this work we evaluate the conditions of prevalence of each regime. The balance of these two regimes is associated with the black and brown carbon levels; thus, the differentiation of the chemical reactions in the center and at the edges of the plume.

EAC2025_PO2-1_223_Dovrou.pdf

PO2: 2

Photosensitization Induced by Carbonyl Compounds and Its Role in Secondary Aerosols Formation

Ruifeng Zhang, Chak Chan

King Abdullah University of Science and Technology, Saudi Arabia

Organic photosensitizers from biomass burning can generate oxidants, facilitating the conversion of precursors into secondary aerosols. Chloride ions mix with photosensitizers in biomass burning particles, influencing aerosol oxidative potential. Using SO_2 oxidation to sulfate as an indicator, we found NH_4Cl + glyoxal particles produced sulfate 4–5 times faster than NaCl + glyoxal, especially at low humidity. Adding imidazole-2-carboxaldehyde (IC) increased sulfate production 73-fold compared to NH_4Cl alone. Kinetic analysis revealed chloride ions react with $^3IC^*$ at rates ~1000 times higher than in bulk solutions, highlighting the synergistic role of chlorine chemistry and photosensitization in atmospheric oxidation.

EAC2025_PO2-2_263_Zhang.pdf

PO2: 3

Aerosol composition and gas/particle partitioning in a nitrogen dominated atmosphere

Pascale Ooms[1], Farhan Nursanto[1], Willem Kroese[2], Marianne Heida[3], Margreet van Zanten[1,3], Roy Wichink Kruit[3], Marte Voorneveld[3], Marten in 't Veld[3], Rupert Holzinger[2], Uli Dusek[4], Juliane Fry[1]

[1]Wageningen University & Research, the Netherlands; [2]Utrecht University, the Netherlands; [3]National Institute for Public Health and Environment, the Netherlands; [4]Rijksuniversiteit Groningen, the Netherlands

Reactive nitrogen has previously been found relevant in new particle formation and growth events, but specific mechanisms are not yet fully understood. The research consortium of CAINA (Cloud-Aerosol Interactions in a Nitrogen dominated Atmosphere) aims to gain new insights into these important interactions. We will present first results of aerosol and gas composition measurements that have started in a nitrogen rich environment in central Netherlands. A MARGA, ACSM and chemiluminescence NO_y detector are used to investigate nitrogen speciation across the gas and aerosol phase. The studied mechanisms are informed by thermodynamic equilibrium models (e.g. ISORROPIA2 and E-AIM).

EAC2025_PO2-3_442_Ooms.pdf

PO2: 4

Chemical formation pathways of secondary organic aerosols in the Beijing-Tianjin-Hebei region in wintertime

Jie Li

Yunnan University, China

A regional air quality model system (RAQMS) was developed by incorporating an aqueous reaction mechanism for secondary organic aerosol (SOA) formation and primary semi-volatile (SVOC) and intermediate volatile organic compounds (IVOC) precursors to investigate various chemical pathways for SOA formation in the Beijing-Tianjin-Hebei (BTH) region in wintertime. The average contributions from various precursors or chemical pathways to SOA formation during the study period were estimated, in which AVOCs (anthropogenic VOCs), SVOCs, IVOCs, BVOCs (biogenic VOCs), GLY and MGLY contributed 38.4%, 24.9%, 28.4%, 0.2% and 8.1% of SOA mass concentration, respectively, in the BTH region.

EAC2025_PO2-4_803_Li.pdf

PO2: 5

Cross-validation of methods for quantifying the contribution of local (urban) and regional sources to PM2.5 pollution: Application in the Eastern Mediterranean (Cyprus)

Elie Bimenyimana[1], Jean Sciare[1], Konstantina Oikonomou[1], Minas Iakovides[1], Michael Pikridas[1], Emily Vasiliadou[3], Chrysanthos Savvides[3], Nikos Mihalopoulos[1,2]

[1]Climate and Atmosphere Research Centre (CARE-C), Nicosia, Cyprus; [2]National Observatory of Athens, Athens, Greece; [3]Department of Labour Inspection, Ministry of Labour and Social Insurance, Nicosia, Cyprus

This work quantifies the contribution of local versus regional PM sources in Cypriot cities by applying two source apportionment methods namely the “Lenschow approach” and Positive Matrix Factorization (PMF) to a comprehensive filter-based $PM_{2.5}$ chemical composition dataset collected at multisite network consisting of one urban traffic site (NICTRA) and two urban background (NICRES and LIMRES) located within the two largest cities of Cyprus (Nicosia and Limassol), along with one regional background (AMX).The robustness of our conclusions on local versus regional source contributions is demonstrated by strong agreement between the two techniques.

EAC2025_PO2-5_211_Bimenyimana.pdf

PO2: 6

Black Carbon Trends and Source Apportionment in Berlin: A Multi-Year Analysis

Himanshu Setia[1], Michael Pikridas[2], Seán Schmitz[1], Erika Von Schneidemesser[1]

[1]Forschungsinstitut für Nachhaltigkeit – Helmholtz-Zentrum Potsdam, Germany; [2]Climate and Atmosphere Research Center (CARE-C), The Cyprus Institute, Nicosia, Cyprus

Black Carbon (BC) is a key air pollutant affecting air quality, climate, and public health. This study analyzes over five years of BC measurements in Berlin using Aethalometer AE33 data, alongside $PM_{2.5}$, PM_{10}, NOx, and CO concentrations to assess source contributions. Traffic-related BC will be estimated using NOx and CO correlations, while biomass burning influences will be evaluated through seasonal trends and, where possible, levoglucosan or Elemental Carbon/Organic Carbon validation. Seasonal, annual, and diurnal variations will be examined, contributing to the Net4Cities initiative. Findings will inform air quality policies, particularly in quantifying fossil fuel vs. non-traffic BC contributions.

EAC2025_PO2-6_494_Setia.pdf

PO2: 7

Aerosols from Biomass Burning: A Comparative Study under Controlled and Uncontrolled Combustion Conditions

Durre Nayab Habib, Laurynas Bucinskas, Andrius Garbaras, Agne Masalaite

State Research Institute, Center For Physical Sciences And Technology, Vilnius, Lithuania, Lithuania

Biomass burning is a major source of atmospheric aerosols, impacting air quality and climate. This study examines the isotopic composition ($\delta^{13}C$) of aerosols from various wood species and coal under controlled and uncontrolled combustion conditions. Two experimental setups were used: one simulating domestic heating in Lithuania and the other in a controlled laboratory environment. Biomass materials (18 types) and coal were combusted, and aerosol samples were collected using a high-flow sampler. $\delta^{13}C$ values varied between −24‰ to −30‰ for uncontrolled and −22‰ to −29‰ for controlled conditions. The findings highlight the influence of combustion conditions on aerosol formation and composition.

EAC2025_PO2-7_109_Habib.pdf

PO2: 8

Modelling Air Pollution in Coastal Industrial Zones of Chile: A Fuzzy Clustering and High-Resolution Spatial Approach Including the “Gray Zone”

Miguel Ángel Lugo Salazar, Hector Iván Jorquera González

Pontifical Catholic University of Chile, Chile

Quintero and Puchuncaví are two coastal cities in Chile currently recognized as part of the country's "sacrifice zones" due to frequent air pollution episodes caused by industrial emissions. A key challenge is identifying the spatiotemporal distribution of $PM_{2.5}$ and SO_2 near these sources. We developed a new methodology for source apportionment of industrial emissions using a fuzzy clustering technique to determine the contributions of $PM_{2.5}$ and SO_2 concentrations from industrial complexes in these cities. This approach allows us to isolate industrial impacts from other sources in the study areas, such as traffic and residential emissions.

EAC2025_PO2-8_911_Lugo Salazar.pdf

PO2: 9

Source apportionment analysis of phosphorus in PM2.5 and PM10 in two Greek cities

Kyriaki Papoutsidaki[1], Georgios Grivas[2], Faidra Aikaterini Kozonaki[1,2], Kalliopi Tavernaraki[1], Konstantina Oikonomou[3], Irini Tsiodra[2], Maria Tsagkaraki[1], Aikaterini Bougiatioti[2], Nikolaos Mihalopoulos[2], Maria Kanakidou[1,4,5]

[1]ECPL, Department of Chemistry, University of Crete, Heraklion, 70013, Greece; [2]IERSD, National Observatory of Athens, P. Penteli, Athens, 15236, Greece; [3]CARE-C Research Center, The Cyprus Institute, Nicosia, 2121, Cyprus; [4]CSTACC, ICE-HT, FORTH, Patras, Greece; [5]Institute of Environmental Physics, University of Bremen, Bremen, Germany

Phosphorus (P) is crucial for ecosystems, cycling through land, ocean, and atmosphere. In the eastern Mediterranean, P limits marine productivity, with atmospheric deposition as a key source. This study analyzed PM2.5 (Athens) and PM10 (Heraklion) samples for total and inorganic P, bioaerosol proxies, and chemical components. Results showed peak total P in spring, correlating with bioaerosols. Positive Matrix Factorization identified bioaerosols (31%) as major P sources, followed by anthropogenic emissions (28%) and Saharan dust (19%). These findings highlight the significant role of bioaerosols in atmospheric P cycling, emphasizing their importance in marine nutrient supply.

EAC2025_PO2-9_989_Papoutsidaki.pdf

PO2: 10

Source apportionment of aerosol particles by positive matrix factorization in urban background environment (Vilnius, Lithuania)

Viachaslau Alifirenka, Vitalij Kovalevskij, Mindaugas Gaspariūnas, Mindaugas Bernatonis, Steigvilė Byčenkienė

State research institute Center for Physical Sciences and Technology, Lithuania

An aerosol is a suspension of a liquid or solid particles suspended in a gas. Aerosols are a key contributor to environmental issues such as global warming, poor air quality and health. Depending on their nature, aerosols are divided into natural and artificial. Natural aerosols are formed under the influence of natural forces

The aim of this study was to determine the sources of aerosol particles using positive matrix factorization in an urban background environment. Measurements were performed from January 2 to December 21, 2019 at the urban background site located at the Vilnius.

EAC2025_PO2-10_209_Alifirenka.pdf

PO2: 11

Spatial characterization of Urban Particle Phase Pollution Sources through Mobile Measurements in Sarajevo

Michael Bauer[1], Jay Gates Slowik[1], Marta Via[2], Peeyush Khare[1,5], Benjamin Guy Jacques Chazeau[3], Kristina Glojek[1,6], Manousos Ioannis Manousakas[1,7], Zachary C.J. Decker[1,8], Almir Bijedić[4], Enis Krečinić[4], Griša Močnik[2], André S. H. Prévôt[1], Katja Džepina[1]

[1]PSI Center for Energy and Environmental Sciences, 5232 Villigen PSI, Switzerland; [2]University of Nova Gorica, Nova Gorica, 5000, Slovenia; [3]Aix Marseille Univ., CNRS, LCE, Marseille, 13007, France; [4]Federal Hydrometeorological Institute of Bosnia and Herzegovina,

Sarajevo, 71000, Bosnia and Herzegovina; [5]now at: Institute of Climate and Energy Systems (ICE-[3]Troposphere, Forschungszentrum Jülich, 52428 Jülich, Germany; [6]now at: Institute of Environmental Assessment and Water Research (IDAEA-CSIC), Barcelona, 08034, Spain; [7]now at: Environmental Radioactivity & Aerosol Tech. for Atmospheric & Climate Impacts, INRaSTES, National Centre of Scientific Research "Demokritos", Ag. Paraskevi, 15310, Greece; [8]now at: NOAA CSL & Cooperative Institute for Research in Environmental Sciences (CIRES), Boulder, CO, USA

Air pollution in Sarajevo, Bosnia and Herzegovina, is exacerbated by wintertime temperature inversions and solid fuel combustion, leading to PM2.5 levels comparable to those in Asian megacities. To identify pollution sources, high-resolution mobile and stationary measurements were conducted in January 2023 as part of the SAAERO project. Using Positive Matrix Factorization (PMF), five organic aerosol factors were identified, with oxygenated organic aerosol (OOA) dominating overall. Residential wood burning and cooking were key contributors in different urban areas. These findings provide crucial insights for targeted air quality mitigation strategies in South-Eastern Europe.

EAC2025_PO2-11_779_Bauer.pdf

PO2: 12

Chemical composition, sources and vertical transport of non-refractory submicron aerosol in Po Valley: simultaneous on-line measurements at Bologna (54 m a.s.l.) and Mt. Cimone (2165 m a.s.l.)

Marco Rapuano[1], Cecilia Magnani[1], Matteo Rinaldi[1], Marco Paglione[1], Alessandro Bracci[1], Ferdinando Paqualini[1], Laura Renzi[1], Martina Mazzini[1], Simonetta Montaguti[1], Claudia Roberta Calidonna[2], Marco Zanatta[1], Camilla Perfetti[1], Nora Zannoni[1], Stefano Decesari[1], Angela Marinoni[1]

[1]Institute of Atmospheric Sciences and Climate (CNR-ISAC), National Research Council of Italy, Bologna, 40129, Italy; [2]Institute of Atmospheric Sciences and Climate (CNR-ISAC), National Research Council of Italy, Lamezia Terme, 88046, Italy

Submicron particulate matter (PM_1) impact health, climate, and ecosystems, with Organic Aerosol (OA) being a key component. OA is either directly emitted (POA) or formed through atmospheric processes (SOA), undergoing ageing during transport. Time-of-Flight- (ToF) and Quadrupole- (Q) Aerosol Chemical Speciation Monitors (ACSM) have been measured non-refractory PM_1 (NR-PM_1) since August 2024, in Bologna (urban) and at Mt. Cimone (remote). Results show OA dominates NR-PM1, with SO_4 more abundant at Mt. Cimone and NO_3 at Bologna. POA is observed in the lower Po Valley but absent at Mt. Cimone, indicating significant OA ageing, influenced by Planetary Boundary Layer dynamics.

EAC2025_PO2-12_317_Rapuano.pdf

PO2: 13

Comprehensive source apportionment of black carbon at a rural site in Punjab using the aethalometer model and positive matrix factorization (PMF) model

Ajit Kumar[1], Vikas Goel[1,3], Mohammad Faisal[2,4], Umer Ali[2], Anjanay Pandey[2], Vikram Singh[2], Mayank Kumar[1]

[1]Department of Mechanical Engineering, Indian Institute of Technology Delhi, New Delhi, 110016, India; [2]Department of Chemical Engineering, Indian Institute of Technology Delhi, New Delhi, 110016, India; [3]Department of Civil and Environmental Engineering, Virginia Tech, Blacksburg, USA, 24060; [4]Laboratory of Atmospheric Chemistry, Paul Scherrer Institute, Villegen, Aargau 5232 Switzerland

Crop residue burning severely impacts air quality and health in India, despite regulations. This study measures black carbon (BC) at a rural stubble-burning site in Punjab and applies source apportionment techniques. The Aethalometer Model (AM), though widely used, identifies only two sources, limiting accuracy. To improve analysis, the Positive Matrix Factorization (PMF) model was also used. BC concentrations ranged from 1.45 to 85.0 µg/m³, averaging 12.6 µg/m³. AM estimated 48.5% BC from biomass burning and 51.5% from fossil fuels, while PMF identified five sources. The study found an average Absorption Ångström Exponent (AAE) of 1.7 ± 0.3.

EAC2025_PO2-13_810_Kumar.pdf

PO2: 14

Advancing Air Quality and Climate Insights in Lahti, Finland: Investigating Regional Emission Sources

Haitong Zhang[1,2], Benjamin Foreback[1,2], Michael Boy[1,2,3]

[1]1Institute for Atmospheric and Earth System Research/Physics, University of Helsinki, Finland; [2]Atmospheric Modelling Centre Lahti, Finland; [3]3School of Engineering Science, Lappeenranta-Lahti University of Technology,Finland

Air pollution in Lahti is influenced by transboundary transport from Eastern Europe and Russia. This study applied the FLEXPART-SOSAA model to assess pollutant transport and the role of large-scale weather patterns. Results show significant contributions of sulphates, black carbon, and organic aerosols, with seasonal variations driven by coal combustion, biomass burning, and meteorological conditions. Cyclones enhance transport, while anticyclones cause stagnation. Model results align with ground-based observations, highlighting the need for international cooperation and adaptive strategies for air quality management.

EAC2025_PO2-14_318_Zhang.pdf

PO2: 15

Black carbon source apportionment and air mass transport effects in urban areas across warm and cold seasons

Moritz Hey[1,2], Agne Minderyte[3], Nikolaos Evangeliou[4], Steigvilė Byčenkienė[3], Iwona S. Stachlewska[2]

[1]Institute for atmospheric Physics, University of Mainz (JGU); [2]University of Warsaw; [3]Center for Physical Sciences and Technology; [4]Stiftelsen NILU (former Norwegian Institute for Air Research)

This study examines black carbon (BC) sources and aerosol optical properties in Vilnius and Warsaw during the warm (2022) and cold (2022/23) seasons. Aethalometers and Nephelometers were used to investigate BC source contirbution and optical properties, while the FLEXPART model was used to distinguish local and transported BC. Results showed similar BC source distribution in summer but increased coal burning in Warsaw during winter. Optical classification indicated higher contribution of BC-BrC mixtures in winter, though small BC-dominated particles prevailed year-round. Long-range transport significantly influenced BC levels, especially in winter, highlighting its role in urban BC dynamics in Poland and Lithuania.

EAC2025_PO2-15_884_Hey.pdf

PO2: 16

Light Absorbing Carbon in Atmospheric Particulate Matter in Lagos

Adebola Odu-Onikosi[1,2], Paul Solomon[3], Philip K. Hopke[1,4]

[1]Clarkson University, United States of America; [2]EnvironQuest Limited, Nigeria; [3]PAS Environmental, LLC, United States of America; [4]University of Rochester, United States of America

Light-absorbing carbon (LAC) consisting of black carbon (BC) and brown carbon (BrC) are key compoents of PM2.5 and poses risks to climate, visibility, and human health. LAC was mesured at 6 sites in Lagos Nigeria from 2020 to 2021 using filter and continuous methods. Filters were analysed for LAC with a Multiwavelength Absorption Black Carbon Instrument (MABI) at seven wavelengths (405 nm, 465 nm, 525 nm, 639 nm, 870 nm, 940 nm and 1050 nm) and for EC with a Sunset thermal-optical analyzer. Aethlab MA350s were operated at each site. Differences among sites and measurements will be presented.

EAC2025_PO2-16_249_Odu-Onikosi.pdf

PO2: 17

Evaluation of aerosol optical properties of cooking emissions in rural East African homes

Andrea Cuesta-Mosquera[1], Thomas Müller[1], Leizel Madueno[1], Allan Mubiru[2], Christine Muhongerva[3], Manuela van Pinxteren[1], Dominik van Pinxteren[1], Henning Kothe[4], Mira Pöhlker[1]

[1]Leibniz Institute for Tropospheric Research, Leipzig, 04318, Germany; [2]Atmosfair gGmbH, Berlin, 12059, Germany; [3]Safer Rwanda, Kigali, P.B 7301, Rwanda; [4]Buana e.V., Hamburg, 22767, Germany

The optical properties of aerosol emitted during cooking in rural households in Rwanda were investigated. Participants used traditional cooking methods and improved cookstoves. Aerosol mass concentrations were monitored using portable light absorption photometers. Filter PM10 samples were collected and analysed to determine elemental, organic (OC), and total carbon concentrations. During the use of the stoves, the total absorption decreased by ~50-70% compared with traditional cooking. The largest reductions occurred in the UV due to a significant difference in OC between both methods. The change resulted in different Absorption Ångström Exponent (AAE, traditional cooking = 2,4, new stove = 1,4).

EAC2025_PO2-17_879_Cuesta-Mosquera.pdf

PO2: 18

Optical and Aerodynamic Properties of Solid Aerosol Aggregates in the Context of Potential Stratospheric Aerosol Injection

Zhongxia Sun[1], Sandro Vattioni[2], Martin Gysel-Beer[1]

[1]Paul Scherrer Institute PSI, Switzerland; [2]ETH Zürich, Switzerland

This study investigates the optical and aerodynamic properties of solid aerosol aggregates in the context of stratospheric aerosol injection (SAI) for solar radiation management. Through numerical simulations and laboratory experiments, it quantifies the impact of particle coagulation on light scattering and atmospheric residence time, both of which collectively determine the radiative forcing potential of injected aerosols.

EAC2025_PO2-18_934_Sun.pdf

PO2: 19

Characteristics of Black Carbon in San Luis Potosi City, Mexico.

Valter Armando Barrera Lopez[1], Juan Pablo Lopez[2], Guadalupe Galindo[3]

[1]UASLP, Mexico; [2]IMAREC, UASLP, Mexico; [3]CIACYT, UASLP, Mexico

BC is emitted primarily from the incomplete combustion of fossil fuels, biofuels, and biomass burning, therefore, can be classified into two subfractions: fossil fuel (BCff) and biomass burning (BCbb). BC is formally defined as a refractory light-absorbing substance composed of aggregated carbon spherules.

San Luis Potosi City is located in central Mexico and is characterized by a huge automotive industry, funding industry, and mining sector.

This study presents an evaluation of BC measured by an AE33 Aethalometer, from three different zones and years in San Luis Potosi City, with different characteristics and emission sources.

EAC2025_PO2-19_1093_Barrera Lopez.pdf

PO2: 20

Unraveling the Role of PAHs in Shaping Primary and Secondary Brown Carbon Absorption in Eastern India's Semi-Urban Atmosphere

Prerna Thapliyal[1], Apoorvi Sharma[1], Ashish Soni[2], Pratibha Vishwakarma[1], Tarun Gupta[1]

[1]Indian Institute of Technology, Kanpur, India; [2]Indian Institute of Tropical Meteorology, Pune, India

This study examines the contribution of PAHs to Brown Carbon (BrC) light absorption at a semi-urban site in Jorhat, India. Using laser reflectance data and the Minimum R^2 approach, BrC absorption was determined and apportioned into primary and secondary BrC. PAHs contributed 0.8% to BrC absorption, with high molecular weight PAHs dominating (98.6%). Benzo(g,h,i)perylene was the largest contributor (41.2%). PAH absorption correlated strongly (0.84) with primary BrC but weakly with secondary BrC, highlighting its origin from direct emissions and its significant role in BrC radiative forcing and atmospheric impact.

EAC2025_PO2-20_121_Thapliyal.pdf

PO2: 21

Wintertime aerosol chemical composition over the Arabian Sea based on shipboard collected aerosols: Implication to surface water biogeochemical processes

Garima Shukla[1,2], Ashwini Kumar[1,2]

[1]1CSIR-National Institute of Oceanography, Dona Paula, Goa, 403004, India; [2]2Academy of Scientific and Innovative Research (AcSIR), Ghaziabad 201002, India

Atmospheric aerosol chemistry is crucial to assess and understand the role of aerosols in controlling the surface water biogeochemical processes. In this context, a cruise-based study is undertaken during northeast monsoon (NE), and aerosol samples were collected for the analyses of their chemical composition in the Arabian Sea. This comprehensive analysis of aerosol composition in the Arabian Sea provides valuable insights into the sources and transformation processes of marine aerosols, emphasizing the influence of continental outflows and secondary aerosol formation. These findings contribute towards the better quantification of aerosols, which plays an important role in understanding the surface water biogeochemistry.

EAC2025_PO2-21_445_Shukla.pdf

PO2: 22

Spatial and Seasonal Variation in Chemical Composition of Urban Residential Outdoor PM2.5 across four cities in India

Rajdeep Singh, Vinayak Sahota, Sonali Borse, Akshay Kumar, Harish C. Phuleria
Indian Institute of Technology Bombay, India

This study, part of APEAL, uniquely examines seasonal and spatial variations in PM2.5 chemical composition across four Indian cities. PM2.5 levels were highest in Delhi, especially in winter, exceeding other cities by up to 87%. Overall, major contributors to PM2.5 levels were WSII, OC, and EC. WSII, dominated by sulfate and nitrate, peaked in winter, while summer fractions featured sodium and phosphate. SOC was highest in Delhi (86%), indicating strong photochemical activity, while WSM, mainly zinc, peaked in Mumbai. This spatial and seasonal variability in chemical composition can explain varying impacts rather than PM mass concentration.

EAC2025_PO2-22_1165_Singh.pdf

PO2: 23

Multiphase Aerosol-Cloud Chemistry and Secondary Aerosol Formation from α-pinene

Laurie Anne Novák[1], Jinglan Fu[2,4], Willem S. J. Kroese[3], Juliane Fry[1], Maarten Krol[1,3]

[1]Wageningen University & Research, The Netherlands; [2]Center for Isotope Research, Rijksuniverstiteit Groningen, The Netherlands; [3]Institute for Marine and Atmospheric Research Utrecht, Utrecht University, The Netherlands; [4]Institute of Meteorology and Climate Research-Atmospheric Aerosol Research, Karlsruhe institute of Technology, Germany

The oxidation of biogenic volatile organic compounds (BVOCs), such as α-pinene, plays a key role in secondary organic aerosol (SOA) formation, particularly in nitrogen-rich atmospheres like the Netherlands. This study integrates AIDA cloud chamber experiments with the F0AM box model to investigate the multiphase chemistry of α-pinene oxidation products. By varying relative humidity and seed composition, we assess their impact on SOA growth and organic nitrogen species formation. Our results improve the mechanistic understanding of gas-aqueous-particle partitioning, enhancing SOA representation in cloud-resolving models and contributing to better predictions of aerosol evolution in regional and global atmospheric models.

EAC2025_PO2-23_1064_Novák.pdf

PO2: 24

On-line speciation of glyoxal multiphase reactions on deliquesced ammonium sulfate particles

Anne Monod[1], Nicolas Brun[1], Anil Kumar Mandariya[2], Junteng Wu[3], Jian Xu[1], Manon Rocco[1], Laurent Poulain[4], Mathieu Cazaunau[2], Antonin Berge[2], Edouard Pangui[2], Brice Temime-Roussel[1], Bénédicte Picquet-Varrault[2], Jean-Louis Clément[1], Aline Gratien[2], Liang Wen[4], Thomas Schaefer[4], Andreas Tilgner[4], Hartmut Herrmann[4], Jean-François Doussin[2]

[1]Aix-Marseille University, France; [2]Université Paris Est Créteil and Université Paris Cité, CNRS, LISA, Créteil, France; [3]Université Clermont Auvergne, CNRS, OPGC, LaMP, Clermont Ferrand, France; [4]Leibniz Institute for Tropospheric Research (TROPOS) Leipzig, Germany

This study presents chemical speciation of the gas and the particle phases during the uptake of gaseous glyoxal on deliquesced AS seed particles (RH ≥ 80 %) in the CESAM chamber.
Fast reactive uptake of gaseous glyoxal on AS particles was observed, source apportionment analysis through positive matrix factorization led to the identification and quantification of three dominant processes: glyoxal hydration, fast aging and photochemistry. Individual products, e.g. imidazole-2-carboxaldehyde, were formed within minutes in the chamber. A detailed mechanism of glyoxal reactive uptake will be proposed.

EAC2025_PO2-24_1100_Monod.pdf

PO2: 25

Playing with bricks: speciation models to depict the interaction among water-soluble components of the atmospheric particulate matter

Stefano Bertinetti[1], Matteo Marafante[1], Luca Carena[1], Clemente Bretti[2], Demetrio Milea[2], Anna Annibaldi[3], Cristina Truzzi[3], Silvia Illuminati[3], Debora Fabbri[1], Davide Vione[1], Milena Sacco[4], Mery Malandrino[1], Silvia Berto[1]

[1]1Department of Chemistry, University of Turin, Turin, 10125, Italy; [2]Dipartimento di Scienze Chimiche, Biologiche, Farmaceutiche e Ambientali, CHIBIOFARAM, Università degli Studi di Messina, Messina, 98168, Italy; [3]Department of Life and Environmental Sciences, Università Politecnica delle Marche, Ancona, 60131, Italy; [4]Regional Environmental Protection Agency of Piedmont, Turin, 10135, Italy

A water droplet in air acts as a complex chemical reactor, where various chemical species interact with each other, and many reactions can occur, such as acid-base reactions, photolysis, metal hydrolysis, and complexation. Modelling the chemical species in these droplets helps better understand environmental processes. These processes are influenced by the type and concentration of specific chemical species. Speciation models for water-soluble components of PM10 have been developed. The results highlight the importance of the interaction between Fe and oxalate. More detailed investigation of this interaction was conducted by modeling different conditions to assess the photochemical activity of these systems.

EAC2025_PO2-25_937_Bertinetti.pdf

PO2: 26

Results from the first chemical ionization mass spectrometry Intercomparison Workshop at the TROPOS twin chamber setup in ACTRIS CiGas

Peter Mettke[1], Nina Sarnela[2], Falk Mothes[1], Hartmut Herrmann[1]

[1]Atmospheric Chemistry Department (ACD), Leibniz Institute for Tropospheric Research, Germany (TROPOS); [2]Institute for Atmospheric and Earth System Research (INAR) / Physics, University of Helsinki

Condensable vapors are precursors of Secondary organic aerosols (SOA). Their improved detection has led to massive progress in the understanding of atmospheric processes, but the large variety of instruments and techniques limits the comparability of the results. In this study, ten NO_3-CI-ToFMS instruments took part in an intercomparison workshop at a simulation chamber setup. A unified inlet system was designed to improve the comparability. A series of experiments were performed parallel in both chambers, including gas mixtures of analytical standards, α-pinene oxidation under various conditions and sulfuric acid formation from OH oxidation. Observed differences emphasize the need for further investigation.

EAC2025_PO2-26_756_Mettke.pdf

PO2: 27

Concentrations of Key Atmospheric Pollutants: BC and PAHs in PM2.5 – Levels, Meteorological Influence, Correlation with Other Pollutants and Health Aspects

Lenia-Nezaet de Brito Gonsalvesh[1], Nadya Neykova[2], Blagorodka Veleva[2], Stela Naydenova[1], Anife Veli[1], Zilya Mustafa[1], Elena Hristova[2]

[1]Burgas State University Prof. Dr Asen Zlatarov, Bulgaria; [2]National Institute of Meteorology and Hydrology, Sofia, Bulgaria

Fine particulate matter is a key air quality indicator influenced by interactions with other pollutants and meteorological conditions. In this regard current study focuses on PM2.5 and associated BC and PAH concentrations at an urban background site in Sofia, where three samplings were carried out during February-March 2022, October-November 2022 and February-March 2023. BC concentrations were analyzed using Multi-wavelength Absorption Black Carbon Instrument, while 19 PAH compounds in PM2.5 were quantified via GC-MS/MS. Present study analyzes correlations between PM2.5, BC, PAHs and other pollutants (PM10, NO2, CO, Benzene) using data from Sofia-Mladost (EEA) and assesses the impact of meteorological factors.

EAC2025_PO2-27_800_Gonsalvesh.pdf

PO2: 28

Effects of hydroperoxy radical heterogeneous loss on the summertime ozone formation in the North China Plain

Ruonan Wang

Institute of Earth Environment, Chinese Academy of Sciences, China, People's Republic of

Hydroperoxy radical (HO2) is key in NO to NO2 oxidation, contributing to tropospheric O3 formation. While HO2 uptake on wet aerosols is efficient, its impact on O3 remains unclear. Model simulations of a severe O3 pollution episode in the North China Plain (NCP) in 2018 showed that HO2 heterogeneous loss reduced daytime HO2 and MDA8 O3 concentrations by 5% and 1%, respectively. However, decreased HO2 uptake due to reduced emissions from 2013 to 2018 only contributed to a 5% increase in MDA8 O3, indicating it is not a major driver of O3 trends in the NCP.

EAC2025_PO2-28_536_Wang.pdf

PO2: 29

Modelling for atmospheric radicals and oxidants on PM2.5 and O3 episodic and non-episodic days in an urban area of Taiwan

Shi-Ya Tang, Li-Hao Young

China Medical University, Taiwan

This study aims to characterize the key radicals and oxidants during $PM_{2.5}$ and O_3 episodic and non-episodic days in a Taiwan urban area using a photochemical box model with field constraints. The OH was the dominant radical, peaking at noon and followed by HO_2 and RO_2, whereas the NO_3 peaked in the evening. The production of OH was mainly driven by the HOx cycling between HO_2 and NO, whereas the major loss of OH was due to its reaction with VOCs. Nighttime chemistry of NO_3 and N_2O_5 hydrolysis were implicated in elevated $PM_{2.5}$ in the following morning hours.

EAC2025_PO2-29_1137_Tang.pdf

PO2: 30

Biomass Burning Organic Aerosols as a Pool of Atmospheric Reactive Triplets to Drive Multiphase Sulfate Formation

Chak Keung Chan[1], Zhancong Liang[1], Liyuan Zhou[1], Yuqing Chang[1], Yiming Qin[2]

[1]King Abdullah University of Science and Technology, Saudi Arabia; [2]City Univeristy of Hong Kong, Hong Kong

Biomass-burning organic aerosol(s) (BBOA) are rich in brown carbon (BrC), which significantly absorbs solar irradiation and potentially accelerates global warming. Despite its importance, the multiphase photochemistry of BBOA remains poorly understood. In this study, we explored the photochemical reactivity of BBOA particles in multiphase S(IV) oxidation to sulfate. We found that sulfate formation in BBOA particles is predominantly driven by photosensitization involving the triplet excited states ($^3BBOA^*$). Our results highlight that the chemistry of $^3BBOA^*$ in particles can greatly contribute to the formation of sulfate. Photosensitization of BBOA will likely become increasingly crucial due to the intensified global wildfires.

EAC2025_PO2-30_293_Chan.pdf

PO2: 31

Fast generation of peroxides via particulate photosensitization

Zhancong Liang, Liyuan Zhou, Chak K. Chan

King Abdullah University of Science and Technology, Saudi Arabia

Peroxide species are key oxidants in shaping the atmospheric oxidative capacity, yet their formation pathways remain elusive under high-NO_x conditions, where classical gas-phase mechanisms are suppressed. Herein, we report an underappreciated 'in-particle' peroxide formation pathway driven by photosensitization reactions in biomass burning organic aerosol (BBOA). This mechanism remains highly efficient even in polluted, high-NO_x environments, leading to orders-of-magnitude increase in particulate H_2O_2 concentrations under sunlight —far exceeding levels expected from gas-phase partitioning. These new findings suggest that intensifying wildfires in our warming world, beyond their primary emissions, may significantly reshape atmospheric oxidation chemistry and exacerbate air quality degradation.

EAC2025_PO2-31_1210_Liang.pdf

PO2: 32

Wildfire chromophores enhance the production of sulfate radicals in Ammonium Sulfate photochemistry

Angelina Petersen[1], Zonghao Luo[2], Alair Wong[1], Ruiyang Xiao[2], Tran Nguyen[1]

[1]University of California, Davis, United States of America; [2]Central South University, Changsha, China

Recent research challenges the assumption that ammonium sulfate (AS) aerosols are photochemically inert. While prior studies used dilute solutions, aerosol liquid water (ALW) contains high ionic strength AS, allowing for the formation of reactive sulfate radicals ($SO_4^{\bullet-}$) under troposhpehric light. Wildfire-emitted chromophores, increasingly common due to climate change, significantly enhanced $SO_4^{\bullet-}$ radical production when added to these AS solutions. To determine the production yield, the radicals were trapped with an organic compound to form organosulfates, and tracked via liquid chromatography coupled with high-resolution mass spectrometry. The findings reveal important implications for atmospheric chemistry, climate models, aerosol-cloud interactions, and health impacts.

EAC2025_PO2-32_1200_Petersen.pdf

PO2: 33

Numerical Analysis of Fuel Injection Control and Its Impact on Aerosol Formation and Transport in Urban Canyons and Open Environments

Mojtaba Bezaatpour[1], Mehrdad Nazemian[2], Miikka Dal Maso[1], Matti Rissanen[1,3]

[1]Tampere University, Finland; [2]Sahand University of Technology; [3]University of Helsinki

This study employs a numerical modeling approach to analyze pollutant emissions from a combustion chamber and their transformation into aerosols in urban environments. The first phase focuses on optimizing fuel injection control to reduce emissions and improve efficiency, revealing that an increasing oscillatory injection pattern enhances power output while enabling waste heat recovery. The second phase models pollutant dispersion and chemical transformation in street canyons and open areas using CFD and atmospheric chemistry simulations. The findings offer insights into the impact of fuel injection strategies, urban geometry, and meteorological conditions on air quality, supporting better emission control and mitigation policies.

EAC2025_PO2-33_1070_Bezaatpour.pdf

PO2: 34

Dust contribution in the performance evaluation of the FARM dispersion model

Annalisa Tanzarella[1], Angela Morabito[1], Ilenia Schipa[1], Francesca Intini[1], Tiziano Pastore[1], Stefano Spagnolo[1], Nicola Pepe[2], Paola Radice[2], Roberto Primerano[1], Vincenzo Campanaro[1]

[1]ARPA Puglia, Italy; [2]ARIANET srl

This work presents the results produced within the framework of The Puglia Regional Air Quality Plan. The reconstruction of PM10 concentrations across the entire regional territory, for a specific emission scenario, was carried out using the modelling system implemented at ARPA Puglia. The emission database was reconstructed for the year 2019 using the INEMAR system. The model performance evaluation was conducted using the DELTA TOOL software, by comparing the modelled PM10 data with the measured data from the 61 monitoring stations of the regional air quality network, taking into account the contribution of Saharan dust.

EAC2025_PO2-34_762_Tanzarella.pdf

PO2: 35

Impact of Traffic Emissions on Near-Road Air Quality in the Presence of a Noise Barrier: A PALM-LES Simulation

Ali Kooh andaz[1], Xiaoyu Li[2], Ville Silvonen[1], Jarkko Niemi[3], Juan Andres Casquero-Vera[2], Sami D. Harni[4], Leena Järvi[2,5], Topi Rönkkö[1], Anu Kousa[3], Tommy Chan[2], Tuukka Petäjä[2], Hilkka Timonen[4], Miikka Dal Maso[1]

[1]Aerosol Physics Laboratory, Physics Unit, Tampere University, Tampere, Finland; [2]Institute for Atmospheric and Earth System Research/Physics, Faculty of Science, University of Helsinki, Helsinki, Finland; [3]Helsinki Region Environmental Services Authority HSY, Ilmalantori 1, FIN-00240, Helsinki, Finland; [4]Atmospheric Composition Research, Finnish Meteorological Institute, PL 503, FIN-00101 Helsinki, Finland; [5]Helsinki Institute of Sustainability Science, Faculty of Science, University of Helsinki, Helsinki, Finland

Urban air quality significantly affects public health, with traffic emissions influenced by urban structures. This study investigates how a noise barrier affects traffic aerosol movement using the parallelized large eddy simulation model PALM. Simulations use real-world topographic and also meteorological data to assess conditions with wind flowing perpendicular to the highway. By comparing scenarios with and without the barrier, and validating results with field measurements, the study evaluates its impact on total particle concentrations.

EAC2025_PO2-35_478_Kooh andaz.pdf

PO2: 36

Radiative Cooling in New York/New Jersey Metropolitan Areas by Wildfire Particulate Matter

Georgios A. Kelesidis[1,2], Constantinos Moularas[1,2], Hooman Parhizkar[2], Leonardo Calderon[3], Irini Tsiodra[4], Nikolaos Mihalopoulos[4,5], Marios Bruno Korras-Carraca[6], Nikolaos Hatzianastassiou[6], Panos G. Georgopoulos[2], Jose G. Cedeño Laurent[2], Philip Demokritou[2]

[1]Faculty of Aerospace Engineering, Delft University of Technology, Delft, 2629 HS, The Netherlands; [2]School of Public Health, Rutgers University, Piscataway, NJ 08854, USA; [3]School of Environmental and Biological Sciences, Rutgers University, New Brunswick, NJ 08901, USA; [4]Institute for Environmental Research and Sustainable Development, National Observatory of Athens, Athens, 15236, Greece; [5]Department of Chemistry, University of Crete, Heraklion, 71003, Greece; [6]Department of Physics, University of Ioannina, Ioannina, 45110, Greece

Here, state-of-the-art real time and time integrated instrumentation is used to characterize the physicochemical properties and radiative effects of wildfire particulate matter (WFPM) reaching the highly populated metropolitan areas of New Jersey/ New York during the extreme wildfire incident of summer 2023. The WFPM direct radiative forcing of -352.4 W/m^2 derived here based on the light absorption and scattering measured at the peak of this incident explains the observed temperature reduction of about 3 K. Such negative radiative forcings may limit natural ventilation of megacities, increase the residence time of WFPM and other background air pollutants, exacerbating public health risks.

EAC2025_PO2-36_289_Kelesidis.pdf

PO2: 37

Monitoring and Analysis of Black Carbon in different cities in Mexico

Valter Armando Barrera Lopez

UASLP, Mexico

Mexico is number 13 on the list of countries with the largest volumes of CO_2 emissions in year 2013. Nevertheless, there are not enough official measurements of BC, especially in most medium-sized cities. Peralta et al. (2019) recompiled all the BC studies measured in Mexico, and pretended to establish a BC Network, but just a few state governments were interested. This study added information from 5 different monitoring sites with different characteristics measured by an AE33 Aethalometer, to have a better understanding of this pollutant to develop mitigation and adaptation strategies, reduce emission precursor sources, and risks in the population.

EAC2025_PO2-37_526_Barrera Lopez.pdf

PO2: 38

Aerosol Model-Measurement Comparison for Improving the Prediction of Aircraft Engine Deterioration

Erik Seume[1], Barbara Harm-Altstädter[2], Lutz Bretschneider[2], Jan Göing[1]

[1]Institute of Jet Propulsion and Turbomachinery, Technische Universität Braunschweig, Germany; [2]Institute of Flight Guidance, Technische Universität Braunschweig, Germany

Aerosol particles cause aircraft engine deterioration, adversely affecting flight safety and maintenance costs. The present paper aims to contribute to refining estimates of the amount of aerosols ingested by engines. Therefore discrepancies in model outputs and atmospheric measurements are identified. This is done by comparing atmospheric composition models with in-situ measurements of aerosol particles, which were performed with the research drone ALADINA downwind of the airport Berlin-Brandenburg. The research shows that the aviation community needs observations in airport proximity to obtain more precise estimates of the quantities of ingested contamination.

EAC2025_PO2-38_103_Seume.pdf

PO2: 39

Desert dust exposure in sub-Saharan Africa: the case of the city of Cotonou, Benin

Marcos Migan[1,2], Fabrice Cazier[3], Nathalie Verbrugghe[4], Anthony Verdin[1], Fresnel Boris Cachon[2], Marc Fadel[1], Aurore Dega[2], Aaron Kakpo[2], Loïc Adonouhoue[2], Firmin Sagbo[2], Dorothee Dewaele[3], Nour Jaber[1], Faustin Aissi[1], Ulrich Patinvoh[5], Gildas Agodokpessi[5], Ménonvè Cynthia Atindehou[2], Arnauld Fiogbe[5], Richard Lalou[6], Dominique Courcot[1]

[1]Université du Littoral Côte d'Opale (ULCO), France; [2]Université d'Abomey-Calavi, LBBM, Benin; [3]Université du Littoral Côte d'Opale (ULCO), CCM, France; [4]Université du Littoral Côte d'Opale (ULCO), PFT, France; [5]Centre National Hospitalier et Universitaire de Pneumo Phtisiologie de Cotonou (CNHUPP-C), Benin; [6]Université Paris Cité, UMR 261 – MERIT, Paris

The present work will focus on outdoor air pollution and examines the various factors that contribute to the concentration of $PM_{2.5}$ in ambient air in Cotonou, Benin. Ambient air quality was monitored over the period from January to May 2024. Statistical analysis tools were used to identify and quantify the contribution of sources to the concentration of $PM_{2.5}$ in ambient air in Cotonou.

Results show that exceedances of ambient $PM_{2.5}$ concentration occur mainly during the dry season, when the harmattan wind is active. A maximal average daily concentration of 166 $\mu g/m^3$ was recorded, whereas the WHO recommendation is 15 $\mu g/m^3$.

EAC2025_PO2-39_861_Migan.pdf

PO2: 40

Effects of Urban Form on PM2.5 Concentration Using Explanatory Machine Learning

Mehri Davtalab, Steigvilė Byčenkienė

SRI Center for Physical Sciences and Technology (FTMC), Lithuania

Air pollution is a major health risk, with $PM_{2.5}$ exposure causing 253,000 premature deaths in the EU in 2021. Urbanization alters air pollution distribution by increasing built-up areas and reducing green spaces. This study examines how 2D/3D urban form affects $PM_{2.5}$ in Vilnius, Lithuania, using Spatial Random Forest machine learning. Key factors influencing $PM_{2.5}$ include built-up volume (BU-Vol), percentage of landscape (PLAND), and largest patch index (LPI), while edge density (ED) is least important. Findings enhance understanding of urban form's impact on air quality, aiding pollution control efforts.

EAC2025_PO2-40_414_Davtalab.pdf

PO2: 41

Investigating the vertical distribution of sporadic appearance of ultrafine aerosol particles emitted at the airport FRA

Malte Schuchard[1], Anna Voß[1], Konrad Bärfuss[1], Sven Bollmann[1], Lutz Bretschneider[1], Markus Hermann[2], Frank Holzäpfel[4], Ralf Käthner[2], Astrid Lampert[1], Falk Pätzold[1], Andreas Schlerf[1], Steffen Schmitt[3], Barbara Harm-Altstädter[1]

[1]Institute of Flight Guidance, Technische Universität Braunschweig, Braunschweig, 38108, Germany; [2]Department of Atmospheric Microphysics, Leibniz Institute for Tropospheric Research (TROPOS), 04318, Leipzig, Germany; [3]Institute of Combustion Technology, German Aerospace Center (DLR), Stuttgart, 70569, Germany; [4]Institute of Atmospheric Physics, German Aerospace Center (DLR), Oberpfaffenhofen-Wessling, 82234, Germany

Ultrafine aerosol particles (UFP) impose significant health risks, especially in the vicinity of airports due to high exposure of emissions. To obtain a profound understanding of the vertical distribution of UFP in the atmospheric boundary layer, the research drone ALADINA was used to measure aerosol particles in the size of 4-19 nm (N_{4-19}) around Frankfurt Airport in October 2024. The results indicate a pronounced appearance of N_{4-19} close to ground, when air masses originate from the airport plume. In addition, peaks of N_{4-19} occur in a vertically concentrated altitude of 200-400 m, suggesting horizontal transport during aircraft approach.

EAC2025_PO2-41_739_Schuchard.pdf

PO2: 42

Saharan Dust Transport in the Mediterranean: Circulation Patterns, Air Quality Monitoring, and Chemical Composition Analysis

Francesca Calastrini[1,3], Andrea Orlandi[2], Gianni Messeri[1,3], Riccardo Benedetti[3], Alessandro Zaldei[1], Carolina Vagnoli[1], Beniamino Gioli[1], Giovanni Gualtieri[1], Tommaso Giordano[1], Simone Putzolu[1], Silvia Becagli[4], Rita Traversi[4], Mirko Severi[4], Silvia Nava[5], Franco Lucarelli[6]

[1]Istituto di BioEconomia IBE-CNR, 50145 Florence, Italy; [2]ENEA, SSPT-CLIMAR, 40121 Bologna, Italy; [3]Consorzio LaMMa, 50019 Sesto Fiorentino, Florence, Italy; [4]Department of Chemistry, University of Florence, 50019 Sesto Fiorentino, Florence, Italy; [5]I.N.F.N., Florence, Via Sansone 1, 50019 Sesto F.no, Florence, Italy; [6]Department of Physics and Astronomy, University of Florence, 50019 Sesto F.no, Florence, Italy

In the Mediterranean, Saharan dust transport increases PM10 levels, often exceeding EU limits and impacting human health. Recent years have seen more frequent and intense intrusions, likely due to climate change. The LaMMA Consortium applied a weather classification method to identify circulation patterns linked to these events. Data from the AirQino network helped track PM10 and PM2.5 plumes in space and time. Analyses from 2018-2023 reveal both direct and complex dust transport paths. Chemical analyses of PM10 samples in Tuscany confirmed the desert origin using techniques like ion chromatography, PIXE, and ICP-AES.

EAC2025_PO2-42_918_Calastrini.pdf

PO2: 43

Dust storm dynamics: a study using HYSPLIT and WRF to analyze dust transport patterns in León, Spain

Evi Becerra-Acosta[1], Ana I. Calvo[1], Josue M. Polanco-Martinez[2], Carlos Blanco-Alegre[1], Lucrecia Bile Osa-Akara[1], Darrel Baumgardner[3], Roberto Fraile[1]

[1]University of Leon, Spain; [2]University of Salamanca; [3]Droplet Measurement Technologies

We use the regional atmospheric model WRF and the Hybrid Single-Particle Lagrangian Integrated Trajectories model to diagnose the contribution of Saharan dust to the northwest region of Spain. We find that synoptic conditions correspond to an anomalous cut-off low whose center initially sits in front of the Iberian Peninsula and rapidly migrates southwards over northwest Africa and Morocco, exposing air to the central dust source in the region. These dynamic conditions are apt for a strong meridional advection of aerosol, which limits the action of scavenging processes and renders a substantial mass of aerosol deposition in NW Spain.

EAC2025_PO2-43_822_Becerra-Acosta.pdf

PO2: 44

The Spectroscopic Multiparameter Particle Analyzer

Darrel Baumgardner
Droplet Measurement Technologies, United States of America

An innovative instrument to quantify multple properties of aerosol particles has been developed that integrates technology that images at high resolution, extracts the complex refractive index from spherical particles, identifies organic and bioaerosols from the fluorescence signatures and measures the absorption cross section with thermal analysis. The Spectroscopic Multiparameter Particle Analyzer (SMPA) is the results of years of development at DMT of a suite of ground based and airborne instrument, i.e. the CAPS, WIBS, SP2 and AFN that have been well characterized by users worldwide. Selected featurs from the instruments have now been integrated into a single system, the SMPA.

EAC2025_PO2-44_145_Baumgardner.pdf

PO2: 45

Enhancing Air Quality Governance: Results from LIFE SIRIUS in Rome

Maria Agostina Frezzini, Donatella Occhiuto, Laura Bennati, Arianna Marinelli, Alessandro Di Giosa
Enviromental Protection Agency of Lazio Region ARPA Lazio, Italy

The LIFE SIRIUS project enhances air quality governance in urban areas through integrated assessment methods. In Rome, it evaluated Air Quality Plans, emission scenarios, and mitigation measures. Using a high-resolution dispersion model, it projected air quality for 2030 under "do nothing" (CLE2030) and "with measures" (CLE2030+AQP) scenarios. Findings indicate NO_2 reductions up to 13 µg/m³, $PM_{2.5}$ drops up to 13 µg/m³, and consistent PM_{10} improvements. Measures like sustainable transport and renewable energy incentives proved effective. The study highlights the need for coordinated policies, robust emission inventories, and advanced modelling to meet air quality targets and mitigate health risks.

EAC2025_PO2-45_132_Frezzini.pdf

PO2: 46

High-Resolution Modeling of Air Pollution in Poland: Evaluation of EMEP4PL and uEMEP for PM2.5, NO2, and O3

Kinga Areta Wisniewska[1], Małgorzata Werner[1], Bruce R. Denby[2], Qing Mu[3], Maciej Kryza[1]
[1]University of Wrocław; [2]Norwegian Meteorological Institute; [3]Xi'an Jiaotong-Liverpool University

This study compares two chemical transport models – EMEP4PL (4 km x 4 km resolution) and downscaling uEMEP (1 km ×1 km, 500 m × 500 m, and 100 m × 100 m resolutions) – using daily averages of PM2.5, NO_2, and O_3 in 2022. We examined seasonal variability, station/area type effects. The uEMEP model demonstrated significant performance improvements compared to EMEP4PL. The highest accuracy was achieved at 500 m × 500 m resolution. The uEMEP model outperformed EMEP4PL, with improvements at rural stations and weaker performance at urban traffic sites. Seasonal analysis revealed challenges.

EAC2025_PO2-46_791_Wisniewska.pdf

PO2: 47

Impacts of urban expansion on meteorology and air quality in North China Plain during wintertime: A case study

Qian Jiang
Institute of earth environment, Chinese Academy of Sciences, China, People's Republic of

The North China Plain (NCP) has rapid urbanization, with urban areas increasing from 1.78% in 2000 to 6.70% in 2015. Urban expansion impacts air quality through changes in meteorology and physicochemical processes. WRF-Chem simulations show urbanization raises near-surface temperature by 0.2℃, boundary layer height by 1.6%, and humidity by 0.4%. O3 increases by 2.2%, while PM2.5 decreases by 2.4% overall and 8.9% in urban areas. NO2, SO2, and CO also decline. Despite higher emissions, urban expansion reduces particulate pollution in cities.

EAC2025_PO2-47_351_Jiang.pdf

PO2: 48

Microscale impact assessment of particulate matter emissions from a large steel plant in Taranto (Italy)

Francesca Intini[1], Angela Morabito[1], Annalisa Tanzarella[1], Ilenia Schipa[1], Gianni Tinarelli[2], Daniela Barbero[2], Umberto Giuriato[2], Tiziano Pastore[1], Vincenzo Campanaro[1]
[1]ARPA PUGLIA, Italy; [2]ARIANET Srl, via B. Crespi 57, Milan, 20159, Italy

The study assesses the microscale impact of particulate matter emissions from a large steel plant in Taranto, Italy, using Lagrangian particle modeling. The aim is to reconstruct exposure at a microscale level, considering the influence of urban structures and recently built park roofs on pollutant dispersion. Simulations were conducted with the PMSS modeling suite over an 8 km × 8 km domain with a 5 m resolution, divided into 25 communicating tiles to speed up a parallel computation which was performed on a the RECAS HPC Data Center. The abstract presents the modeling setup and preliminary results of the study.

EAC2025_PO2-48_816_Intini.pdf

PO2: 49

Preliminary Analysis of Aerosol Size Distribution at Col Margherita

Claudia Rossetti[1], Eleonora Favaro[2], Elena Barbaro[1], Matteo Feltracco[2], Andrea Gambaro[2], Lorenzo Giovannini[3], Giorgio Doglioni[3], Massimo Cassiani[3,4], Marco Di Paolantonio[5], Paolo Di Girolamo[6], Akanksha Rajput[3], Dino Zardi[3], Warren Lee Raymond Cairns[1]

[1]Institute for Polar Sciences, National Research Council (CNR-ISP), Venice, Italy; [2]Department of Environmental Sciences, Informatics and Statistics, Ca' Foscari University of Venice, Italy.; [3]Department of Civil Environmental and Mechanical Engineering (DICAM), University of Trento, Trento, Italy.; [4]Stiftelsen NILU, Kjeller, Norway; [5]Institute of Marine Sciences, National Research Council (CNR-ISMAR), Italy; [6]Department of Health Sciences (DISS), University of Basilicata, Potenza, Italy

This study presents a preliminary assessment of aerosol concentrations at the Col Margherita Observatory (2543 m a.s.l.). Data from June 12, 2023, to August 20, 2024, showed a seasonal pattern, with maximum concentrations in summer and late summer, and minimum values in winter. Diurnal trends were generally weak, but particles tended to peak at night and drop during the day, opposite to planetary boundary layer height. These findings suggest distinct sources and processes for different particle sizes and offer insight into aerosol transport in the Dolomites. Further analysis will include LIDAR data from Passo Valles.

EAC2025_PO2-49_1027_Rossetti.pdf

PO2: 50

Investigating drivers of recent reductions in PM2.5 concentrations across the UK

Daniel Bryant[1,2], Alastair Lewis[1,2], Sarah Moller[1,2]

[1]Wolfson Atmospheric Chemistry Laboratories, University of York, Heslington, York, UK; [2]National Centre for Atmospheric Science, University of York, Heslington, York, UK

Larger than expected decreases in $PM_{2.5}$ have been observed recently across the UK. This work utilises the AURN and complementary networks to investigate the potential drivers of these recent reductions. The largest reductions of aerosol components were ammonium and nitrate during spring, with larger decreases observed at more southerly sites. Overall, the European source of $PM_{2.5}$ appears to be weakening during spring, driving reductions in $PM_{2.5}$ concentrations in the UK. This analysis highlights a complex air quality policy issue. The UK can only control a certain fraction of the $PM_{2.5}$ concentrations, with the controllable fraction varying across the UK.

EAC2025_PO2-50_1207_Bryant.pdf

PO2: 51

Characterization of Secondary Organic Aerosols formed in Atmospheric Simulation Chambers and Flow Tube with Liquid Chromatography - High-Resolution Mass Spectrometry

Nicolas Houzel[1], Paul Genevray[1], Fatima Al Ali[1,2], Lingshuo Meng[1,2], Florence Jacob[2], Fabrice Cazier[1], Manolis Romanias[2], Alexandre Tomas[2], Cécile Coeur[1]

[1]Université du Littoral Côte d'Opale, France; [2]IMT Nord europe, Institut Mines-Télécom

Secondary Organic Aerosols (SOAs) are formed from the oxidation of **Volatile Organic Compounds** (VOCs). They present complex chemical compositions. To assess the **molecular characterization** of them, the Electrospray Ionization – Liquid Chromatography – Quadrupole Time of Flight – Tandem Mass Spectrometry was implemented with simulation chambers/flow tubes for different VOCs precursors emitted by various sources: **biomass combustion** (furans, methoxyphenols), **vegetation** (terpenes) and **transport** (aromatics). These studies demonstrate the usefulness and effectiveness of the technique to characterize oxidation products, oligomers, Highly Oxygenated Organic Molecules... This work is useful for SOA formation understanding, identification of markers to trace sources and toxicological studies.

EAC2025_PO2-51_315_Houzel.pdf

PO2: 52

Urban vs. Suburban PM10 Organic Aerosols fingerprints in an Eastern Mediterranean medium-sized coastal city

Evangelos Stergiou[1,2], Anastasia Chrysovalantou Chatziioannou[1], Spiros A. Pergantis[1], Maria Kanakidou[1,2,3]

[1]ECPL, Department of Chemistry, University of Crete; [2]CSTACC, ICE-HT, FORTH; [3]LAMOS, Institute of Environmental Physics, University of Bremen

This study investigates the PM10 (particulate matter of diameter smaller than 10 μm) organic aerosol fingerprints in an urban and a suburban site in Heraklion, Crete, during winter 2024. Liquid chromatography coupled with electrospray ionization Orbitrap mass spectrometry was used to analyze 48 PM10 aerosol filter samples in both positive and negative full MS modes. Principal component analysis revealed a clear separation between urban and suburban samples for positive ion mode features. The majority of significant urban features in positive mode correlated with black carbon and predominantly consisted of relatively high volatility molecules with low O:C ratios indicating fresh emissions.

EAC2025_PO2-52_1049_Stergiou.pdf

PO2: 53

Organic and emerging pollutants in indoor suspended particles hospitals before, during and after SARS-CoV2 pandemic.

Paola Romagnoli, Francesca Vichi, Catia Balducci, Angelo Cecinato

CNR, Italy

Four indoor chemical characterisation campaigns were conducted in five Italian hospitals. Measurements were performed before the peak of SARS-CoV2 (autumn 2019), during (spring 2021) and after the lifting of the pandemic restrictions (winter 2022 and 2023). Deposition dust (DD) and its comparison with atmospheric particulate matter (PM) were analysed. In this study, PM samples were collected using an air conditioning filter, which can represent indoor particulate matter. The air conditioning filter has a good effect on particle retention and is contaminated by ultrafine particles, which can be resuspended and follow the air conditioning back into the indoor air.

EAC2025_PO2-53_1108_Romagnoli.pdf

PO2: 54

Primary emissions and secondary organic aerosol production potential of a large automobile fleet focusing on cold starts at an underground parking facility

Christos Kaltsonoudis[2], Damianos Pavlidis[1,2], Angeliki Matrali[1,2], Christina N. Vasilakopoulou[2], Silas Androulakis[1,2], Christina Christopoulou[1,2], Georgia A. Argyropoulou[1,2], Katerina Seitanidi[2], Yanfang Chen[3], A. S. H. Prevot[3], Spyros N. Pandis[1,2]

[1]Department of Chemical Engineering, University of Patras, Patras, 26504, Greece; [2]Institute of Chemical Engineering Sciences (FORTH/ICE-HT), Patras, 26504, Greece; [3]Laboratory of Atmospheric Chemistry, Paul Scherrer Institute, Villigen, 5232, Switzerland

While vehicular emissions are highly regulated, significant uncertainty remains during cold starts as well as their potential to form secondary organic aerosol. To address this gap, a measurement campaign was conducted in an underground parking garage in Patras, Greece,

providing a controlled environment to study light-duty vehicular emissions. An oxidative flow reactor was placed in front of a PTR-CHARON-ToF-MS and an AMS to simulate aging of vehicular emissions over timescales ranging from hours to days, allowing characterization of both fresh and aged volatile organic compounds (VOCs) and the fresh and aged organic aerosol.

EAC2025_PO2-54_978_Kaltsonoudis.pdf

PO2: 55

Stability of clusters of highly oxygenated organic molecules from alpha-pinene ozonolysis and sulphuric acid oxidation.

Heikki Junninen[1], Paap Koemets[1,6], Eva Sommer[2], Ruth Konrat[3], Sander Mirme[1,6], Kalju Tamme[1], Paul Winkler[3], Manjula Canagaratna[4], Doug Worsnop[5]

[1]University of Tartu, Estonia; [2]CERN, European Organisation for Nuclear Research; [3]University of Vienna, Austria; [4]Aerodyne Research Inc; [5]University of Helsinki; [6]Airel OÜ

The chemical composition of first-step oxidation products is measured and identified by elemental composition, but molecular structures are only estimated by modeling. Here we add additional measured information about the atmospheric nucleating clusters by measuring the stability of clusters of highly oxygenated organic molecules from alpha-pinene ozonolysis and sulphuric acid oxidation. We use a differential mobility analyzer together with an electrospray and mass spectrometer to generate ions with known composition (ammoniumhalides), fragment them in mass spectrometer and apply the obtained fragmentation energy to unknown sample from CLOUD chamber.

EAC2025_PO2-55_1051_Junninen.pdf

PO2: 56

Chemical aerosol composition of biomass burning emissions exposed to daytime and nighttime oxidation conditions in the EUPHORE chambers

Mila Ródenas[1], Rubén Soler[1], Teresa Vera[1], Balint Alfoldy[2], Asta Gregorič[2,3], Martin Rigler[1], Esther Borrás[1], Eduardo Yubero[4], Javier Crespo[4], Tatiana Gómez[1], Maria L. Martinez[1], Amalia Muñoz[1]

[1]EUPHORE Laboratories, Fundación CEAM, Paterna, 46980, Spain; [2]Aerosol d.o.o., Ljubljana, SI-1000, Slovenia; [3]Center for Atmospheric Research, University of Nova Gorica, Ajdovščina, Slovenia; [4]AtmosphericPollution Laboratory (LCA-UMH), Miguel Hernández University, Elche, 03202, Spain

Biomass burning impacts climate, air quality, and health through aerosol emissions that undergo oxidation under day and night conditions. This study, based on experiments at the EUPHORE simulation chambers, explores daytime photooxidation of emissions, driven by OH radicals, and nighttime aging, dominated by nitrate radicals. Using advanced instrumentation (API-ToF-CIMS+FIGAERO), key compounds found in the particle phase as well as chemical families are identified for each oxidation condition tested. The findings highlight how oxidation processes influence aerosol composition and optical properties, emphasizing their role in climate and air quality.

EAC2025_PO2-56_1126_Ródenas.pdf

PO2: 57

Aerosol composition, sources, and their relation to meteorology on the highest mountain in southwest Germany

Harald Saathoff[1], Yanxia Li[1], Alexander Böhmländer[1], Milin Sebastian[1], Ottmar Möhler[1], Franziska Vogel[2], Hengheng Zhang[3], Thomas Leisner[1]

[1]Karlsruhe Institute of Technology, IMKAAF, Germany; [2]CNR-ISAC, Bologna, Italy; [3]Research Institute for Applied Mechanics, Kyushu University, Fukuoka, Japan

Aerosol particles influence cloud formation, precipitation, radiative transfer, and air quality, impacting meteorological predictions. From June 15 to July 26, 2023, aerosol measurements were conducted at Mt. Feldberg (1500 masl) in the Black Forest, Germany, using advanced sensors and mass spectrometers. Lidar scanning provided atmospheric structure insights. Data from the Swabian MOSES 2023 campaign showed aerosol variations linked to Saharan dust, Canadian wildfire plumes, and precipitation washout effects. High-resolution mass spectra will help identify aerosol sources for comparison with transport models. This study examines aerosol composition, sources, and their relation to meteorological conditions.

EAC2025_PO2-57_329_Saathoff.pdf

PO2: 58

ATMOMACCS: Predicting atmospheric compound properties.

Linus Emil Elias Lind[1], Hilda Sandström[1], Patrick Rinke[1,2,3]

[1]Department of Applied Physics, Aalto University, Espoo, 02150, Finland; [2]Physics department, School of Natural Sciences, Technical University of Munich, Garching, 85748, Germany; [3]Atomistic Modelling Center, Munich Data Science Institute, Technical University of Munich, Garching, 85748, Germany

In this contribution, we introduce a new interpretable molecular descriptor, ATMOMACCS, specifically tailored to atmospheric molecules. We demonstrate its competitive performance in predicting various thermodynamic properties, such as saturation vapor pressure, vaporization enthalpy, partition coefficients, and glass-transition temperature, equaling or surpassing published results for four distinct atmospheric molecular datasets. Our molecular descriptor addresses the need for customized and accurate modeling in data-driven atmospheric science. Additionally, the descriptor's inherent interpretability and strong performance in thermodynamic property prediction, using machine learning, show promise for further research in molecular-level atmospheric science.

EAC2025_PO2-58_579_Lind.pdf

PO2: 59

Cheating the path to new molecular tracers: gas-phase ammonia and organic aerosol-driven reactivity

Luca D'Angelo, Florian Ungeheuer, Jialiang Ma, Julia David, Alexander Lucas Vogel

Institute for Atmospheric and Environmental Sciences, Goethe University Frankfurt, Frankfurt am Main, Germany

In this work, we exposed ambient $PM_{2.5}$ samples to ammonia (NH_3) saturated air in order to identify compounds affected by atmospheric NH3 concentrations. We investigated the molecular composition of the samples after 72 hours of exposure to NH_3, water and synthetic air using HPLC-HRMS. The results show an increase in N-containing compounds and in light-absorbance.

EAC2025_PO2-59_394_DAngelo.pdf

PO2: 60

Comparative Analysis of Chemical Composition and Oxidative Potential of PM1.0 and PM2.5 in Seosan, Republic of Korea

Chaehyeong Park, Seoyeong Choe, Hajeong Jeon, Dong-Hoon Ko, Myoungki Song, Geun-Hye Yu, Min-Suk Bae
Mokpo National University, Korea, Republic of (South Korea)

Concentrations of carbonaceous components (OC and EC) and increased proportions of levoglucosan and terephthalic acid (TPA), particularly at night. These components are by-products of coal and waste combustion processes, indicating that ultrafine particles formed from combustion activities possess higher toxic chemical characteristics and exhibit prolonged atmospheric persistence. Additionally, the toxicity equivalency factor (TEF) evaluation of PAHs revealed that PM1.0 posed greater carcinogenic and mutagenic risks compared to PM2.5. DTT-OP analysis also indicated that PM1.0 exhibited higher oxidative potential per mass unit. These findings suggest that current policies regulating only ambient PM concentrations are insufficient and highlight the necessity for separat

EAC2025_PO2-60_576_Park.pdf

PO2: 61

Composition and sources of organic particles and vapours in an urban location during wintertime

Angeliki Matrali[1,2], Christos Kaltsonoudis[2], Maria Georgopoulou[1,2], Andreas Aktypis[2], Georgia Argyropoulou[1,2], Christina N. Vasilakopoulou[2], Katerina Seitanidi[2], Spyros N. Pandis[1,2]

[1]Department of Chemical Engineering, University of Patras, Patras, Greece; [2]Institute for Chemical Engineering Sciences, ICEHT/FORTH, Patras, Greece

Understanding the chemical composition of organic aerosol (OA) and its gaseous precursors is crucial for assessing secondary organic aerosol formation and potential health effects to exposed population. A study in an urban background site in Athens investigated the chemical composition of OA and organic gaseous species, with the use of a Proton Transfer Reaction Mass Spectrometer (PTR-TOF-MS), with simultaneous collection of sorbent tube samples analyzed through gas chromatography (GC-MS). Results were compared to corresponding measurements of the previous year at an urban location in Athens and different compounds were related to sources apportioned through positive matrix factorization (PMF).

EAC2025_PO2-61_653_Matrali.pdf

PO2: 62

Identification of fine particulate matter and Gaseous Pollution Sources Contributing to Oxidative Potential in a National Petrochemical Industrial Complex: Based on the source apportionment Model

Seoyeong Choe, Chaehyeong Park, Hajeong Jeon, Dong-Hoon Ko, Myoungki Song, Geun-Hye Yu, Min-Suk Bae
Mokpo National University, Korea, Republic of (South Korea)

The oxidative potential normalized to QDTT-OP for PM2.5 showed a significant correlation with key emission sources, particularly EC and Pb, likely due to incomplete combustion processes. Effectively managing these emissions is essential for mitigating health risks associated with air pollution. This study provides valuable insights for developing strategies to improve air quality and public health in areas surrounding industrial complexes.

EAC2025_PO2-62_573_Choe.pdf

PO2: 63

Impact of Agricultural Activities on PM2.5 Emissions and Oxidative Potential in Rural Areas of South Korea

Hajeong Jeon, Chaehyeong Park, Seoyeong Choe, Dong-Hoon Ko, Myoungki Song, Geun-Hye Yu, Min-Suk Bae
Mokpo National University, Korea, Republic of (South Korea)

The study concludes that the oxidative potential of PM2.5 originating from agricultural activities is elevated due to biomass burning, which could potentially increase human health risks. Moreover, the findings provide insight into the emission characteristics of air pollutants according to differences in agricultural practices between rice and dry field farming. By understanding the emission patterns based on the timing of agricultural activities and the characteristics of cultivated crops, this study offers valuable data for predicting emission quantities.

EAC2025_PO2-63_574_Jeon.pdf

PO2: 64

Long-Range Transport and Airborne Measurements of VOCs Using Proton-Transfer-Reaction Mass Spectrometry Validated Against GC-MS-Canister Data During the ASIA-AQ Campaign

Dong-Hoo Ko, Sea-Ho Oh, Chaehyeong Park, Seoyeong Choe, Hajeong Jeon, Myoungki Song, Geun-Hye Yu, Min-Suk Bae
Mokpo National University, Korea, Republic of (South Korea)

Chlorinated VOCs, such as 1,2-dichloroethane and 1,2,4-trichlorobenzene, display transport behaviors. Their relatively consistent concentrations during long-range transport emphasize the influence of industrial activities, including coal combustion and petrochemical processes, as major sources. The prevalence of chlorinated VOCs in the Chungnam industrial area and during transportation stages further highlights their strong link with industrial emissions rather than urban traffic sources. These observations necessitate the development of integrated air quality management strategies that accommodate both local and transboundary sources of VOCs.

EAC2025_PO2-64_575_Ko.pdf

PO2: 65

Monitoring of Nitrated Polycyclic Aromatic Hydrocarbons in the Czech Republic

Zdeňka Rohanová, Irina Nikolova, Jiří Kovářík
Czech Hydrometeorological Institute, Czech Republic

Nitrated polycyclic aromatic hydrocarbons (NPAH) are a group of highly toxic organic pollutants with significant carcinogenic potential. NPAH are persistent in the environment and contribute to mutagenic and genotoxic effects of pollution. This has a negative impact on human health and mortality worldwide. Their long-term continuous monitoring in the Czech Republic is practically non-existent which makes this research unique. This study maps concentration of NPAH in the air and evaluates their relation to concentration of PAH and nitrogen oxides (NOx). Year-round sampling was done in four cities. High-volume sampler equipped with PM10 sampling head inlet was used for collection.

EAC2025_PO2-65_1002_Rohanová.pdf

PO2: 66

Saccharides study in aerosol during wintertime over urban sites in Central Europe and Indo-Gangetic Plain

Pradhi Rajeev[1], Tarun Gupta[2], Leszek Marynowski[3]

[1]Indian Institute of Technology Patna, India; [2]Indian Institute of Technology Kanpur, India; [3]University of Silesia in Katowice

Saccharides are vital organic compounds in atmospheric chemistry, acting as tracers for aerosol sources like biomass burning and soil resuspension. This study analyzed saccharides in aerosols from highly polluted regions: Allahabad (India) and Sosnowiec (Poland). Seasonal variations were observed, with higher anhydrosaccharide concentrations in Allahabad due to hardwood and crop residue combustion, while Sosnowiec emissions mainly came from softwood burning. Correlations among saccharides indicated biomass combustion as a major source. Additionally, contributions from soil resuspension and fungal spores were noted. Overall, aerosol saccharide composition varied by location and source, impacting atmospheric processes.

EAC2025_PO2-66_1155_Rajeev.pdf

PO2: 67

The impact of open burning of rice straw on PM concentrations and tracer components in eastern Spain

Nuria Galindo

Miguel Hernández University of Elche, Spain

Two sampling campaigns were carried out in October 2023 and 2024 near the city of Valencia, coinciding with the period when rice straw burning is allowed. During the first campaign PM_{10} samples were collected, while during the second campaign the sampler was equipped with a $PM_{2.5}$ inlet. A comprehensive chemical characterisation, including the analysis of levoglucosan and its isomers, was performed. Marked increases in the concentrations of anhydrosugars and other components usually emitted from biomass combustion, such as WSOC and K^+, was observed on days impacted by biomass burning, along with increases in OC/EC, Levoglucosan/Mannosan and Levoglucosan/Galactosan ratios.

EAC2025_PO2-67_379_Galindo.pdf

PO2: 68

Long-term monitoring of carbonaceous aerosols in the UK: Insights form national air quality monitoring network

Gyanesh K Singh, Krzysztof Ciupek, David M Butterfield, Chris C Robins, Douglas Walker, Andrew S Brown

National Physical Laboratory, UK, United Kingdom

Carbonaceous aerosols (CA) present significant implications for air quality, climate as well as human health. Understanding long-term trends and variability of CA is of utmost importance for evaluating the effectiveness of air quality policies and assessing their environmental impacts. This work highlights the efforts of the National Physical laboratory (NPL), UK which manages the UK's Particle Concentrations and Numbers (PCN) and Black Carbon (BC) air quality Network. The results from this Network highlights the significance of sustained monitoring efforts in supporting evidence-based policy development and improving our understanding of aerosol dynamics in a changing environment.

EAC2025_PO2-68_594_Singh.pdf

PO2: 69

Nighttime vertical distribution of black and brown carbon from biomass combustion during traditional Burning of the Witches in Central Europe

Saliou Mbengue[1], Petr Vodička[2], Kateřina Komínková[1,3], Jaroslav Schwarz[2], Naděžda Zíková[2], Radek Lhotka[2], Lenka Suchánková[1,2,4], Laurence Windell[2,5], Vlastimil Hanuš[1], Gabriela Vítková[1], Roman Prokeš[1,4], Adéla Holubová Šmejkalová[6], Petra Pokorná[2], Jakub Ondráček[2], Vladimír Ždímal[2]

[1]Global Change Research Institute of the Czech Academy of Sciences, Brno, 60300, Czech Republic; [2]Institute of Chemical Process Fundamentals of the Czech Academy of Sciences, Prague, 16500, Czech Republic; [3]Department of Geography, Faculty of Sciences, Masaryk University, Brno, 60200, Czech Republic; [4]RECETOX, Faculty of Science, Masaryk University, Brno, 61137, Czech Republic; [5]Laboratory of Atmospheric Chemistry, Paul Scherrer Institute, Villigen, 5232, Switzerland; [6]Czech Hydrometeorological Institute, Košetice Observatory, Košetice, 39424, Czech Republic

In this study, a 250 m-tall tower was used to investigate the vertical distribution of black (BC) and brown (BrC) during the traditional Burning of the Witches (BoW), the largest open-air biomass burning (OBB) experiment in Central Europe. Carbonaceous aerosol concentrations were significantly higher during the BoW, and the vertical distribution was exacerbated by the low and stable atmospheric boundary layer during the night. The enrichment of the BB smoke in BrC led to a significantly enhanced absorption Ångström exponent, more pronounced at the near-surface level which was mostly influence by local OBB smoke plumes confined within the mixing layer.

EAC2025_PO2-69_185_Mbengue.pdf

PO2: 70

Cross molecular chemical characterization of primary and aged logwood stove emissions using online mass spectrometry

Yamina Allouche[1], Rachel Gemayel[1], Sergio Harb[1], Jérôme Beaumont[1], Serge Collet[1], Ali Hnaino[1], Nicolas Karoski[1], Vincent Fuvel[1], Jason Bardou[1], Adrien Dermigny[1], Laurent Meunier[1], Théo Claude[1], Robin Aujay-Plouzeau[1], Céline Ferret[1], Nathalie Bocquet[1], Andrea Baccarini[2], Nikunj Dudani[2], Pabrito Ray[2], Luka Drinovec[3,4], Grisa Mocnik[3,4], Brice Temime-Roussel[5], Barbara D'Anna[5], Alexandre Albinet[1]

[1]INERIS, Parc Technologique Alata, Verneuil en Halatte, 60550, France; [2]Aerospec, EPFL, Lausanne, 1015, Switzerland; [3]Haze Instruments, Ljubljana, Slovenia; [4]University of Nova Gorica, Nova Gorica, Slovenia; [5]Aix Marseille Univ., CNRS, LCE, Marseille, France

Residential wood combustion is a significant source of $PM_{2.5}$ in winter, emitting volatile and semi-volatile organic compounds that form secondary organic aerosols (SOA). Despite their environmental impact, the SOA formation mechanisms, particularly involving nitrate radicals at night, remain underexplored. This study investigates the chemical transformations of the emissions from a modern logwood stove using advanced online mass spectrometry techniques (CHARON-PTR-ToF-MS and EESI-ToF-MS). Experiments, simulating real-life heating conditions, focused on the day- (OH radicals) and nighttime (NO_3 radicals) aging of softwood and hardwood combustion. The study provides real-time molecular characterization of primary and aged emissions, offering insights into their chemical composition.

EAC2025_PO2-70_234_Allouche.pdf

PO2: 71

Source attribution of carbonaceous fraction of particulate matter in the urban atmosphere based on chemical composition

Katarzyna Styszko[1], Alicja Skiba[2], Anna Tobler[3], Roberto Casotto[4], Zbigniew Gorczyca[2], Lucyna Samek[2], Dariusz Widel[5], Mirosław Zimnoch[2], Anne Kasper-Giebl[6], Jay G. Slowik[3], Kaspar R. Daellenbach[3], Andre S. H. Prevot[3], Kazimierz Różański[2]

[1]AGH University of Krakow, Faculty of Energy and Fuels, Krakow, Poland.; [2]AGH University of Krakow, Faculty of Physics and Applied Computer Science, Krakow, Poland; [3]Laboratory of Atmospheric Chemistry, Paul Scherrer Institute, 5232 Villigen-PSI, Switzerland; [4]Datalystica Ltd, Park innovAARE, 5234 Villigen, Switzerland; [5]Jan Kochanowski University, Institute of Chemistry, Uniwersytecka 7 Street, 25-406 Kielce, Poland; [6]Institute for Chemical Technologies and Analytics, TU-Wien, 1060 Vienna, Austria

Air quality is of large concern in the city of Krakow. A comprehensive study was launched in which two PM fractions (PM1 and PM10) were sampled during 1-year campaign, lasting from April 21, 2018 to March 19, 2019. A suite of modern analytical methods was used to characterize the chemical composition of the collected samples. The carbon isotope composition in both analysed PM fractions, combined with an isotope-mass balance method, allowed to distinguish three main components of carbonaceous emissions in the city: (1) emissions related to combustion of hard coal, (2) emissions related to road transport, and (3) biogenic emissions.

EAC2025_PO2-71_775_Styszko.pdf

PO2: 72

Carbon content in PM10 and PM2.5 at a rural background monitoring site in the hinterland of Zadar, Croatia

Ranka Godec, Helena Prskalo, Suzana Sopčić, Ivan Bešlić, Gordana Pehnec
Institute for Medical Research and Occupational Health, Croatia

The rural-regional background monitoring station in Ravni Kotari, Croatia, continuously monitored PM10 and PM2.5 fractions throughout 2024. Elemental carbon (EC) and organic carbon (OC) were measured using the thermal-optical method, following the EUSAAR_2 protocol and EN 16909 standard. Results showed seasonal variations in carbon fractions, with no significant differences between weekdays and weekends, except for OC and total carbon (TC). While the proportion of secondary organic carbon (SOC) was consistent across PM fractions, primary organic carbon (POC) was 2.5 times higher in PM2.5. Water-soluble organic carbon (WSOC) had a higher contribution in PM10 than $PM_{2.5}$.

EAC2025_PO2-72_1154_Godec.pdf

PO2: 73

Carbonaceous Particles from Gasoline and Diesel Vehicles' Exhaust: Chemical and Isotopic Composition

Agne Masalaite[1], Rupert Holzinger[2], Inga Garbariene[1], Laurynas Bucinskas[1], Andrius Garbaras[1], Ulrike Dusek[3]
[1]State research institute Center for Physical Sciences and Technology, Vilnius, Lithuania; [2]Institute for Marine and Atmospheric research Utrecht (IMAU), Utrecht University, The Netherlands; [3]Centre for Isotope Research (CIO), University of Groningen, Groningen, The Netherlands

The chemical composition of exhaust particles from both gasoline and diesel vehicles is complex, comprising a mixture of organic compounds and elemental carbon. In current experimental setup, three different vehicles were used. The fractional contributions of aerosols released at different thermal decomposition temperatures for emissions from one diesel and two gasoline powered vehicles during different operating conditions revealed the differences that will be presented. The isotopic composition ($\delta^{13}C_{TC}$) revealed the difrences of diesel exhaust particles. Detailed chemical and isotopic analysis presented herein may contribute to the broader discourse on air quality management and the development of sustainable transportation solutions.

EAC2025_PO2-73_743_Masalaite.pdf

PO2: 74

Characterization of endocrine disruptors and other organic compounds in gas and particles from outdoor and indoor air in Northern France

Marc Fadel[1], Peggy Desmettres[2], Léa Habib[1], Jean-Pierre El Morr[1], Carine Bail[3], Yann Landkocz[1,3], Dominique Courcot[1], Frédéric Ledoux[1]
[1]Unité de Chimie Environnementale et Interactions sur le Vivant, University of Littoral Côte d'Opale, Dunkirk, France; [2]Atmo Hauts de France, Lille, France; [3]Observatoire local de santé, Dunkirk, France

The INTERFERENCE project investigates the concentration levels of endocrine-disrupting compounds (phthalates, alkylphenols, and musks), PAHs, and n-alkanes in indoor and outdoor air, considering both gaseous and particulate phases. Sampling was conducted across four sites in Dunkirk, covering industrial, urban, suburban, and rural environments. Seasonal campaigns collected indoor and outdoor air samples, analyzed for target compounds, alongside resident interviews. Results highlight significant differences between sites, influenced by environmental and residential factors. The next phase involves developing an action plan with residents, elected officials, and economic stakeholders through working groups to reduce exposure to endocrine disruptors.

EAC2025_PO2-74_994_Fadel.pdf

PO2: 75

Mass concentrations of carbonaceous species in PM2.5 between seasons at different monitoring sites

Helena Prskalo, Ranka Godec, Valentina Gluščić, Ivona Mikić, Ivan Bešlić
Institute for Medical Research and Occupational Health, Division of Environmental Hygiene, Croatia

This research examined seasonal variations in atmospheric particulate matter (PM), organic carbon (OC), and elemental carbon (EC) at two monitoring sites in Zagreb. Samples of PM2.5 were collected throughout 2024. The industrial site showed higher mass concentrations of PM2.5, OC, and EC compared to the urban background site. Seasonal variations were noted, with significant differences in EC and OC concentrations. The highest OC concentration was observed in winter at the industrial site (42.4 μg/m³). The OC/EC ratio indicated higher secondary organic carbon (SOC) in summer at both sites.

EAC2025_PO2-75_913_Prskalo.pdf

PO2: 76

Multi-Seasonal Chemical Characterization of Organic Aerosols at Gruvebadet Laboratory

Diego Fellin[1,2], Gregory Vandergrift[3], Swarup China[3], Zhenli Joy Lai[3], Nurun Nahar Lata[3], Zezhen Cheng[3], Claudio Mazzoleni[4], Naruki Hiranuma[5], Mauro Mazzola[2], Elena Barbaro[1,2], Andrea Gambaro[1], Stefania Gilardoni[2]
[1]Department of Environmental Sciences, Informatics and Statistics, Ca' Foscari University of Venice, Italy; [2]Institute of Polar Sciences, National Research Council, Italy; [3]Environmental Molecular Sciences Laboratory, Pacific Northwest National Laboratory, WA, USA; [4]Atmospheric Sciences Program, Michigan Technological University, MI, USA; [5]Department of Life, Earth, and Environmental Sciences, West Texas A&M University, TX, USA

The Arctic remains critically underrepresented in organic aerosol (OA) records, limiting our understanding of its impacts on the regional and global climate system.

This study provides a multi-seasonal characterization of OA samples collected at Gruvebadet (Ny-Ålesund, Svalbard) from 2021 to 2023. High-resolution mass spectrometry was performed on 29 offline aerosol filters, allowing us to derive key molecular parameters to assess their chemical composition and atmospheric processing. Results reveal strong seasonal variability, with oxidation patterns influenced by marine emissions, long-range transport, and Arctic Haze. These findings expand Arctic OA datasets, improving our understanding of aerosol sources and their representation in climate models.

EAC2025_PO2-76_963_Fellin.pdf

PO2: 77

Physicochemical characterization of soot emissions from combustion of jet fuel blended with pentanol

Constantinos Moularas[1], Una Trivanovic[2,3], Irini Tsiodra[4], Kalliopi Tavernaraki[4], Nikos Mihalopoulos[4,5], Georgios A. Kelesidis[1]

[1]Faculty of Aerospace Engineering, Delft University of Technology, Delft, 2629 HS, The Netherlands; [2]Institute of Energy & Process Engineering, Department of Mechanical and Process Engineering, ETH Zürich, Zurich, 8092, Switzerland; [3]Federal Institute of Metrology METAS, Bern-Wabern, 3003, Switzerland; [4]Institute for Environmental Research and Sustainable Development, National Observatory of Athens, Athens, 15236, Greece; [5]Department of Chemistry, University of Crete, Heraklion, 71003, Greece

Here, soot is produced by enclosed spray combustion of jet fuel blending with pentanol. The physicochemical characterization of the generated soot is obtained using real-time and time-integrated sampling instrumentation. Increasing the pentanol content decreases the mass concentration up to 70 %, as well as the soot graphitization. Most importantly, the concentration of carcinogenic high molar-weight polyaromatic hydrocarbons (PAHs) is reduced due to the pentanol presence in the jet fuel. Increasing pentanol reduces the genotoxic potential of soot considerably. Thus, optimization of the pentanol content in jet fuel could eliminate the genotoxicity of soot and bound PAHs from aircraft engines.

EAC2025_PO2-77_919_Moularas.pdf

PO2: 78

Rising Role of Secondary Organic Aerosol Amidst Emission Reductions in North China Plain

Chunshui Lin

Institute of Earth Environment, Chinese Academy of Sciences, China, People's Republic of

Since the implementation of the Clean Air Act in 2013, China's annual average of fine particulate matter ($PM_{2.5}$) has decreased by over 50%. However, haze episodes continue to affect the North China Plain (NCP) during winter. The formation of secondary organic aerosols (SOA) in light of these emission reductions remains poorly understood. In this study, we conducted a model-assisted analysis of field sampling data in Shijiazhuang, revealing that SOA has surpassed primary organic aerosol (POA) in prominence during the winter haze of 2024 compared to 2014.

EAC2025_PO2-78_421_Lin.pdf

PO2: 79

Evaluation of automated online-GC systems for time-resolved continuous measurements of ozone precursor VOCs in laboratory and field application

Max Hell[1], Dominik van Pinxteren[1], Hartmut Herrmann[1], Susanne Bastian[2]

[1]Leibniz Institute for Tropospheric Research, Germany; [2]Saxon State Office for the Environment, Agriculture and Geology (LfULG)

Due to low regulatory requirements, VOC monitoring is only sparsely done in german and EU air quality monitoring networks. A laboratory intercomparison under different sample air humidities of four commercially available online-GC for VOC monitoring was done. Additionally, three of them were tested in a two-month winter field campaign and two of the instruments were deployed for 1 1/2 years in a field test. Due to significant maintenance efforts, caused by a variety of hardware and software issues, only 73-76% of data availability were achieved. Most data quality issues arose from significant peak shifts and thus peak misclassifications.

EAC2025_PO2-79_367_Hell.pdf

PO2: 80

Automatic detection of allergenic pollen grains using the Swisens Poleno Jupiter in 2024–2025 (Poland, Wrocław)

Szymon Tomczyk[1], Małgorzata Werner[1], Małgorzata Malkiewicz[1], Karol Bubel[2]

[1]University of Wrocław, Faculty of Earth and Environmental Sciences, Wrocław, Poland; [2]Institute of Environmental Biology, Wrocław University of Environmental and Life Sciences

Many automatic monitors of airborne bioaerosols are based on machine learning algorithms for classification and allow real-time detection and quantification of allergenic pollen grains. These methods are still under rapid development and require regular evaluation. The objective of this study is to evaluate the performance of the SwisensPoleno Jupiter in Wrocław (Poland) for a two-year period. During this period, two classification models were used: one trained on Switzerland's pollen data and the other adapted to Polish data. Validation has been conducted using pollen concentration data obtained from manual measurements with a Hirst-type pollen trap.

EAC2025_PO2-80_390_Tomczyk.pdf

PO2: 81

Characterization of a novel, mid-cost device for ambient monitoring of ultrafine particles

Una Trivanovic[1], Osnan Maragoto Rodriguez[2], Kevin Auderset[1], Florian Hüwe[2], Konstantina Vasilatou[1]

[1]Laboratory Particles and Aerosols, Swiss Federal Institute of Metrology METAS, 3003 Bern, Switzerland; [2]nanoDUST GmbH, 63739 Aschaffenburg, Germany

Ambient monitoring of aerosols typically measures mass concentrations resulting in ultrafine particles (< 100 nm) being overlooked despite their potential for increased toxicity relative to larger particles. Here, we characterize a novel, mid-cost device for the ambient monitoring of ultrafine particle number concentration and mean diameter for both total and solid particle fractions. The device performed extremely well when tested with soot areosol with median diameters from 15 - 120 nm. At 200 nm and 10nm, particles were still measured reliably but with reduced counting efficiency. Good agreement was also seen for the particle size at all conditions tested.

EAC2025_PO2-81_732_Trivanovic.pdf

PO2: 82

Comparison of ultrafine particle penetration in inertial and diffusional aerosol spectrometers: Nanocol vs. SDI2001

Maida Domat[1], Olivier Masson[2], François Gensdarmes[2]

[1]University of Oviedo, Spain; [2]Autorité de Sûreté Nucléaire et de Radioprotection (ASNR)

The study compares the penetration efficiency of ultrafine particles in two aerosol spectrometers, Nanocol and SDI2001. Nanocol, designed for high flow rates, significantly outperforms SDI2001, achieving over 70% penetration efficiency for 5 nm particles compared to SDI2001's 10%. This improvement is attributed to Nanocol's refined inertial impaction stage, enhancing accuracy in ultrafine particle classification. The findings suggest the need to revise SDI2001 values for better ultrafine particle deposition assessments. Future work will focus on validating diffusion battery channels and refining theoretical models to improve characterization accuracy.

EAC2025_PO2-82_1122_Domat.pdf

PO2: 83

An Improved Method for Measuring Cyclone Efficiency

Abhigya Devkota, Kerry Chen, Jason Olfert
University of Alberta, Canada

Cyclone efficiency data has traditionally been measured using an aerodynamic particle sizer (APS) (Maynard and Kenny, 1995), where aerosol size distribution measurements are taken upstream and downstream of the cyclone. However, "phantom" particle counts in the APS can result in measurement errors. Here the use of an aerodynamic aerosol classifier (AAC) and condensation particle counter (CPC) is explored for this application. The AAC classifies particles by their aerodynamic diameter and has the potential to make cyclone efficiency measurements with a broader range of aerosol sources, without measurement artifacts.

EAC2025_PO2-83_195_Devkota.pdf

PO2: 84

Improving the accuracy of aerosol concentration measurements of an optical particle counter (UCASS) for balloon soundings

Sina Jost[1], Ralf Weigel[1], Konrad Kandler[2], Luis Valero[1,2], Jessica Girdwood[3,4], Chris Stopford[3], Warren Stanley[3], Luca Katharina Eichhorn[1], Christian von Glahn[1], Holger Tost[1]

[1]Institute for Physics of the Atmosphere, Johannes Gutenberg University, Mainz, Germany; [2]Institute for Applied Geosciences, Technical University Darmstadt, Germany; [3]Particle Instruments & Diagnostics Research Group, University of Hertfordshire, Hatfield, Hertfordshire, AL10 9AB, United Kingdom; [4]National Centre for Atmospheric Science, School of Earth, Atmospheric and Environmental Sciences, University of Manchester, Manchester, M13 9PL, United Kingdom

We study a passive-flow Universal Cloud and Aerosol Sounding System (UCASS) for measuring aerosol and droplet size distributions during balloon soundings. We introduce an improvement by implementing a thermal flow sensor (TFS) to continuously measure UCASS flow velocities. Our balloon sounding experiments show that significant non-zero angles of attack occur during ascent, emphasizing the need for independent measurements. In-flight comparisons reveal discrepancies between GPS/pressure-derived and TFS-based velocities, leading to potential misestimation of concentrations. We found that TFS velocities are reliable up to 7.5 km altitude in mid-latitude conditions, but may be biased at higher altitudes due to low air density.

EAC2025_PO2-84_308_Jost.pdf

PO2: 85

Systematic Investigation of CPC Counting Efficiency for Three Alternative Working Fluids and Five Particle Seed Materials Cut-Offs at 10 nm and 23 nm

Victoria Fruhmann, Martin Kupper, Helmut Krasa, Alexander Bergmann
Graz University of Technology, Austria

The counting efficiency (CE) of condensation particle counters (CPCs) depends on factors such as working fluid (WF) properties and particle composition. This study evaluates alternative WFs to minimize material dependence while ensuring safety. Using simulations, experiments, and safety assessments, three WFs - n-decane, propylene-glycol, and HFE-7500 - were compared to n-butanol. Results indicate that n-decane exhibits the lowest material dependency, while propylene-glycol and HFE-7500 show varying influences. Findings suggest n-decane as a promising alternative. These insights contribute to optimizing CPC performance with reduced material influence, particularly at 10 nm and 23 nm cut points.

EAC2025_PO2-85_1044_Fruhmann.pdf

PO2: 86

Atomically precise determination of cluster structures

Yaochen Han, Shirong Liu, Jicheng Feng
School of Physical Science and Technology, ShanghaiTech University, Shanghai, 201210, China

In this study, we present an online methodology to determine cluster structures in their native states. The collisional cross-sectional area, which is highly correlated with cluster structure, can be easily obtained via DMA-MS system and theoretical approach, both of which exhibit considerable consistency. The developed tool for deriving cluster structures is highly precise and sensitive to a single atom. The results demonstrate the ability of the plasma method to create alloy clusters of arbitrary atom combinations and the versatility of the developed tool to directly obtain cluster structures with single-atom precision.

EAC2025_PO2-86_1180_Han.pdf

PO2: 87

Improving the time resolution of a size scanning Particle Size Magnifier

Joonas Vanhanen[1], Joonas Purén[1], Herbert Hartl[2], Aki Pajunoja[1]

[1]Airmodus Ltd., Helsinki, 00560, Finland; [2]Institute for Atmospheric and Earth System Research, Faculty of Science University of Helsinki, Helsinki, Finland

The Airmodus PSM2.0 is an advanced Particle Size Magnifier designed to measure aerosols in the 1–12 nm range. This study enhances its time resolution, reducing scanning time from 2 minutes to 30 seconds to improve measurements in dynamic environments. By optimizing flow geometry and increasing data logging frequency, scanning limits and calibration needs were assessed. Findings enable faster, more accurate size distribution measurements, particularly in nucleation studies and engine exhaust analysis. The results refine ultrafine particle detection methods, supporting atmospheric research and air quality monitoring in real-world applications.

EAC2025_PO2-87_835_Vanhanen.pdf

PO2: 88

Measurement of number concentration of nanoparticles in suspension using ES-DMA technique

Jaeseok Kim
Korea Research Institute of Standards and Science, Korea, Republic of (South Korea)

Among various techniques for measuring size and size distribution of nanoparticles, in the study, electrospray scanning mobility particle sizer (ES-SMPS) technique was used. I have focus on sample preparation to determine size and number concentration of nanoparticles.

EAC2025_PO2-88_422_Kim.pdf

PO2: 89

Glassy nano-aerosol phase state and viscosity analysis using improved dual tandem differential mobility analyzer technique

Harsh Raj Mishra, Robert Groth, Branka Miljevic, Zoran Ristovski
School of Earth and Atmospheric Sciences, Queensland University of Technology, Brisbane, Australia

This research enhances the Dimer Coagulation, Isolation, and Coalescence (DCIC) technique for measuring aerosol particle viscosity, a critical factor influencing climate, atmospheric composition, and human health. Due to the bipolar charging efficiency of particles dropping dramatically with size, having a high PNC at smaller sizes is very challenging. The enhanced technique achieves a higher number concentration of smaller particles, by charging large particles and then evaporating them to smaller sizes. Under heating conditions, a significant shift in particle size distribution was observed. This method enables precise DCIC merge mode measurement down to 30 nm using sucrose as a test case.

EAC2025_PO2-89_688_Mishra.pdf

PO2: 90

How to quantify the uncertainty of the dilution factor of diluters with internal mixing gas preparation?

Lars Hillemann, Annett Mütze, Daniel Göhler, Stephan Gabsch, Stephan Große
Topas GmbH, Germany

If a dilution system is installed upstream a particle counter or aerosol spectrometer, the dilution ratio contributes linearly to the measured number concentration. Therefore, the uncertainty of the dilution rate is required to quantify the measurement uncertainty of the aerosol concentration for example when measuring the penetration of filters.

The contribution discusses the applied method to quantify the uncertainty of the dilution rate and aims on developing a common method to evaluate the uncertainty of dilution systems to enable the comparison of results.

EAC2025_PO2-90_949_Hillemann.pdf

PO2: 91

Emission of airborne particles from 3D printing

Luigi Fappiano[1], Elisa Caracci[1], Andrea Ceccacci[1], Gianluca Iannitti[1], Luca Stabile[1], Giorgio Buonanno[1,2]
[1]Department of Civil and Mechanical Engineering, University of Cassino and Southern Lazio, Cassino, FR, Italy; [2]International Laboratory for Air Quality and Health, Queensland University of Technology, Brisbane, Qld, Australia

Exposure to airborne particles in indoor environments is a significant concern for human health, as the presence of indoor particle sources leads to considerably higher concentrations of particles. In recent years, interest in 3D printers has grown exponentially, especially with their increasing use in homes, rising concern among users regarding emissions from these devices.

In this work an experimental campaign was carried out to measure particle number concentrations and size distributions while the 3D printer was in operation using TPE and TPU filaments.

All the tests performed showed that printing TPE and TPU filaments emit sub-micron particles.

EAC2025_PO2-91_108_Fappiano.pdf

PO2: 92

The Fluidizer - a newly standardized method for dustiness determination

Carla Ribalta[1], Anna Pohl[1], Spyros Bezantakos[2], Daniela Wenzlaff[1], Kathleen De Maeyer[3], Bart De Vos[3], Kai-Helge Schäfer[4], Dirk Broßell[1], Elisabeth Heunisch[1], Thomas A.J. Kuhlbusch[1]
[1]Federal Institute for Occupational Safety and Health (BAuA), Germany; [2]The Cyprus Institute, Cyprus; [3]Groep IDEWE, Belgium; [4]TÜV Nord, Germany

In this work, we present the Fluidizer as a dustiness method currently undergoing standardization at OECD, and its performance in testing several nanomaterials including different fibrous nanomaterials.

Dustiness of eleven nanomaterials, from which 5 were fibrous nanomaterials, were assessed in two laboratories.

The coefficient of variation per laboratory was generally <35%. CPC and electron microscopy analysis for fibrous materials were in agreement. These results show the robustness of the Fluidizer method and applicability for dustiness determination of nanomaterials with different morphologies.

EAC2025_PO2-92_904_Ribalta.pdf

PO2: 93

Use of a Particle-on-Slide Model for the Collection of Scattered Light, and Application to Multiphase Aerosols in Time-Dependent Systems

Thomas Dight, Chris Stopford, Richard S Greenway, Robert Lewis, Ricky Linforth
Particle Instrumentation and Diagnostics, School of Physics, Engineering and Computer Science, University of Hertfordshire, United Kingdom

We present the development and use of a particle-on-slide methodology for the generation of light-scattering data on aerosols. This method is validated using simple, well understood model aerosols, however its chief interest is in the study of dynamic systems where it is desirable to gather data on the same particle over a period of time. Where this model is appropriate, it is simpler and more accessible than existing particle levitation methods, and allows for light scattering and microscopy data to be gathered in tandem.

EAC2025_PO2-93_1124_Dight.pdf

PO2: 94

Expanded Polytetrafluoroethylene Membrane-Based Humidification System for Aerosol Light Scattering Measurements

Cade Tischer, Jonathan Linderich, James Sherman, Patrick Richardson
Appalachian State University, United States of America

The study at AppalAIR focuses on a new ePTFE tube humidifier designed to improve aerosol humidification. This system addresses challenges from previous designs, like water droplet formation, by using a highly porous membrane to transfer water vapor into a dry sample stream. The humidifier features a water jacket, stainless steel connectors, and a solenoid pump for slow, continuous water transfer. A controlled external heater adjusts the water temperature to regulate relative humidity. Extensive testing showed successful humidification, with the system operating for over two months in the field, demonstrating the design's effectiveness for aerosol sample humidification.

EAC2025_PO2-94_903_Tischer.pdf

PO2: 95

The VERT GPF-Retrofit Program for Cleaner Urban Mobility within the HORIZON Europe AeroSolfd Project

Lauretta Rubino, Andreas Mayer, Thomas Lutz, Jan Czerwinski, Lars Larsen
VERT Association, Switzerland

AeroSolfd, a HORIZON Europe project launched in 2022, aims to advance clean urban mobility by developing affordable and sustainable retrofit solutions. This three-year initiative addresses not only tailpipe emissions, but also brake and pollution in semi-closed environments.

VERT has developed and tested a TRL 8 GPF-retrofit system. Results demonstrate >99% filtration efficiency on standard and real-world driving cycles. Fifty gasoline vehicles (GDI and PFI) were retrofitted across Europe exhibiting no issues with filter regeneration, increased fuel consumption, or secondary emissions during 6-8 months of operation. Furthermore, a PN-PTI testing campaign of 1000 gasoline vehicle was conducted. Final results are presented.

EAC2025_PO2-95_1170_Rubino.pdf

PO2: 96

Measuring NaCl with the CV-ToF-ACSM

Marije van den Born, Jan Mulder, Ulrike Dusek
Centre for Isotope Research (CIO), Energy and Sustainability Research Institute Groningen (ESRIG), University of Groningen, Groningen, the Netherlands

To date, there are few online measurement methods to quantify sub-micron sea spray concentrations. Aerosol chemical speciation monitors (ACSM) are not ideal for sea salt aerosol measurements because the refractory NaCl cannot be fully evaporated. In this study, we show the potential for the ToF-ACSM equipped with a capture vaporizer for detecting and quantifying NaCl aerosol for the first time. Laboratory experiments and controlled chamber experiments showed the potential of the CV-ToF-ACSM to quantitavely measure NaCl. Application of the method to measurements at a coastal site highlighted the ptential of the CV-ToF-ACSM for real-time sea salt aerosol measurements.

EAC2025_PO2-96_493_van den Born.pdf

PO2: 97

Application of ToF-ACSM for Characterizing NR-PM1 chemical Composition at CIAO observatory in Southern Italy

Francesco Cardellicchio[1], Emilio Lapenna[1], Teresa Laurita[1], Davide Amodio[1], Antonella Buono[1], Isabella Zaccardo[1,2], Canio Colangelo[1], Gianluca Di Fiore[1], Serena Trippetta[1], Lucia Mona[1]
[1]National Research Council – Institute of Methodologies for Environmental Analysis (CNR-IMAA), Italy; [2]Università degli Studi della Basilicata, Italy

Within the European Aerosol, Clouds and Trace Gases Research Infrastructure (ACTRIS), measurements of chemical composition and concentration levels of non-refractory submicron particulate matter (NR-PM_1) were performed for the first time at the CNR-IMAA Atmospheric Observatory (CIAO, Tito Scalo – Italy, Laurita et al., 2025) from May to October 2024 using a Time-of-Flight Aerosol Chemical Speciation Monitor (ToF-ACSM). This instrument uses time-of-flight mass spectrometry to continuously analyze air samples, even over extended periods, enabling precise measurements of chemical compositions of NR-PM_1, including ammonium (NH_4^+), nitrate (NO_3^-), sulfate (SO_4^{2-}), chloride (Cl^-), and organics aerosol (OA).

EAC2025_PO2-97_1104_Cardellicchio.pdf

PO2: 99

Maximizing the output from filter sample analysis: Evolved gas analysis from thermal-optical carbon analysis (TOCA) using photoionization mass spectrometry (PIMS)

Sven Ehlert[1], Hendryk Czech[2,3], Marco Schmidt[2], Patrick Martens[4], Martin Rigler[5], Andreas Walte[1], Ralf Zimermann[2,3]
[1]Photonion GmbH; [2]University of Rostock, Germany; [3]Helmholtz Centre Munich; [4]Desert Research Institute, Reno; [5]Aerosol d.o.o.

Carbonaceous aerosols impact climate and health, comprising 20–50% of PM2.5 mass. Thermal-optical carbon analysis (TOCA) is an established technique for organic and elemental carbon analysis, but enables molecular analysis when coupled with photoionization mass spectrometry (PIMS). We demonstrate TOCA-PIMS for wood type identification in stove emissions, distinguishing birch, spruce, and beech via unique thermal decomposition markers, as well as rapid PAH proxy- analysis from the same filter sample analysis. Moreover, hyper-fast gas chromatography as add-on may resolves isomers. This method expands chemical analysis capabilities, aiding atmospheric chemistry research and integration into routine air quality monitoring.

EAC2025_PO2-99_826_Ehlert.pdf

PO2: 100

A new experimental Bench for Respiratory Droplet Analysis Under Varying Hygrothermal Conditions: Design and Characterization

Lyes Ait Ali Yahia, Evelyne Géhin, Thibault Perin, Cheikhouna Fall, Bilel Rahmouni
Univ Paris-Est Creteil, France

The subject of collecting and analyzing (physically and biologically) respiratory droplets became important since the last COVID-19 outbreak. Indeed, being able to physically characterize droplets (size distribution, emission rates and state) emitted by living beings will help advance our understanding of the transmission of airborne diseases in indoor environments. The main objective of this work is to propose a new experimental bench that allows to isolate and collect respiratory droplets in a controlled hygrothermal environment.

EAC2025_PO2-100_438_Ait Ali Yahia.pdf

PO2: 101

Generation of aged bioaerosols in the laboratory for training machine-learning algorithms of automatic bioaerosol monitors

Tianyu Cen[1], Stefan Horrender[1], Nicolas Bruffaerts[2], Elizabet D'hooge[2], Astha Tiwari[2], Christina Giannakoudaki[1], Benoit Crouzy[3], Elias Graf[4], Konstantina Vasilatou[1]

[1]Particles and Aerosols Laboratory, Federal Institute of Metrology METAS, Bern, Switzerland; [2]Mycology and Aerobiology, Sciensano, Rue J. Wytsmanstraat 14, 1050 Brussels, Belgium; [3]Federal Office of Meteorology and Climatology MeteoSwiss,Chemin de l'Aérologie 1, 1530 Payerne, Switzerland; [4]Swisens AG, Emmen, Switzerland

Bioaerosols such as pollen and fungal spores are ubiquitous in the atmosphere. Recent advancements in monitoring airborne biological particles using automatic bioaerosol monitors are based on image analysis, fluorescence, and machine learning. These systems provide real-time information on particle number concentration and classification at the taxonomic or species level. However, most studies have only focused on fresh bioaerosols for setting up datasets for machine learning. In ambient air, bioaerosols may change shape and property during aging and transportation, representing a key research gap. For this, we developed a new coupled experimental setup for the continuous generation of aged bioaerosols.

EAC2025_PO2-101_735_Cen.pdf

PO2: 102

Quantifying the Impact of Environmental Conditions and Biological Data Variability on the Robustness of Deep Learning-Based Pollen Classification Models

Christina Giannakoudaki[1,5], Stefan Horender[1], Elias Graf[3], Benoît Crouzy[2], Sophie Erb[2,4], Julia Schmale[4], Konstantina Vasilatou[1]

[1]Federal Institute of Metrology (METAS), Lindenweg 50, Bern-Wabern 3003, Switzerland; [2]Federal Office of Meteorology and Climatology MeteoSwiss, 1530 Payerne, Switzerland; [3]Swisens AG, 6032 Emmen, Switzerland; [4]Environmental Remote Sensing Laboratory, École Polytechnique Fédérale de Lausanne, 1015 Lausanne, Switzerland; [5]Extreme Environments Research Laboratory, École Polytechnique Fédérale de Lausanne, Sion, Switzerland

The SwisensPoleno Jupiter bioaerosol monitor automates pollen monitoring in Switzerland using holographic images and UV laser-induced fluorescence (UV-LIF) spectra, fed to a deep learning classification neural network. This study tested the robustness of the retrained model from Sauvageat *et al.* (2020) by sampling various pollen taxa and eliminating data leakages, which occur when training and testing datasets per taxon come from the same experiment. The model performed well for Pinus sylvestris (93% accuracy) but poorly for Betula pendula and Betula utilis (3% to 6%). Ongoing tests and conditioning of pollen grains aim to investigate parameters affecting the model's classification accuracy.

EAC2025_PO2-102_767_Giannakoudaki.pdf

PO2: 103

Bioaerosol and ChAMBRe: methodologies to study the bacterial viability in different atmospheric conditions

Virginia Vernocchi[1], Marco Brunoldi[1,2], Elena Gatta[2], Tommaso Isolabella[1,2], Dario Massabò[1,2], Federico Mazzei[1,2], Franco Parodi[1], Paolo Prati[1,2]

[1]INFN - GENOVA, Italy; [2]University of Genoa, Department of Physics, Italy

Bioaerosols are airborne particles with biological origin. At the ASC-ChAMBRe, bioaerosol research focuses on the interaction between bacteria and air pollutants. We used different methods for ASC experiments, including monitoring bacteria total concentration with WIBS-NEO and investigating culturable/viable bacteria concentration through different approaches. These include a multi-step protocol using an Andersen impactor, an automatic custom-made tray for collecting bacteria by gravitation on petri dishes and a liquid impinger for bacterial collection on various media depending on the analytical methodology chosen for the subsequent characterization. Here we'll present the experimental protocols, their characterization and further results.

EAC2025_PO2-103_332_Vernocchi.pdf

PO2: 104

Effects on viability, culturability and cell fragmentation of two bioaerosol generators during E. coli bacteria aerosolization

Federico Mazzei[1,2], Marco Brunoldi[1], Elena Gatta[1], Muhammad Irfan[1], Tommaso Isolabella[1,2], Dario Massabò[1,2], Franco Parodi[2], Virginia Vernocchi[2], Paolo Prati[1,2]

[1]Department of Physics, University of Genoa, Italy; [2]INFN, Division of Genoa, Italy

This study compares the performance of two bioaerosol generators: the Sparging Liquid Aerosol Generator (SLAG) by CH Technologies (SLAG CH Tech.) and the 1520 Flow Focusing Monodisperse Aerosol Generator (FMAG) by TSI (1520 FMAG TSI) , focusing on the viability, culturability, and cells fragmentation of *E. coli.*

EAC2025_PO2-104_327_Mazzei.pdf

PO2: 105

In situ characterization of adsorbates on aerosol nano-aggregates

Alfred Weber, Vinzent Olszok, Philipp Rembe, Annett Wollmann

Clausthal University of Technology, Germany

This paper presents a new surface-sensitive measurement method for the characterization of aerosol aggregates based on the combination of aerosol photoemission and aerosol UV-vis-extinction. The adsorption of water vapor on TiO2 nanoparticles is considered as a test case.

EAC2025_PO2-105_399_Weber.pdf

PO2: 106

Selective detection of aerosolised respiratory droplets in ambient air

Matjaž Malok[1], Darko Kavšek[1], Anja Pogačnik Krajnc[1], Maja Remškar[1,2]

[1]Jozef Stefan Institute; [2]Nanotul Ltd, Slovenia

The first method for selective detection of respiratory droplets is based on measurement of time-dependent capacitance . When droplets enter the electric field of the sensor, the capacitance is changed due to replacement of air as a part of dielectric field with water. This change is then converted into an electrical signal. The selectivity is explained by much higher dielectric constant of water compared to air, which is not the case for carbon-based particles. The device can detect individual respiratory droplets larger than 100 nm. Measurement of respiratory droplets in lecture hall and in kindergarten will be presented.

EAC2025_PO2-106_812_Malok.pdf

PO2: 107

Development of an online instrument for measuring the oxidative potential of atmospheric particulate matter with two complementary assays.

Albane Barbero[1], Guilhem Freche[1], Luc Piard[1], Lucile Richard[1], Takoua Mhadhbi[1], Anouk Marsal[1], Julie Camman[1,2], Mathilde Brezins[1,2], Benjamin Golly[3], Jean-Luc Jaffrezo[1], Gaëlle Uzu[1]

[1]Univ. Grenoble Alpes, CNRS, INRAE, IRD, Grenoble INP*, IGE, 38000 Grenoble, France*Institute of Engineering and Management Univ. Grenoble Alpes; [2]Aix Marseille Univ., CNRS, LCE, UMR 7376, 13331 Marseille, France; [3]Univ. Savoie Mont Blanc, CNRS, LOCIE (UMR 5271), 73376, Le Bourget-du-Lac,

The ROS-Online device, developed at the IGE laboratory in Grenoble, enables real-time, continuous measurement of the oxidative potential (OP) of atmospheric particulate matter (PM). It uses two complementary assays, OP Ascorbic Acid (OPAA) and OP Dithiothreitol (OPDTT), to assess PM's ability to induce oxidative stress in the lung environment, a key factor in cardiovascular and pulmonary diseases. The device offers higher sensitivity and particle collection efficiency than offline methods, providing reliable data across varying pollution levels. ROS-Online's performance correlates well with traditional offline methods, demonstrating its potential as an effective tool for air quality monitoring and research.

EAC2025_PO2-107_188_Barbero.pdf

PO2: 108

Developing an RH-based correction for a PM2.5 low-cost sensor network

Savinda Heshani Arambawatta Lekamge, Henry Paul Oswin

Queensland University of Technology, Australia

The present study aimed at developing an RH-based correction for a $PM_{2.5}$ low-cost sensor network by using a novel method called "the dual-sensor approach". Two identical sensor boxes with the Plantower PMS7003 were placed before and after the heated inlet. The setup was collocated with the regulatory-grade instrument for one week. The $PM_{2.5}$ concentration obtained by the sensor with the heater reduced the overestimation of the $PM_{2.5}$ concentration from 63% to 15%. However, the correction factor varied throughout measurement, meaning that the composition of the $PM_{2.5}$ changes depending on the wind direction, varying the hygroscopicity of the particles.

EAC2025_PO2-108_671_Arambawatta Lekamge.pdf

PO2: 109

From the EU metrology projects AEROMET I & II to the HE project MI-TRAP – Reliable chemical aerosol analysis by X-ray spectrometry without calibration samples

Burkhard Beckhoff[1], Yves Kayser[2], Andre Waehlisch[1]

[1]PTB, Germany; [2]MPI CEC, Germany

PTB uses calibrated instrumentation for aerosol elemental analysis and contributed to many aerosol metrology projects: EMPIR AEROMET initiated multiple measurement campaigns and developed reference methods and calibration procedures, the follow-up project AEROMET II focused on traceable measurements and characterisation of aerosols by means of portable instruments, and the current MI-TRAP project aims to establish a network of monitoring stations addressing discrepancies between transport emission standards and ambient air quality limit values. Examples of PM characterization using reference-free quantification of the mass of the deposited material will be given, summarizing methodological findings paving the way to round robin and related activities.

EAC2025_PO2-109_1015_Beckhoff.pdf

PO2: 110

WALL-E: A New Wall-Free Particle Evaporator for Real-Time Online Particle Composition Measurements

Imad Zgheib[1,2], Linyu Gao[2], Cecilie Carstens[2], Frederic Bourgain[2], Michel Dupanloup[2], Felipe Lopez-Hilfiker[1], Sebastien Perrier[2], Matthieu Riva[1,2]

[1]Tofwerk AG, 3645, Thun, Switzerland; [2]Univ Lyon, Université Claude Bernard Lyon 1, CNRS, IRCELYON, F-69626, Villeurbanne, France

WALL-E is a newly designed Wall-Free Particle Evaporator enabling real-time aerosol analysis with minimal wall interactions and fragmentation. Integrating a thermal desorber, cooling unit, and CIMS, it optimizes fluid dynamics to reduce thermal decomposition, improving quantification of semi-volatile and low-volatility species. Controlled experiments with authentic standards and oxidized VOCs demonstrate its performance. WALL-E provides high-resolution molecular insights into aerosol composition and volatility, making it a valuable tool for studying atmospheric processes, emissions, and environmental health impacts in both laboratory and ambient environments.

EAC2025_PO2-110_811_Zgheib.pdf

PO2: 111

A New Ground-Based Spectrometer for Improved Microphysical Characterization of Aerosols and Clouds

Lea Haberstock[1,2], Almuth Neuberger[1,2], Darrel Baumgardner[3], Dagen Hughes[3], Ilona Riipinen[1,2], Paul Zieger[1,2]

[1]Department of Environmental Science, Stockholm University, Stockholm, 11418, Sweden; [2]Bolin Centre for Climate Research, Stockholm, 11418, Sweden; [3]Droplet Measurement Technologies, Longmont, CO, USA, 80503

Accurately measuring the microphysical properties of clouds and aerosols remains a major challenge due to their complexity and variability. The newly developed Ground-Based Fog and Aerosol Spectrometer (GFAS) advances these measurements by combining forward and backscattered polarized light detection. In addition to measuring particle size (0.4–40 µm EOD), the GFAS provides information on backscattering intensity and polarization changes, helping to distinguish liquid droplets from solid particles such as ice crystals and dust while reducing sizing biases. Its automated wind-alignment minimizes sampling losses. We present first results from laboratory experiments and field deployments, demonstrating the instrument's capabilities.

EAC2025_PO2-111_820_Haberstock.pdf

PO2: 112

Fine Particulate Matter (PM) Atmospheric Pollution : Monitoring Air Quality Using Plane Tree Barks as Bio-Monitors

Nour Daaboul[1,2,3], Christine Franke[1], Laurent Alleman[2], Valerie Forest[3]

[1]Center of Geosciences and Geoengeneering, Mines Paris - PSL, Fontainebleau, 77300, France; [2]Centre de recherche Énergie Environnement, IMT Nord Europe, Institut Mines-Télécom, Université de Lille, 59000, Lille, France; [3]Mines Saint-Etienne, Univ Jean Monnet, INSERM, U 1059 Sainbiose, Centre CIS, F-42023 Saint-Etienne, France

This study explores the use of *Platanus* × *acerifolia* (plane trees) as passive biomonitors for urban air pollution in Paris. Tree bark samples, collected since 2016 through the Ecorc'Air project, provide insights into fine particulate matter (PM) accumulation. Magnetic susceptibility measurements quantify iron-rich particles, while SEM imaging confirms PM trapping. Statistical analysis identifies key urban pollution hotspots. XRF and ICP-MS determine metal compositions linked to vehicular emissions. Ongoing research evaluates potential health risks using oxidative potential and cytotoxicity assays. Funded by CARINGS, the project involves Mines Paris-PSL, IMT Nord Europe, and Mines Saint-Étienne.

EAC2025_PO2-112_178_Daaboul.pdf

PO2: 113

High temporal frequency and online aerosol characterization for source apportionment evaluations. An application to a mixed urban and industrial hotspot.

Eleonora Marchetti[1,2], Marco Vecchiocattivi[2], Elisa Spano[3], David Cappelletti[1]

[1]Università di Perugia, Dipartimento di Chimica, Biologia e Biotecnologie, Perugia, 06123, Italy; [2]Arpa Umbria, Servizio Rete Aria, Perugia, 06121, Italy; [3]Orion srl, Veggiano, 35030, Italy

Air quality is a major health concern in Europe, with particulate matter (PM) being one of the main pollutants. The recent EU Directive 2881/2024 imposes stricter limits on PM10 and PM2.5 and highlights the need for supersites to enhance monitoring.
In response, the Le Grazie supersite in Terni, one of central Italy's most polluted cities, was established to characterize PM chemistry using instrumentation for online measurements. The high temporal resolution data provided by this instrumentation enables source apportionment analysis. The presentation will outline the instrumentation, its strengths and weaknesses, and initial findings on pollution sources.

EAC2025_PO2-113_1030_Marchetti.pdf

PO2: 114

Investigation of DMSO-H2O mixture as working fluid for Condensation Particle Counters

Sarah Kirchhoff[1,2], Patrick Weber[1], Gerhard Steiner[3], Christian Kunath[3], Andreas Petzold[1,2], Ulrich Bundke[1]

[1]Forschungszentrum Jülich GmbH, Institute of Energy and Climate Research – Troposphere (ICE-3), Jülich, Germany; [2]Institute of Atmosphere and Environmental Research Wuppertal, Germany; [3]GRIMM Aerosol Technik GmbH

This study investigates the use of a Dimethyl Sulfoxide (DMSO)-water mixtures as a working fluid in Condensation Particle Counters (CPC), as it offers several advantages for CPCs operated in sensitive working environments. It has been shown that the D50-cutoff diameter is dependent on the temperature difference within the CPC operated with pure DMSO, where greater temperature differences result in smaller cutoff-diameters.

We will present the behaviour of a CPC operated with mixtures of DMSO and water including a detailed report on the counting efficiency, during various measuring conditions, focusing on the temperature difference between the condenser and the saturator.

EAC2025_PO2-114_392_Kirchhoff.pdf

PO2: 115

Optimizing UAV methodology with a low-cost sensing system for air quality monitoring in diverse environmental settings

Joana Lage[1,2], Carolina Correia[1], Susan Marta Almeida[1], Diogo Henriques[3], Jens Voigtländer[4], Sebastian Düsing[4], Birgit Wehner[4], Ajit Ahlawat[4,5]

[1]Centro de Ciências e Tecnologias Nucleares (C2TN), Instituto Superior Técnico, Universidade de Lisboa, Loures, 2695-066, Portugal; [2]Faculdade de Engenharia, Universidade Lusófona de Humanidades e Tecnologias de Lisboa, Lisbon, 1749-024, Portugal; [3]IN+, Center for Innovation, Technology and Policy Research, Instituto Superior Técnico, Universidade de Lisboa, Av. Rovisco Pais, Portugal; [4]Atmospheric Microphysics Department, Leibniz Institute for Tropospheric Research (TROPOS), Leipzig-04318, Germany; [5]Department of Geoscience and Remote Sensing, Delft University of Technology (TU Delft), Delft-2628 CN, The Netherlands

This study presents an optimized methodology using Unmanned Aerial Vehicles (UAVs) equipped with an integrated system of low-cost sensors (LCSs) to obtain real-time vertical and horizontal pollutant dispersion profiles in three different environmental settings: urban, rural, and industrial. This approach aims to overcome the limitations of traditional methods by enabling high-resolution, near-surface vertical profiling of air pollutants.

The methodology involves adapting a monitoring unit, incorporating AQ LCSs previously validated by the authors, to a customized commercial UAV platform (DJI Matrice 210). The UAV is equipped with GPS, a black carbon (BC) instrument (MicroAeth® AE51), and a multi-pollutant monitoring unit (MU).

EAC2025_PO2-115_1156_Lage.pdf

PO2: 116

Single particle polarization measurement for aerosol characterization and classification

Dominic Rothenfluh, Yanick Zeder, Philipp Burch, Reto Abt, Erny Niederberger, Andreas Schwendimann, Elias Graf

Swisens AG, Switzerland

Polarized side-scattering measurements enhance aerosol characterization in the SwisensPoleno Jupiter. The system records p- and s-polarized light intensities from particles illuminated by a 405 nm laser. The polarization ratio (PR) is determined by integrating mid-section scattering signals, effectively distinguishing biological particles (e.g., pollen) from water droplets. PR values are consistent across multiple instruments. This method complements holography and fluorescence spectroscopy, improving real-time aerosol identification and atmospheric monitoring accuracy.

EAC2025_PO2-116_833_Rothenfluh.pdf

PO2: 117

Implementation of a sensor network for the detection of airborne pollutants in a medium-sized city (In the context of the MAMELI project)

Giacomo Fanti[1], Andrea Spinazzè[2], Andrea Cattaneo[2], Ester Luconi[1], Elia Biganzoli[3,4], Valentina Bollati[1,3]

[1]Department of Clinical Sciences and Community Health, University of Milan, Italy; [2]Department Science and High Technology, University of Insubria, Italy; [3]INES (Institute of Epigenetics for Smiles), University of Milan, Italy; [4]Department of Biomedical and Clinical Sciences,

University of Milan, Italy

The aim of the exposomic is to understand how exposures from environment, diet and lifestyle interact with our genetic background.The MAMELI Project aims to investigate a wide range of environmental factors in an urban population. A network of 16 low-cost real-time air quality monitors was located in the city hosting the living lab (Legnano, Italy). Moreover, three reference grade instruments for the target pollutants have been installed and co-located. The data collected by this network opens several research opportunities in the exposure sciences field because of their high level of detail on the spatial and temporal variability.

EAC2025_PO2-117_437_Fanti.pdf

PO2: 118

A novel approach for the determination of Total Carbon, Organic Carbon, and Elemental Carbon with Aerosol Magee Scientific Carbonaceous Aerosol Speciation System CASS

Klemen Kunstelj[1], Matic Ivancic[1], Asta Gregoric[1,2], Gasper Lavric[1], Balint Alfoldy[1], Irena Jezek Brecelj[1], Martin Rigler[1]

[1]Aerosol d.o.o., Slovenia; [2]Centre for Atmospheric Research, University of Nova Gorica, Slovenia

Carbonaceous aerosols (CA) are usually the most significant contributor to fine particulate matter (PM2.5). They are frequently separated into Organic Carbon (OC) and Elemental Carbon (EC) based on their volatility using thermal-optical methods.

The Aerosol Magee Scientific Total Carbon Analyzer TCA08 is a scientific instrument that measures the Total Carbon ("TC") of suspended aerosol particles in near real-time using a simplified thermal method (Rigler et al., 2020). Combining Total Carbon Analyzer TCA08 and Aerosol Magee Scientific Aethalometer® provides a novel approach for measuring TC, eBC, OC, and EC content of suspended aerosol particles in near-real-time with high-time resolution.

EAC2025_PO2-118_273_Kunstelj.pdf

PO2: 120

Understanding Indoor Air Quality Under Various Ventilation Strategies Using Low-Cost Sensors in a Future Home

Navaneeth Meena Thamban[1], Thomas J. Bannan[1], Grant Henshaw[2], Richard Fitton[2], William Swan[2], Rongrong Wu[1], Ujjawal Arora[1], Gordon McFiggans[1]

[1]Department of Earth and Environmental Science, The University of Manchester, M13 9PS, United Kingdom; [2]Energy House 2.0, University of Salford, Salford, M6 6PU, United Kingdom

The Future Homes Standard, set for 2025 in the UK, outlines guidelines for "zero-carbon ready" homes by improving energy efficiency, low-carbon heating, and fabric performance. However, these improvements may impact indoor air quality. Ventilation strategies like MVHR and DMEV help mitigate this while maintaining efficiency.

To assess their effectiveness, low-cost sensors from Quant AQ and AirGradient were strategically deployed across Bellway's Future Home at the University of Salford's Energy House 2.0 and Controlled experiments were performed. PM_1 concentrations were measured using these sensors, indicating that DMEV and MVHR reduce aerosol concentrations by up to 99% in future home's various locations.

EAC2025_PO2-120_1193_Thamban.pdf

PO2: 121

Assessing Air Pollution in Irish Towns using a Low-Cost Sensor Network

Shona O'Sullivan[1], Niall O'Sullivan[1], Vaios Moschos[2], Kirsten N. Fossum[2], Darius Ceburnis[2], Jurgita Ovadnevaite[2], John Wenger[1], Stig Hellebust[1]

[1]University College Cork, Ireland; [2]University of Galway, Ireland

Residential solid fuel burning is Ireland's main winter air pollution source. The TownAir project assesses the impact of 2022 solid fuel regulations by identifying $PM_{2.5}$ sources. A field campaign in Enniscorthy (Winter 2024/2025) used regulatory EPA monitors, a low-cost sensor (LCS) network, and advanced instruments. A concentration similarity index (CSI) compared $PM_{2.5}$ across the LCS network, with preliminary results showing higher levels in older residential areas. Source apportionment via PMF will be conducted using a low-cost sensor and will complement chemical characterization. A future campaign in Letterkenny (Winter 2025/2026) will offer comparative insights into regional pollution trends.

EAC2025_PO2-121_242_OSullivan.pdf

PO2: 122

Low cost sensors network for PM and NO2 urban monitoring: initial and ongoing calibration and management

Davide Gallione[1], Nicole Mastromatteo[1], Davide Bertoni[4], Saverio De Vito[5], Grazia Fattoruso[5], Sofia Fellini[1], Silvia Ferrarese[4], Pietro Salizzoni[2], Silvia Trini Castelli[3], Marina Clerico[1]

[1]Department of Environment, Land and Infrastructure Engineering, Politecnico di Torino, Torino, 10129, Italy; [2]Laboratoire de Mécanique des Fluides et d'Acoustique, Université de Lyon, Ecole Centrale de Lyon, INSA Lyon, Université Claude Bernard Lyon I, Ecully, 69134, France; [3]Institute of Atmospheric Sciences and Climate, CNR, Torino, 10133, Italy; [4]Department of Physics, University of Turin, Torino, 10125, Italy; [5]ENEA RC-Portici, TERIN-SII-EDS, 80055 Portici, Italy

Urban areas are particularly vulnerable to elevated pollution levels. To measure concentrations of pollutants, the spatial and temporal resolution of the measurement are a key factor. Low-cost sensors can be an effective tool in the assessment of exposure to air pollutants. Following a year of experimentation using two LCS stations, a calibration methodology was developed.Ten low-cost micro-sensor stations called MoNiCa were fixed to monitor PM and NO_2 in Turin. Throughout the campaign, trends in the concentrations of the pollutants were consistent with the meteo-climatic, traffic and positioning characteristics. Based on this research, LCS proved to be complementary to canonical instrumentation.

EAC2025_PO2-122_341_Gallione.pdf

PO2: 123

A Source Specific Calibration of Low-Cost Air Quality Sensors Using Machine Learning and Emission Inventories: A Case Study in Fianarantsoa, Madagascar

Rajat Sharma, Erwann Rayssac, Andry Razakamanantsoa, Agnès Jullien

University Gustave Eiffel, France

This study develops a machine learning calibration model for a network of low-cost air quality sensors using emission inventory data for source specific corrections. The approach leverages cross-validation among nearby and co-located sensors, enhancing model robustness. A Data Reliability Indicator assesses performance across income group countries, improving reliability and spatial transferability compared to conventional approaches, which lack fine-scale and source specific insights.

EAC2025_PO2-123_546_Sharma.pdf

PO2: 125

Evaluating the performance of AE51 and MA200 micro-aethalometers during bicycle-mounted field deployment in city streets

Valeria Paola Mardoñez Balderrama[1], Laura Renzi[1], Luca Boniardi[2], Marco Zanatta[1], Alessandro Bigi[3], Ferdinando Pasqualini[1], Cristina Colombi[4], Angela Marinoni[1]

[1]Institute for Atmospheric Sciences and Climate, National Research Council of Italy, CNR-ISAC, Italy; [2]EPIGET Lab, Department of Clinical Science and Community Health, Dipartimento di Eccellenza 2023-2027, Università degli Studi di Milano; [3]Dipartimento di Ingegneria 'Enzo Ferrari', University of Modena and Reggio Emilia,; [4]UOC Qualità dell'Aria, Agenzia Regionale Protezione Ambiente (ARPA) Lombardia

Filter-based absorption photometers, particularly aethalometers, are used to measure equivalent black carbon (eBC) concentrations. Portable models like the microAeth® AE51 and MA200 enable high-resolution monitoring for personal exposure and BC mapping. As part of the RI-URBANS project, 13 devices were mounted on courier bicycles in Milan to assess BC spatial variability. The AE51 proved more robust than the MA200, which experienced software crashes due to vibrations. Both devices correlated well with the reference AE33, though MA200 required longer stabilization periods. Noise issues at 1-second resolution required post-processing. Findings help refine mobile BC monitoring methods and assess urban pollution mapping.

EAC2025_PO2-125_753_Mardoñez Balderrama.pdf

PO2: 126

Evaluating the performance of the low-cost black carbon sensor bcMeter at an urban background site

Andrea Doldi[1], Luca Pagliarulo[1], Ezio Bolzacchini[1], Luca Ferrero[1], Steffen Freitag[2], Lena Große Schute[2], Klara Junk[2], Ana Maria Todea[3], Christof Asbach[3]

[1]Department of Earth and Environmental Sciences, Università degli Studi di Milano-Bicocca, 20126, Milan, Italy; [2]Landesamt für Natur, Umwelt und Verbraucherschutz NRW (LANUV), Essen, Germany; [3]Institut für Umwelt & Energie, Technik & Analytik (IUTA) e.V., Duisburg, Germany

Black carbon (BC) is emitted in the atmosphere by incomplete combustion processes and impacts both human health and climate. Traditional BC monitoring methods are expensive, limiting spatial and temporal coverage. The bcMeter is a recently developed low-cost (<300€) BC monitoring device that can facilitate the spatial coverage of BC measurements.The performance of two bcMeter was evaluated at an urban background site in Mülheim-Styrum (Germany) against reference data from an AE33 aethalometer. The bcMeter provided results comparable with a reference aethalometer in daily averages, proving a promising option for future application in monitoring networks, where daily data resolution is sufficient.

EAC2025_PO2-126_750_Doldi.pdf

PO2: 127

Machine Learning-Driven PM2.5 Mapping and Hotspot Analysis Using a Large-Scale Low-Cost Sensor Network in Bihar, India

Vaishali Jain, Malay Pandey, Piyush Rai, Sachchida Nand Tripathi
Indian Institute of Technology Kanpur, India

This study develops a novel hybrid approach integrating satellite data and a large-scale low-cost sensor network using machine learning to generate high-resolution PM2.5 maps at a 200m scale over Bihar, India. A dataset from 511 sensors (May 2023–April 2024) was preprocessed, calibrated, and supplemented with ERA5 data. A GNN-based model outperformed previous models, achieving RMSE of 12.35 μg/m³ and Pearson's r of 0.9. The analysis identified northern Bihar as more polluted due to population clusters and land use. Findings highlight intra-state pollution sources and seasonal variations, aiding policymakers in developing targeted air quality management strategies.

EAC2025_PO2-127_584_Jain.pdf

PO2: 128

Miniaturized and Cost-Effective Electrochemical Sensors for Environmental Monitoring Using Additive Manufacturing

Abhishek Raj, Ankit Sahai, Rahul Swarup Sharma
Dayalbagh Educational Institute, India

This study presents an approach towards the development of customized electrochemical sensors using conductive PLA composite via fused filament fabrication (FFF) for electrochemical application. A PLA-based composite reinforced with graphene nanoplatelets (GNP), multi-walled carbon nanotubes (MWCNT), and lithium titanate oxide (LTO) was fabricated and characterized. Electrical conductivity increased by 12,065%, tensile strength by 64.3%, and compressive strength by 103.7% compared to pure PLA. Thermogravimetric analysis showed improved thermal stability (361.54°C). These findings validate the potential of 3D-printed electrochemical sensors as a low-cost, efficient, and scalable alternative for detecting heavy metals and air pollutants in environmental applications.

EAC2025_PO2-128_1148_Raj.pdf

PO2: 129

Air mass trajectory-based monitoring network for off-line atmospheric aerosol sampling

Radim Seibert, Daniel Hladký, Vladimíra Volná, Blanka Krejčí
Czech Hydrometeorological Institute, Czech Republic

The TRAMONE (Trajectory-based Monitoring Network) research project is being presented. Its aim is to develop a low-cost, intelligent, autonomous system for atmospheric aerosol sampling on filters, utilizing mobile data network control. The system enables sample collection based on near-real-time air mass trajectory calculations. The software controls the samplers based on whether the trajectory corresponds to a predefined path, serving as an alternative to expensive continuous sampling and subsequent filter analysis. The hardware and software will be freely available for public use.

EAC2025_PO2-129_192_Seibert.pdf

PO2: 130

Air quality PM sensors performances compared to conventional measurement techniques

Francesca Vichi, Catia Balducci, Cristiana Bassani, Giulio Esposito, Antonietta Ianniello, Andrea Imperiali, Mauro Montagnoli, Mattia Perilli, Paola Romagnoli, Valerio Paolini

Consiglio Nazionale delle Ricerche - Istituto sull'Inquinamento Atmosferico (CNR-IIA), Italy

In the framework of the DivAirCity Project, aimed at improving Air Quality in Cities through Social Inclusion and Nature Based Solutions, an integrated approach to monitoring, in which conventional instruments and both home-built and commercially available sensors, was undertaken.Both Airly sensors and PM conventional measurements by gravimetry were employed. The optical sensors measure PM by light scattering, and physical properties of the particles, which vary with location and season, may influence the accuracy of the results. Anyway the agreement between data obtained by gravimetry and sensor values was quite good (R^2=0.89), and the trends recorded are in general comparable.

EAC2025_PO2-130_907_Vichi.pdf

PO2: 131

Feasibility study of a low-cost miniaturised Bio-OPC for biologically relevant fluorescent particle detection

Jianghan Tian, Ricky Linforth, Thomas Dight, Robert Lewis, Warren Stanley, Paul Kaye, Chris Stopford
Wolfson Centre for Biodetection Instrumentation Research (WCBIR), University of Hertfordshire, Hatfield, Hertfordshire, AL10 9AB, United Kingdom

Real-time and in situ monitoring of bioaerosols using laser-induced fluorescence is promising, but the specialised instruments designed for this purpose are often large, heavy (typically 20–40 kg), and costly. We introduce a newly designed, low-cost miniaturized Bio-OPC and evaluate its feasibility for detecting various bio-fluorophores in the laboratory. We demonstrate its ability to detect bacteria and pollen in different environments. Compounds such as β-NADH (Nicotinamide adenine dinucleotide) at varying concentrations were used as fluorescent materials, and monodispersed aerosols were generated in the lab to test the sensitivity of the instrument.

EAC2025_PO2-131_156_Tian.pdf

PO2: 132

Occupational exposure assessment using miniaturized aerosol instruments in different workplace environments

Hanna Koponen[1], Patrik Gran[2], Antti Karjalainen[2], Marko Hyttinen[2], Pertti Pasanen[2], Olli Sippula[1,3]
[1]Fine Particle and Aerosol Technology Laboratory, Department of Environmental and Biological Sciences, University of Eastern Finland, Finland; [2]Indoor Environment and Occupational Hygiene Group, Department of Environmental and Biological Sciences, University of Eastern Finland; [3]Department of Chemistry, University of Eastern Finland

Occupational diesel exhaust exposure levels are not well quantified in many working sectors and new information is also needed on the use of new miniaturized measurement instruments such as micro-aethalometers and ultrafine particle counters for the assessment of occupational exposure. In this study, occupational exposure of bus drivers, mechanics, construction workers and inspection station workers were measured with these instruments. High momentary diesel exhaust concentrations were detected. The correlation between lung deposited surface area and equivalent black carbon indicates that black carbon plays an important role in exposure to fine particles in the studied workplaces.

EAC2025_PO2-132_366_Koponen.pdf

PO2: 133

Selective detection of NO2 at ppb concentration with small Cu3N-based sensor

Adrien Baut, Michael Pereira Martins, Andreas Thomas Güntner
ETH Zuerich, Switzerland

Air quality deterioration is a growing concern due to urbanization, industrial emissions, and transportation. NO2, a harmful pollutant, poses health risks, prompting strict exposure limits. Effective NO2 sensors must be highly sensitive, selective to confounders analytes, and energy-efficient. While chemoresistive metal oxides offer sensitivity and fast response, they lack selectivity and require high temperatures. Metal nitrides, like Cu_3N, show promise due to excellent catalytic properties. A novel method using aerosol deposition and dry nitridation yields highly porous Cu_3N sensors, achieving excellent NO2 detection at low temperatures (few ppb) enabling cost-effective, miniaturized air quality monitoring networks.

EAC2025_PO2-133_1164_Baut.pdf

PO2: 134

Using low-cost sensors for assessing human exposure and dose

Maria Triantafillaki[1], Sofia Eirini Chatoutsidou[1], Theodosios Kassandros[2], Stavros Cheristanidis[3,4], Serafim Kontos[3,4], Evangelos Bagkis[2], Kostas Karatzas[2], Dimitrios Melas[4], Mihalis Lazaridis[1]
[1]School of Chemical and Environmental Engineering, Technical University of Crete, Greece; [2]Environmental Informatics Research Group, School of Mechanical Engineering, Aristotle University of Thessaloniki, Greece; [3]Center of Interdisciplinary Research and Innovation, Aristotle University of Thessaloniki, Greece; [4]Laboratory of Atmospheric Physics, Department of Physics, Aristotle University of Thessaloniki, Greece

The current study investigates the applicability of low-cost PM sensors for their future use as a reliable instrument for outdoor particulate matter ($PM_{2.5}$, PM_{10}) measurements. The evaluation of the accuracy and reliability of the sensors was carried out through linear regressions applied between the particulate matter concentrations (PM_{10}, $PM_{2.5}$) measured by a reference instrument and the concentrations measured by the low-cost sensors. Subsequently, the deposited dose was estimated for each region of the human respiratory tract (HRT) using the corrected PM_x concentrations (sensors).

EAC2025_PO2-134_216_Triantafillaki.pdf

PO2: 135

Comparison of online (Xact) and offline (ICP-MS) measurements for trace elements in particulate matter across the EU

Petra Makorič[1], Kristina Glojek[1,2], Andres Alastuey[2], Xavier Querol[2], Andre Prevot[3], Enis Omerčić[4], Enis Krečinić[4], Damir Smajić[4], Almir Bijedić[4], Ismira Ahmović[4], Ranka Godec[6], Gordana Pehnec[6], Jean-Luc Jaffrezo[5], Gaelle Uzu[5], Sophie Darfeuil[5], Iain Rober White[1], Katja Džepina[1,3], Griša Močnik[1]
[1]University of Nova Gorica, Nova Gorica, 5000 Slovenia; [2]Institute of Environmental Assessment and Water Research , Barcelona, 08034, Spain; [3]Paul Scherrer Institut, Villigen, 5232, Switzerland; [4]Federal Hydrometeorological institute of BiH, Sarajevo,71000, Bosnia and Herzegovina; [5]Institute for Environmental Geosciences, Grenoble, France; [6]Institute for Medicinal Research and Occupational Health, Zagreb, Croatia

Trace elements in particulate matter (PM) are crucial for source apportionment due to their health impacts. Their measurement can be done using online (e.g., Xact 625i XRF) or offline (ICP-MS, ICP-OES, XRD) methods. This study compares online XRF and offline ICP-MS/ICP-OES data from four European sites: Deskle (SLO), Sarajevo (BiH), Barcelona (ES), and Nova Gorica (SLO), with differing PM sizes, digestion methods, and sampling periods. Results show strong correlations for S ($r^2 > 0.90$) and Cu ($r^2 > 0.80$). Correlations for Pb, Zn, and K vary by site and season, influenced by sources, matrix effects, and special events.

EAC2025_PO2-135_328_Makorič.pdf

PO2: 136

Aerosol monitoring using different measurement platforms – bicycle, tram, tethered balloon, drone, low-cost sensors

Abdul Samad, Ulrich Vogt
University of Stuttgart, Germany

This study explores the effectiveness of various measurement platforms—bicycles, trams, tethered balloons, drones, and low-cost sensors—in monitoring aerosol concentrations and meteorological parameters. Mobile platforms, such as bicycles and trams, collect high-resolution data along urban transit routes, identifying pollution hotspots. Aerial platforms, including tethered balloons and drones, extend monitoring to vertical profiles, assessing pollutant dispersion. The use of low-cost, real-time sensors has further enhanced air quality studies by enabling widespread and continuous data collection. The talk will compare these platforms, discussing their advantages, limitations, and contributions to air quality investigations.

EAC2025_PO2-136_371_Samad.pdf

PO2: 137

Characterization of Photoacoustic Sensors for the Measurement of Soot at Different EC/OC contents and Black Carbon in Comparison to an Aethalometer

Martin Kupper[1], Ioannis Raptis[2], Nikos Kousias[2], Herbert Reingruber[3], Michael Arndt[3], Hafiz Hashim Imtiaz[1], Martin Penz[1], Markus Knoll[1], Helmut Krasa[1], Leonidas Ntziachristos[2], Alexander Bergmann[1]

[1]Institute of Electrical Measurement and Sensor Systems, Graz University of Technology, Graz, 8010, Austria; [2]Laboratory of Applied Thermodynamics, Aristotle University, Thessaloniki, 54124, Greece; [3]AVL List GmbH, Graz, 8010, Austria

In this work we present results from a laboratory characterization exercise of three PAS instruments and an aethalometer, for the measurement on black carbon and brown carbon with known EC/OC content. We evaluated the time response and the linearity for different particle size distributions and mass concentrations.

EAC2025_PO2-137_928_Kupper.pdf

PO2: 138

INITIAL MEASUREMENTS OF ATMOSPHERIC AEROSOL SIZE DISTRIBUTIONS FOR TRAINING A MACHINE LEARNING MODEL TO PREDICT AEROSOL LIQUID WATER AND CLOUD CONDENSATION NUCLEI

Aydan Phillip Gibbs[1], James Sherman[1], Lifei Yin[2]

[1]Appalachian State University, United States of America; [2]Georgia Institute of Technology, United States of America

In the first step of an integrated study of aerosol liquid water content and cloud condensation nuclei spectra, a field campaign collected size distributions and hemispheric backscattering fraction data, among others. This presented us with the unique oppertunity to see how well correlated particle size is to light scattering with practical data instead of simulated. We found these values to be correlated at all 3 wavelengths studied.

EAC2025_PO2-138_1094_Gibbs.pdf

PO2: 139

Large-scale Saharan dust episode in March-April 2024: study of desert aerosol loads over Potenza, southern Italy, using remote sensing and in-situ measurements

Teresa Laurita, Caterina Mapelli, Benedetto De Rosa, Francesco Cardellicchio, Michail Mytilinaios, Emilio Lapenna, Davide Amodio, Aldo Giunta, Canio Colangelo, Serena Trippetta, Nikolaos Papagiannopoulos, Aldo Amodeo, Lucia Mona
CNR-IMAA, Italy

Saharan dust storms can travel thousands of kilometers, impacting air quality, human health, and economies. The CIAO observatory in Potenza, Italy, frequently experiences these intrusions, especially in spring and summer. Between 30 March and 1 April 2024, an extreme Saharan dust event affected the Mediterranean and Europe. At the conference, we will present lidar and in-situ aerosol observations from this episode, highlighting their complementarity. Lidar data reveal dust layer dynamics, while particle size distribution measurements confirm increased fine and coarse particle concentrations, peaking on 31 March when dust was confined to lower altitudes.

EAC2025_PO2-139_951_Laurita.pdf

PO2: 140

Ultra-high resolution identification methods of organosulfates in atmospheric nanoparticles from the CERN CLOUD chamber experiments

Mario Simon[1], Jenna E. DeVivo[2], Florian Ungeheuer[1], Nirvan Bhattacharyya[2], Markus Thoma[1], Felix Möller[1], Lucia Caudillo-Plath[1], Alexandria J. Stinchfield[2], Alexander L. Vogel[1], Neil M. Donahue[2], Joachim Curtius[1]

[1]Institute for Atmospheric and Environmental Sciences, Goethe University Frankfurt, 60438 Frankfurt/Main, Germany; [2]Center for Atmospheric Particle Studies, Carnegie Mellon University, Pittsburgh, PA 15213, USA

Organosulfates (OSs) are important compounds in atmospheric aerosols, but their formation and impact on climate and air pollution remain uncertain. This study analyzes offline particle samples from the CLOUD chamber, comparing results with semi-online particle analysis to improve understanding of OS formation pathways and properties.Using high-resolution mass spectrometry, compounds could be accurately assigned. By comparing different methods and chemical compositions, the study aims to enhance the identification of OSs and understand discrepancies caused by factors like aging and sample handling, offering insights into the formation and distribution of OSs in atmospheric aerosols.

EAC2025_PO2-140_1121_Simon.pdf

PO2: 141

A selective electrochemical sensor for determination of H2O2 in atmospheric samples

Daniel Alba-Elena[1], María Cerrato-Alvarez[1], Lucia Fernandez-Santiso[1], Carolina Hernandez-Labrado[2], Edelmira Valero[3], María Teresa Baeza-Romero[1]

[1]Department of Physical Chemistry, School of Industrial and Aerospace Engineering, Institute of Nanoscience, Nanotechnology and Molecular Materials (Inamol), Universidad de Castilla-La Mancha (UCLM), Toledo, 45071, Spain.; [2]Department of Inorganic, Organic and Biochemical Chemistry, Faculty of Environmental Sciences and Biochemistry, Inamol, UCLM, Toledo, 45071, Spain; [3]Department of Physical Chemistry, Higher Technical School of Industrial Engineering, Inamol, UCLM, Albacete, 02071, Spain

Peroxides play a crucial role in atmospheric chemistry contributing to the mass of secondary organic aerosols (SOA), with important health implications. The fluorescent DCF-HRP method, while useful, lacks selectivity for H_2O_2.

This study presents a selective electrochemical sensor for determining H_2O_2 in atmospheric samples. Screen-printed carbon electrodes were modified with an conducting polymer and platinum nanoparticles, enabling direct H_2O_2 measurement via flow injection analysis with chronoamperometric detection. After optimizing instrumental and chemical parameters, the sensor demonstrated selectivity for H_2O_2 over other commercial peroxides. Finally, it was successfully applied to the analysis of laboratory-generated SOA, comparing favorably with the DCF-HRP method.

EAC2025_PO2-141_1196_Alba-Elena.pdf

PO2: 142

Comparative Study of Aerosol Optical/Chemical Characteristics by ChAMBRe and field Campaigns.

Muhammad Irfan[1], Dario Massabò[1,2], Federico Mazzei[1,2], Paolo Prati[1,2], Tommaso Isolabella[1,2], Virginia Vernocchi[2], Marco Bunoldi[1], Elena Gatta[1]

[1]Department of Physics, University of Genova, Italy; [2]INFN, Genova Division

Fine particulate matter (PM2.5) and carbonaceous aerosols significantly affect atmospheric radiative balance and air quality due to their optical characteristics. In this study, we present a detailed look at how aerosols affect light and how they absorb light across different regions. Our research specifically investigates combustion aerosols from various urban and industrial sources, studying their absorption characteristics and impact by both in-situ and filter-based measurement methods. Such efforts allow us to study the impact of geographic and climatic factors on aerosol absorption and scattering characteristics, improving climate models and air quality assessment.

EAC2025_PO2-142_451_Irfan.pdf

PO2: 143

Comparison of different bioaerosol sampling techniques for qualitative analysis of poultry house microbiota using next generation sequencing (NGS)

Rafal Gorny[1], Anna Lawniczek-Walczyk[1], Malgorzata Golofit-Szymczak[1], Marcin Cyprowski[1], Agata Stobnicka-Kupiec[1], Jose Luis Perez Diaz[2]

[1]Central Institute for Labour Protection – National Research Institute, Poland; [2]University of Alcalá, Spain

The bacterial and fungal aerosols were sampled at workplace in poultry house using six bioaerosol instruments: six-stage Andersen and single-stage MAS impactors, Coriolis μ and BioSampler impingers, open-face filter cassette, and COUNTERFOG® BIAFTS sampler. The collected microbiota were quantitatively and qualitatively assessed using NGS. Alpha diversity metrics revealed that the highest richness and evenness of bacterial biota was observed in samples collected with Coriolis μ impinger, whereas fungal biota in samples collected with both MAS impactor and Coriolis μ impinger. Beta diversity showed that bioaerosol samples from Coriolis μ impinger were significantly different from those isolated with other tested samplers.

EAC2025_PO2-143_166_Gorny.pdf

PO2: 144

Ensuring the worldwide equivalence of measurements of nanoparticle number concentration and charge concentration: an international comparison

Andrew Brown[1], Andreas Nowak[2], Jordan Tompkins[1], Mamatha Tomson[1], Anza Waheed[2], David Godau[2], Jinsang Jung[3], Hyeongrae Kim[3], Kevin Auderset[4], Konstantina Vasilatou[4], Junjie Liu[5], Yue Liu[5], Thomas Wu[6], Lemuel Kuehsamy[7], Hiromu Sakurai[7], Yoshiko Murashima[7], Timothy Sipkens[8], Holger Gerwig[9], Wilma Travnicek[9], Sabrina Unglert[9], Kay Weinhold[10], Maik Merkel[10], Ali Wiedensohler[10]

[1]National Physical Laboratory (NPL), United Kingdom; [2]Physikalisch-Technische Bundesanstalt (PTB), Germany; [3]Korea Research Institute of Standards and Science (KRISS), Republic of Korea; [4]Federal Institute of Metrology METAS, Switzerland; [5]National Institute of Metrology, China; [6]National Metrology Centre, A*STAR, Singapore; [7]National Metrology Institute of Japan (NMIJ), National Institute of Advanced Industrial Science and Technology (AIST), Japan; [8]NRC Canada; [9]German Environment Agency (Umweltbundesamt), Germany; [10]Leibniz-Institute for Tropospheric Research (TROPOS), Germany

A crucial activity to support the Mutual Recognition Arrangement of the International Committee for Weights and Measures is the delivery of formal comparison exercises between National Metrology Institutes and, where appropriate, Designated Institutes and other reference laboratories.

Ten laboratories have participated in an experimental campaign for the CCQM-K185/P237 comparison, which measures the particle number and charge concentration of 30 nm and 50 nm monodisperse soot, and 80 nm and polydisperse soot nanoparticles.

We present the results from earlier aerosol metrology comparisons, set out the scope and experimental campaign for the CCQM-K185/P237 comparison and highlight some provisional findings from this exercise.

EAC2025_PO2-144_585_Brown.pdf

PO2: 145

High-resolution mapping of urban ultrafine particle (UFP) and CO2 fluxes

Tobias Bitz, Stephan Weber

Technical University of Braunschweig, Germany, Institute of Geoecology, Climatology and Environmental Meteorology

Cities are major CO_2 and particulate sources. The eddy covariance (EC) method, which relies on tower-based measurements, quantifies emissions on a larger scale but misses fine-scale processes like identifying single emission hotspots. To address this, EC is combined with mobile measurements using the aerodynamical resistance approach to calculate high-resolution fluxes. This approach, applied to CO_2 fluxes, is being expanded to study local particle fluxes in Berlin. Long-term EC measurements and mobile campaigns, using bicycles and cars, identified emission hotspots. These measurements show strong correlations between emissions, traffic, and turbulence, providing valuable data for dispersion models, though methodological deviations are expected.

EAC2025_PO2-145_942_Bitz.pdf

PO2: 146

Field intercomparison of absorption measurements at the suburban Demokritos station in Athens

Maria Gini[1], Konstantinos Granakis[1], Stergios Vratolis[1], Evaggelia Diapouli[1], Luka Drinovec[2,3], Jesús Yus-Díez[2], Grisa Močnik[2,3], Tobias Hammer[4], Thomas Müller[5], Robin Lewis Modini[6], Jorge Saturno[7], Konstantina Vasilatou[4], Konstantinos Eleftheriadis[1]

[1]Institute of Nuclear and Radiological Sciences & Technology, N.C.S.R. Demokritos, 15341 Athens, Greece; [2]Center for Atmospheric Research, University of Nova Gorica, Nova Gorica, 5270, Slovenia; [3]Haze Instruments d.o.o., Ljubljana, 1000, Slovenia; [4]Department of Chemistry and Biology, Federal Institute of Metrology METAS, 3003 Bern, Switzerland; [5]Atmospheric Microphysics Department, Leibniz Institute for Tropospheric Research, Leipzig, 04318, Germany; [6]PSI Center for Energy and Environmental Sciences, Paul Scherrer Institute, 5232 Villigen, Switzerland; [7]Physikalisch-Technische Bundesanstalt, Bundesallee 100, 38116 Braunschweig, Germany

Several methods for in-situ aerosol absorption measurement exist, including optical light attenuation, photothermal interferometry, photo-acoustic spectroscopy, and extinction-minus-scattering. The STANBC project aims to establish a measurement framework for both the aerosol light absorption coefficient and its conversion to eBC mass concentration, ensuring measurement traceability, consistency, and comparability across different air quality monitoring networks in Europe. This work focuses on the comparison of different techniques for measuring light absorption and black carbon in the field. The campaign took at the at the National Center for Scientific Research “Demokritos” (DEM) monitoring station in Athens, Greece, from 25/09/2023 to 11/10/2023.

EAC2025_PO2-146_1018_Gini.pdf

PO2: 147

Emissions of cooking stoves and indoor air pollution levels

Henna Rinta-Kiikka[1], Juho Louhisalmi[1], Antti Karjalainen[1], Antti Väisänen[1], Marko Hyttinen[1], Nabin Subedi[1], Rejina Maskey Byanju[2], Sunil Prasad Lohani[3], Bhupendra Das[2], Ramesh Sapkota[2], Enna Mool[2], Sarvesh Pandey[3], Smika Sharma[3], Charan Bhattarai[2], Bal Krishna Paudel[2], Jarkko Tissari[1]

[1]University of Eastern Finland, Finland; [2]Tribhuvan University, Nepal; [3]Kathmandu University, Nepal

The study measured emissions and indoor air pollution from traditional and improved Nepalese cooking stoves and from modern camp stoves. The results showed that camp stoves had the lowest fuel consumption and highest efficiency, whereas mud stove and metallic ICS had the highest fuel consumption and lowest efficiency. Emission levels were generally high and indoor air pollution increased significantly during combustion. The metallic ICS showed poor combustion, leading to high emissions. Additionally, the pot itself was found to increase fine particle emissions. These findings highlight the need to improve ICS technology to reduce household air pollution.

EAC2025_PO2-147_278_Rinta-Kiikka.pdf

PO2: 148

Mass concentration intercomparison of soot generated with Mini-Cast

Amel Kort[1], Guillaume PAILLOUX[1], Benoit Sagot[2]

[1]ASNR, France; [2]ESTACA, France

In the context of studies regarding airborne dispersion of soot particles emitted during fire scenarios and characterization of soot emitted by diesel engines, it is important to have a robust measurement of the mass.

This study consists of an intercomparison of the mass concentration measurement of soot generated by the Mini-Cast with ex-situ analyses and with real-time measurements using various types of instruments based on different principles.

The gravimetric measurement is used as the reference for the mass concentration. In this article, only the results of the MA300 are presented. The whole results will be discussed during the presentation.

EAC2025_PO2-148_642_Kort.pdf

PO2: 149

Real-time quantification of refractory brown-carbon “tarballs” using SP2

Joel C. Corbin, Fengshan Liu, Brett Smith, Timothy A. Sipkens, Alireza Moallemi, Rym Mehri, John Liggio, Jalal Norooz Oliaee

Metrology Research Centre, National Research Council Canada, Canada

Using a custom tarball-generation setup, we measured particle absorption cross-sections at 400 to 900 nm to report mass absorption coefficients (MACs) as a function of tarball annealing temperatures, up to 550 °C. Corresponding SP2 signals are investigated using detailed modelling approaches (Michelsen et al., 2015). Additional experiments using pulsed 1064 nm radiation will also be discussed. Based on this detailed work, we propose simplified setups for quantifying TB concentrations in real-time during field experiments.

EAC2025_PO2-149_985_Corbin.pdf

PO2: 150

QUANTIFICATION OF PURE LEVOGLUCOSAN AND PHOTOOXIDIZED LEVOGLUCOSAN AEROSOL BY AEROSOL MASS SPECTROMETRY

Liqing Hao, Aki Nissinen, Angela Buchholz, Siegfried Schobesberger, Annele Virtanen

University of Eastern Finland, Finland

Levoglucosan is one of the most used molecular markers for biomass burning. The research will investigate the response of aerosol mass spectrometer (AMS) to the pure levoglucosan aerosol particles subject to aging and mixing with other inorganic/organic particles. The combined CE*RIE (where RIE and CE stand for relative ionization efficiency and collection efficiency) for levoglucosan was found to be 1.11. Two marker fragments $C_2H_4O_2$ (m/z60) and $C_3H_5O_2$ (m/z73) and two other potential markers $C_6H_4O_3$(m/z124) and $C_6H_6O_3$ (m/z126) will be used to quantify levoglucosan in the mixtures with inorganic/organic aerosols and in the photoaging experiments.

EAC2025_PO2-150_730_Hao.pdf

PO2: 151

High-Resolution Air Quality Surveillance and Emission Source Tracking with Scanning LiDAR

Seong-min Kim[1], Kwanchul Kim[1], Gahye Lee[1], Jeong-min Park[1], Sea-ho Oh[1], Min-kyung Sung[1], Sung-Jo Kim[1], Sangcheol Kim[2], Kyoungho Kim[3], Youndae Jung[3], Ilkwon Yang[3], Byung-Jin Choi[3], Sungchul Choi[4], Changgi Choi[4]

[1]Advanced Institute of Convergence Technology (AICT), Korea, Republic of (South Korea); [2]Sungkyunkwan University Environmental Forensic Lab.; [3]Climate & Environment Division Scientific Environment Surveillance Team, Gyeonggi Provincial Government; [4]Samwoo TCS Co., Ltd

This study analyzes $PM_{2.5}$ pollution in the Sihwa Industrial Complex using scanning LiDAR. Results reveal seasonal and diurnal variations, with peaks during commuting and lunch hours. Major sources include waste treatment and manufacturing plants. The findings confirm LiDAR's effectiveness in air quality monitoring and emission source identification.

EAC2025_PO2-151_435_Kim.pdf

PO2: 152

Long-time-series of high-time resolution carbonaceous aerosol measurements with different in-situ measurement techniques vs. offline analysis at two background monitoring sites in Germany.

Franziska Bachmeier[1], Michael Elsasser[1,2], Julian Rüdiger[1], Cedric Couret[1,2], Olaf Bath[1], Maik Schütze[1], Bryan Hellack[1]

[1]Air Quality Network, German Environment Agency, Dessau, 06844, Germany; [2]Air Quality Network, German Environment Agency, Zugspitze, 82475, Germany

The German Environment Agency has monitored BC, Elemental Carbon (EC), and Organic Carbon (OC) since 2010 at five background stations with high temporal resolution. A comparison of online (Aethalometer AE33 and MAAP) and offline (thermography with optical correction (transmission)) measurements of two monitoring sites over two years shows a strong correlation, with AE33 slightly overestimating BC. Seasonal trends indicate higher BC levels in autumn and winter. The study also examines correlations with meteorological and chemical parameters and evaluates source attribution methods.

EAC2025_PO2-152_837_Bachmeier.pdf

PO2: 153

Understanding the Generation and Removal of Primary Particulate Matter: Insights from Diesel, Oil, and Metal Emissions

Ki-Joon Jeon, Jong-Sang Youn, Yen Thi-Hoang Le

Inha University, Korea, Republic of (South Korea)

The removal of condensable particulate matter (CPM) remains a major challenge due to its complex formation and diverse properties. This study generated and characterized primary particulate matter (PM) from diesel combustion, oil mist, and metal fume, and evaluated their removal by electrostatic precipitators (EP) and fabric filters (FF). FF showed superior removal of sub-100 nm particles compared to EP due to diffusion capture but suffered efficiency loss over time with oil mist. These findings highlight the need for standardized testing protocols and emphasize the importance of particle size distribution in evaluating PM control technologies.

EAC2025_PO2-153_1204_Jeon.pdf

PO2: 154

Aerosol Particle Classification using Single-Particle Mass Spectrometry and Deep Learning for the Detection of Ship Emissions

Guanzhong Wang[1], Heinrich Ruser[1], Julian Schade[2], Seongho Jeong[2], Johannes Passig[3,4], Ralf Zimmermann[3,4], Günther Dollinger[1], Thomas Adam[2,4]

[1]Institute for Applied Physics and Measurement Technology, University of the Bundeswehr Munich; [2]Institute of Chemistry and Environmental Engineering, University of the Bundeswehr Munich; [3]Institute of Chemistry, Division of Analytical and Technical Chemistry, University of Rostock; [4]Joint Mass Spectrometry Center (JMSC), Helmholtz Zentrum München

The Sulfur Emission Control Areas was established to reduce sulfur emissions from ships. Gas-phase measurement instruments have a limited detection range (few hundred meters). In contrast, particle-phase systems, like single-particle mass spectrometry (SPMS), can extend this range to several kilometers by analyzing aerosol particles that retain source-specific chemical markers. This study utilized SPMS to analyze aerosol particles, achieving over 92% accuracy in classifying 13 particle classes using a convolutional neural network. Notably, particles rich in vanadium, nickel, and iron ions indicate the use of high-sulfur fuels, and combined with wind data and Automatic Identification System information, allow for real-time monitoring.

EAC2025_PO2-154_895_Wang.pdf

PO2: 155

Revised IMPROVE-A OC/EC Protocol Permits Gas/Diesel Analyses

Philip K. Hopke[1,2], Nicole Hyslop[3]

[1]Clarkson University, United States of America; [2]University of Rochester; [3]University of California-Davis

After a change in instrumentation to implement the IMPROVE-A protocol in the thermal-optical analysis of the carbonaceous components of $PM_{2.5}$, a significant change in several of the OC-EC fractions (OC4, OP, and EC2). These changes produced significant problems in the source apportionment of gasoline and diesel vehicles and aged secondary organic aerosol. After extensive discussions, the operators of the Chemical Speciation Network, the University of California-Davis, made a change in the OC4 step by extending the time to a fixed 580 s. This modification has resulted in OC-EC fraction data that permit source apportionments similar to those using earlier data.

EAC2025_PO2-155_171_Hopke.pdf

PO2: 156

Online Oxidative Potential Measurements of Soluble and Insoluble Particulate Matter

Matthias Harder[1], Ka Yuen Cheung[1], Elisa Chamot[1], Battist Utinger[1], Steven John Campbell[2], Markus Kalberer[1]

[1]Department of Environmental Sciences, University of Basel, 4056 Basel, Switzerland; [2]MRC Centre of Environment and Health, Environmental Research Group, Imperial College London, London W12 0BZ, United Kingdom

Epidemiological studies show strong correlation between exposure to ambient particulate matter (PM) and adverse human health effects. The oxidative potential (OP) of PM, has been implicated in PM-induced toxicity, however conventional methods for measuring aerosol OP are labor-intensive and may underestimate OP values due to the short lifetimes of certain species. To address these challenges, our research focuses on advancing online instrumentation for real-time quantification of aerosol OP. Our recent work has further expanded to investigate the OP of both soluble and insoluble PM fractions to be able to develop a measurement device that more accurately reflects real-world conditions.

EAC2025_PO2-156_412_Harder.pdf

PO2: 157

Motor vehicle exhaust ultrafine particle number (PN) concentration monitor and calibration technology

Tongzhu Yu[1,2], Yixin Yang[1,2], Huaqiao Gui[1,2], Junjie Liu[3], Da-Ren Chen[1,4]

[1]Anhui Institute of Optics and Fine Mechanics, Hefei Institutes of Physical Science, Chinese Academy of Sciences, Hefei, 230031, China; [2]Environmental Research Institute of Hefei Comprehensive Science Centre, Building E, Phase IV, Electric Park, Shushan Economic and Technological Development Zone, Hefei, China; [3]National Institute of Metrology, Beijing, 100029, China; [4]Particle Laboratory, Department of Mechanical and Nuclear Engineering, Virginia Commonwealth University, Richmond, VA, 23284, USA

In response to the demand for high-temperature and high-concentration ultrafine particulate matter (UFPM) emissions from motor vehicles, this study independently developed an ultrafine particulate number (PN) monitor for motor vehicle exhausts, which is based on the scheme of 'unipolar diffusion charging - flat plate electrostatic grading - differential microcurrent detection' . Meanwhile, we have developed a set of calibration equipment for the PN monitor to meet the calibration requirements of the PN monitor.

EAC2025_PO2-157_291_Yu.pdf

PO2: 158

Initial results from the first long term integrated study of aerosol liquid water content and cloud condensation nuclei in the southeastern U.S.

James Patrick Sherman[1], Pengfe Liu[2], Lifei Yin[2]

[1]Appalachian State University, United States of America; [2]Georgia Tech University, United States of America

Two field campaigns were conducted at the NOAA Federated Aerosol Network site at Appalachian State University to develop, train, and evaluate the Random Forest Machine Learning model to predict cloud condensation nuclei spectra and aerosol liquid water content, using only dried and humidified aerosol scattering and backscattering measured by nephelometers. We will next apply the trained ML model retrospectively to the long-term aerosol optical property datasets at APP to examine how and why aerosol hygroscopicity, ALWC, and CCN spectra are changing. The activities represent the first integrated multi-season study of CCN and aerosol hygroscopicity in the SE U.S.

EAC2025_PO2-158_1077_Sherman.pdf

PO2: 159

Electric system's insulators: a two-year Italian study on saline pollution

Mattia Borelli[1], Giorgio Santucci de Magistris[2], Claudia Schianchi Betti[2], Chiara Andrea Lombardi[1], Andrea Bergomi[1], Paola Fermo[1], Anna Maria Toppetti[3], Lucio Fialdini[3], Paolo Omodeo[3], Alessandra Balzarini[3], Irene Gini[3], Guido Pirovano[3]

[1]University of Milan, Department of Chemistry, 20133 Milano, Italy; [2]RSE S.p.A., Power Generation Technologies and Materials Department, 29122 Piacenza, Italy; [3]RSE S.p.A., Sustainable Development and Energy Sources Department, 20134 Milano, Italy

In times of energetic transition, the resilience of the electrical system is fundamental. To give support in smartly managing the system servicing, insulators saline pollution phenomenon was studied by mean of a two-year experiment during which insulator chains were exposed outdoor. Unlike the current literature, a complete chemical approach, including Ion Chromatography and Thermal Optical analysis in Transmittance mode, was carried out. Seasonal trends could be linked to the role of the weathering and to thermodynamic evolutions of the deposits. This study represents a novelty for Italy and poses the fundamentals to manage the risk through modelling and alerting systems.

EAC2025_PO2-159_1066_Borelli.pdf

PO2: 160

Assessing the impact of urban greenspaces on PM2.5 spatiotemporal variability in Riga, Latvia, via citizen science and low-cost sensors

Maria Kimourtzi[1], Georgios Grivas[1], Charalambos Chatzidiakos[1], Nora Gāgane[2], Sabīne Skudra[2], Aija Zučika[2], Gerid Hager[3], Todd Harwell[3], Inian Moorthy[3], Evangelos Gerasopoulos[1]

[1]National Observatory of Athens, Greece; [2]Riga Planning Region, Latvia; [3]International Institute for Applied Systems Analysis (IIASA), Austria

Within the Horizon Europe Urban ReLeaf project, a novel $PM_{2.5}$ monitoring network with low-cost sensors was established in Riga, Latvia, where fine aerosol characteristics remain uncharted. Field-calibrated and validated Purple Air PA-II monitors were deployed at 20 sites (urban green, urban background, traffic). All sites have operated concurrently since September 2024, and by the time of EAC 2025, a full year of measurements will be collected. $PM_{2.5}$ data are analysed for high-resolution spatiotemporal variations, with emphasis on the role of greenspaces. Contrasts among sites placed in the border zone of greenspaces and those located deeper in their core were observed.

EAC2025_PO2-160_917_Kimourtzi.pdf

PO2: 161

Improved Aerosol Eddy Covariance Fluxes using the ELPI+ (Electrical Low-Pressure Impactor): Preliminary Road Traffic and Sea-Spray Emission Fluxes

E. Douglas Nilsson[1], D. Hadden[1], P. Markuszewski[1,2], E.M. Mårtensson[1,3], K. Rosman[1]

[1]Department of Environmetnal Science, Stockholm University, Sweden; [2]Physical Oceanography Department, Institute of Oceanology, Polish Academy of Sciences, Poland; [3]Department of Earth Sciences, Uppsala University, Uppsala, Sweden

The Eddy Covariance (EC) method was used for an Electronic Low-Pressure Impactor ($ELPI^+$), Dekati Ltd, to measure vertical fluxes of aerosols. We correct the EC-fluxes for discrete-counting, sampling-line particle and signal losses, limited time-response, density fluctuations, deliquescence errors. With a response time t~ 0.1s for most of the $ELPI^+$ it is faster than most OPCs and CPCs , with smaller errors. With the $ELPI^+$and EC method, for the first time we can study size resolved turbulent aerosol fluxes in the complete size range. This includes the emission from road vehicle traffic in the range where we expect engine-exhaust to dominate.

EAC2025_PO2-161_1163_Nilsson.pdf

PO2: 162

Scattering of light with orbital angular momentum from singly trapped spherical particles

Matthew Hart, Shawn Divitt, Vasanthi Sivaprakasam

U.S. Naval Research Laboratory, United States of America

We present experimental results confirming the predicted scattering of light with orbital angular momentum (OAM) from single spherical dielectric particles with diameters ranging from 5 µm to 20 µm.

EAC2025_PO2-162_260_Hart.pdf

PO2: 163

Synergies between ACTRIS and ICOS: combination of aerosol and GHS's first campaign measurements for the characterization of atmospheric composition at CIAO observatory in Tito, Potenza, Southern Italy

Antonella Buono[1], Isabella Zaccardo[1,2], Emilio Lapenna[1], Teresa Laurita[1], Francesco Cardellicchio[1], Davide Amodio[1], Canio Colangelo[1], Gianluca Di Fiore[1], Carmela Cornacchia[1], Serena Trippetta[1], Lucia Mona[1]

[1]National Research Council – Institute of Methodologies for Environmental Analysis (CNR-IMAA), Contrada S. Loja, I-85050, Tito Scalo, Potenza, Italy ; [2]Università degli Studi della Basilicata—Dipartimento di Ingegneria, Via dell'Ateneo Lucano, 10, I-85100, Potenza, Italy

The first measurement campaign at CIAO observatory combines aerosol profiling, chemical composition, and greenhouse gas (GHG) concentrations through the ACTRIS and ICOS research infrastructures. This collaboration aims to enhance the understanding of atmospheric phenomena such as dust intrusions, volcanic eruptions, wildfires, and fossil fuel emissions on both global and local scales. ACTRIS focuses on aerosols and trace gases, while ICOS monitors the carbon cycle and GHGs. By integrating these data, the campaign provides real-time analysis of interactions between aerosols and GHGs, supporting climate monitoring and policy development.

EAC2025_PO2-163_1105_Buono.pdf

PO2: 164

Two Motion-Correction Approaches for Turbulent Particle Flux Measurements from a Moving Vessel in the Arctic

Florian Fröhlich[1], Theresa Mathes[1], Sabine Lüchtrath[1], Philipp Oehlke[2], Holger Siebert[2], Birgit Wehner[2], Andreas Held[1]

[1]Environmental Chemistry and Air Research, Technische Universität Berlin, Berlin, Germany; [2]Leibniz Institute for Tropospheric Research, Leipzig, Germany

To enhance knowledge about turbulent particle fluxes in the Arctic, this study aims to correct a large particle flux data set collected during the PS131 expedition of the research icebreaker Polarstern which was influenced by the vessel's motion. As the standard approach of realigning the measurement coordinate system with a fixed frame of reference proved to be challenging due to a lack of information on the offsets between the motion and eddy covariance/MCPC measurement systems, a second approach was taken that uses spectral FFT analysis to remove the influence of the movement, promising a more reliable data correction in theory.

EAC2025_PO2-164_927_Fröhlich.pdf

PO2: 165

Update of the Walking in Chamber of the Polytechnic University of Catalonia for ad hoc Aerosols studies

Claudia Grossi[1], Victoria Moreno[2], Lluis Font[2], Arturo Vargas[1]

[1]Universitat Politècnica de Catalunya, Spain; [2]Universitat Autonoma de Barcelona, Spain

The Radon Studies Laboratory (LER) is equipped with a walking in radon and climate chamber of 21 m³ volume.

As part of the RADosis project, funded by the Spanish Nuclear Safety Council, the INTE-UPC radon chamber has been recently upgraded to also generate, measure and control: i) the concentration of airborne particles (between few hundreds up to tens of thousands of pt/cm^3); ii) the particles size distribution (between tens to hundreds of nm). These values can be controlled for any desired duration, with temporal variations generally below 10%.

The installed instrumentation and the developed methodology will be presented here.

EAC2025_PO2-165_450_Grossi.pdf

PO2: 166

From Reference Materials to Real Filters: Mapping Water Content in PM Using KF Titration

Dmytro Chyzhykov[1,2], Kamila Widziewicz-Rzońca[1], Piotr Oskar Czechowski[1]

[1]Institute of Environmental Engineering Polish Academy of Sciences, M. Skłodowskiej-Curie 34 Str., 41-819, Zabrze, Poland; [2]Silesian University of Technology, Akademicka 2a Str., 44-100, Gliwice, Poland

Understanding water content in atmospheric particulate matter (PM) is crucial for accurate mass quantification and interpreting aerosol hygroscopicity and health impacts. This study uses programmed temperature-step Karl Fischer (KF) titration to examine water desorption profiles of various PM-relevant reference materials, including salts, metal oxides, carbonaceous compounds, and organics. Samples were heated stepwise (50°C–250°C) to distinguish adsorbed, bound, and constitutional water. Desorption patterns were compared with ambient PM filters and artificial PM mixture to assess matrix effects. Results show some materials, especially hydrates and porous carbon, retain water at high temperatures, highlighting potential biases in PM analysis and aiding protocol refinement.

EAC2025_PO2-166_1212_Chyzhykov.pdf

PO2: 167

Integrated study of δ^{13}C-CH_4 and δ^{13}C-CO2 signatures and aerosol properties as tracers of Wildfire Events: Insights from the ACTRIS-ICOS CIAO Observatory

Isabella Zaccardo[1,2], Antonella Buono[1], Emilio Lapenna[1], Teresa Laurita[1], Francesco Cardellicchio[1], Davide Amodio[1], Canio Colangelo[1], Gianluca Di Fiore[1], Serena Trippetta[1], Lucia Mona[1]

[1]CNR-IMAA, Italy; [2]Università degli Studi della Basilicata (Italy)

The isotopic footprint of carbon-13 (^{13}C) provides a valuable tool for monitoring wildfires and understanding their environmental impacts. This study aims to analyse the variability of the isotopic signatures to identify different sources of CO_2 and CH_4.

We will investigate the potential influence of wildfire events on the isotopic composition of these gases and on aerosol properties through an integrated approach, by combining the GHGs (greenhouse gases) measurements with aerosol characterization.

EAC2025_PO2-167_1102_Zaccardo.pdf

PO2: 168

Global calibration as a possible alternative to conventional collocation calibration strategy for air quality low-cost sensor networks: Review and experience from long-term deployments

Miloš Davidović[1], Saverio De Vito[2], Maitane Iturrate-Garcia[3], Milena Davidović[4], Maja Jovanović[1], Danka Stojanović[1], Milena Jovašević-Stojanović[1], Shahin Tabandeh[5]

[1]Vidis Centre, Vinča Institute of Nuclear Sciences, National Institute of the Republic of Serbia, University of Belgrade, Belgrade, 11351, Serbia; [2]ENEA CR-Portici, Energy Technologies and Renewable Sources Department, Portici, 80055, Italy; [3]Federal Institute of Metrology METAS, Switzerland; [4]Faculty of Civil Engineering, University of Belgrade, Serbia; [5]VTT MIKES, Tekniikantie 1, 02150 Espoo, Finland

Low-cost air quality (AQ) sensor networks recently introduced a promising paradigm shift. This shift can, due to its cost effectiveness, increase spatial resolution of AQ monitoring. One possible solution for reducing the cost of calibration is to derive global calibration models (GCMs). In this work we first summarize the performance of several GCMs developed recently, by several research groups that examine GCMs when applied to different types of sensors used in air quality monitoring. Secondly, we compare GCMs for two long-term deployments of sensor networks, our research group has developed using data from Air-Heritage project, and UNICEF pilot school initiative.

EAC2025_PO2-168_1099_Davidović.pdf

PO2: 169

Challenges in interpreting black carbon data from national air quality monitoring in the UK

Krzysztof Ciupek[1], David Butterfield[1], Gyanesh Singh[1], David C. Green[2], Anja H. Tremper[2], Max Priestman[2], Eija Asmi[3], Griša Močnik[4], Konstantina Vasilatou[5], Tobias Hammer[5], Thomas Müller[6], Joel Corbin[7], Alejandro Keller[8], Konstantinos Eleftheriadis[9], Jorge Saturno[10]

[1]Air Quality and Aerosol Metrology Group, National Physical Laboratory, United Kingdom; [2]Environment Research Group, Imperial College London, United Kingdom; [3]Finnish Meteorological Institute, Finland; [4]Department of Environmental Sciences, Jozef Stefan Institute, Slovenia; [5]Laboratory Particles and Aerosols, Federal Institute of Metrology METAS, Switzerland; [6]Leibniz Institute for Tropospheric Research, Germany; [7]Metrology Research Centre, National Research Council Canada, Canada; [8]Institute of Aerosol and Sensor Technology, FHNW, Switzerland; [9]Institute of Nuclear Technology and Radiation, NCSR Demokritos, Greece; [10]Physikalisch-Technische Bundesanstalt, Germany

Various air quality monitoring networks assess black carbon (BC) levels as part of their national policies and provide evidence for effectiveness of the mitigation strategies. However, interpreting BC data encounters several challenges, ranging from instrumentation discrepancies to methodological variations. Examples of such networks are the UK's Particle Concentration & Numbers (PCN) and Black Carbon (BC) Networks, which has expanded in 2024 from 14 to 26 sites with another seven sites to be installed. We will present an overview of the most recent data from the BC Network data together with highlighting and addressing challenges in their interpretation.

EAC2025_PO2-169_909_Ciupek.pdf

PO2: 170

Fast analysis tool for temporal aerosol particle size and fluorescence response data tested with indoor measurements at EAC 2024 in Tampere

Yanick Zeder, Elias Graf, Philipp Burch, Erny Niederberger

Swisens AG, Switzerland

The SwisensPoleno Jupiter, an airflow cytometer, enables high-throughput characterization of aerosol particles using multiple measurement techniques. Continuous monitoring generates terabytes of data, stored in a fast-access database for analysis. A server-based backend with a web frontend facilitates feature computation, filtering, and visualization. The analysis tool was tested with EAC 2024 data, showing a correlation between particle concentrations and conference activities. Over 95% of particles (>6.8 µm) exhibited fluorescence. Peaks coincided with breaks, indicating human-related bioaerosols, dust, and microplastics. The toolchain enables efficient temporal analysis of fluorescence and holography features, enhancing aerosol research applications.

EAC2025_PO2-170_513_Zeder.pdf

PO2: 171

Urban Air Quality Monitoring: Measurement Campaigns and Key Findings

Daniela Wimmer[1], Johannes Murg[1], Martin Cresnoverh[1], Manfred Linke[1], Benedikt Tschofenik[2]

[1]AVL, Austria; [2]Office of the Styrian Provincial Government, Austria

The findings from this study underline the importance of continuous UFP monitoring for urban air quality assessments, public health risk evaluations, and evidence-based urban planning. Long-term and high time-resolution measurements are essential to improve our understanding of source contributions, and the role of local meteorological and topographical influences on UFP dispersion. To support these efforts, the utilized AVL UltraFine Particle Monitor, provides a reliable tool for capturing both long-term trends and short-term fluctuations in UFP concentrations. Its capability for high-precision real-time measurements makes it well-suited for regulatory applications and scientific research aimed at developing effective air quality management strategies.

EAC2025_PO2-171_832_Wimmer.pdf

PO2: 172

An open toolkit for particle size distribution analysis

Gaurav Kumar Srivastav[1,2], Janne Lampilahti[3], Katrianne Lehtipalo[3], Shahzad Gani[1,3]

[1]Centre for Atmospheric Sciences, Indian Institute of Technology Delhi, New Delhi, India.; [2]India Meteorological Department, Ministry of Earth Sciences, Government of India.; [3]Institute for Atmospheric and Earth System Research/Physics, University of Helsinki, Helsinki, Finland

This study introduces a user-friendly Graphical User Interface (GUI) toolkit designed to simplify particle size distribution (PSD) analysis. It enables visualization, multimodal log-normal fitting, and calculation of key parameters like growth rates, condensation sinks, and particle number concentrations. Featuring a cluster-initialized least squares fit algorithm and an automated mode determination method, it is universally applicable without location-specific adjustments. Tested against long-term datasets, the toolkit provides visual feedback for quality assurance and supports data-labeling for machine learning. We are continuously upgrading this & Feedback from EAC25 will help in refine and identify additional features needed by the aerosol research community.

EAC2025_PO2-172_535_Srivastav.pdf

PO2: 173

Optical Properties of Black Carbon Aerosols and Their Climate Implications in Guadalajara, Jalisco

Ernesto Reyes Villegas

Tecnologico de Monterrey, Mexico

This study examines the optical characteristics of BC using Aethalometer measurements collected at an urban site in the city center of Guadalajara, Jalisco from June 2024 to January 2025. The dataset includes absorption coefficients at multiple wavelengths (babs_1 to babs_7), absorption Ångström exponent (AAE), and mass absorption cross-sections (MAC370, MAC880), which provide insight into the composition and sources of BC aerosols.

EAC2025_PO2-173_1128_Reyes Villegas.pdf

PO2: 174

Annual variations and long-term air quality trends in a low-pollution, northern city

Veera Blankenstein[1], Ville Silvonen[1], Laura Salo[1], Ari Elsilä[2], Kati Skippari[2], H. Timonen[3], Topi Rönkkö[1]

[1]Aerosol Physics Laboratory, Tampere University, Tampere, 33720, Finland; [2]City of Tampere, Urban Environment and Infrastructure, Environmental Protection Unit, 33100, Finland; [3]Atmospheric Composition Research, Finnish Meteorological Institute, Helsinki 00101, Finland

In this study, a dataset from 2005-2024 has been analysed covering both long-term trends and temporal variations for $PM_{2.5}$, PM_{10}, particle number concentration (PNC), LDSA, ozone and nitrous oxides (NO_x) in Tampere, Finland. This is one of the few studies from Nordic countries with such a long measurement period.

In conclusion, the air quality in Tampere has improved over time. Still, although Tampere has low pollution levels, the World Health Organization annual guidelines for $PM_{2.5}$ and NO_2 were exceeded several times in the measurement period.

EAC2025_PO2-174_829_Blankenstein.pdf

PO2: 175

Chemical, Physical and Microbial Characteristics of PM10 and PM2.5 in Urban Region of India

Shailendra Pratap Singh

Department of Chemistry, Dr. Bhimrao Ambedkar University, Agra, India.

PM is a portion of air pollution comprising tiny particles and liquid droplets categorized by size and continues to be associated with human disease. In present investigation, particulate matter ($PM_{2.5}$ and PM_{10}), microbial and metal concentration in the ambient environment of the city of Taj, Agra (India) were assessed. Total metal concentration for PM_{10} at Khandari and Trans Yamuna was found to be 252.93 $\mu g/m^3$ and 250.70 $\mu g/m^3$ respectively. In case of bioaerosol, bacterial concentration was higher as compared to fungi. A total of 4 species, Aspergillus Niger, Aspergillus flavus, Penicillium citrinum, and fumigates were isolated at different sampling sites.

EAC2025_PO2-175_1143_Singh.pdf

PO2: 176

Developing an emissions inventory for metallic aerosols in London, UK

Phillip B. Punter[1,2], David Green[1,2], Anja Tremper[2], Sean Beevers[2]

[1]MRC Centre for Environment and Health, Environmental Research Group, Imperial College, London, W12 0BZ; [2]NIRH Health Protection Research Unit for Environmental Exposures and Health, Imperial College, London, W12 0BZ

Metallic aerosols are a toxicologically important constituent of particulate matter air pollution, particularly in urban areas. However, measurements of these components are limited spatially and temporally. Here, high-time resolution PM compositional measurements from two London supersites are used to calculate emission factors (EFs) for 15 health and source apportionment related metals. These EFs are specific to the London traffic fleet and will improve emissions estimates from a key urban source. This study demonstrates the importance of high-time resolution measurements to enable insights into the causes of the broad range in EFs observed.

EAC2025_PO2-176_851_Punter.pdf

PO2: 177

Simulation and sampling of human respiratory emission in a laboratory environment

Nico Chrisam[1,2], Kevin Maier[1], Susanna Oswald[1], Christoph Haisch[2]

[1]Fraunhofer-Institut ITMP-IIP; [2]Technical University of Munich

Our breath aerosol test setup aims to preserve microorganism viability during aerosol analysis, crucial for studying viral respiratory emissions. It uses a bubble-bust nebulizer to gently produce microbial particles, minimizing physical stress and desiccation. The nebulizer includes a stainless-steel sintered filter frit, air and liquid media supply, and a sheath air supply to regulate humidity. For sampling, a growth tube and impinger combination is used. The growth tube operates with a positive temperature gradient, allowing particles to grow through condensation, while the impinger collects larger particles directly into culturable or aqueous media, facilitating fast analysis and reducing microorganism damage.

EAC2025_PO2-177_1032_Chrisam.pdf

PO2: 178

Assessing Influenza A Virus Aerostability: Insights from a Novel Bioaerosol Technology

Kennedy Peek, Allen Haddrell, Jamie F. S. Mann, Jonathan P. Reid, Andrew D. Davidson

University of Bristol, United Kingdom

Previous studies assessing the impact of environmental factors such as relative humidity (RH), temperature, and CO2 levels on influenza A virus infectivity have yielded incosistent results. Here, we use the novel Controlled Electrodynamic Levitation and Extraction of Bioaerosols onto a Substrate (CELEBS) device to systematically examine how these factors impact IAV infectivity over time. CELEBS enables precise control over monodisperse virus-laden droplets, allowing high-resolution viral decay measurements. Preliminary findings show that the IAV strain A/X31 (H3N2) remains highly aerostable, whereas A/PR/8/34 (H1N1) is less stable at intermediate RHs, suggesting a potential role for surface proteins in airborne stability.

EAC2025_PO2-178_645_Peek.pdf

PO2: 179

Predicting the pulmonary toxicity induced by repeated exposures to a mixture of alumina nanoparticles and HClg using in vitro air-liquid interface exposures

Maëva Cherriere[1,2], Myriam Oger[3], Suzanne De Araujo[2], Anne-Laure Favier[3], Maxime Floreani[1], Anthony Lecomte[1], Franck Robidel[1], Stéphanie Rodrigues[1], Guillaume Barbier[1], Sabine François[4], Samir Dekali[2], Ghislaine Lacroix[1], Thomas Loret[1]

[1]INERIS, MIV / TEAM, Verneuil-en-Halatte, 60550, France; [2]IRBA, D.EBR / U.RTE, Brétigny-sur-Orge, 91223, France; [3]IRBA, D.PRT / U.I, Brétigny-sur-Orge, 91223, France; [4]IRBA, D.EBR / U.RAD, Brétigny-sur-Orge, 91223, France

This study compares *in vivo* and *in vitro* approaches to assess the pulmonary toxicity of alumina (Al_2O_3) nanoparticles and hydrogen chloride (HCl) mixtures emitted during solid propellant combustion. Wistar rats were exposed via inhalation, while lung cell co-cultures were exposed at the air-liquid interface (ALI). After four days of exposure, pulmonary inflammation was observed *in vivo* at lower doses than *in vitro*. Despite these differences, ALI *in vitro* methods show promise in predicting the toxicity of repeated exposures and could serve as an alternative to animal models for assessing inhalation toxicity of pollutant mixtures.

EAC2025_PO2-179_193_Cherriere.pdf

PO2: 180

Increased PM Levels Enhance Minimum Leaf Conductance and Modify Transpiration Dynamics Through Stomatal Density Adjustments

Sombir Pannu[1], Ayaan Shaikh[2], Mayank Kumar[3], Usha Mina[4], Piyush Jain[5], Vikram Singh[1]

[1]Department of Chemical Engineering, Indian Institute of Technology Delhi, Hauz Khas, Delhi, 110016, New Delhi, India; [2]Department of Chemical Engineering, National institute of Technology Sri Nagar, 190006, India; [3]Department of Mechanical Engineering, Indian Institute of Technology Delhi, Hauz Khas, Delhi, 110016, New Delhi, India; [4]School of Environmental Sciences, Jawaharlal Nehru University, New Delhi 110067, India; [5]Sibley School of Mechanical and Aerospace Engineering, Cornell University, Ithaca, NY 14853, USA

Aerosols influence plant-water dynamics, yet their direct effects remain unclear. This study examines Pusa Sadabahar tomato plants under controlled conditions, exposed to ambient, filtered, and high PM air. Transpiration rate, stomatal density, and leaf hydration kinetics were analyzed alongside microscopic evaluations of wetness formation and aerosol deposition. Findings reveal a 20% increase in stomatal density, altering minimum leaf conductance (gmin and transpiration rates. This study enhances understanding of aerosol-induced physiological changes, highlighting their role in plant stress responses and potential groundwater depletion in North-West India, emphasizing the need for further research on plant-aerosol interactions.

EAC2025_PO2-180_683_Pannu.pdf

PO2: 181

Alveolar in vitro model at air-liquid-interface

Anna-Katharina Hensel[1], Henri Hakkarainen[1], Laura Mussalo[2], Claire Fayad[2], Katja Kanninen[2], Pasi Jalava[1]

[1]University of Eastern Finland, Finland; [2]A. I. Virtanen Institute for Molecular Sciences, University of Eastern Finland, Finland

This abstract presents a study on an optimised *in vitro* lung cell model to assess airborne pollutant exposure. We employ a small-volume manual liquid-application exposure system at air-liquid interface to investigate dose-dependent effects of ultrafine particles on a tri-culture model mimicking the alveolar barrier. The study addresses challenges in achieving uniform particle deposition and accurate dosing while maintaining particle properties. Results show a dose-dependent reduction in cellular metabolic activity when UFPs are administered in 100 µL of PBS, allowing a homogeneous distribution. This refined exposure technique aims to improve experimental reproducibility and physiological relevance for exposure studies in inhalation toxicity.

EAC2025_PO2-181_349_Hensel.pdf

PO2: 182

In vitro dioxin- and PAH-like activities of particulate residential wood burning emissions: influence of appliances, combustion conditions and fuel composition

Ali HNAINO[1,2], Abd El Rahman EL MAIS[1], Serge COLLET[1], Ahmad EL-MASRI[1], Vincent FUVEL[1], Jason BARDOU[1], Adrien DERMIGNY[1], Selim AIT-AISSA[1], Francois BRION[1], Barbara DANNA[2], Alexandre ALBINET[1]

[1]Ineris, Parc Technologique Alata, Verneuil-en-Halatte, 60550; [2]Aix Marseille Univ, CNRS, LCE, Marseille, France

Residential wood heating is the main source of polycyclic aromatic hydrocarbons (PAHs) in ambient air. Factors influencing the formation of such toxic compounds during biomass burning remain poorly documented. This study aims to characterize the aryl hydrocarbon receptor (AhR) mediated activities from different heating appliances under varied combustion conditions and fuel compositions. The biological activity of PM-bound dioxin- and PAH-like compounds was assessed *in vitro* using the human liver cancer cell line (HepG2). By identifying key factors influencing the toxic emissions of PM, the findings will provide valuable insights into mitigating the emissions of PM-bound AhR-active substances into ambient air.

EAC2025_PO2-182_181_HNAINO.pdf

PO2: 183

Oxidative Potential of PM1, PM2.5, and PM10 in Car and Tram Tunnels: Evaluating Public Health Risks

Rakshit Jakhar[1], Katarzyna Styszko[1], Lucyna Samek[2], Katarzyna Szramowiat-Sala[1]

[1]AGH University of Krakow, Faculty of Energy and Fuels, Krakow, Poland; [2]AGH University of Krakow, Faculty of Physics and Applied Computer Science, Krakow, Poland

Oxidative potential (OP) assesses the reactivity and environmental impact of airborne particulate matter (PM), assessing health-related exposures. This study quantifies the OP of PM_{10}, $PM_{2.5}$, and PM_1 from Krakow's car and tram tunnels using ascorbic acid (AA) and reduced glutathione (GSH) depletion assays. PM10 exhibited the highest OP in the car tunnel (23 µg m^{-3} OPAA, 21 µg m^{-3} OPGSH), while PM_1 showed the highest in the tram tunnel (28 µg m^{-3} OPAA, 24 µg m^{-3} OPGSH). Correlations between OP and metal content were generally weak, except for Rb in tram tunnel PM2.5. Findings highlight PM toxicity and health risks.

EAC2025_PO2-183_880_Jakhar.pdf

PO2: 184

Oxidative potential of urban aerosol and related elements in three simulated lung fluids

Hana Hlavackova

Czech Academy of Sciences, Czech Republic

Particulate matter (PM) bound elements are important components of atmospheric aerosols. Heavy metals are known environmental pollutants due to their toxicity, their ability to accumulate in the human body (Mitra et al. 2022). Heavy metals can exhibit toxicological effects even in trace amounts. Oxidative potential (OP) is defined as the potential of aerosol particles to induce the production of reactive oxygen species (ROS). The oxidative potential is influenced by heavy metals that are present in the environment (Charrier and Anastasio, 2012).

EAC2025_PO2-184_409_Hlavackova.pdf

PO2: 185

Association between particle-bound reactive oxygen species and in-vitro oxidative responses induced by traffic-related urban nanoparticles

Gianluca Di Iulio[1,2], Maurizio Gualtieri[3], Matteo Rinaldi[4,5], Marco Paglione[4,5], Lorenzo Massimi[6], Silvia Canepari[6], Maria Agostina Frezzini[7], Ferdinando Pasqualini[2], Carmina Sirignano[2,4], Francesca Costabile[2,4]

[1]Department of Public Health and Infectious Diseases, Sapienza University of Rome, Rome, 00185, Italy; [2]Institute of Atmospheric Sciences and Climate, National Research Council of Italy (CNR-ISAC), 00133 Rome, Italy; [3]Department of Earth and Environmental Sciences, University of Milano-Bicocca, 26126 Milan, Italy; [4]National Biodiversity Future Center (NBFC), 90133 Palermo, Italy; [5]Institute of Atmospheric Sciences and Climate, National Research Council of Italy (CNR-ISAC), 40129 Bologna, Italy; [6]Department of Environmental Biology, University of Rome Sapienza, 00185 Rome, Italy; [7]Regional Environmental Protection Agency (ARPA), 00173 Rome, Italy

This study explores the relationship between particle-bound reactive oxygen species (PB-ROS) and oxidative stress responses induced by fine particulate matter, based on the RHAPS experiment in the Po Valley (2019). PB-ROS were analyzed using two approaches: a filter sampler and a particle-into-liquid sampler. Oxidative stress was measured in human bronchial epithelial cells (BEAS-2B). Results indicate that transient ROS, which are fresher and linked to traffic emissions, while long-lived ROS species are found in aged aerosols. A positive correlation between transient ROS and oxidative stress gene expression suggests potential health risks from transient ROS in urban environments.

EAC2025_PO2-185_498_Di Iulio.pdf

PO2: 186

Anti-oxidant and anti-inflammatory properties of nanoalgosomes in a co-culture of airway bronchial cells and macrophages at the Air-Liquid Interface

Wesam Darwish[1], Giorgia Adamo[2], Mohammad Almasaleekh[1], Johannes Becker[1], Sabrina Picciotto[2], Ralf Zimmermann[1], Antonella Bongiovanni[2], Sebastiano Di Bucchianico[1]

[1]University of Rostock, Germany; [2]National Research Council of Italy, Italy

Nanoalgosomes, extracellular vesicles from *Tetraselmis chuii*, show promise for aerosol-based therapeutics due to their biocompatibility and bioactivity. This study evaluated their effects in a human lung co-culture model exposed to nebulized nanoalgosomes, followed by oxidative stress (TBHP) or inflammation (LPS). Nanoalgosomes maintained cell viability, preserved epithelial barrier integrity, reduced oxidative stress, and suppressed LPS-induced pro-inflammatory cytokine release. These findings confirm their anti-inflammatory and antioxidant properties at the air-liquid interface (ALI), supporting their potential for respiratory therapies.

EAC2025_PO2-186_448_Darwish.pdf

PO2: 187

Ex-Vivo Respiratory Pharmacokinetics Model for Inhaled Therapies Using Negative Pressure Ventilation and Perfusion: A Proof-of-Concept

Juan Pablo Vasco Marin[1], Lara Leclerc[1], Nicolas Curt[1], Nathalie Prevot[1,2], Edouard Sage[3,4], Sophie Perinel[1,2], Jérémie Pourchez[1]

[1]Mines Saint-Etienne, Univ. Jean Monnet, UMR INSERM 1059 SAINBIOSE, 42270 Saint-Priest-en-Jarez, France; [2]University Hospital of Saint-Étienne, CHU Saint-Etienne, 42270 Saint-Priest-en-Jarez, France; [3]Department of Thoracic Surgery and Lung Transplantation, Foch Hospital, Suresnes, France; [4]Paris-Saclay University, INRAE, UVSQ, VIM, 78350, Jouy-en-Josas, France

Respiratory models are crucial for developing and evaluating aerosol-based medical devices. While in-vivo models, particularly human imaging, are most informative, ethical constraints limit their use. In-vitro models are simpler but lack lung complexity. In-silico models offer simulations but struggle with pathologies and have high computational costs. Ex-vivo models, especially with large animal lungs, offer a balance, preserving lung architecture. This study adapts ex-vivo lung perfusion and negative pressure ventilation prototypes, typically used in transplantation, for pharmacokinetic studies. A successful 6-hour perfusion with a pig lung demonstrates the model's potential for characterizing inhaled therapies.

EAC2025_PO2-187_279_Vasco Marin.pdf

PO2: 188

Exposure of commuters to black carbon air pollution in urban environment, Croatia

Ana Cvitešić Kušan[1], Katja Bukvić[2], Ivan Mihaljević[1], Tvrtko Smital[1], Sanja Frka[1]

[1]Ruđer Bošković Institute, Zagreb, Croatia; [2]Faculty of Science, University of Zagreb, Zagreb, Croatia

Air pollution is a critical public health concern, with particulate matter (PM) characteristics significantly influencing adverse outcomes. While regulatory approaches have traditionally focused on PM mass concentrations, recent research highlights black carbon (BC) and oxidative potential (OP) as more reliable indicators of PM toxicity. This study evaluates personal exposure to BC during daily commutes in Zagreb, Croatia, and the OP of various PM size fractions. Two microAethalometers were used along a 10 km route between fixed monitoring stations, providing comparative data on exposure across transport modes (bicycle and tram) and times of day, providing insights into personal exposure patterns.

EAC2025_PO2-188_610_Cvitešić Kušan.pdf

PO2: 189

PM10 chemical profiling of vehicles emissions in a Lisbon road tunnel (Portugal)

Alexandra Nunes[1], Claudia Gabriel[1], Susana Marta Almeida[1], Teresa Moreno[2], Vania Martins[1]

[1]C2TN / INSTITUTO SUPERIOR TECNICO, Portugal; [2]Consejo Superior de Investigaciones Científicas - Instituto de Diagnóstico Ambiental y Estudios del Agua

Road traffic has turned into the primary contributor of particles that impact human health and local environments. Road tunnel studies provide a context for assessing traffic emissions, as they capture exhaust and non-exhaust releases, and resuspended dust with limited external pollution influence. A dataset from the Marquês de Pombal Tunnel was used to estimate vehicular emission factors, to develop detailed chemical and carbonaceous profiles. The study found that PM_{10} concentrations inside the tunnel were significantly higher than those at the background site, highlighting the dominant influence of freshly emitted exhaust pollutants and road dust resuspension on particulate matter levels.

EAC2025_PO2-189_992_Nunes.pdf

PO2: 190

Seasonal variability of airborne particles in Lisbon during natural phenomena events and a climatic atypical year

Alexandra Nunes, S. M. Almeida, Vânia Martins
C2TN / INSTITUTO SUPERIOR TECNICO, Portugal

Sampling campaign was conducted in Lisbon (Entrecampos), Portugal, a strategic area with intermodal connections to public transport, to assess urban air quality. The aim was to identify seasonal variations and PM concentration limits in areas under intense road pressure. Natural atmospheric events, such as wildfires, often cause significant air pollution. In September 2024, Portugal experienced severe wildfires, causing smoke clouds and degrading air quality. Dust plumes occurred in autumn 2024, reaching a rare record of 108 µg/m3. The study found that the average seasonal exposure to PM2.5 reaches WHO limits, but several days exceeded the WHO limit for PM10 concentration.

EAC2025_PO2-190_1283_Nunes.pdf

PO2: 191

Aerosolisation of short, medium, and long chain length per- and polyfluoroalkyl substances (PFAS) from contaminated water

Jishnu Pandamkulangara Kizhakkethil[1], Zongbo Shi[2], Anna Bogush[1], Ivan Kourtchev[1]
[1]Centre for Agroecology, Water and Resilience (CAWR), Coventry University, Wolston Lane, Ryton-on-Dunsmore CV8 3LG, UK; [2]School of Geography, Earth and Environmental Sciences, University of Birmingham, Edgbaston, Birmingham, B15 2TT, UK

This study investigates the aerosolisation potential of 21 PFAS, including restricted and new-generation compounds, from contaminated waters under aeration conditions. PFAS-fortified aqueous solutions, at concentrations and pHs representing wastewater treatment conditions, were aerated using an aeration chamber. All 21 PFAS studied showed significant aerosolisation properties, with aerosolisation increasing as the PFAS carbon chain length increased. The pH of the contaminated water affected PFAS aerosolisation. Our results suggest that aeration-intensive processes such as wastewater aeration could act as a source of atmospheric PFAS.

EAC2025_PO2-191_128_Pandamkulangara Kizhakkethil.pdf

PO2: 192

Investigation of the Internal Flow Dynamics of Conical Diffuser Chambers

Jeongbeen Kim[1], Yoonkyeong Ha[1], Sukbyung Chae[2], Changhyuk Kim[1,3]
[1]School of Civil and Environmental Engineering, Pusan National University, Korea, Republic of (South Korea); [2]Department of Mechanical Engineering, Korea University of Technology and Education, Korea, Republic of (South Korea); [3]Institute for Environment and Energy, Pusan National University, Korea, Republic of (South Korea)

Conical diffuser chambers are continuous flow reactors commonly used for studying gas/aerosol-phase reactions and pollutant removal processes. However, turbulent flows caused by the design of the chambers hinder understanding the effects of factors on the particle characteristics. In this study, computational fluid dynamics (CFD) simulations and flow visualization experiments were conducted to analyze internal flow dynamics and their impacts on the particle dynamics. Inlet cone angles (15 and 30°), flow rates (0.3 to 1.5 LPM), and static mixer configurations were controlled as design parameters. Internal flow streamlines were visualized by introducing smoke into the chamber and recorded.

EAC2025_PO2-192_294_Kim.pdf

PO2: 193

Chemical analysis of limonene secondary organic aerosols under high reactive nitrogen conditions for varying humidities

Willem Samuel Jacobus Kroese[1], Jinglan Fu[2,3], Yanxia Li[3], Harald Saathoff[3], Juliane Fry[4], Rupert Holzinger[1], Ulrike Dusek[2]
[1]Institute for Marine and Atmospheric Research, Utrecht University, Utrecht, 3584 CC, The Netherlands; [2]Energy and Sustainability Research Institute, University of Groningen, Groningen, 9747 AG, The Netherlands; [3]Institute for Meteorology and Climate Research, Karlsruhe Institute of Technology, Karlsruhe, 76344, Germany; [4]Meteorology & Air Quality, Wageningen University & Research, Wageningen, The Netherlands

Experiments in the AIDA chamber examined secondary organic aerosol (SOA) formation from limonene ozonolysis under high reactive nitrogen and varying humidities (0%, 45%, 90%). Results show that increased humidity enhances organic nitrate formation while suppressing dimer formation, affecting the SOA composition. Online measurements and filter analyses confirmed the production of highly oxygenated organic molecules that participate in new particle formation and condensation. These findings suggest that humidity significantly influences SOA chemistry, emphasizing the need to refine atmospheric models of reactive nitrogen–VOC interactions.

EAC2025_PO2-193_624_Kroese.pdf

PO2: 194

Unraveling 2,5-Dimethylfuran Autoxidation by Ozone and OH radical: Experimental Insights from MION Orbitrap Mass Spectrometry

Rabbia Asgher[1], Sakshi Jha[1], Avinash Kumar[1], Shawon Barua[1], Sana Farhoudian[1], Matti Rissanen[1,2]
[1]Aerosol Physics Laboratory, Tampere University, Tampere, 33720, Finland; [2]Department of Chemistry, University of Helsinki, Helsinki, 00014, Finland

Furans, a group of volatile organic compounds (VOCs) released from biomass burning and biogenic sources, significantly impact atmospheric chemistry, particularly in wildfire plumes, where furan makes up about 30% of VOCs. Beyond its natural occurrence, furan is considered a potential biofuel due to its high energy density, raising concerns about its potential atmospheric emissions. This study investigates the O_3 and OH-initiated autoxidation of 2,5-DMF, providing crucial insights into the formation of Highly Oxygenated Molecules (HOM) and their role in secondary organic aerosol (SOA) formation. The research aims to advance our understanding of furans' role in atmospheric chemistry.

EAC2025_PO2-194_883_Asgher.pdf

PO2: 195

Peroxy radical and oxidation product formation in monoterpene oxidation by nitrate radicals: insights from free-jet flowtube experiments

Jiangyi Zhang[1], Yi Zhang[1,2,3], Hannu Koskenvaara[1], Jian Zhao[1], Mikael Ehn[1]

[1]Institute for Atmospheric and Earth System Research, Faculty of Science, University of Helsinki, Helsinki, 00014, Finland; [2]State Key Laboratory of Atmospheric Boundary Layer Physics and Atmospheric Chemistry, Institute of Atmospheric Physics, Chinese Academy of Sciences, Beijing 100029, China; [3]College of Earth and Planetary Sciences, University of Chinese Academy of Sciences, Beijing 100049, China

Aerosols influence global radiation and human health, with secondary organic aerosol (SOA) forming largely through highly oxygenated organic molecules (HOMs). While HOM formation from ozone (O_3) and hydroxyl radical (OH) oxidation is well-studied, the role of nitrate radical (NO_3) remains less understood. Using a free-jet flowtube with controlled reaction times, we investigate peroxy radical and product formation from NO_3-initiated monoterpene oxidation. In alpha-pinene ozonolysis, adding NO_2 (as NO_3 source by reacting with O_3) suppresses peroxy radicals $C_{10}H_{15}O_{8,10}$, favoring the closed-shell product $C_{10}H_{14}O_7$. Future experiments will use amine-CIMS to identify less oxygenated species and further explore NO_3-driven oxidation mechanisms.

EAC2025_PO2-195_118_Zhang.pdf

PO2: 196

Photochemical degradation of gaseous naphthalene/benzene and secondary organic aerosol formation for typical atmospheric conditions

Merve Polat[1,2], Amir Ben brik[3], Niall O'Sullivan[3], Maarten Kieft[5], Mixtli Campos-Pineda[4], Albert A. Ruth[4], John Wenger[3], Jakob Klenø Nøjgaard[1,2], Matthew S. Johnson[1,5]

[1]Department of Chemistry, University of Copenhagen, 2100, Copenhagen, Denmark,; [2]National Research Centre for the Working Environment, 2100, Copenhagen, Denmark; [3]School of Chemistry and Environmental Research Institute, University College Cork, Cork, T12 YN60, Ireland; [4]School of Physics and Environmental Research Institute, University College Cork, Cork, Ireland; [5]Luper technologies, 5656 AE Eindhoven, Netherlands

The atmospheric degradation of key species, naphthalene (Nap) and benzene (Bz), emitted from asphalt plants has been investigated in the Irish Atmospheric Simulation Chamber with a focus on reactivity, oxidation products, and secondary organic aerosol formation (SOA) potentials. A total of 24 experiments have been conducted investigating eight reaction mixtures of the OH-initiated oxidation of the species, both individually and together, under different NOx, SO2 and RH conditions. The initial results show that SOA formation occurs only when OH and Nap are present and that the evolution of aerosols from Nap + OH is highly dependent on other compounds present.

EAC2025_PO2-196_652_Polat.pdf

PO2: 197

Current chemical ionization mass spectrometry (CIMS) techniques for measuring early generation peroxy radicals from monoterpene ozonolysis are prone to mischaracterization due to an artifact

Antti Metsämäki[1], Matti Rissanen[1,2], Siddharth Iyer[1]

[1]Tampere University, Finland; [2]University of Helsinki, Finland

Current chemical ionization mass spectrometry (CIMS) techniques for measuring early generation peroxy radicals from monoterpene ozonolysis are prone to mischaracterization due to an artifact. In this study, a computational analysis is performed to analyse the possibility of ozonolysis derived peroxy radicals, such as from cyclohexene and α-pinene, losing an O2 during the ionization process. According to the results, this artefact may affect ionization products of many prominently employed reagent ions. Therefore, precaution is required in interpreting measured spectra from alkene ozonolysis experiments.

EAC2025_PO2-197_845_Metsämäki.pdf

PO2: 198

Computational study on HOM formation from 2,5-Dimethylfuran oxidation initiated by ozone and OH radical

Sakshi Jha[1], Rabbia Asgher[1], Siddharth Iyer[1], Prasenjit Seal[1], Avinash Kumar[1], Shawon Barua[1], Matti rissanen[1,2]

[1]Tampere university, Physics Unit, Tampere, Finland; [2]University of Helsinki, Chemistry Department, Finland

This study explores the formation of Highly Oxygenated Organic Molecules (HOMs) from the oxidation of 2,5-Dimethylfuran (2,5-DMF) by OH radicals and ozone (O_3). 2,5-DMF, a VOC emitted from biomass combustion, is a potential fuel alternative, making its atmospheric impact crucial to study. OH and O_3 reactions produce radicals that undergo autoxidation, leading to HOMs, which influence air quality and climate. Using quantum chemical methods, the study provides a detailed mechanistic understanding of these processes. Supported by the European Research Council, the research utilizes computational tools to refine oxidation pathways, contributing to atmospheric chemistry and air pollution modeling.

EAC2025_PO2-198_801_Jha.pdf

PO2: 199

Theoretical Investigation of the Reactivity of Organosulfates with OH Radical

Zahraa Chouaib, Denis Duflot, Celine Toubin

Univ. Lille, CNRS, UMR 8523– PhLAM – Physique des Lasers Atomes et Molécules, F-59000 Lille, France

Organosulfates (OSs) are key components of atmospheric aerosols, yet their oxidation by hydroxyl radicals (OH) remains poorly understood. This study uses quantum chemistry to investigate the aqueous-phase reactivity of anionic OSs with OH, mimicking aerosol water conditions. Conformational analysis (CREST) and DFT (M06-2X/6-311++G**) with SMD solvation model determine reaction pathways, refined by CCSD(T) calculations. Rate constants are obtained via transition state theory with tunneling corrections. Comparisons with experimental data clarify OS oxidation kinetics and fragmentation into key products, improving understanding of their atmospheric fate.

EAC2025_PO2-199_612_Chouaib.pdf

PO2: 200

The Atmospheric Autoxidation of Mesitylene

Anni Savolainen[1], Siddharth Iyer[1], Matti Rissanen[1,2]

[1]Tampere University, Finland; [2]University of Helsinki, Finland

Mesitylene is an atmospherically abundant aromatic hydrocarbon. It is found in coal tar and used in industrial solvents and as a jet fuel additive. Mesitylene reacts in the atmosphere with OH in a reaction chain that results in the formation of a bicyclic peroxy radical (BPR). After that its reaction mechanism is relatively unknown despite measurements showing that it produces molecules with up to 11 oxygens. In this study, molecular rearrangement reactions, and subsequent autoxidation reactions, are studied for the mesitylene BPR using quantum chemical methods and master equation simulations, providing a more complete atmospheric autoxidation mechanism for mesitylene.

EAC2025_PO2-200_295_Savolainen.pdf

PO2: 201

The Atmospheric Autoxidation Process of Pseudocumene

Anna-Maria Kervinen[1], Siddharth Iyer[1], Matti Rissanen[1,2]

[1]Aerosol Physics Laboratory, Tampere University, Finland; [2]Department of Chemistry, University of Helsinki, Finland

Pseudocumene (C_9H_{12}) makes up significant portion of anthropogenic aromatic emissions. Aromatics have been shown to rapidly autoxidize and produce highly oxygenated organic molecules (HOMs). The oxidation of aromatics leads to formation of a bicyclic peroxy radical (BPR), which through bimolecular reaction can form a bicyclic alkoxy radical (BAR). The ring-opening of the BPR has been shown to be a source of HOMs. Additionally, the ring-open products of the BAR have been suggested to produce HOMs. In this study both the peroxy and alkoxy routes are examined via quantum chemical computations to see their potential for producing HOMs.

EAC2025_PO2-201_377_Kervinen.pdf

PO2: 202

Predictions of homogeneous nucleation rate in laminar and turbulent flows

Nikolaos Tsimpliaris Kagiaras[1], Marika Pilou[1,2], Ioannis Drossinos[2], Michalis Lazaridis[3], Dimitrios Mitrakos[1]

[1]School of Mechanical Engineering, National Technical University of Athens, Athens, 15780, Greece; [2]National Center for Scientific Research “Demokritos”, Agia Paraskevi, 15341, Greece; [3]School of Chemical and Environmental Engineering, Technical University of Crete, Chania, 73100, Greece

In applying Classical Nucleation Theory (with or without correction formulas) to calculate the homogeneous nucleation rate, correction factors are required and must be constantly recalibrated as physical conditions change. Homogeneous nucleation related experiments in the literature are scarce, and DBP (dibutyl phthalate) is the only species with data available for both turbulent and laminar flow. In our study, we simulate two DBP experiments—one for laminar flow and one for turbulent flow. Our goal is to accurately predict the order of magnitude for both cases using a single set of correction factors. A diagram of the preliminary data is provided.

EAC2025_PO2-202_972_Tsimpliaris Kagiaras.pdf

PO2: 203

Microbial Ice Nucleation in Polar and Atmospheric Environments: Insights from Antarctic Precipitation and Metagenomic Datasets

Sharath Chandra Thota[1,2], Ksenija Vučković[1], Irina Gorodetskaya[1], Catarina Magalhães[1,2]

[1]CIIMAR - Interdisciplinary Centre of Marine and Environmental Research, Porto, 4450-208, Portugal; [2]Department of science, University of Porto, Porto, 4169-007, Portugal

Ice nucleation proteins (INPs) facilitate cloud ice formation at high sub-zero temperatures and are found in diverse microorganisms inhabiting cold environments. These proteins are particularly important in Antarctica and high-altitude ecosystems, where microbial communities influence atmospheric ice formation and climate processes.

In this study, we identified INP sequences from newly assembled genomes of potential novel bacterial species isolated from rain and snow at King George Island, Antarctic Peninsula, along with metagenomic datasets from polar and atmospheric environments. Using a custom DIAMOND database of known INPs, we performed BLASTx searches, filtering high-confidence hits based on sequence identity and coverage.

EAC2025_PO2-203_666_Thota.pdf

PO2: 204

A DLCA methodology for simulating Brownian agglomeration of nanowire aerosols

Nabil Abomailek[1,2], Juan José Vilatela[1]

[1]IMDEA Materials Institute, Spain; [2]Department of Applied Physics, Universidad Autónoma de Madrid, Spain

We present a DLCA model for unidimensional particles with size-dependent translational and rotational diffusivities. The model simulates the aerosol phase agglomeration of nanowires produced by FCCVD and is intended to measure agglomerate growth, kinetics and percolation. The goal of the study is to predict the conditions of gelation for a given population of aerosol-synthesized nanowires. By simulating different monodisperse populations of nanowires of variable length and diameter, as well as populations with lognormal distributions of length and diameter, we conclude that nanowire populations of high aspect ratio and low polydispersity will have increased tendency to form aerogels.

EAC2025_PO2-204_566_Abomailek.pdf

PO2: 205

Single-droplet techniques for analysis of evaporation kinetics and particle morphology in spray dryers

Barnaby Miles[1], Lukesh Mahato[1], Rachael Miles[1], Emmanuelle Costard[2], Jewe Schröder[2], Arend Dubbelboer[2], Jonathan Reid[1]

[1]School of Chemistry, University of Bristol, Bristol, BS8 1TS; [2]Danone Research & Innovation, Uppsalalaan 12, 3584 CT Utrecht, the Netherlands

Understanding the impact of droplet drying kinetics on the morphology of resultant dried particles is crucial to improve the spray drying process. Experiments in spray dryers have struggled to monitor the drying of the individual droplets directly, whereas SDD experiments have been shown to be successful in relating the drying behaviour of single droplets to the resultant particle morphology.

We present novel investigations into the drying kinetics of a range of fat free, dairy-based powders, the impact of their drying behaviour on the final particle morphology and comparative generation of particles in an SDD technique against a small-scale spray dryer.

EAC2025_PO2-205_496_Miles.pdf

PO2: 206

Controlling the Morphology of Microparticles Formed by Evaporation of Aerosol Droplets Containing Polymer Nanoparticles

Sorrel K. Haughton[1], Panagiotis Georgiou[2], Lukesh K. Mahato[1], Barnaby E. A. Miles[1], Steven P. Armes[2], Jonathan P. Reid[1]

[1]University of Bristol, United Kingdom; [2]University of Sheffield, United Kingdom

Control over the morphology of particles formed in spray driers is highly desirable; the morphology affects the material’s chemical and physical properties. In this work aqueous, nanoparticle-laden aerosol droplets were probed using an electrodynamic balance and scanning

electron microscopy to determine the effect of relative humidity and the nanoparticle's mechanical strength on the final microparticle's morphology. Lower relative humidities increased the evaporation rate and increased the buckling seen in the final particles. Lowering the glass transition temperature of the nanoparticles in the droplets increased the degree of buckling of the final microparticle, but had no impact on the evaporation kinetics.

EAC2025_PO2-206_635_Haughton.pdf

PO2: 207

Roles of Mucin and Albumin in Exhaled Respiratory Droplet Evaporation and Rehydration: Implications for Airborne Disease Transmission

Yue Meng[1], Alexei Kiselev[1], Denis Duft[1], Thomas Leisner[1,2]

[1]Karlsruhe Institute of Technology, Germany; [2]University of Heidelberg, Germany

Our results highlight the significant roles of different proteins in affecting the physicochemical properties of exhaled respiratory droplets during evaporation and rehydration. The organic content of respiratory fluids varies depending on the region of the respiratory tract where it is produced. Virus-laden respiratory droplets generated in areas with higher organic content may form a more robust shell under dry conditions, thereby enhancing the virus's environmental survivability by protecting it from factors such as temperature, humidity, and ultraviolet radiation.

EAC2025_PO2-207_368_Meng.pdf

PO2: 208

New cleaning model to predict the removal efficiency of 10-130 nm contaminant particles on Si wafers using microdroplet impaction

Seungwook Lee, Donggeun Lee

Pusan National University, Korea, Republic of (South Korea)

We developed a Monte Carlo model to bridge the gap between existing cleaning models and actual cleaning experiments. This MC model was successfully validated through a series of cleaning experiments for 10-130 nm particles on Si wafer surface, using on a two-fluid supersonic nozzle to control the impact velocities of sprayed microdroplets. More importantly, we demonstrated for the first time the significance of cleaning time duration, showing that continued droplet spraying after a liquid film forms on the surface has a negligible effect on particle removal efficiency. Here, we proposed a cyclic repetition of droplet spraying and surface drying.

EAC2025_PO2-208_1177_Lee.pdf

PO2: 209

Sea spray aerosol emissions (1940-2023) subject to climate change: trends and variation, based on new source parameterizations, the cases of the North Sea and the Baltic Sea

Yang Liu[1,2], Douglas Nilsson[1,2], Paul Glantz[1,2]

[1]Department of Environmental Sciences, Stockholm University, Stockholm, Sweden; [2]Bolin Centre for Climate Research, Stockholm University, Stockholm, Sweden

Sea spray aerosol (SSA), as a dominant natural source of aerosols, is influenced by multiple factors such as sea surface temperature (SST), salinity (S), wind speed (U), ice coverage (I), etc., especially in the Anthropocene. To parameterize SSA emission flux and understand its correlation with key factors, this study developed an SSA source function for both mass and number emissions, incorporating the factors mentioned above. The results show a high similarity in variation compared with satellite-based observations. SSA emissions correlate with these factors differently, exhibiting varying time-lagging relationships.

EAC2025_PO2-209_1166_Liu.pdf

PO2: 210

Stiff kinetics parameter estimation using neural ordinary differential equation and collocation training

Wenqing Peng[1,2], Zhi-Song Liu[2,3], Michael Boy[1,2,3]

[1]Institute for Atmospheric and Earth System Research (INAR), The University of Helsinki, Helsinki, 00014, Finland; [2]Atmospheric Modelling Centre Lahti, Lahti University Campus, Lahti, 15140, Finland; [3]School of Engineering Sciences, Lappeenranta-Lahti University of Technology LUT, Lahti, 15110, Finland

The work propose a data-driven approach to estimate reaction rate coefficient of autoxidation reactions. We validate our approach is fast and stable on a synthetic stiff atmospheric chemistry kinetic problem.

EAC2025_PO2-210_1056_Peng.pdf

PO2: 211

Using digital PCR targeting the respiratory microbiome to quantify respiratory aerosol within complex spaces

Henry Paul Oswin[1], Raymond Tellier[2], Rowena Bull[3], Adriana Notaras[3], KM Ahsanul Kabir[3], Charitha de Silva[3], Raina Macintyre[3], Donald Milton[4], Lidia Morawska[1]

[1]Queensland University of Technology, Australia; [2]McGill University, Canada; [3]University of New South Wales, Australia; [4]University of Maryland, United States

We developed a digital PCR targeting normal respiratory microflora

EAC2025_PO2-211_669_Oswin.pdf

PO2: 212

Development of a particle categorization for the broad representation of atmospheric measurement data with the SwisensPoleno Jupiter

Julia Burkart

GeoSphere Austria, Sonnblick Observatory, Austria

We develop a simple particle classification scheme to broadly represent ambient data measured by the SwisensPoleno Jupiter. The plausibility and usefulness of this approach is discussed with respect to data obtained at the Sonnblick Observatory, a high alpine research station.

EAC2025_PO2-212_1101_Burkart.pdf

PO2: 213

Experimental study of homogeneous nucleation in bismuth vapor

Maksim Shilikhin, Einar Kruis, Ramin Rishmawi
University of Duisburg-Essen, Germany

The homogeneous nucleation of bismuth vapor in the gas phase was investigated to evaluate the impact of various experimental parameters (e.g. evaporation temperature and rate, choice of carrier gas, volumetric flow of carrier gas) on the properties of the resulting particles and their nucleation rate. After careful study of measures required to guarantee an oxygen-free carrier gas, online measurements were carried out using a 1 nm-scanning mobility particle sizer, while ex situ analyses were performed with STEM. Furthermore, experimental results were compared with predictions of homogeneous nucleation to assess the accuracy and predictive capability of the nucleation theory.

EAC2025_PO2-213_1220_Shilikhin.pdf

PO2: 214

Iron's impact on SOA formed from Monoterpenes.

Sacha Fallah, Jens Top, Natasha M. Garner, Imad El Haddad, Markus Ammann, David M. Bell
PSI Center for Energy and Environmental Sciences, Switzerland

Secondary organic aerosol (SOA) forms when volatile organic compounds(VOCs) oxidize, producing low-volatility compounds that partition into particles. SOA impacts climate, health, and ecosystems, with biogenic VOCs like terpenes being major sources. SOA can mix with inorganic particles containing metals (e.g., Iron [Fe]), altering its properties. Garner et al. (2024) showed Fe increased mass and dimer formation in α-pinene SOA. We investigated SOA from terpenes using (NH4)2SO4 or Fe-containing seeds at varying humidities. Oxidation products were analyzed via SMPS and EESI-TOF. Results show differing SOA compositions without Fe. We explore how Fe affects β-pinene and limonene SOA, especially at high RH.

EAC2025_PO2-214_1222_Fallah.pdf

PO2: 215

Carbonaceous fine aerosol in Sarajevo, Bosnia and Herzegovina: Elevated concentrations and highly polluted winter episodes

Marta Via[1], Benjamin Chazeau[2], Asta Gregorič[3], Michael Bauer[4], Kristina Glojek[5], Petra Mokorić[1], Martin Rigler[3], Peeyush Khare[4], Levi Folghera[4], Leah Williams[6], John Jayne[6], Philip Croteau[6], Almir Bijedić[7], Enis Omerčić[7], Enis Krečinić[7], Damir Smajić[7], Ismira Ahmović[7], Griša Močnik[1], Jay Gates Slowik[4], André S. H: Prévôt[4], Katja Džepina[4]

[1]University of Nova Gorica, Ajdovščina, 5270, Slovenia; [2]Aix Marseille Univ., CNRS, LCE, Marseille, 13007, France; [3]Research and Development Department, Aerosol d.o.o, Ljubljana, 1000, Slovenia; [4]Center for Energy and Environmental Sciences, Paul Scherrer Institute (PSI), Villigen, 5232, Switzerland; [5]Institute of Environmental Assessment and Water Research (IDAEA-CSIC), Barcelona, 08034, Spain; [6]Aerodyne Research, Inc.45 Manning Rd, Billerica, MA 01821, USA; [7]Federal Hydrometeorological Institute of Bosnia and Herzegovina, Sarajevo, 71000, Bosnia and Herzegovina

This study represents one of the first fine aerosol study including carbonaceous source apportionment in Sarajevo, Bosnia and Herzegovina, embedded in the Sarajevo AEROsol Experiment (SAAERO) project. The aim is to characterise fine aerosol loadings and sources with special interest on winter stagnation episodes, when fine aerosol concentrations can exceed 200 $\mu g \cdot m^{-3}$. For that purpose, we deployed an ACSM and an aethalometer AE33 to characterise the concentrations of fine aerosol components and sources of the carbonaceous aerosol at the Sarajevo-Bjelave site. The main sources of carbonaceous aerosol found are traffic, solid-combustion, and secondary OA.

EAC2025_PO2-215_482_Via.pdf

PO2: 216

Temperature effects on toluene SOA properties

Evangelia Kostenidou[1], Clément Dubois[2], Eva Johanna Horchler[2], Katja Olsen Møller Åbom[2], Ditte Thomsen[2], Mads Mørk Jensen[2], Emil Mark Iversen[2], Merete Bilde[2]

[1]Democritus University of Thrace, Greece; [2]Aarhus University, Denmark

In this work we studied the effects of temperature on toluene SOA physicochemical properties. SOA formation took place in the AURA smog chamber at different temperatures (-15, 0 and 20^{o}C). After the completion of SOA production, the temperature was either increased or decreased by 15-20^{o}C. Both the particulate and gas phase were analyzed using online, high resolution state-of-the-art instrumentation. We found differences in the SOA density, collection efficiency and O:C ratio at different SOA formation temperatures. When the temperature changed during the experiment, SOA density remained approximately constant, but in some cases O:C ratio and CE changed.

EAC2025_PO2-216_256_Kostenidou.pdf

PO2: 217

Research on IoT and Deep Learning-Based Monitoring and Prediction Technology for Biological Hazards in Indoor Air

Kwangin Han, Joohyuk Park, Sohwa Shin, Sanghyun Lee, Ahmee Jeong, Sujin Son, Jiyoon Shin
Sundosoft Co., Ltd., Korea, Republic of (South Korea)

This study developed an IoT-based system integrated with deep learning to monitor and predict biological hazards in indoor air. The network measured airborne bacteria and mold in real time, collecting data alongside environmental parameters. GIS was utilized for spatial analysis by facility type and region. Both time-series and non-time-series prediction models were compared, with the time-series model showing superior performance for data influenced by preceding concentrations. A missing data correction model enhanced continuous data usage. Finally, a web GIS platform enabled real-time responses to indoor air quality changes, promising improved management in multi-use and vulnerable spaces.

EAC2025_PO2-217_423_Han.pdf

PO2: 219

On the impact of Saharan dust on ice nucleating particles at high-mountain and urban environments in Southern Europe

Olga Ruiz-Galera[1], Elena Bazo[1,2], Gloria Titos[1,2], Diego Patrón[1], Alejandro Ontiveros[1], Sonia Castillo[1], Juan Andrés Casquero-Vera[1,2], Francisco José Olmo[1,2], Lucas Alados-Arboledas[1,2], Alberto Cazorla[1,2]

[1]Andalusian Institute for Earth System Research (IISTA-CEAMA); [2]Department of Applied Physics, University of Granada

Atmospheric aerosols act as ice nucleating particles (INPs), influencing cloud microphysics, radiative balance, and precipitation. However, their impact remains uncertain. This study examines INP variability from June 2024 to May 2025 at two AGORA stations: UGR (urban) and SNS (high-mountain). INP concentrations samples were analyzed using GRAINS (GRAnada Ice Nuclei Spectrometer). SNS showed higher summer INP activity due to mineral dust, while UGR showed higher activity during autumn and winter, highly linked to anthropogenic aerosol. A correlation between INP and optical properties suggests human influence on dust INP activity. Future chemical and mineralogical analyses will further explore INP composition.

EAC2025_PO2-219_196_Ruiz-Galera.pdf

PO2: 220

Ecotoxicity of PM10 from heating appliances using different biomass fuels in two dwellings

Yago Alonso Cipoli[1], Estela Vicente[1], Franco Lucarelli[2], Nora Kóvats[3], Manuel Feliciano[4], Jíri Rysavy[5], Célia Alves[1]

[1]Centre for Environmental and Marine Studies (CESAM), Department of Environment, University of Aveiro, 3810-193, Aveiro, Portugal; [2]National Institute of Nuclear Physics (INFN), Sesto Fiorentino, Florence 50019, Italy; [3]Centre of Natural Environmental Sciences, University of Pannonia, Egyetem str. 10, 8200, Veszprém, Hungary.; [4]CIMO, LA SusTEC, Instituto Politécnico de Bragança, Campus de Santa Apolónia, 5300-253 Bragança, Portugal; [5]Technical University of Ostrava, Centre for Energy and Environmental Technologies, Energy Research Centre, 17. Listopadu 2172/15, 70800, Ostrava, Poruba, Czech Republic

The transition to a low-carbon economy is a key EU strategy, promoting woody biomass for residential heating. This study analyzed the chemical composition and ecotoxicity of PM10 in two Portuguese dwellings using a pellet stove (modern) and a wood stove (older system). Indoor PM10 concentrations were higher for the wood stove, frequently exceeding WHO guidelines. Ecotoxicological assays classified all pellet stove samples as “toxic” and 98% of wood stove samples as “very toxic.” Strong and significant correlations (r^2>0.8) were found between PM_{10}-bound elements and toxicity, highlighting the greater environmental and health risks associated with the older heating system.

EAC2025_PO2-220_243_Cipoli.pdf

PO2: 221

Determination of the initial concentration of aerosols and chemical agents at the portable air purifier test site

Tomasz Jankowski

CIOP-PIB, Poland

People spending time inside and outside buildings in urban areas are exposed to inhalation of chemical substances (vapors, gases and suspended dust). Unfavorable conditions inside buildings can result in serious health problems in humans manifested by SBS. In order to ensure adequate IAQ, especially in urban areas, proper air purification is required. CIOP-PIB undertook to build a research stand based on the ANSI/AHAM AC-1:2020 method. In our tests for the presence of aerosols and chemical substances in the air of the laboratory chamber, APS 3321 and SMPS 3938 measured techniques and GC/MS and HPLC/UV analytical techniques were used.

EAC2025_PO2-221_201_Jankowski.pdf

PO2: 222

Automatic classification of electrohydrodynamic atomization modes based on machine learning

Kelly Schneider Moreira[1], Luigi Piero Di Bonito[2], Matheus Novelli[3], Marc Artero[1], Lelio Campanile[4], Francesco Di Natale[2], Luewton Lemos F Agostinho[1]

[1]NHL Stenden University of Applied Science, Netherlands, The; [2]Department of Chemical, Materials and Industrial Production Engineering, University of Naples Federico II, Naples, Italy; [3]Federal University of Minas Gerais, 31270-901, Brazil; [4]Department of Mathematics and Physics, University of Campania, Caserta, Italy

This study builds on the method of Verdoold et al., proposing a machine learning-based system to classify EHDA modes (dripping, intermittent, cone-jet and multijet). The system generates “mode maps” in real time and uses data from more than 10 solutions to train models. Testing algorithms such as XGBoost, we achieved 93.76% accuracy. This approach improves EHDA automation, increasing its potential for industrial applications.

EAC2025_PO2-222_1034_Moreira.pdf

PO2: 223

Evaluation of Ultrafine Particle Abatement Systems in a 125 kW Biomass Pellet Boiler

Enrique Rojas García[1], David Sanz´Rivera[1], Jesús Javier Rodríguez Maroto[1], Aida Domínguez-Sáez[1], Manuel Pujadas Cordero[1], Marcos López Yebra[4], María Elena Borjabad García[2], Raquel Ramos[2], Mónica Gomez Gomez[2], Felipe Ruiz[3], Camilo Pérez Corral[3]

[1]Centro de Investigaciones Energéticas Medioambientales y Tecnológicas (CIEMAT), Madrid 28040, Spain; [2]CEDER-CIEMAT Autovía A-15 salida 56, 42290 Lubia (Soria), Spain; [3]CURVADOS QUINTÍN S.L. Polígono Bakiola 35B 48498 Arrankudiaga (Vizcaya), España; [4]Universidad Complutense de Madrid (UCM), Madrid 28040, Spain

Biomass combustion is a sustainable alternative to fossil fuels but generates ultrafine particles (UFP) with environmental and health impacts. This study evaluates UFP abatement systems in a 125 kW biomass boiler operating in condensation mode. Different technologies were analyzed using real-time measurements and isokinetic sampling. Results show that appropriate retention devices significantly reduce particle concentration without affecting combustion efficiency. An innovative inertial system developed by CIEMAT achieved the highest UFP reduction. These findings contribute to improving air quality and minimizing health risks.

EAC2025_PO2-223_372_Rojas García.pdf

PO2: 224

Thin continuous polytetrafluoroethylene coatings by electrospray

Deepak Parajuli[1], Eszter Bodnár[1], Joan Rosell-Llompart[1,2]

[1]University Rovira i Virgili, Spain; [2]Catalan Institution for Research and Advanced Studies, Spain

In this poster contribution, we provide methodological details and results for implementing the electrospraying of a suspension of polytetrafluoroethylene (PTFE) nanoparticles in acetone, without the addition of surfactants. The collected particulate films were heat treated to melt the particles, and were analyzed by Scanning Electron Microscopy to evaluate porosity or compactness. Both the top views and fracture sections of the films revealed structures that relate to PTFE crystallinity. The water contact angle was around 135 degrees, showing hydrophobicity. Also, the PTFE coatings prevent the outer wetting of the capillary in electrospraying of polystyrene in MEK and PVP in ethanol.

EAC2025_PO2-224_1107_Parajuli.pdf

PO2: 225

Particle emissions from the use of tobacco products

Efthimios Zervas, Niki Matsouki
Hellenic Open University, Greece

The scope of this work is to compare particulate emissions from CCs, e-cigs and HTPs.

In a first step, an extended bibliographic search was performed in Scopus and Pubmed databases. This search resulted to more than 370 publications concerning CCs, 113 for e-cigs and 69 for HTPs. The presence of particles was studied both in mainstream emissions and in a room or chamber. High heterogeneity was found in the experimental settings among the researchers.

In a second step, a number of tobacco products are tested under different experimental conditions to determine the emissions of particles.

EAC2025_PO2-225_1158_Zervas.pdf

PO2: 226

Formation of trioxy acid via OH-initiated aldehyde oxidation in the atmosphere

Emelda Ahongshangbam[1,2], Avinash Kumar[3], Melissa Meder[1,2], Matti P Rissanen[1,3], Nanna Myllys[1,2]

[1]Department of Chemistry, University of Helsinki, Helsinki, 00041, Finland; [2]Institute for Atmospheric and Earth System Research, University of Helsinki, Helsinki, 00014, Finland; [3]Aerosol Physics Laboratory, Tampere University, Tampere, 33720, Finland

Hydrotrioxides (ROOOH), once thought unstable, were directly observed in atmospheric reactions between peroxy (ROO) and hydroxyl (OH) radicals. This study explored similar reactions involving acyl peroxy radicals (APR), formed during aldehyde oxidation. Using a flow tube and mass spectrometry, researchers detected trioxy acids from benzaldehyde-derived APR reacting with OH. Quantum calculations confirmed their stability. In contrast, APRs from heptanaldehyde and acetaldehyde followed different paths, showing either rapid internal rearrangements or intermediate trioxy acid formation. These findings highlight the importance of -OOOH group chemistry in understanding atmospheric processes and secondary organic aerosol formation under varying environmental conditions.

EAC2025_PO2-226_1234_Ahongshangbam.pdf

PO2: 227

A case study of the strengths and limitations of using the isotopic composition of Carbon (d13C) and Nitrogen (d15N) to partition the sources of C and N in Particulate Matter collected over Naples (Italy)

Mauro Rubino[1], Carmina Sirignano[2], Elena Chianese[3], Miguel Angel Hernández-Ceballos[4], Anikò Angyal[5], Marzaioli Fabio[1], Davide Di Rosa[1], Giuseppe Caso[1], Angelo Riccio[3]

[1]Università della Campania "Luigi Vanvitelli", Italy; [2]Istituto di Scienze dell'atmosfera e del clima, Centro Nazionale delle Ricerche, Via Piero Gobetti, 101, 40129 Bologna, Italy; [3]Dipartimento di Scienze e Tecnologia, Università Parthenope, Centro Direzionale Isola C4, 80134 Napoli, Italy; [4]Departamento de Física, Universidad de Córdoba, Edificio "Einstein", Planta Baja, Campus de Rabanales, 14071 Córdoba, Spain; [5]Laboratory of Ion Beam Physics, Institute for Nuclear Research, Hungarian Academy of Sciences (MTA Atomki), H-4026, Debrecen, P. O. Box 51, Hungary

We measured isotopes of C ($d^{13}C$) and N ($d^{15}N$) in Particulate Matter ($PM_{2.5}$ and PM_{10}) collected over Naples in May 2016 and November 2016 - January 2017, together with the concentration of major ions (NH_4^+, K^+, Ca^{2+}, Na^+, Mg^{2+}, NO_3^-, SO_4^{2-}, $C_2O_4^{2-}$, Cl^-) that of total C and N, as well as the origin of air masses (wind direction, speed and backtrajectories – Hysplit).

1) C_{PM10} showed an important fraction (up to 44%) from carbonate C

2) $C_{PM2.5}$ was predominantly derived from C_3/fossil

3) N_{PM10} showed a shift from volatilization to combustion sources

4) N_{PM10} was mainly from combustion

EAC2025_PO2-227_1259_Rubino.pdf

PO2: 228

Transport and air pollution exposure around schools

Christina Mitsakou, Rosemary Chamberlain, Otto-Emil Jutila, Artemis Doutsi, Sani Dimitroulopoulou, Karen Exley
UK Health Security Agency, United Kingdom

We conducted an updated analysis of **air pollution concentrations ($PM_{2.5}$ and NO_2) at school locations in England, UK** and associations with socio-economic inequalities. Previous analysis showed that air pollution outside schools is likely to be compounding existing childhood socio-economic disadvantage. We also reviewed **transport and planning policies in urban areas**, particularly those implemented around schools, that can have beneficial impacts on the environment and health and may offer other co-benefits. Mitigating air pollution in and around schools and during travel has the potential to reduce children's exposure to harmful pollution and potential associated health risks.

EAC2025_PO2-228_401_Mitsakou.pdf

PO2: 229

Additive Fingerprints of Micro- and Nano-plastics in PM10 from Occupational Environments

Benedetta Giannelli Moneta, Catia Balducci, Marina Cerasa, Tommaso Rossi, Silvia Mosca, Marco Giusto, Tiziana Sargolini, Adriana Pietrodangelo
National Research Council, Italy

This study investigated around 70 organic additives as potential tracers of micro- and nanoplastics (MNPs) in airborne PM_{10} collected from three occupational environments. Using GC-MS analysis, distinct additive profiles were observed at each site. The tire repair shop showed the strongest correlation, with high levels of phthalates, benzothiazole, and homosalate in both raw materials and air samples. Weaker links were found in the bottling plant and textile facility. Overall, the findings suggest that workplace materials contribute to airborne MNPs and that specific additives may serve as useful markers for tracing their presence in indoor environments.

EAC2025_PO2-229_1258_Giannelli Moneta.pdf

PO2: 230

Characterisation of Long-Range Transported Aerosols at Barbados during EUREC4A: Insights from Single-Particle Mass Spectrometry

Doğuşhan Kılıç[1,2], Peter Gallimore[1], Nicholas Marsden[1,2], Michael Flynn[1], Hugh Coe[1]

[1]Department of Earth and Environmental Sciences, The University of Manchester, UK; [2]National Centre for Atmospheric Research, Manchester, UK

Saharan mineral dust influences climate and marine ecosystems, with effects shaped by particle composition and mixing state, which evolve during transport. In situ data, especially over oceans, are scarce. We present high time-resolution single-particle measurements from Ragged Point, Barbados (EUREC4A-UK, Jan–Feb 2020), capturing a major dust intrusion. Instruments revealed silicate-rich particles internally mixed with nitrate, sulphate, CaCl, organics, and sea salt—distinct from externally mixed dust observed nearer the source (e.g., Cape Verde). These findings suggest substantial chemical aging during transatlantic transport, enhancing hygroscopicity and modifying cloud-forming potential, highlighting complex interactions between dust and marine aerosols in the boundary layer.

EAC2025_PO2-230_1279_Kılıç.pdf

PO2: 231

Characterization of aerosol microphysical properties and transport mechanisms to the Alps

Stefania Gilardoni[1], Paolo Bonasoni[2], Angela Marinoni[2], Cristian Gencarelli[3], Henri Diémoz[4], Annachiara Bellini[4], Eros Mariani[5], Antonello Provenzale[6], Luigi Mazari[7], Francesco Petracchini[7]

[1]Institute of Polar Sciences –National Research Council, Milan, Italy; [2]Institute of Atmospheric Sciences and Climate –National Research Council, Bologna, Italy; [3]Institute of Environmental Geology and Geoengineering – National Research Council, Milan, Italy; [4]Regional Environmental Agency Valle d'Aosta, Aosta, Italy; [5]Milan Research Area - National Research Council, Milan, Italy; [6]Institute of Geosciences and Earth Resources – National Research Council, Torino, Italy; [7]Department of Earth System Sciences and Environmental Technologies – National Research Council, Rome, Italy

Observations of atmospheric aerosols at high elevations play a crucial role in monitoring changes in atmospheric background composition, evaluating the effects of both anthropogenic and natural aerosols at a regional scale, and enhancing our understanding of aerosol-cloud interaction mechanisms. However, high-altitude observations are limited due to environmental and technical challenges. We will present the first aerosol measurements collected at the Testa Grigia Observatory, at 3,480 m in the Italian Alps from September 2021 to May 2023.

EAC2025_PO2-231_1288_Gilardoni.pdf

PO2: 232

Comparative characterisation of indoor aerosols from salt atomisation and pan frying: size distribution and ventilation impact in a naturally ventilated townhouse

Prem Perumal, James Matthews, Dudley Shallcross

Atmospheric Chemistry Research Group, School of Chemistry, University of Bristol, Bristol, United Kingdom

Indoor air quality is shaped by source emissions, ventilation conditions, and spatial airflow patterns. We compare behaviour from two indoor sources in a naturally ventilated terraced house: 5% NaCl aerosols, generated via atomiser, and aerosols from frying bacon. Measurements were performed using two Grimm Scanning Mobility Particle Sizes, placed in the kitchen and the upstairs bedroom. NaCl aerosols exhibited stable unimodal distributions (~80–90 nm) with low variability and moderate concentrations, bacon frying resulted in bimodal distributions (60–120 nm) with higher concentrations, exceeding 7000 particles cm^{-3}. Concentrations were elevated in the upstairs bedroom, demonstrating vertical transport and inter-room persistence.

EAC2025_PO2-232_1281_Perumal.pdf

PO2: 233

Development and characterisation of a new aerosol sampling system and preliminary investigations regarding the composition of organic aerosol

David Wasserzier, Niklas Karbach, Thorsten Hoffmann

Johannes Gutenberg-Universität Mainz, Germany

Organic aerosols (OA), formed from reactions between gaseous precursors like biogenic VOCs and oxidants such as ozone, significantly impact climate and health. Understanding OA's chemical composition is crucial for identifying their sources and transformations. A novel aerosol sampler, designed for high flow and ease of use, employs a radial impeller and a 3D-printed filter tray. Calibration involved atomizing sodium chloride and sulfate solutions. The Orbitrap mass spectrometer is essential for non-target analysis, providing the high resolution and mass accuracy needed to identify unknown compounds. This study enhances the understanding of OA's sources, transformations, and impacts.

EAC2025_PO2-233_1272_Wasserzier.pdf

PO2: 234

Development and Evaluation of a Fanless In-Vehicle Electrostatic Precipitator for Urban PM Reduction

Dongho Shin, Daewon Kim, Gunhee Lee, Bangwoo Han

Department of Urban Environment Research, Korea Institute of Machinery and Materials, Korea, Republic of (South Korea)

This study introduces a grille-mounted electrostatic precipitator (ESP) designed to reduce road PM concentrations by utilizing vehicle motion. The system consists of a charging unit, collection unit, and uses passive airflow generated by driving or the radiator fan, eliminating the need for a dedicated fan. The ESP was installed on a real vehicle and tested under actual driving conditions. Results showed that collection efficiency increases with vehicle speed, enabling estimation of clean air delivery rate (CADR) during driving. This approach offers a novel, energy-efficient method to collect particulate matter before it disperses into the urban environment.

EAC2025_PO2-234_1245_Shin.pdf

PO2: 235

Effects of Chamber Configurations on the Nanoparticle Output of Spark Discharge Generators: A Combined CFD, Particle Tracing and Experimental Study

Dániel Megyeri[1], Marie Bermeo[2], Martin Magnusson[2], Attila Kohut[1], Maria Messing[2,3], Zsolt Geretovszky[1]

[1]University of Szeged, Hungary; [2]Lund University, Sweden; [3]Chalmers University of Technology, Sweden

Spark ablation offers a chemical-free route to produce nanoparticles with controlled properties. This study investigates how spark discharge generator chamber geometry affects nanoparticle yield and transport efficiency. Experiments with various inlet/outlet configurations producing palladium nanoparticles in nitrogen carrier gas were complemented by CFD and Particle Tracing simulations. Results show that modified geometries increase local gas velocities, shorten residence times, and reduce losses. After normalizing for spark energy and

frequency, experimental yields aligned well with simulations, except where the residence time exceeded the sparking period. These findings underscore that inlet/outlet placement strongly affects yield, while chamber volume has a marginal effect.

EAC2025_PO2-235_1274_Megyeri.pdf

PO2: 236

LOAC-S, a new space-borne OPC for planetary aerosols

Ian Aenishanslin[1], Nicolas Verdier[2], Gwenaël Berthet[1], Jean-Baptiste Renard[1], Fabrice Colin[1], Clémence Agrapart[1]

[1]CNRS, France; [2]CNES, France

Aerosols play an essential role in our understanding of planetary atmospheres, being involved in many chemical processes within them as well as affecting the planet's radiative budget. While remote sensing can provide an initial estimation of aerosol composition, in-situ measurements allow for a deeper understanding of aerosol granulometry, concentration, and typology.

To address these issues, we propose a novel spaceborne optical particle counter (OPC) to measure light scattering by aerosols in planetary atmospheres (e.g. Mars or Venus). The instrument is based on the LOAC (Light Optical Aerosol Counter) concept and redesigned for space conditions improved performance to meet scientific requirements.

EAC2025_PO2-236_1289_Aenishanslin.pdf

PO2: 237

Temporal Variation of Tire Wear Particles in Ambient Air: Development of Analytical Techniques and Seasonal Trends

Aynur Naghizade, Maurice Millet, Olivier Delhomme

Strasbourg University, France

Tire wear is a growing source of non-exhaust particulate matter (PM), especially PM10 and PM1, which pose serious health risks. This study developed and validated a high-sensitivity HPLC-MS/MS method to quantify 21 tire-related compounds, including phenylenediamines, benzotriazoles, and triazines. Air samples from Strasbourg were collected seasonally and extracted using Accelerated Solvent Extraction. Eight compounds were consistently detected, with the highest concentrations in winter and PM10 levels exceeding PM1. The method showed excellent linearity, low detection limits, and high precision. These findings highlight tire wear as a key pollutant and support its inclusion in air quality regulation and health assessments.

EAC2025_PO2-237_1282_Naghizade.pdf

PO2: 238

The Angstrom coefficient (Aerosol) evaluation through wide-field stellar photometry

Shefali Negi[1], Jan Ebr[1], Sergey Karpov[1], Jiří Eliášek[1,2]

[1]Institute of Physics of the Czech Academy of Sciences, Czech Republic; [2]Institute of Theoretical Physics, Faculty of Mathematics and Physics, Charles University, V Hole˘sovi˘ck´ach 2, 180 00 Prague, Czech Republic

We developed a non-invasive atmospheric monitoring method for CTAO (Cherenkov Telescope Array Observatory) and Pierre Auger Observatory site locations- the difference between the measured magnitude and the catalog magnitude of a star is equal to the atmospheric extinction. Data is obtained from the FRAM (F/Photometric Robotic Atmospheric Monitor) telescopes using B, V, and R standard Johnson-Cousins filters and the Gaia DR3 catalog as a reference. However, the Angstrom coefficient calculated by the three combinations of VAOD value in the B, V, and R filters (B-V, V-R, R-B) is not the same and also negative for B-V and B-R combinations.

EAC2025_PO2-238_1263_Negi.pdf

PO2: 239

Using online chemical ionisations high-resolution mass spectrometry for the characterisation of size-dependent reactions in aerosol particles

Nico Blum[1], Marcel Douverne[1], Thorsten Hoffmann[1], Matthieu Riva[2], Sebastien Perrier[2], Christian George[2]

[1]Johannes-Gutenberg University Mainz, Germany; [2]IRCELYON, Universite Claude Bernard Lyon, France

Reactions within organic aerosols significantly impact climate and industrial processes. Understanding these reactions is vital for accurate climate modeling and optimizing chemical applications. A novel setup, combining a Chemical Ionization Orbitrap inlet with an aerosol inlet, enables high-resolution analysis of aerosol particle reactions. This setup allows for the observation of particle size-dependent reaction speeds, enhancing our comprehension of complex processes. By testing various reactant gases and investigating different reaction types, researchers can access a broader range of reactions, ultimately improving climate models and industrial efficiency across sectors like chemical, pharmaceutical, and environmental engineering.

EAC2025_PO2-239_1276_Blum.pdf

PO2: 240

LungVis 1.0 – AI-enhanced 3D imaging for spatially resolved dosimetry and biokinetics of inhaled nanoparticles throughout the entire murine lung

Lin Yang[1], Ruolin Shen[2], Darya Trofimova[3], Sebastian Ziegler[3], Wolfgang G. Kreyling[4], Marie Piraud[2], Fabian Isensee[3], Otmar Schmid[1]

[1]Institute of Lung Health and Immunity (LHI), Helmholtz Zentrum München, Comprehensive Pneumology Center (CPC-M), Member of the German Center for Lung Research (DZL), Neuherberg/Munich, 85764, Germany; [2]Helmholtz AI, Helmholtz Zentrum München, Neuherberg/Munich, 85764, Germany; [3]Helmholtz Imaging, Applied Computer Vision Lab, Division of Medical Image Computing, German Cancer Research Center (DKFZ), Heidelberg, Germany; [4]Institute of Epidemiology, Helmholtz Zentrum München, Neuherberg/Munich, 85764, Germany

Understanding the dynamic process of spatially resolved aerosol deposition and subsequent transport of (nano-)particles in the lung is of utmost importance for toxicological research and therapeutic (nano-)particle applications. Here we present first results from our LungVis1.0 imaging ecosystem, which combines AI enhanced image processing of light sheet fluorescence microscopy (LSFM) images for holistic 3D co-mapping of lung morphology and aerosol deposition and pulmonary biokinetics with cellular resolution in non-dissected murine lungs. These data demonstrate hot spot features in bronchial and alveolar aerosol deposition at a resolution suitable for validation of computational fluid dynamics (CFD) models of aerosol-lung deposition.

EAC2025_PO2-240_1297_Yang.pdf

PO2: 241

New particle formation from alpha pinene and trace sulfuric acid

Eva Sommer[1,2], Joao Almeida[1,3], Mario Simon[4], Lucía Caudillo-Plath[4], Wenjuan Yu[5], Heikki Junninen[6], Zhensen Zheng[7,8], Bernhard Judmaier[7], Christos Xenofontos[9], Andrea Pozzer[10], Jasper Kirkby[1,4]

[1]CERN, Switzerland; [2]University of Vienna, Austria; [3]Faculty of Sciences of the University of Lisbon, Portugal; [4]Goethe University Frankfurt, Germany; [5]University of Helsinki, Finland; [6]University of Tartu, Estonia; [7]University of Innsbruck, Austria; [8]Ionicon Analytik Ges.m.b.H., Austria; [9]The Cyprus Institute, Cyprus; [10]Max Planck Institute for Chemistry, Germany

New particle formation (NPF) produces about half of global cloud condensation nuclei, often via sulfuric acid–ammonia nucleation. Oxygenated organic molecules (OOM) from terpenes like alpha-pinene can also drive NPF without sulfuric acid. This study examines alpha-pinene-driven NPF in the presence of trace sulfuric acid under cool, clean atmospheric conditions using the CERN CLOUD chamber. Measurements included gas-phase species, clusters, and aerosol size distributions. A new parametrisation of nucleation rates based on OOM and sulfuric acid concentrations was developed and integrated into the EMAC atmospheric model to enhance global representation of NPF processes.

EAC2025_PO2-241_1293_Sommer.pdf

PO2: 242

Particulate Matter: multi-sample analysis protocol for Oxidative Potential determination

Laura Martina[1], Serena Poti[1,2], Maria Rachele Guascito[1,3], Adelaide Dinoi[1], Daniela Cesari[1], Antonio Pennetta[1], Giuseppe De Luca[1], Ermelinda Bloise[1], Paola Semeraro[1], Anna Rita De Bartolomeo[3], Daniele Contini[1]

[1]Istituto di Scienze dell'Atmosfera e del Clima (ISAC) - CNR, Lecce, 73100, Italy; [2]Dipartimento di Ingegneria dell'Innovazione, Università del Salento, Lecce, 73100, Italy; [3]Dipartimento di Scienze e Tecnologie Biologiche ed Ambientali DiSTeBA, Università del Salento, Lecce, 73100, Italy

The **Oxidative Potential** (OP) of particulate matter (PM) reflects its ability to generate reactive oxygen species (ROS), so it is proposed as a *proxy* for toxicity. We optimized the most widely used **DTT and AA acellular assays** for OP determination, using a microplate spectrophotometer. These protocols were applied to $PM_{2.5}$ samples collected in Lecce during TOX-IN-AIR project monitoring compaigns. Samples were extracted in ultrapure water from quartz filters, and both assays were used to evaluate PM redox activity. The different sensitivities of DTT and AA provide a broader view of PM components by measuring reagent consumption over time.

EAC2025_PO2-242_1271_Martina.pdf

PO2: 243

Particulate-loaded filters analysis via Laser-Induced Breakdown Spectroscopy

Silvana De Iuliis[1], Davide Ciniglia[2], Francesca Migliorini[1], Stefania Gilardoni[3], Roberto Dondé[1]

[1]CNR-ICMATE, Institute of Condensed Matter Chemistry and Energy Technologies, Italy; [2]Department of Mechanical and Industrial Engineering, University of Brescia, Italy; [3]CNR-IPS, Institute of Polar Sciences, Italy

Laser-Induced Breakdown spectroscopy (LIBS) is a powerful tool for qualitative and quantitative elemental analysis of solid samples or aerosols. In the condition of extremely low analyte concentrations, the LIBS application o aerosol is not straightforward. An alternative approach involves the collection of atmospheric particulates onto a filter and the analysis without any sample pre-treatment. In this work, particle aerosol is collected on a 3 mm diameter filter to build the calibration curve and single-shot LIBS measurements are carried out. As a case study, this indirect analysis is implemented to analyze impurities in snow samples collected on Cordillea Blanca glaciers, Peru.

EAC2025_PO2-243_1257_De Iuliis.pdf

PO2: 244

Quantifying short-term intervention-associated source contributions to air quality using a causal machine learning approach

Qili Dai, Yufen Zhang, Yinchang Feng

College of Environmental Science and Engineering, Nankai University, Tianjin 300350, China

Abrupt source emission changes from natural or human interventions often cause unexpected air quality variations. These short-term source emission shifts are difficult to identify and apportion using conventional factor analysis, which relies on chemical covariance. We train a machine learning model on routine air quality data and emission proxies to establish a baseline representing business-as-usual conditions. Deviations during interventions allow causal quantification of source contributions. Applied to the Chinese Spring Festival and a mandatory airport closure, this approach revealed distinct air quality variation patterns and demonstrated its effectiveness in quantifying short-term emission impacts, complementing traditional receptor models.

EAC2025_PO2-244_1239_Dai.pdf

PO2: 245

Seasonal variability of PM2.5 major chemical components and source tracers in the Mediterranean urban background atmosphere

Evangelos Tsompanoglou[1], Maria Ochsenkühn-Petropoulou[1], Mirtat Bouroushian[1], Stavroula Katsikari[2], Angelos Laoutaris[2], Manousos Ioannis Manousakas[2], Konstantinos Eleftheriadis[2], Evangelia Diapouli[2]

[1]School of Chemical Engineering, National Technical University of Athens, Greece; [2]Environmental Radioactivity & Aerosol Technology for Atmospheric and Climate Impact Lab, NCSR Demokritos, Greece

The present study focuses on levels and seasonal trends of urban background aerosol and its chemical components, in the Mediterranean, a region displaying significant anthropogenic and natural sources and already visible impact from climate change. 24h $PM_{2.5}$ samples were collected on a daily basis during 2024, at the Demokritos Urban Background Station in Athens, Greece. They were by X-Ray Fluorescence for major and trace elements. In addition, near-real time elemental (EC) and organic carbon (OC) concentrations in $PM_{2.5}$ were recorded on a 3h basis, by the thermo-optical transmittance (TOT) method.

EAC2025_PO2-245_1296_Tsompanoglou.pdf

PO2: 246

Source apportionment of PM in Campania during high tourist season: an integrated analytical and modeling approach

Giuseppe Caso[1], Fabio Marzaioli[1], Mauro Rubino[1], Miguel A. Hernández-Ceballos[2], Francesca Barone[3], Enikő Papp[4], Zsófia Kertész[4], Anikó Angyal[4]

[1]University of Campania “Luigi Vanvitelli”, Department of Mathematics and Physics, 81100 Caserta, Italy.; [2]Department of Physics, University of Córdoba, 14071 Córdoba, Spain.; [3]ARPAC - Region Campania Agency for the environment protection, 80143 Naples, Italy.; [4]Laboratory for Heritage Science (HSLab), Institute for Nuclear Research, Hungarian Academy of Sciences (MTA Atomki), H-4026 Debrecen, Hungary.

A study on atmospheric particulate matter (PM) conducted in Campania (southern Italy) collected high tourist season by the A.R.P.A.C air quality monitoring network. As part of this research activity, elemental characterization, morphological analysis, statistical and atmospheric modeling techniques were applied on PM_{10} and $PM_{2.5}$ fraction in order to identify major emission sources of PM and quantify the contribution of each source on measured concentration levels.

EAC2025_PO2-246_1242_Caso.pdf

PO2: 247

The Effect of Explicit Many-Water Molecules on Dimethyl Sulfide Oxidation

Wilin Julian Sari, Nanna Myllys
University of Helsinki, Finland

Theoretical investigations were conducted to examine the gas-phase hydrogen abstraction reaction between hydroxyl radical and dimethyl sulfide, in the presence of explicit water molecules (one until three water molecules). The calculations employed density functional theory with a dispersion correction. The energy of the hydrated transition state with one water molecule is lower compared to that of the non-hydrated counterpart, i.e. 6.07 kcal/mol. To evaluate the atmospheric relevance of these hydrated-oxidation reactions, reaction rate coefficients of the complexes are also calculated.

EAC2025_PO2-247_1227_Sari.pdf

PO2: 248

Understanding the sources of PM10 and PM2.5 in an underground train station in Ile de France (Paris metropolitan area)

Juanita Rausch[1], Sylvie Ngo[2], David Jaramillo Vogel[1], Sébastien Perseguers[3], Gaelle Uzu[4], Jean-Luc Jaffrezo[4], Heidi Carrilho[2]
[1]Particle Vision GmbH, Switzerland; [2]SNCF, France; [3]Gradiom Sàrl, Switzerland; [4]Université Grenoble Alpes, CNRS, IRD, INP-G, INRAE, IGE

A combination of advanced bulk and single particle analysis coupled to machine learning classification based on morpho-chemical predictors achieved a detailed estimation of the share of the different particle types/sources within PM10 and PM2.5 in an underground train station. These results give insights into the relative contribution of specific sources even though they are dominated by one main activity (railway traffic). The knowledge gained by this detailed PM characterization contribute to a better understanding of the degree of pollution derived by the different train components (brake pads, railway line, pantograph). And hence determine the most promising fine dust abatement measures.

EAC2025_PO2-248_1251_Rausch.pdf

PO2: 249

Characterization of PM2.5 and its oxidative potential in three regions of the South Italy

Daniela Cesari[1], Caterina Mapelli[1], Adelaide Dinoi[1], Daniela Chirizzi[2], Antonio Pennetta[1], Giuseppe Deluca[1], Daniele Contini[1]
[1]Institute of Atmospheric Sciences and Climate - ISAC-CNR, Lecce, 73100, Italy; [2]Clinical Pathology and Microbiology Unit, Vito Fazzi General Hospital, Lecce, 73100, Italy

The oxidative potential (OP) of atmospheric aerosol (PM) is proposed as a metric to assess the PM exposure health effects, with OP indicating the PM ability to induce oxidative stress in biological systems. The Dithiothreitol assay is the most used for determining OP-PM. Considering the Mediterranean basin, the number of studies concerning OP of PM is limited. This study focused on the $PM_{2.5}$ OP measured in a semirural site in Basilicata region (south Italy), evaluating the impact of sources to the $PM_{2.5}$ concentration and to its OP, comparing the results with those obtained from two other regions of south Italy.

EAC2025_PO2-249_282_Cesari.pdf

PO2: 251

The Impact of COVID-19 Restrictions on Airborne Concentrations of Contaminants of Emerging Concern in Milan (Italy): The Case of Cocaine

Giovanna Mazzi[1], Elena Barbaro[2], Matteo Feltracco[1], Marco Roman[1], Cristina Colombi[3], Eleonora Favaro[1], Andrea Gambaro[1,2]
[1]Università Ca' Foscari di Venezia, Italy; [2]Institute of Polar Sciences, Italian National Research Council,; [3]ARPA Lombardia, Unità Operativa Qualità dell’Aria

The work regards illicit drugs (IDs), which are Contaminants of Emerging Concern, and their presence in the atmospheric urban aerosol. European studies indicate cannabis is the most consumed drug, followed by cocaine, amphetamines, and opioids. Italy follows the same trend. The research examined the airborne concentration of IDs in Milan prior, during, and after the Covid-19 period, revealing significant levels of cocaine. Results suggest the pandemic had little impact on airborne IDs, in agreement with European trafficking trends. The study contributes to understanding the use of drugs as social behavior indicators and their potential impact on tourism.

EAC2025_PO2-251_757_Mazzi.pdf

PO2: 252

Data-Driven Modeling of Ultrafine Particles in Northern France: An XGBoost Approach Using ATOLL Observations

Pratima Gupta
University of Lille, France

Ultrafine particles (UFPs, <100 nm) present serious health risks and arise from both anthropogenic sources like traffic and natural processes such as nucleation events. Due to limited monitoring and complex behavior, modelling UFPs is challenging. This study applies a machine learning approach using XGBoost to predict UFP concentrations based on data from the ATOLL station in Northern France. An 80/20 data split, 10-fold cross-validation, and hyperparameter tuning via grid search and Bayesian optimization were used. NO_2 served as a traffic proxy. SHAP analysis provided model interpretability. The best-performing XGBoost model achieved an R^2 of 0.84 on the test set.

EAC2025_PO2-252_1236_Gupta.pdf