Conference Agenda

Session

Poster Session Monday

Time: **Monday, 01/Sept/2025: 5:15pm - 6:45pm**

Location: **Studium2000 Building5**

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

Presentations

PO1: 1

Advancing Atmospheric Research in the Eastern Mediterranean: Insights from the Cyprus Atmospheric Remote Sensing Observatory

Hossein Panahifar[1], Maria Poutli[1,2], George Kotsias[1], Argyro Nisantzi[1,2], Silas Michaelides[2], Diofantos Hadjimitsis[1,2], Patric Seifert[3], Albert Ansmann[3], Rodanthi-Elisavet Mamouri[1,2]

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The Cyprus Atmospheric Remote Sensing Observatory (CARO), a National Facility (NF) for remote sensing of aerosols and clouds, is under evaluation to become an ACTRIS National Research Infrastructure facility for Cyprus. It comprises the Aerosol Remote Sensing (ARS) and Cloud Remote Sensing (CRS) observational platforms. CARO observatory is poised to serve as the reference observatory for the Eastern Mediterranean, North Africa, and Middle East (EMMENA) region. Situated at a strategic location, CARO provides critical data for understanding atmospheric aerosols, cloud dynamics, and radiative forcing, contributing to regional and global climate studies.

EAC2025_PO1-1_869_Panahifar.pdf

PO1: 2

Assessing the Sources of PM1 Trace Elements in the Marseille-Fos Basin through Rolling Positive Matrix Factorization Crossed-Study

Mathilde Brezins[1], Benjamin Chazeau[1], Nicolas Marchand[1], Amandine Durand[1], Grégory Gille[2], Jean-Luc Jaffrezo[3], Gaëlle Uzu[3], Barbara D'Anna[1]

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The Marseille-Fos basin is a critical Mediterranean site characterized by specific meteorological conditions and intensive anthropogenic activities. While organic aerosol sources have been studied, information on the elemental composition of aerosols in this region remains limited. Trace elements from anthropogenic emissions, predominantly in the submicron fraction, pose health risks. This study uses online XRF instrumentation (Xact 625i) to monitor elemental PM1 at two coastal sites: MRS-LCP (urban background) and FOS (industrial). Applying an innovative Rolling PMF approach to Xact datasets, the study identified eight factors at MRS-LCP and nine at FOS, with seven common factors.

EAC2025_PO1-2_356_Brezins.pdf

PO1: 3

Atmospheric Dry Deposition in the Central Mediterranean Seen from a Single-Particle Perspective

Marcos Eduardo Pérez Morán[1], Kilian Schneiders[1], Melanie Eknayan[1], Fernando De Tomasi[2], Pierina Ielpo[3], Mark Scerri[1,4], Michael Nolle[5], Konrad Kandler[1]

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We discuss aerosol dry deposition, a crucial process in the aerosol cycle. We conducted a study focusing on data from Lecce, Italy, and San Lawrenz, Malta. We used a simple sampler to collect dry deposition three times per week for one year, which was then analyzed using electron microscopy. Our study revealed patterns in dust and sea-salt deposition rates, with variations between locations and seasons. We observed dust outbreaks and seasonal patterns, with dust being present in all samples. Dust composition slightly varies between the events. San Lawrenz showed higher and coarser sea-salt deposition due to its proximity to shores.

EAC2025_PO1-3_307_Pérez Morán.pdf

PO1: 4

Physical and chemical characterization of emissions from biobased renovation materials used for energy upgrade of Cultural Heritage Buildings

Georgia Kastrinaki, D Zarvalis, K. Tsortanidou, E. Gkagkari, D. Deloglou, E. Daskalos, C. Lekkos, E. Papaioannou

Chemical Process and Energy Resources Institute (CPERI), Centre for Research and Technology Hellas (CERTH)

The CALECHE project will present innovative solutions in various areas, including aesthetically acceptable integration of photovoltaic systems into buildings, advances in insulation materials specifically designed to meet the essential needs of historic buildings in terms of humidity regulation, while promoting resource circularity and reducing the overall carbon footprint.

EAC2025_PO1-4_1306_Kastrinaki.pdf

PO1: 6

Characterization of the Atmospheric Microbiome at a high-altitude station in the eastern Mediterranean using Flow Cytometry

Ernest Abboud[1], Carolina Molina[1,2], Sofia Gkretsi[1], Romanos Foskinis[1,3], Promodos Fetfatzis[4], Konstantinos Granakis[4], Konstantinos Eleftheriadis[4], Athanasios Nenes[1,2], Kalliopi Violaki[1]

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Engineering Sciences, Foundation for Research and Technology Hellas, GR-26504, Patras, Greece; [3]Laboratory of Environmental Remote Sensing Laboratory, School of Architecture, Civil & Environmental Engineering, École Polytechnique Fédérale de Lausanne, Lausanne, 1015, Switzerland; [4]Environmental Radioactivity & Aerosol Technology for atmospheric & Climate ImpacT Lab, INRASTER, NCSR Demokritos 15310 Ag. Paraskevi, Attica, Greece

Bioaerosols can have important impacts on public health or climate. In this study, a flow cytometer was used to characterize and quantify bioaerosol (n = 67) particles at Mt. Helmos in Greece. A life/dead staining was applied to differentiate between the low and high nucleic acid (LNA and HNA, respectively) and the dead and intact populations. Results showed the presence of the LNA and HNA populations, supported by pictures of the integrated microscope. The LNA population is formed by smaller bioparticles (e.g., dead or bacterial cells) than the HNA population (e.g., potential metabolically active bacteria, fungal spores, or intact pollen)

EAC2025_PO1-6_1171_Abboud.pdf

PO1: 7

Drivers of cloud droplet number using a synergy of remote sensing and in situ instrumentation during the Cleancloud Helmos OrograPhic site experimeNt (CHOPIN)

Romanos Foskinis[1], Nicole Clerx[1], Marilena Gidarakou[2], Christos Mitsios[3], Carolina Molina[3], Kaori Kawana[3], Prodromos Fetfatzis[4], Maria Gini[4], Olga Zografou[4], Konstantinos Granakis[4], Aiden Jönsson[5], Paul Zieger[5], Lu Zhang[6], Andreas Massling[6], Mika Komppula[7], Konstantinos Eleftheriadis[4], Alexandros Papayannis[2], Alexis Berne[1], Athanasios Nenes[1,3]

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We present results from the CHOPIN (“Cleancloud Helmos OrograPhic site experimeNt”) campaign during autumn & spring (October 2024 – April 2025) at Mt.Helmos in the Peloponnese, Greece. In situ and remote sensing measurements distributed at 6 sites along the lee side of the Mt. Helmos, 4 at the Kalavrita ski Center (altitude ~ 1690 m), 1 at the foothills (altitude ~ 1747 m) and the Helmos Hellenic Atmospheric Aerosol and Climate Change station ((HAC)^2) at the mountaintop (altitude ~ 2314 m) constrain aerosol-cloud interaction. We focus on the drivers of droplet formation and the degree to which clouds are aerosol- vs. velocity-limited.

EAC2025_PO1-7_1174_Foskinis.pdf

PO1: 8

Interactions between urban heat island (UHI) and urban pollution island (UPI) under key atmospheric conditions

Andrea Cecilia[1], Annalisa Di Bernardino[2], Margherita Erriu[2], Anna Maria Siani[2], Giampietro Casasanta[1], Marianna Conte[1], Lorenzo Marinelli[3], Stefania Argentini[1]

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This study investigates the interaction between nighttime urban heat island (UHI) and daily urban pollution island (UPI) in Rome, Italy, from 2018 to 2024, focusing on three atmospheric conditions: low wind speed, atmospheric stagnation, and heat waves. Under these conditions, statistically significant negative correlations are found for PM_{10}, $PM_{2.5}$, NO_2, and NO, but only in winter, indicating a seasonal dependency. In contrast, the positive correlation between for O_3 remains consistent across seasons. The results suggest that both phenomena peak in intensity under the same conditions, emphasizing the need to consider them jointly when assessing urban environmental impacts.

EAC2025_PO1-8_828_Cecilia.pdf

PO1: 9

Long-term aerosol acidity in the urban center of Athens, Greece

Aikaterini Bougiatioti[1], Kalliopi Petrinoli[1,2], Iasonas Stavroulas[3], Maria Tsagkaraki[2], Nikolaos Mihalopoulos[1]

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Particle water (liquid water content, LWC) and aerosol pH are important parameters of the aerosol phase, affecting heterogeneous chemistry and secondary aerosol formation. In this context, LWC and pH estimates covering a 6-year period was performed for an urban background site in Athens, Greece. High-temporal variability chemical composition derived from an Aerosol Chemical Speciation Monitor is used for SO_4^{2-}, NH_4^+, NO_3^-, Cl^- and organics as input for ISORROPIA II, while levels of the remaining ions are obtained from concurrent daily filter analysis. Results show a clear seasonal variability, linked to sources such as biomass burning and mineral dust transportation.

EAC2025_PO1-9_977_Bougiatioti.pdf

PO1: 10

Do Medicanes promote high dust concentrations in Italy? – A case study on the 2014 Medicane ‘Qendresa’

Franziska Vogel[1], Fabio Massimo Grasso[2], Umberto Rizza[2], Marco Zanatta[1], Angela Marinoni[1]

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Medicanes are hurricane-like cyclones that occasionally occur in the Mediterranean. Due to their rotation, they can have the potential to move dust loaden air masses from the Saharan desert towards Europe. Measurements on Monte Cimone of the coarse particle concentration showed very high values on the 7th November, 2014, which is the day on which Medicane Qendresa intensified. We used the WRF-Chem model to simulate dust transport from Sahara towards the Mediterranean basin. Early results show that this Medicane is dispersing dust particles around its core, but also releases sea spray particles under strong wind conditions at ocean surface.

EAC2025_PO1-10_781_Vogel.pdf

PO1: 11

Heavy Metal(loid) fluxes and microbial community associated to Bulk Atmospheric Deposition in the port area of Ancona

Matteo Fanelli[1], Marco Basili[1], Grazia Marina Quero[1], Emanuela Frapiccini[1], Lorenzo Massi[2], Federico Girolametti[2], Behixhe Ajdini[2], Cristina Truzzi[2], Anna Annibaldi[2], Pierluigi Penna[1], Gian Marco Luna[1], Silvia Illuminati[2]

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Bulk Atmospheric Depositions were studied inside the Ancona port. Samples were collected from June 2021 to June 2023 and treated differently for Heavy Metal(loid)s (HMs) and Microbiome (MB) analysis. HMs were determined by GF-AAS, AFS, and DMA in soluble and insoluble fractions, separated by filtration.

Microbiome community composition was assessed through 16s RNA sequencing. Depositional Fluxes for each HM was evaluated and sources apportionment was performed through Enrichment Factor and multivariate analysis.

Intra and interannual differences were observed for HMs and MB. Shipbuilding activities and traffic (maritime and vehicular) resulted to be the principal anthropogenic sources on the area.

EAC2025_PO1-11_551_Fanelli.pdf

PO1: 12

Characterization of the Atmospheric Microbiome in a Semi-Rural Area of Central Europe Using Flow Cytometry

Ernest Abboud[1], Pierre Rossi[2], Benoit Crouzy[3], Athanasios Nenes[1,4], Kalliopi Violaki[1]

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The characterization and identification of bioaerosols are crucial for understanding their impact on Earth's systems. Flow cytometry is a powerful tool for bioaerosol analysis. We established a protocol to quantify and characterize bioaerosol samples (n = 39) from a semi-rural site in central Europe (Payerne, Switzerland). A live/dead protocol was optimized using two nucleic acid stains: Syto13 for all cells and Propidium Iodide for dead cells. Following acquisition, a clustering algorithm (FlowSOM) identified populations with low and high nucleic acid content (e.g., bacterial cells and dead bioaerosols or fungal spores and protists, respectively).

EAC2025_PO1-12_1172_Abboud.pdf

PO1: 13

Bicycle-based mapping of black carbon across the streets of Milan

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

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Black carbon (BC) in urban areas mainly originates from vehicular emissions, residential heating, and industry. Due to its climate and health impacts, the European Environmental Agency classifies BC as a pollutant of emerging concern. Fixed monitoring stations lack the spatial resolution to capture BC variability, making mobile measurements a valuable alternative. This study, as part of RI-URBANS project, used bicycle-mounted microAeth® devices to measure BC in Milan across four seasons. Results showed higher concentrations near roads, varying by season and time of day. The study aims to develop a street-level land use regression (LUR) model to improve air quality assessments.

EAC2025_PO1-13_760_Mardonez Balderrama.pdf

PO1: 14

URBAN EMISSIONS FATE TOWARDS SECONDARY AEROSOL FORMATION; A CHAMBER STUDY

Sana Farhoudian[1], Rabbia Asgher[1], Avinash Kumar[1], Shawon Barua[1], Fariba Partovi[1], Matti Rissanen[1,2]

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Vehicles, cooking emissions & volatile chemical products emit substantial quantities of volatile, semi-volatile & intermediate-volatility organic compounds, which contribute to considerable secondary organic aerosol production. Once VOCs are released into ambient atmosphere, they undergo oxidation, partition between gas & particle phases & ultimately integrate into primary and secondary organic aerosols, thereby introducing uncertainties into health risk assessments. Here, chamber experiments were conducted for various VOC precursors (daytime & nighttime) under different conditions & NOx levels & the biogenic impact factors on aerosol yields and composition. Additionally, a low NOx future scenario was explored, assuming reductions in emissions from incomplete combustion.

EAC2025_PO1-14_1091_Farhoudian.pdf

PO1: 15

Antibacterial electrospun wound dressing with flame-made Ag/SiO2 nanoparticles

Reshma V. Ramachandran[1,2], Jennifer Geara[3], Maria Samara[1,2], Thomas Thersleff[4], Ning Xu Landén[3], Georgios A. Sotiriou[1,2]

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Infections significantly hinder wound healing, leading to severe complications and increased healthcare costs. The rise of antibiotic resistance necessitates innovative solutions. We present an approach using antimicrobial nanomaterials, specifically nanosilver, in wound dressings. Our research developed electrospun nanofibrous membranes from polyvinyl alcohol (PVA) and chitosan, infused with Ag/SiO_2 nanoparticles via flame spray pyrolysis. These dressings demonstrated potent antibacterial activity against MRSA and *P.aeruginosa* in ex-vivo and human skin models while maintaining biocompatibility. This novel strategy offers a scalable, cost-effective, and antibiotic-free solution for advanced wound care, addressing a critical need in the medical field.

EAC2025_PO1-15_1178_Ramachandran.pdf

PO1: 16

Decreasing or increasing pollution in the Mediterranean atmosphere? 16 years of black carbon observations at the Monte Cimone GAW Global Station integrated with FLEXPART and COPERNICUS products.

Marco Zanatta[1], Paolo Bonasoni[1], Paolo Cristofanelli[1], Sabine Eckhardt[2], Nikolaos Evangeliou[2], Cecilia Magnani[1], Davide Putero[1], Laura Renzi[1], Franziska Vogel[1], Angela Marinoni[1]

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Black carbon (BC) is a key climate-warming aerosol, with its impact varying across space and time. In the Mediterranean, a climate change hotspot, long-term observations are essential to understand BC trends. At Monte Cimone (CMN), BC has been continuously monitored since 2007, revealing seasonal variations with higher summer concentrations. FLEXPART simulations show increased summer biomass burning contributions, while ERA5 data highlight meteorological influences. A long-term decline in BC was observed, though recent trends suggest a reversal since 2016–2017, potentially linked to regional warming. Further analysis will explore how meteorological changes and emissions affect BC variability at CMN.

EAC2025_PO1-16_334_Zanatta.pdf

PO1: 17

Effects of Soil Amendments on Soil Carbon Sequestration Stability and Nutrient Availability in Fukuyama Lettuce: Applications of Biochar and Black Soldier Fly Frass

Man-Chu Hsiao, Chang-Tanh Chang

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This study examines the effects of biochar and black soldier fly frass as soil amendments on Fushan lettuce. Field experiments revealed that optimal application ratios enhance soil carbon sequestration stability and nutrient supply, promoting crop growth. Significant increases in lettuce leaf length and width were observed with these treatments. While total soil nitrogen content increased slightly, total carbon levels decreased, indicating that microbial decomposition released some carbon into the atmosphere, impacting soil carbon content.

EAC2025_PO1-17_856_Hsiao.pdf

PO1: 18

Investigating New Particle Formation and Growth over an Urban Location in the Eastern Mediterranean

Yinon Rudich

Weizmann Institute, Israel

New Particle Formation (NPF) is a key atmospheric process affecting cloud condensation nuclei and climate. However, the chemical species driving NPF and growth in the Mediterranean Basin remain uncertain. This study conducted high-resolution aerosol, gas, and particulate composition measurements at a semi-urban site in the eastern Mediterranean (Rehovot, Israel) in 2021 and 2023. A hybrid source apportionment analysis identified ammonium sulfate and oxidized organics in daytime nucleation, with semi-volatile species contributing to growth. Nighttime events involved only semi-volatile species and ammonium sulfate. Chemical imaging confirmed internal particle heterogeneity, supporting hybrid PMF findings and highlighting the role of gas-phase photochemistry in NPF.

EAC2025_PO1-18_619_Rudich.pdf

PO1: 19

The Italian Automated Lidar Ceilometer Network ALICENET: From Near Real-time Monitoring to Long-term Characterisation of Aerosol Vertical Distributions across Italy

Francesca Barnaba[1], Annachiara Bellini[2], Alessandro Bracci[1], Henri Diemoz[2], Luca Di Liberto[1], Caterina Mapelli[1,3], Ferdinando Pasqualini[1]

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ALICENET, the Italian Automated Lidar Ceilometer Network, is a wide cooperative consortium involving several regional environmental protection agencies, universities, research centres and private companies. Through active remote sensing, ALICENET continuously (24/7) monitors aerosol vertical distributions across the country. A key strength of ALICENET is its centralised data processing, which converts raw instrumental data into quality-controlled information on aerosol properties and vertical layering. This contribution aims at presenting the network and its quantitative capabilities, complementing other aerosol measurements and model-based approaches to characterize aerosol processes at different spatial and temporal scales across Italy and Central Mediterranean.

EAC2025_PO1-19_867_Barnaba.pdf

PO1: 20

State of the art of lunar sun-photometry algorithms and application to Izaña 2023 MAPP campaign

Monica Campanelli[1], Victor Estelles[2], Gaurav Kumar[2], Africa Barreto[3], Natalia Kouremeti[4], Roberto Roman[5], Ramiro Gonzalez[2], Pablo Gonzalez[3], Lionel Doppler[6], Mauro Mazzola[7], Anca Nemuc[8], Stefano Casadio[9], AnnaMaria Iannarelli[9], Paola Russo[10]

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In this work we present the state of the art of lunar sun- photometry algorithms. We will intercompare the aerosol optical depth values retrieved with the 4 actually available algorithms from measurements taken by the standard instruments of the 3 international sun-photometer networks, SKYNET, AERONET and PFR, simultaneously operating during an international MAPP-EMPIR campaign held in 2023 in the Izaña Observatory in Tenerife, Canary Islands

EAC2025_PO1-20_501_Campanelli.pdf

PO1: 21

Ground-Based Comparison and Validation of ATLID/EarthCARE L2 Aerosol and Cloud Products: Integrating E-PROFILE and AERONET Data

Onel Rodríguez-Navarro[1,2], Jorge Muñiz-Rosado[1,2], Alberto Cazorla[1,2], Roberto Román[3,4], Alexander Haefele[5], Eric Sauvageat[5], Ana Del Águila[1,2], Daniel Pérez-Ramírez[1,2], Lucas Alados-Arboledas[1,2], Francisco Navas-Guzmán[1,2]

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The EarthCARE satellite, a joint ESA-JAXA mission launched in May 2024, aims to improve our understanding of cloud-aerosol-radiation interactions. This study validates aerosol products from EarthCARE's ATLID lidar using ground-based data from E-Profile and AERONET. Over 800 satellite overpasses have been analyzed, comparing ATLID-derived Level 2 products with direct and GRASP-inverted ground measurements. Key validated parameters include aerosol optical thickness, backscatter/extinction profiles, and PBL height, retrieved using STRATfinder. The synergy between spaceborne and ground-based observations enhances the accuracy of aerosol characterization, contributing to improved climate and atmospheric studies.

EAC2025_PO1-21_1028_Rodríguez-Navarro.pdf

PO1: 22

Optical and microphysical properties of local and long-range transport biomass burning aerosols with remote sensing techniques

Riccardo Damiano[1], Alessia Sannino[1], Zeeshan Ali[1], Matteo Manzo[1], Salvatore Spinosa[1], Salvatore Amoruso[1], Antonella Boselli[2]

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In summer of 2017, wildfires near Mount Vesuvius (Italy) and in British Columbia (Canada) led to biomass burning aerosols over the ACTRIS National Facility of Naples. Using lidar and sun-photometer data, a comparison between fresh (local) and aged (transported) particles was carried out. Local aerosols had higher AOD, smaller particles and stronger absorption. Lidar data showed a single layer for local fires and three layers for Canadian fires. The stratospheric layer of Canadian smoke had high depolarization (about 30%). Findings emphasize aging effects on aerosol properties and the importance of multi-instrument observations for complete aerosol characterization.

EAC2025_PO1-22_516_Damiano.pdf

PO1: 23

Validation of aerosol extinction and mass profiles derived from elastic LIDARs using in-situ measurements

Martine Collaud Coen[1], Maxime Hervo[1], Lena Fasnacht[1], Melania van Hove[2], Benjamin Brem[3], Robin Modini[3], Martin Gysel-Beer[3], Augustin Mortier[4], Martine Collaud Coen[5], Alexander Haefele[1]

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The E-Profile network can help to fill observational gaps and reduce uncertainties in the global aerosol mass concentration. The V-profile retrieval produce extinction and mass profiles from low-power lidars to quantify the aerosol mass (e.g. dust, ash or biomass burning). This study evaluates the quality of this new product by comparisons with in-situ observations in Switzerland. The 10 years timeseries at Kleine Scheidegg and Jungfraujoch offer in-situ data outside the blind zone of the Lidar, whereas comparison at Payerne are done in well-mixed atmosphere. Improvements of the choice of the lidar ration and the extinction to mass coefficient are described

EAC2025_PO1-23_346_Collaud Coen.pdf

PO1: 24

Deep-Pathfinder algorithm for ground-based assessment of ATLID/EarthCARE L2 aerosol product

Laurel Molina-Párraga[1,2], Ana del Águila[1,2], Jorge Muñiz-Rosado[1,2], Onel Rodriguez-Navarro[1,2], Alexander Haefele[3], Eric Sauvageat[3], Francisco Navas-Guzmán[1,2], Lucas Alados-Arboledas[1,2]

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Understanding the vertical structure of the atmosphere is essential for monitoring clouds and aerosols. The planetary boundary layer (PBL) plays a key role in climate dynamics, and its retrieval benefits from both satellite and ground-based observations. This study evaluates Deep-Pathfinder, a U-Net-based algorithm, for estimating PBL height from ceilometer data. Comparisons with EarthCARE-derived products over Granada show good agreement, with some discrepancies likely due to wavelength differences. Deep-Pathfinder was adapted to be applied on historical data from Granada E-Profile station. Its potential application across the E-Profile network highlights its value in enhancing remote sensing atmospheric profiling capabilities.

EAC2025_PO1-24_1187_Molina-Párraga.pdf

PO1: 25

Enhanced Fire Detection in Industrial Complexes Using Scanning LiDAR Technology

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LiDAR-based fire detection improves real-time monitoring by overcoming limitations of conventional imaging. A dual-wavelength scanning LiDAR was developed, enabling 360° observation and PM concentration analysis. Field tests in Siwha Industrial Complex confirmed its potential for early fire detection.

EAC2025_PO1-25_939_Kim.pdf

PO1: 26

Integrating remote sensing and in-situ measurements to assess the impact of PBL dynamics on air pollution in Milan, Po valley (Italy)

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The study investigates the influence of the Planetary Boundary Layer (PBL) on air pollution in Milan, located in the Po Valley, one of the most polluted regions in Europe. Combining remote sensing and in-situ measurements from 2023, it examines aerosol properties and vertical mixing. The mixed aerosol layer height shows a strong anti-correlation with black carbon concentrations, highlighting the role of PBL dynamics in pollutant dispersion. While primary emissions are strongly affected by vertical mixing, secondary aerosols show more complex patterns. By integrating both techniques, the study offers valuable insights into emission, dilution, and atmospheric transport for air quality monitoring.

EAC2025_PO1-26_595_Perfetti.pdf

PO1: 27

Remote Sensing Observations of Aerosol-Cloud Interactions in a Nitrogen Polluted Environment

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Aerosol-cloud interactions (ACI) are a significant source of uncertainty in climate projections. The Cloud-Aerosol Interactions in a Nitrogen-dominated Atmosphere (CAINA) project particularly focuses on understanding how reactive nitrogen influences ACI by bringing together in-situ observations, remote sensing and modelling. This study focuses on the quantification of cloud impacts caused by these aerosol particles by bringing together remote sensing observations and aerosol speciation measurements at the Cabauw Observatory (Netherlands).

EAC2025_PO1-27_771_Sinha.pdf

PO1: 28

Synergy of PollyXT Lidar & sun/sky photometer to retrieve aerosol properties utilizing GRASP algorithm in Limassol, Cyprus

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Limassol city in Cyprus is strongly influenced by the aerosol transport from neighboring regions. In this study selected cases of different atmospheric conditions will be used to characterize aerosol layers in Limassol by retrieving optical and microphysical properties. The Generalized Retrieval of Atmosphere and Surface Properties (GRASP) algorithm is used for the retrieval of particles' size distribution, complex refractive index, AOD and the aerosol vertical distribution. Dust, smoke, and marine-dominated cases were analyzed and compared with measurements from the instruments. The synergy of PollyXT Polarization Raman Lidar and the CUT-TEPAK AERONET enables the characterization of fine and coarse mode aerosols.

EAC2025_PO1-28_766_Savva.pdf

PO1: 29

Assessment of microplastic particle exposure in indoor football halls by correlative microscopy

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A correlative microscopy approach was developed to assess inhalative exposure to micro- and nanoscale plastics (MNP) in complex indoor aerosols. Scanning electron microscopy (SEM) and Raman microscopy were integrated with AI-driven software for precise particle identification and quantification. This method was applied to aerosol samples from indoor football halls in Norway, comparing exposure to particles from natural (olive stone) and synthetic (tyre rubber) turf fillings. The approach enables accurate airborne concentration estimates of MNPs, addressing key challenges in exposure assessment and potential health risks for indoor environments.

EAC2025_PO1-29_700_Stange.pdf

PO1: 30

Optimized Flotation Separation for the Characterization of Airborne Microplastics

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The European Commission's 2020 Action Plan aims to improve air quality also by reducing airborne microplastics (MPs), which pose health risks, including occupational diseases due to inhalation of plastics like polyvinyl chloride. MPs can also carry toxic contaminants, leached through degradation or abrasion. This study presents an optimized flotation technique for isolating MPs from particulate matter (PM), followed by GC-MS and HPLC-MS/MS analysis for contaminants' characterization. The method was validated using NIST SRM 2585 and applied to airborne PM samples. Results showed that flotation effectively separates MPs, enabling the identification of toxic additives, highlighting the method's potential for exposure studies.

EAC2025_PO1-30_1106_Fricano.pdf

PO1: 31

Inhaled nanoplastics as vectors for benzopyrene: Unveiling a synergistic mechanism of airway toxicity using air-liquid interface exposure

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Respiratory diseases have highlighted environmental concerns, with plastics identified as key pollutants due to their interaction with air contaminants. We aimed to assess the toxicity of polyethylene terephthalate nanoplastics (PET-NPs) contaminated with benzo(a)pyrene (BaP). We coated PET-NPs with BaP, and exposed the Calu-3 cell line to single and repeated exposures to the pollutants alone or combined at the air-liquid interface. Transmission electron microscopy showed that PET-NPs were internalized by the cells. BaP and BaP-coated PET-NPs increased cytochrome P1A1 activity, confirming BaP bioavailability when adsorbed onto PET-NPs. Only BaP-coated PET-NPs triggered antioxidant and pro-inflammatory responses, suggesting a synergistic mechanism of toxicity.

EAC2025_PO1-31_1042_MAWAS.pdf

PO1: 32

Atmospheric microplastics modelling and quantification using Gibbs sampler

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Atmospheric microplastics budget is estimated and associated uncertainties are quantified using microplastics measurement from Brahney et al. (2020). Since the number of unknowns in the domain is larger than the number of measurements, we regularize the space of possible solutions using spatial-temporal patterns from previously reported sources and using source-receptor-sensitivities from FLEXPART 11. The optimization of measurements is based on Gibbs sampling method. We construct a hierarchical Bayesian model whose parameters are optimized using Gibbs sampler. The total estimated emissions are 1336 Gg/y, while the associated uncertainty is almost on the same level as emissions.

EAC2025_PO1-32_1031_Tichý.pdf

PO1: 33

Airborne Microplastic: Dry vs. Wet Precipitation Effects and Morphological Evaluation

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This study examines the impact of precipitation on airborne microplastic deposition in Porto, Portugal, by comparing concentrations before and during rainfall. Samples were collected in summer (June-July 2024) and separated into five size fractions for analysis using Raman spectroscopy and SEM imaging. Preliminary results show: wet deposition increases microplastic accumulation by facilitating particle washout, while dry deposition results in slower but prolonged accumulation. Morphological analysis revealed blue microplastics and fibers as the most common colors, likely due to the stability of blue dye. These findings emphasize the importance of standardized monitoring and research on seasonal variability and transport mechanisms.

EAC2025_PO1-33_864_Logvina.pdf

PO1: 34

Analysis of microplastics in airborne particulate matter (PM) in Krakow, south Poland: Review of separation techniques, in vitro toxicity, and health impacts

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Microplastics (MPs) are widespread pollutants traveling through various pathways, with air being a key vector. Their presence in airborne particulate matter (PM) raises health concerns, particularly regarding respiratory and cardiovascular diseases. This study examines MP separation, identification, and characterization in PM collected in Krakow, Poland, emphasizing in vitro toxicity research. The review explores PM sampling, MP extraction, and analytical methods while highlighting the need for standardized protocols. Potential health effects, including oxidative stress and inflammation, are discussed. This study provides a methodological framework to support further research on MPs' impact on air pollution and human health.

EAC2025_PO1-34_656_Uchmanowicz.pdf

PO1: 35

Indoor and Outdoor Airborne Microplastics in School Settings

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Indoor air quality in schools is crucial for children's health, as their developing respiratory systems and higher breathing rates make them more vulnerable to pollutants. This study, conducted in a school in Vilnius, Lithuania, examines the presence and characteristics of microplastics (MPs) in indoor air. The results show that MPs in the **100–500 µm** size range dominate indoors, comprising up to **60%** of total particles, with **black and blue** being predominant. Outdoors, MPs are generally smaller (**50–250 µm**) and primarily **black and white**.

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EAC2025_PO1-35_324_Byčenkienė.pdf

PO1: 36

Microplastic particles in atmospheric bulk deposition samples in Berlin, Germany

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Monthly atmospheric bulk deposition samples of microplastic particles were collected for one year in Berlin, Germany, and analyzed to identify polymer types, sizes, shapes and colors of atmospheric MP particles. Bulk deposition rates varied from approximately 300 to 1900 m^{-2} day^{-1}, with the lowest deposition rates in summer. Precipitation was not well-correlated with deposition rates, indicating a contribution of both dry and wet deposition. Overall, polypropylene (PP) and polystyrene (PS) were the most abundant polymer types, however, the abundance of polymers was seasonally variable. Additionally, differences in polymer types, shape and color were found in different size fractions.

EAC2025_PO1-36_239_Held.pdf

PO1: 37

Quantification of Near Real-Time Tyre Wear Particles in the Ambient PM2.5 Using Online Aerosol Mass Spectrometer

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This study presents a novel method for near real-time quantification of tyre wear particles (TWPs) in ambient PM2.5 using an online aerosol mass spectrometer. The method uses cryo-milled tyre particles to create reference mass spectra from ACSM for ambient TWP monitoring. The analysis at an urban London site showed TWP concentrations of 0.22 ± 0.58 µg/m³, highlighting a critical need for updated regulatory measures. This approach fills a significant gap in TWP emissions measurement, aiding policymakers in understanding human exposure risks and developing public health protection strategies.

EAC2025_PO1-37_374_Fang.pdf

PO1: 38

Size segregated, highly-time resolved elemental source apportionment at two European transportation hotspots

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The transport sector significantly contributes to elemental emissions in particulate matter (PM), with road traffic and shipping as key sources. This study analyses emissions through two monitoring campaigns using high-time resolution elemental data. Measurements were conducted with an Xact 625i ambient metals monitor in Barcelona and Milan, capturing $PM_{2.5}$ and PM_{10} with a switching inlet for size-segregated sampling. SoFi Pro software is used for source apportionment, interpolating between size fractions. This approach aims to differentiate emissions such as traffic, shipping, and industry, revealing distinct patterns in elemental composition based on size, source, and environmental influences at each site.

EAC2025_PO1-38_330_Windell.pdf

PO1: 39

Electrical Charging State and Effective Density of Brake Wear Particles

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Brake wear particles, generated from the pad – disc contact, are a significant contributor to PM10 in urban areas. These particles have recently been suggested to be highly charged, which may have implications on their atmospheric lifetime and deposition in the lung. This work investigates how the charging state of brake wear particles is influenced by brake pad type and braking conditions. We find that brakes produce both positively and negatively charged particles, but that negatively charged particle emissions dominate in all studied cases except one, indicating that both pad type and braking conditions influence brake wear particle charging state.

EAC2025_PO1-39_1037_Bengtsdotter.pdf

PO1: 40

Investigations of Gaseous Emissions from Vehicle Braking Process with Chemical Ionization Mass Spectrometry

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Here, we focus on the characterization of volatile and semi-volatile organic compounds emitted from the braking process of vehicles. For the first time, we have utilized the pin-on-disc tribometer, combined with the high-resolution time-of-flight chemical ionization mass spectrometer and aerosol size distribution instruments to characterize gaseous emissions and ultrafine particles from the braking process of semi-metallic brake pads used in heavy-duty vehicles. Our results show that as the temperature at the brake pad-disc interface rises, more oxidized volatile organic compounds as well as semi-volatile organic compounds (SVOCs) are released. The SVOCs nucleate and grow into larger particles.

EAC2025_PO1-40_1075_Kisimbiri.pdf

PO1: 41

On-Road Measurements of Wetness, Road Dust and Tyre Wear Particle from Truck

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Non-exhaust particle emissions are an increasing danger to air quality mainly in urban areas. This study measures both particle concentrations close to a truck wheel in traffic and other parameters during the same occasion that would improve the understanding of those relationships. Due to a commonly wet weather in this part of the world splash and spray from the wheel is analysed by a wetness sensor inside the wheelhouse at all times. The sensor data is then used to start and stop the particle measurements in order to protect the OPS from damage.

EAC2025_PO1-41_1087_Janhäll.pdf

PO1: 42

Identification of Non-Exhaust Emissions in Laboratory and Field Measurements

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Vehicle-derived particulate matter (PM) consists of exhaust and non-exhaust emission. Non-exhaust emissions like brake wear particles (BWPs) have gained attention due to their metal-rich composition (Fe, Cu, Ba). Using single-particle mass spectrometry (SPMS), we characterized non-exhaust emissions from a GTR24 inspired brake dynamometer and compared them with ambient measurements near a highway. SPMS identified elevated Ba- and Fe-containing particles as BWP markers. Simultaneous background measurements at a rural site confirmed their traffic-related origin. The mobile SPMS system enables real-time non-exhaust emission detection, providing insights into source apportionment, transport, and transformation, supporting EURO7 regulations on non-exhaust emissions.

EAC2025_PO1-42_290_Jeong.pdf

PO1: 43

An experimental characterization of PM emissions from railway braking events for the design of sustainable brake pads

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Non-exhaust PM emissions from transports and particularly from rail transport are steadily increasing over years. The present work reports the application of an experimental procedure for investigating PM emissions produced by railway vehicles brake pads. Different brake pad materials have been tested during tests that simulates the real route of typical trips travelled by suburban trains. Relationships between the main parameters of the brake events and PM_{10}, $PM_{2.5}$ and PM_1 emissions were detected. The results can be useful to develop the optimal brake pad formulations with low-environmental impact and to set specific measures on pads composition for brake-related non-exhaust emissions.

EAC2025_PO1-43_299_De Falco.pdf

PO1: 44

Chemical and Morphological Characterisation of Particulate Matter from Brake Pads

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Non-exhaust emissions (NEE) from braking systems contribute to over 50% of vehicle particulate matter (PM). The Euro 7 standards (UN GTR-24) impose a 7 mg/km/vehicle limit, pushing the industry towards low-wear materials. RAICAM Industrie S.R.L. investigates PM10 and PM2.5 emissions from Low Steel (LS) and Non-Asbestos Organic (NAO) brake pads, tested against grey cast iron and coated discs. PM samples were analysed for morphology, chemical composition, number, and mass using SEM-EDS, XRD and other techniques. Results show LS pads emit more PM than NAO. Ongoing research aims to better understand emission mechanisms and develop effective mitigation strategies.

EAC2025_PO1-44_849_Gomiero.pdf

PO1: 45

Chemical composition of brake wear particles – results from two different brake pads

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Due to stricter regulations, particulate exhaust emissions from vehicles have been decreasing. As a result, non-exhaust emissions, including those from brakes and tires, contribute more significantly to the total particulate matter concentrations in urban areas. This study focuses on the particulate emissions from two different types of brake pads, with an emphasis on the chemical composition of the emitted particles. Brake particles were produced by using a dynamometer with the WLTP brake cycle. Brake wear particles emitted by both brake pads consisted mostly of Fe. Particles contained also Cu, Zn, Sn and Ba, the composition depending on the tested pad.

EAC2025_PO1-45_838_Saarikoski.pdf

PO1: 46

Impact of Brake Pad Composition on Non-Exhaust Particle Emissions

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Non-exhaust particle emissions are a significant source of air pollution, particularly those generated by brake wear. This study examines how different brake pad formulations affect particle emissions. Controlled braking tests were conducted to measure the concentration and composition of emitted particles. The results show differences of up to two orders of magnitude in ultrafine particle emissions depending on the formulation, as well as variations in their composition. These findings highlight the influence of friction materials on the quantity and characteristics of the generated emissions.

EAC2025_PO1-46_793_Al-Wasif Ruiz.pdf

PO1: 47

Size distributions and black carbon emissions from two comparable brake pads

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Brake emissions are a significant part of non-exhaust emissions (NEE), which are not yet regulated. Brake emissions have been found to significantly impact urban air quality especially particulate matter.

In our study we measured brake emissions utilizing a brake dynamometer at VTT facilities. WLTP-brake cycle was chosen for the test with variations of it which simulate regenerative braking available on electric vehicles and with extra weight of 300kg.

Regenerative braking was found have a significant effect on PM and BC emissions where as importance of extra weight is not as prominent.

EAC2025_PO1-47_622_Hoivala.pdf

PO1: 48

Characterisation and Tribological Performance of Brake Wear Emissions

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The study analyzes particulate emissions from brake wear, a major source of urban particulate matter. Using a "Pin on Disc" (PoD) tribometer, three types of brake pads were tested on different discs to measure particle size distribution (10-560 nm), number concentration, and the chemical composition of collected PM_{10}.

A new innovative acid mixture was tested for sample dissolution to determine 25 inorganic elements with ICP-OES and ICP-MS instrumentation. Chemometric analysis (PCA) highlighted correlations between the composition of friction materials and emitted particulate, aiming to improve material formulations to reduce PM_{10} emissions and identify specific inorganic markers of constituents.

EAC2025_PO1-48_302_Diana.pdf

PO1: 49

The Effect of Collection Systems in TRWP Measurements: Impacts on Physical and Chemical Characterization

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This study examines impact of collection system design to the physical and chemical properties of tire and road wear particles (TRWP). A controlled roller test bench experiment compared a housing-based system, which encapsulates the tire, to a nozzle-based system, where the tire remains exposed. Identical test conditions were maintained using a novel measurement methodology. Results show that the housing-based system yields 3 to 10 times higher particle number concentrations than the nozzle-based system. Differences in particle size distribution and elemental composition (Micro-XRF) highlight the need for standardized TRWP collection protocols to improve accuracy in environmental impact assessments.

EAC2025_PO1-49_151_Celenlioglu.pdf

PO1: 50

Evaluating the Repeatability of Tire Wear Particle Measurements in a Novel Housing-Based Collection System

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Accurate and repeatable measurement methodologies are essential for ensuring comparability and reliability in non-exhaust emission assessments. This study investigates the repeatability of a novel housing-based tire road wear particles (TRWP) sampling system under controlled roller test bench conditions. High-resolution particle number concentration (PNC) measurements were conducted across three speed sections of a standardized driving cycle. Results demonstrated increased concentrations and reduced coefficient of variation (CoV) at higher speeds, improving measurement stability and minimizing variability. These findings emphasize the necessity of standardized procedures to enhance TRWP data comparability and facilitate interlaboratory reproducibility.

EAC2025_PO1-50_152_Celenlioglu.pdf

PO1: 51

High Time Resolution Quantification of PM2.5 Oxidative Potential and Reactive Oxygen Species

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Exposure to airborne PM has been attributed to a wide range of adverse health impacts and millions of premature deaths annually. Recent studies have widely suggested that oxidative potential (OP), defined as the capability of particles to catalytically produce reactive oxygen species (ROS) with subsequent depletion of antioxidants, is key to determining the health effects of PM exposure.In this work, we discuss the deployment of two high time resolution instruments which quantify OP (OOPAAI) and ROS (OPROSI) across London. We reveal the dyanamics of OP as well as the PM components and major source contibutors to OP.

EAC2025_PO1-51_946_Campbell.pdf

PO1: 52

International intercomparison of methodologies for measuring the oxidative potential of PM using ascorbic acid assay

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A new international intercomparison of oxidative potential of PM protocols using AA assay has been launched, as part of a joint RI-URBANS and ACTRIS effort. This work relies on the participation of 28 different laboratories in the world to test a simplified OP-AA protocol protocol with their own equipment. The simplified protocol was elaborated in IGE by testing different key parameters, which differ in the existing protocols. The intercomparison started on March 24th with the shipment of reagents and samples. After gathering the results, data treatment to assess their reproducibility was done anonymously by the EU Joint Research Center.

EAC2025_PO1-52_943_Marsal.pdf

PO1: 53

Oxidative potential of fine aerosols in sleeping micro-environments: a one-year study in Lisbon area dwellings

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Recent studies show that indoor air can be more polluted than outdoor air, however sleeping micro-environments are often overlooked in exposure assessments. This study evaluated the Oxidative Potential (OP) of $PM_{2.5}$ in 30 homes in the Lisbon metropolitan area. Results

indicate that in 90% of cases, indoor OP (285±167 pmol.min^{-1}.m^{-3}) was higher than outdoor OP (135±101 pmol.min^{-1}.m^{-3}). Further research is needed to identify pollution sources affecting OP in fine aerosols to reduce human exposure and mitigate health impacts in sleeping environments.

EAC2025_PO1-53_776_Gonçalves.pdf

PO1: 54

Particle Toxicity and its Drivers in India: from Regional to Local Spatial Scales

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PM mass concentration may not be an appropriate metric to determine the health effects of particles. Oxidative potential (OP) can be used to assess the ROS (reactive oxygen species)--generating capacity of PM. The present study aims to examine particle toxicity of $PM_{2.5}$ measured across multiple spatial scales in India through a dithiothreitol assay. Water-extracted PM samples were subjected to acellular Dithiothreitol (DTT) assay for toxicological analysis. Particle toxicity measured through OP^{DTT} ranges from 0.6 - 5.4 nmol min^{-1} m^{-3}, while the $PM_{2.5}$ varies between 89 - 446 µg/m^3. Carbonaceous and elemental species are the major drivers responsible for ROS generation.

EAC2025_PO1-54_578_Dubey.pdf

PO1: 55

Global Health Map: Coupling EMAC and KM-SUB-ELF to estimate air pollution health effects using accurate iron soluble fractions

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We present a multi-scale modelling approach to link large-scale atmospheric chemistry-climate models with small-scale multiphase kinetic models to derive a *global health map*. We use the chemistry-climate model EMAC to derive air pollutant distributions with various time resolutions, and the lung model KM-SUB-ELF to simulate the production of reactive oxygen species, hydroxyl radicals and damage to biomolecules in the human lung.

EAC2025_PO1-55_708_Krüger.pdf

PO1: 56

Real-Time Oxidative Potential Monitoring: Performance of DTT and FOX-Based Systems

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Our study presents on-line methods to measure OP of both particulate and gaseous species and compares the results obtained using two different assays: dithiothreitol (OP_{DTT}) and Ferrous-Orange Xylenol (OP_{FOX}).

The comparison was conducted in three main phases :

(1) laboratory evaluation of the analytical systems' response using model compounds (e.g., H_2O_2, Cu^{2+}, 1,4-napthoquinone, welding fumes) ;

(2) comparison of the sampling efficiency of both systems and on-line measurement of controlled H_2O_2 and $CuSO_4$ concentrations and

(3) responses of both measurement systems to more complex situations such as welding fumes, gaseous oxidants and secondary organic aerosols generated in controlled conditions.

EAC2025_PO1-56_119_Audoux.pdf

PO1: 57

Investigating PM2.5 Toxicity: The Initial Comprehensive OP Study in Australia Utilising Various Acellular Assays

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This study addresses the research gap on $PM_{2.5}$ oxidative potential (OP) in the Southern Hemisphere by analysing an Australian metropolitan urban environment utilising three acellular assays. Over a year of sampling at two urban lsites, OP values have a weak correlation with $PM_{2.5}$ mass concentration. DTT had the most variability and seasonal peaks in winter due to wood heating, whereas AA peaks in autumn during hazard reduction burning. OP levels correlated with transition metals (particularly Fe and Cu) and carbonaceous species that make up 60% of local $PM_{2.5}$. Australian urban air quality management will benefit from these results.

EAC2025_PO1-57_780_Iram.pdf

PO1: 58

Buildings located in valley cities : An original study for the characterization of the human exposure to the infiltrated outdoor air with measurements of oxidative potential

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Breathable fine particles and black carbon (BC) within the air are known for their important health impacts. Two measurements campaigns have been carried out in winter 2023 and winter 2024 to study the contribution of the infiltrated outdoor air to the human air pollution exposure to $PM_{2.5}$ and to BC in six public buildings located in valley cities (South-East of France), including schools. The methodology of this study is the characterization of the impact of indoor-to-outdoor air dynamics on air pollutants levels, based on metrics such as i) biological human response to exposure and ii) source apportionment of BC emissions.

EAC2025_PO1-58_785_Decilap.pdf

PO1: 59

Chemical characterization and Oxidative Potential of fine particulate matter from rural, urban and industrial sites in Sicily within the NOSE 2 project

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Exposure to atmospheric particulate matter (PM) affects human health, especially the respiratory, cardiovascular, and neurological systems, due to excessive reactive oxygen species (ROS) formation; aerosol-induced ROS is defined as aerosol Oxidative Potential (OP). In 2023, PM samples were collected seasonally within NOSE 2 project at three Sicilian air quality stations: Palermo (traffic), Trapani (rural), and Priolo (petrochemical). OP analysis via DTT assay (OP_{DTT}) and OC/EC measurements revealed higher OP values traffic sites and variable levels in Priolo, within the Siracusa AERCA (High Environmental Crisis Risk Area), prompting further analysis on contributions from petrochemical industries.

EAC2025_PO1-59_316_Rapuano.pdf

PO1: 60

PM2.5 oxidative potential at urban and rural sites of the western Mediterranean basin

Nuria Galindo

Miguel Hernández University of Elche, Spain

$PM_{2.5}$ samples were collected simultaneously at an urban background station and a rural site located in southeastern Spain during summer and winter. The samples were analysed for a complete characterisation of their chemical composition. Additionally, OP measurements were carried out by the ascorbic acid (AA) and dithiothreitol (DTT) acellular assays. OP values were higher at the urban than at the rural station, indicating a higher oxidative capacity of $PM_{2.5}$ aerosols in the urban area. Differences were more pronounced for OP^{AA} than for OP^{DTT}, which indicates a lower variability of the DTT activity as a function of the site typology.

EAC2025_PO1-60_123_Galindo.pdf

PO1: 61

Source apportionment of PM2.5 oxidative potential at urban and rural sites of the western Mediterranean basin

Álvaro Clemente María, Noelia Gómez Sánchez, Nuria Galindo Corral, Marina Alfosea Simón, José Francisco Nicolás Aguilera, Javier Crespo Mira, Eduardo Yubero Funes

Miguel Hernández University, Spain

A total of 302 daily $PM_{2.5}$ samples were collected simultaneously at an urban background station and a rural site located in southeastern Spain during summer and winter.

Samples were analysed for OC, EC , water-soluble ions, WSOC, trace metals, levoglucosan and with the dithiothreitol assay (OP^{DTT}).

PMF was used to identify $PM_{2.5}$ sources while the OP^{DTT} apportionment was performed with MLR.

At the rural site, biomass burning was the greatest contributor to PM mass and OP^{DTT}.

A the urban site, although biomass burning and road traffic were not the highest contributors to $PM_{2.5}$, they were the main drivers of OP^{DTT}.

EAC2025_PO1-61_1129_Clemente María.pdf

PO1: 62

Differences in oxidative potential between rural and urban locations in the Netherlands and related source attributions for PM10

Marloes Fleur van Os[1], Johannes Cornelis Esveld[1], Baye Toulaye Pehan Thera[1], Floris Pekel[1], Anouk Marsal[2], Gaëlle Uzu[2]

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TNO is also focusing on the oxidative potential (OP) of particulate matter, to help steer towards more health relevant policies in the Netherlands. Chemical analysis and OP assays of PM10 are used to compare two locations, urban and rural, in the Netherlands. Subsequently, Positive Matrix Factorization (PMF) was performed on the chemical composition data to identify the contributing sources of PM. The OP values are then linked to the PM10 of source profiles through regression analysis to illustrate the contribution of each source to observed OP levels and thereby identify the most health-relevant sources.

EAC2025_PO1-62_163_van Os.pdf

PO1: 63

Field deployment of simultaneous particulate mass and DTT consumption monitoring system for coarse PM and PM2.5

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Since the mass of particulate matter (PM) in the atmosphere is composed of multiple compounds and particle sizes, and includes both harmless and harmful substances, with large variations in its spatiotemporal distribution, PM is a proxy indicator for understanding the effects on health. In this study, we focused on the oxidative potential of PM, which is also mentioned in the draft European Air Quality Directive (52022PC0542), and deployed a field monitoring system that measures the mass of fine particles ($PM_{2.5}$) and coarse particles (PM_c) and continuously and automatically analyzes their oxidative potential using the dithiothreitol (DTT) consumption.

EAC2025_PO1-63_190_Hagino.pdf

PO1: 64

Versatile Aerosol-based Nanomaterial Synthesis for Gas Sensing Applications

George Biskos

The Cyprus Institute, Cyprus

Nanomaterial synthesis by aerosol-based techniques offer a range of advantages including low-cost and continuous production, high reproducibility, good control over the size and composition of the resulting particles, high versatility, as well as minimum or even absence of

wastes. In this paper I will present a variety of evaporation-condensation aerosol nanoparticle generators and how these can be used to synthesize nanomaterials for gas sensing applications.

The resulting nanomaterials are capable of detecting gases across a broad concentration range, from a few percent down to few ppm. Example results will be presented for hydrogen, methane and nitrogen dioxide.

EAC2025_PO1-64_1081_Biskos.pdf

PO1: 65

Next-Gen Aerosol Tech: SAW-based Aerosol Sources for Industrial Applications

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We commercialize the first compact, integratable SAW-based atomizers and aerosol sources to pave the way towards their industrial application. Our SAW-based aerosol generators do not require any moving parts, orifices, nozzles or meshes, use significantly less power and are suited to produce directed micro- and nanometer-sized droplets with an adjustable narrow size distribution. Furthermore, they exhibit low shear forces and can be used with a broad fluid spectrum from aqueous solutions and organic solvents towards highly viscous particle solutions and inorganic inks as well as biological fluids and cell suspensions.

EAC2025_PO1-65_936_Hartmann.pdf

PO1: 66

Direct Synthesis of Silica-coated Iron (Fe@SiO2) Particles Using an Aerosol Process

Delyana Ratnasari, Eka Lutfi Septiani, Takashi Ogi

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$Fe@SiO_2$ particles were synthesized via a swirler connector-assisted spray pyrolysis method to overcome oxidation challenges in soft magnetic materials. By optimizing the SiO_2-to-Fe core ratio, complete FeO reduction was achieved. A precursor solution of $Fe(NO_3)_3 \cdot 9H_2O$ was atomized, mixed with HMDSO vapor, and processed at 1400°C. Characterization confirmed controlled morphology and enhanced magnetic properties. The optimal ratio (14.3×10^8 SiO_2 monomer/Fe core) ensured complete silica coating on Fe, achieving a saturation magnetization of 2.04 T. This study presents a novel, one-step synthesis method for high-purity $Fe@SiO_2$, offering promising applications in inductors and advanced electronic components.

EAC2025_PO1-66_615_Ratnasari.pdf

PO1: 67

Light patterns for colorizations

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Faraday 3D print relies on the topologies of electric field for defining the geometries of the nanostructures. The field topologies were basically formed by allowing two differently oriented fields, namely global and local ones, for competition. Generally, the local field was difficult to be manipulated but its sensitivity to structural geometries turned out to be subtle. Here we manage to dynamically alter the local field using light patterns. The nanostructures printed on the selective areas that receive light projection are geometrically different, as compared to those in shadows. The structures also showed instantaneous response to the presence/absence of light.

EAC2025_PO1-67_1183_Liu.pdf

PO1: 68

Faraday lithography

Yuxiang Yin, Bingyan Liu, Jicheng Feng

shanghaitech University, China, People's Republic of

This work hybridizes Faraday 3D print with etching steps for producing the so-called Faraday lithography (FL). The printed metal features serve as hard masks when performing etching steps, leaving only patterns of substrate materials. The line patterns showed excellent line-edge roughness and their feature size was strikingly reduced to 1/10 to that obtained by photolithography. FL can also make 3D patterns, far exceeding any existing lithographic techniques. This transformative solution is expected to advance semiconductor manufacturing.

EAC2025_PO1-68_1184_Yin.pdf

PO1: 69

Removal of Sulfur Compounds from Pyrolysis Oil using Cu-MOF Beads

You-Yu Dong[1], Joy Thomas[2], Chang-Tang Chang[1]

[1]National Ilan University, Taiwan; [2]National Taiwan University, Taiwan

This study explores the use of copper-based metal-organic frameworks (Cu-MOF) in adsorption desulfurization to address the challenge of removing thiophene compounds from waste tire pyrolysis oil. Simulation experiments show a 70% adsorption efficiency for sulfur compounds. The Cu-MOF adsorbent is fabricated into bead form to enhance surface area utilization. This technology aims to achieve ultra-deep desulfurization, transforming pyrolysis oil into a cleaner alternative energy source while reducing environmental impact.

EAC2025_PO1-69_593_Dong.pdf

PO1: 70

Strategy for the synthesis of size-controlled oxide-free copper nanoparticles and their reactivity

Hideki Tanaka

Chuo University, Japan

Copper nanoparticles, promising alternatives to precious metals, are challenging to synthesize due to oxidation and reduction difficulties. This study explored two strategies: nanosheet surfaces and zeolite pores, to control nanoparticle size and prevent oxidation. Saponite nanosheets, mixed with copper acetate, yielded oxide-free copper nanoparticles upon UV irradiation. Size was controlled by the copper acetate/saponite ratio, demonstrating uniform copper ion adsorption. Copper ions were also introduced into Y-type zeolite pores, forming nanoparticles upon UV irradiation. These nanoparticles exhibited high catalytic activity for benzyl alcohol oxidation, achieving a turnover frequency of 17 h^{-1}, exceeding previous reports.

EAC2025_PO1-70_848_Tanaka.pdf

PO1: 71

Synthesis of TWC Aggregated and Porous Particles via Spray Drying Method: Catalytic Performance and Internal Structure Analysis

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Efficient three-way catalysts (TWCs) are essential for reducing vehicle emissions, but their adoption is hindered by high costs and low-temperature performance limitations. This study investigates spray-dried aggregated and porous TWC particles to optimize structure and enhance CO conversion. Aggregated particles showed increased size with higher concentrations but lower CO conversion due to inefficient catalyst utilization. Introducing a porous structure with PMMA improved CO conversion by enhancing gas diffusion. Higher PMMA concentrations further improved performance by modifying framework thickness and macroporosity. Cross-sectional and 3D elemental mapping confirmed uniform elemental distribution and an interconnected pore network for efficient gas transport.

EAC2025_PO1-71_419_Ando.pdf

PO1: 72

MOF induced Perovskite for Cleaner Energy Production

Yi-Hsuan Tsai[1], Joy Thomas[2], Chang-Tang Chang[1]
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This study develops a $ZnTiO_3$/Cu-BTC composite photocatalyst to enhance hydrogen production. Cu-BTC improves visible light absorption, reduces electron-hole recombination, and lowers the bandgap to 3.78 eV. The 1% Cu-BTC/$ZnTiO_3$ composite significantly enhances absorption in the 600–800 nm range, achieving 78.63 mmol/g hydrogen yield in three hours. The study also examines the effect of Cu-BTC loading on efficiency, offering insights for renewable energy applications.

EAC2025_PO1-72_676_Tsai.pdf

PO1: 73

Process Optimization for Repeated CO2 Capture Using Porous MgO adsorbents

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Carbon dioxide (CO2) is a major greenhouse gas for causing climate change. Porous magnesium oxide (MgO) particles have been investigated vigorously as CO2 capture materials through a mineral carbonation. In this study, processes of wet-carbonation and decarbonation for MgO based CO2 adsorbents were optimized by controlling carbonation time and decarbonation temperature. As a result, compared to the previous conservative wet carbonation procedure in the lab., ~40% of the process time was saved. In addition, the decarbonation energy could be saved ~50% compared to the previous decarbonation process in the lab.

EAC2025_PO1-73_115_Kang.pdf

PO1: 74

Electrophoretic assisted flame synthesis of hydrophilic carbon nanoparticles film

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Carbon-based films exhibit tunable wettability, important for surface engineering. This study investigates Electrophoretic-assisted Flame Synthesis (E-ThFS) to enhance carbon nanoparticle (CNP) deposition efficiency and modify film morphology. Using a premixed ethylene/air flame under incipient sooting conditions (C/O = 0.67) , deposition was compared between conventional thermophoretic flame synthesis (ThFS) and E-ThFS. Applying negative voltages (-1 kV, -3 kV) significantly increased deposition rates and altered film roughness. Contact angle measurements revealed metastable superhydrophobicity before stable hydrophilicity. E-ThFS enables controlled film growth and wettability, expanding applications in sensors, coatings, and smart surfaces. These findings advance nanostructured material design.

EAC2025_PO1-74_1123_Griffo.pdf

PO1: 75

Template-free synthesis of porous metal nitride films from combustion aerosols

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

Metal nitrides possess exceptional catalytic properties making them widely used in catalytic-based applications. However, their performance remains limited by poor mass transfer and reduced accessibility of reactive sites when depostied as films with conventional techniques. Here, we demonstrate a template-free method for the design of highly porous metal nitride films with high compositional versatility. These are obtained by exploiting self-assembly of fractal-like metal oxide agglomerates during deposition from aerosols followed by their dry nitridation. This is exploited exemplarily for molecular sensing of NO2 leading to up to a five-fold higher response with faster response time over more compact spin-coated films.

EAC2025_PO1-75_1162_Baut.pdf

PO1: 76

Effect of the Oxidation State of Copper Nanoparticles on Their Interfacial Interaction with Metallic Substrates

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This study investigates the effects of oxidation on copper nanoparticle collisions using Low-Pressure Impaction (LPI) experiments and Molecular Dynamics (MD) simulations. Unlike studies focusing on oxidation-resistant metals, this work examines an oxygen-affine material to reflect practical scenarios, where the presence of oxygen is often unavoidable. The reactive force field potential (ReaxFF) is used to model oxidation's impact on adhesion, mechanical properties, and collision dynamics, linking experimental and simulation results to advance nanoparticle research for industrial and scientific applications.

EAC2025_PO1-76_933_Plack.pdf

PO1: 77

Electrochemical Sensor for Detection of Oxytetracycline Using ZnO-Modified Carboxylate Multi-Walled Carbon Nanotubes on Glassy Carbon Electrode

Yu -Ting Tsai, Chang-tang Chang
National Ilan University, Taiwan

Oxytetracycline (OTC), a widely used antibiotic, demonstrates broad-spectrum antibacterial activity against Gram-positive and Gram-negative bacteria. Despite its benefits in promoting animal growth, OTC pollution adversely affects soil bacteria, actinomycetes, and microbial populations, with potential risks to human health and the environment, such as allergic reactions and ecosystem disruption. This study aims to develop an electrochemical sensor for detecting OTC, utilizing carboxyl-functionalized multi-walled carbon nanotubes (MWCNT-COOH) on a glassy carbon electrode (GCE) for improved conductivity and charge transfer. The sensor's performance is optimized by comparing different materials and concentrations, targeting low-cost, efficient, and eco-friendly detection.

EAC2025_PO1-77_770_Tsai.pdf

PO1: 78

Multifunctional and Eco-Friendly EDTA/PEI Aerogels for the Removal of Cu(II) from Aqueous Solutions

Siao Jyun Hu[1], Joy Thomas[2], Chang Tang Chang[1]
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This study develops a modified chitosan-based aerogel to enhance Cu(II) removal efficiency. Incorporating EDTA and PEI, the aerogel exhibits strong metal ion chelation and abundant amine functional groups, improving adsorption performance. Results show over 90% removal efficiency for initial Cu(II) concentrations up to 30 ppm, reaching 97% at 15 ppm. The aerogel maintains excellent mechanical stability, ensuring structural integrity while offering low density and high surface area. Its easy recovery and reusability minimize secondary pollution, making it an environmentally friendly and highly efficient material for heavy metal removal.

EAC2025_PO1-78_580_Hu.pdf

PO1: 79

Synthesis of TiO2 nanoparticle and rGO composite material by flame spray pyrolysis for Li-Sulfur battery cathode creation.

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In our current work, we are investigating the possibility of producing TiO2 and reduced graphene oxide (rGO) composite for the craton of Li-Sulfur battery cathode during synthesis of TiO2 by flame spray pyrolysis process. The spherical particles of rGO are produced by the spray drying process and further injected into the flame spray pyrolysis (FSP) rector in the form of dust, which is produced by a fluidized bed aerosol generator. The created material's structural, compositional, and morphological properties are investigated using SEM, EDS, Raman spectroscopy, and TGA techniques. The electrochemical analysis of the effect of different TiO2/rGO ratios is done.

EAC2025_PO1-79_545_Murashko.pdf

PO1: 80

Deep Spatio-Temporal Neural Network for Air Quality Reanalysis

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AQ-Net is a spatiotemporal air quality reanalysis model combining LSTM, multi-head attention, and neural kNN. It predicts pollution levels, including for unobserved stations, by filling spatial gaps using limited observation stations. Evaluated on PM2.5 data from northern China (2013–2017), AQ-Net excels in reconstructing spatiotemporal trends. It enhances generalization in urban environments and helps build a comprehensive picture of air pollution for atmospheric chemistry studies.

EAC2025_PO1-80_572_Kheder.pdf

PO1: 81

Effect of brake friction material on brake particle emissions

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See the uplooded abstract

EAC2025_PO1-81_777_Bressot.pdf

PO1: 82

Real-Time Characterization of PAH Derivatives in Bitumen Fume Emissions

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Bitumen fumes, classified as potentially carcinogenic by IARC, contain volatile and semi-volatile compounds, including PAHs. While most studies focus on the 16 priority PAHs, recent research highlights the presence of more toxic compounds known as PAH derivatives. A two-week measurment campaign in MIT, Nantes, France, allowed the analysis of bitumen emissions from different bitumen formulations under controlled conditions using advanced real-time instruments (PTR-ToF-MS, HR-ToF-AMS, SMPS). Various PAH derivatives including nitrogenated, sulfurated, oxygenated, and alkylated PAHs were identified and quantified, each exhibiting different toxicological potentials. This study enhances our understanding of bitumen emissions, emphasizing the need for further toxicological assessment.

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PO1: 83

A Study on the Distribution Characteristics of Particulate Matter Emissions in Industrial Complex Areas Using Scanning LiDAR

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The Sihwa National Industrial Complex has a total of 798 air pollution emission facilities, of which the majority classified as class 4 and class 5. A detailed description of the air pollution emission sites facility is shown in Table 1. Most small factories tend to have insufficient air pollutant emission management, and the government also has insufficient monitoring.In this study, remote sensing LiDAR measurement technology was used to improve the efficiency of illegal emission management of Sihwa Industrial Complex, where small factories are concentrated. The purpose to analyze the characteristics of $PM_{2.5}$ concentrations in industrial complex areas and identify Hot-spots.

EAC2025_PO1-83_427_Lee.pdf

PO1: 84

Evaluation of different causes of air pollution in the Central European Region

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The paper's area of interest is Moravia, the eastern half of the Czech Republic in Central Europe. The evaluation summarises the main results of two source apportionment studies carried out in this area in 2021 (north-eastern part) and 2023 (central and southern part) in terms of spatial trends, pollution transport and general causes of air pollution.

Arrangement to address air quality problems in the northern half of the area of interest should continue to focus on reducing emissions from domestic heating. In South Moravia, the main priority should be to reduce emissions from road traffic.

EAC2025_PO1-84_194_Volná.pdf

PO1: 85

Monitoring of radioactive aerosols by two-layer filters in the premises air on low levels of the Shelter Object inside the New Safe Confinement

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The results of monitoring of radioactive aerosols (RA) in premises 012/7 (+ 0 м), 012/15 (+ 3 м), 210/7 (+ 6 м) of SO near accumulations of FCM in the New Safe Confinement within 2021 to 2024 are presented. The monthly sampling of RA was carried out by the two-layer filters. The first layer was coarse-fibered FPS-110-0.2, the second layer - fine-fibered FPP-15-1.5.

The nuclides ^{137}Cs, ^{241}Am and ^{154}Eu and markers of submicron aerosols ^{210}Pb and ^{212}Pb were detected by gamma-spectrometer (CANBERRA).

The proposed approach for sampling RA enables the definition of generation sources of RA.

EAC2025_PO1-85_630_Kalynovskyi.pdf

PO1: 86

Effects of exhaust dilution parameters on characteristics of semi-volatile aerosol emissions from a gasoline internal combustion engine

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Intermediate/semi-volatile organic compounds (I/SVOCs) are considered to be significant precursors of secondary aerosols. This experimental work focuses on quantifying the effects of varying exhaust dilution parameters on the characteristics of emissions from a modern light-duty gasoline internal combustion engine (ICE). Alongside complementary analyses, the gas and particle phase I/SVOCs are sampled using an in-house adsorption-tube and filter sampler for subsequent extraction and speciation by two-dimensional gas chromatography time-of-flight mass spectrometry. The findings from this work help enhance the understanding of ICE emission factors, dynamics during sampling, abatement strategies, and the repeatability of measurements and speciation considering currently unregulated I/SVOC emissions.

EAC2025_PO1-86_636_Davies.pdf

PO1: 87

Exploring the Formation and Toxicity of Secondary Particles in Gasoline Vehicle Emissions

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This study examines secondary particle formation and toxicity from a Euro 6 plug-in GDI vehicle under controlled conditions. Exhaust was diluted and aged in the Tampere Secondary Aerosol Reactor (TSAR) to simulate atmospheric processes. Human epithelial A549 cells were exposed to fresh and aged emissions using an air-liquid interface (ALI) system. Physical characterization showed a substantial rise in small particle concentration after aging.Aged particles significantly increased in number, leading to greater reductions in cell viability and higher LDH release, indicating increased cytotoxicity.

EAC2025_PO1-87_587_Tsakonas.pdf

PO1: 88

High secondary aerosol formation from motorcycle exhaust

Pauli Simonen[1], Atte Ojala[1], Giorgos Triantafyllopoulos[2], Dimos Melachrous[3], Ukko-Ville Mäkinen[1], Kuisma Vesisenaho[1], Petteri Marjanen[1], Ville Leinonen[1], Thanasis Tziovas[2], Dimitris Katsaounis[3], Leonidas Ntziachristos[3], Panu Karjalainen[1]

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This study investigates secondary organic aerosol (SOA) formation from modern 4-stroke motorcycles and a moped in transient driving cycles by utilizing oxidation flow reactor. Three vehicles were tested: a 50 cc moped, a 300 cc scooter, and a 1200 cc motorcycle. Results showed high SOA formation from the 50 cc and 300 cc bikes. The findings highlight the significant contribution of 4-stroke motorcycles to urban SOA levels, despite regulatory focus on primary emissions.

EAC2025_PO1-88_703_Simonen.pdf

PO1: 89

The positive impact of burning sustainable aviation fuel on reducing non-volatile particle emissions

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One way to achieve carbon neutrality in air transport is to increase the use of Sustainable Aviation Fuels (SAF). These new fuels also positively impact the reduction of emissions of non-volatile particulate matter (nvPM). This study investigates the effect of SAF composition on the nvPM produced by its combustion using a laboratory burner. The SAF examined in this study developed by Global Bioenergies uses a microorganism that converts sugars to isobutene. The results show that the combustion of pure SAF leads to a significant reduction in emissions in terms of both the number and mass of nvPM compared to those from Jet A-1.

EAC2025_PO1-89_1052_Ganeau.pdf

PO1: 90

Effect of fuel composition to particles emitted from auxiliary heaters of cars

Henri Oikarinen[1], Anni Hartikainen[2], Pauli Simonen[3], Karolina Klemi[1], Laura Ala-Hakuni[3], Santtu Mikkonen[1,2], Panu Karjalainen[3,4]

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Effect of fuel composition to particle emissions of fuel operated auxiliary heater (AH) was tested for 95E10 gasoline, ethanol based RE85 and alkylate fuel. Measurements were conducted using an auxiliary heater installed into a specifically designed freezer to allow for control of initial operating temperature. Both direct emissions and aged emissions enable accounting for the effect of secondary particle formation on total emissions. Sample was aged both with oxidation flow reactor and smog chamber. PN emissions of AH were measured along other variables for both cold and warm initial operating temperatures for all 3 fuel types.

EAC2025_PO1-90_773_Oikarinen.pdf

PO1: 91

Experimental Investigation of Particle Loss from Sampling Tube Surface Roughness, Tube Coiling, Flow Splitters, and Tube Fittings in Aviation nvPM Sampling Systems

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Particle losses due to sampling tube surface roughness, tube coiing, flow splitters, and tube fittings were experimentally investigated for representative aircraft nvPM sampling systems parameters. It was observed that no additional particle losses occured when the surface roughness was below 2 µm, but significantly increased as the roughness height increased. For coiled tubes, no additional particle losses occured for turbulent flow, but additional particle losses were oberved for laminar flow. This study showed that surface roughness, tube coiling, and sampling system components have to be carefully considered to reduce nvPM losses and provide more accurate nvPM reporting.

EAC2025_PO1-91_614_Lidstone-Lane.pdf

PO1: 92

Roadside emission factors of emerging and unregulated pollutants

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Road traffic emission factors of both regulated and unregulated pollutants, including VOCs, ultrafine particles, and chemical species, were determined from a street canyon site measurements in Helsinki.

All the studied 18 aromatic hydrocarbon compounds had a strong correlation with CO_2, showing that VOC emission factors can be well determined from roadside measurements. In addition, most alkanes and polycyclic aromatic hydrocarbons correlated well with CO_2. Interestingly, some of the biogenic VOCs correlated with CO_2, suggesting potential effects of human activity on biogenic VOCs at urban traffic sites that have not been previously considered.

EAC2025_PO1-92_280_Savolainen.pdf

PO1: 93

Real-time monitoring of transport-related air and noise pollution in European cities (Net4Cities): Monitoring plan and approach

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Net4Cities (Real-time monitoring of transport-related air and noise pollution in European cities) is an EU project. that will expand the air and noise pollution monitoring infrastructure and providing evidence-based support for implementing effective transport policies.

Net4Cities will install monitoring devices in 11 cities across 10 European countries, at multiple locations in each city. Measurements include UFP (PNC and LDSA), NH_3, VOCs, CH_4, N_2O, CO_2,, and will be complemented with available data of regulated pollutants and BC. Also

noise monitors and traffic countser will be installed. Measurements will be performed from 1/4/2025 - 31/3/2027. Set-up and first results will be discussed.

EAC2025_PO1-93_966_Van Poppel.pdf

PO1: 94

Exploring Particle Dynamics: Preliminary Investigations in Wear Particle Measurement for Tire and Road Surfaces

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This presentation presents ongoing research conducted in collaboration between the BFH (Bern University of Applied Sciences) and PALAS GmbH focusing on the analysis of were particles originating from tire and road abrasion.

The impact on Tire and Road Wear Particles (TRWP) is investigated through a progression from laboratory-based tire testing to controlled roller rig experiments and on-road trials, incorporating increasingly diverse influencing factors.

The ultimate objective is to develop the capability to directly measure particles from rolling tires using an ISO-kinetic sampling method, enabling precise spatial resolution of particle distribution.

EAC2025_PO1-94_858_Engelmann.pdf

PO1: 95

Particulate emissions from vehicles: a detailed characterization of fine and ultrafine fractions

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This study investigates the emissions of micrometric and sub-micrometric particulates from internal combustion engine vehicles, which contribute significantly to air pollution and lung cancer risk. Using Raman spectroscopy, the research analyzes particulate matter from various vehicle types and fuels, identifying black carbon as the primary component, along with defective graphite, iron oxides, sulphates, and nitrogen compounds. Principal Component Analysis has been performed to differentiate emissions by vehicle and fuel type. Additionally, nanoscale carbon structures, including multi-walled carbon nanotubes, were detected using transmission electron microscopy.

EAC2025_PO1-95_792_Ferrarese.pdf

PO1: 96

Emissions of particulate matter and pollution control technologies for marine engines operated with green fuels

Francesco Di Natale, Arianna Parisi

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Waterways shipping is transitioning to green fuels to reduce its carbon footprint, yet emissions of NOx, VOCs, and particulate matter (PM) remain a challenge. This study evaluates emission control technologies—Diesel Particulate Filters (DPF), Wet Electrostatic Precipitators (WESP), and Wet Electrostatic Scrubbers (WES)—for reducing PM and particle number (PN) emissions in marine engines using biogenic and e-fuels. While DPFs are highly effective, their operational constraints limit applicability. WESP and WES offer flexibility but introduce washwater concerns. Proper integration of these technologies can significantly improve air quality and mitigate maritime emissions. Research funded by the EU–NextGenerationEU under PNRR.

EAC2025_PO1-96_1058_Di Natale.pdf

PO1: 97

Evaluation of Emissions in a Lab-scale Turbojet Engine Using Fossil and Sustainable Aviation Fuels

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The aviation sector is a major source of ultrafine particles (UFP) and pollutants. Sustainable aviation fuels (SAF) offer a potential alternative to reduce environmental impact. This study analyzes emissions from a lab-scale turbojet engine (AMT Olympus) using JP8 and a JP8+SAF blend. Results indicate that while SAF does not significantly reduce UFP concentration, it shifts the particle size distribution to smaller diameters and decreases certain volatile organic compounds. These findings highlight the need for further research on SAF under real conditions to improve their accessibility and effectiveness in reducing aviation emissions.

EAC2025_PO1-97_406_Rojas.pdf

PO1: 98

Ultrafine Particulate Emissions from the Transport Sector: First results from the Net4Cities project

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Net4Cities project supports the he EU Green Deal's Zero Pollution Action Plan by implementing advanced aerosol measurment techniques in 11 cities across 10 European countries. The project focus of monitoring emission from both exhaust and non-exhaust sources in urban traffic area, ports and airports. Results will be presented from Düsseldorf, a major metropolitan city in central Europe with key measurments including ultrafine particles, lung deposited surface area. Data will be integrated into real-time models to identify potential pollution sources and inform policies aimed at reducing pollution.

EAC2025_PO1-98_960_Rana.pdf

PO1: 99

Fresh exhaust particle emissions from modern passenger cars

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Honkova[5], Michal Vojtisek-Lom[5], Martin Pechout[6], Matti Rissanen[1], Andrzej Szczotka[2], Piotr Bielaczyc[2], Jan Topinka[5], Hilkka Timonen[3], Päivi Aakko-Saksa[4], Topi Rönkkö[1]

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Seven passenger cars were driven on a chassis dynamometer in a temperature-controlled test cell according to Real Driving Emissions simulating test cycle. Based on the preliminary results, the fresh exhaust particle emissions of modern passenger cars were relatively low when compared e.g. with their emission standards for solid particles, even though the volatile particles were also included in the EFs. However, the emissions from the PHEVs depended strongly on the used driving mode and the state of charge of the battery. In addition, older conventional cars and a CNG car, that were missing the particulate filters, had clearly higher emissions.

EAC2025_PO1-99_283_Jäppi.pdf

PO1: 100

Portable FTIRs' capability to measure secondary aerosol precursors from vehicle exhaust

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Ambient PM2.5 is formed through atmospheric reactions forming secondary aerosols from gas-phase precursors in the atmosphere under presence of H2O, O2, oxidants and sunlight, and compounds from other sources. For determining the relevant precursor gases, we studied performance of two portable size FTIRs and compared them with laboratory size FTIRs. Exhaust from different fuels were measured using different methods for exhaust gas analyses. The study highlights the strengths and limitations of each device, providing insights into their suitability for various testing situations and their overall performance in capturing accurate and reliable exhaust emission data for potential precursors forming secondary aerosols.

EAC2025_PO1-100_961_Kuutti.pdf

PO1: 101

Influence of Fuel Standards on Vehicular Emissions: Assessing the Impact of Bharat Stage Regulations in Urban Idling Conditions

Amir Ali, Azajul Haque, Anjanay Pandey, Vikram Singh, Mayank Kumar

Indian Institute of Technology Delhi, India

Vehicular emissions, especially under idling conditions, significantly contribute to Delhi's air pollution. This study analyzes emission factors (EFs) of CO, CO_2, Black Carbon (BC), and NH_3 from light-duty vehicles (LDVs) and two-wheelers under idle and 2000 rpm conditions. Results indicate that EF decreases with increasing Modified Combustion Efficiency (MCE), with BS VI fuels exhibiting the lowest emissions due to improved fuel quality and advanced emission controls. Findings align with Euro VI and China's norms, highlighting the importance of fuel quality improvements in reducing emissions and enhancing combustion efficiency.

EAC2025_PO1-101_715_Ali.pdf

PO1: 102

Regulated and unregulated pollutants emitted by an inland waterway ship – comparison of traditional fuel with two alternative fuels.

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Freight transport has significantly increased in the last decades, and using ships instead of trucks could lower the CO_2 emissions. Alternative fuels could lead to even lower emissions, despite poorly documented atmospheric pollutant emissions. This work presents on-board measurements of regulated and unregulated pollutant emissions from an inland ship, comparing traditional non-road diesel to alternative fuels: gas-to-liquid and biodiesel. Results show that the alternative fuels are effective in reducing emissions of CO_2, as well as solid particles, black-carbon, SO_2 and certain VOCs. NO_x emissions from biodiesel are however high. Additional results were obtained for specific conditions (harbours and locks).

EAC2025_PO1-102_186_Vansevenant.pdf

PO1: 103

Chitosan based crosslinked nanoparticles by coaxial electrospraying

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We have demonstrated stable multiplexed coaxial electrospray for a range of aqueous solutions with in-situ crosslinking for the continuous production of uniform chitosan-based nanoparticles with active compounds. A proof-of-concept setup was developed for 8 sprayers in a scalable circular arrangement, capable of mg/h production rates. Field Emission Scanning Electron Microscopy (FESEM) imaging of the nanoparticles revealed relatively homogeneous sizes, under about 200 nm, and globular shapes. The particles collect forming aggregates, suggesting a finite electrical resistivity of the nanoparticulate film.

EAC2025_PO1-103_1092_Pérez-Pacheco.pdf

PO1: 104

Finite Taylor Cone: the impact of the electrospray

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The parametric range in flow rates and electric field for which the the electrospray regime is stable is still not well understood. In this work, the spray and meniscus interaction is studied by numerical means to shed light on this intricate and complex phenomena that involves numerical singularities and deformable interphases of both the electrode and the envelope of the spray. It serves as a first step towards the understanding of the stability of the electrospray regime.

EAC2025_PO1-104_1079_Rivero-Rodriguez.pdf

PO1: 105

Spark Ablation Generation of Metal and TiO2 Nanoparticles for CO2 Hydrogenation

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This study focuses on the generation of spark ablated and in situ oxidized Ti(O_2) nanoparticles, using a spark generator (VSParticle, Delft, NL) and a high temperature oven for oxidation and modification of particle crystal structure and morphology. Furthermore, metal nanoparticles are generated via spark ablation and coated on either the above described TiO_2 particles or nebulized TiO_2 particles. Both particle species are then compared in their photocatalytic activities for the CO_2 hydrogenation reaction.

EAC2025_PO1-105_413_Gfeller.pdf

PO1: 106

Combined Reduction of NOx and PM Emissions from Small-scale Biomass Combustion with Electrostatic Precipitation

Alexandr Molčanov, Kamil Krpec

VSB-TUO, Czech Republic

ESP generates nonthermal plasma that triggers chemical reactions and converts reaction products into aerosols via ion-induced nucleation. This, allows ESP to reduce PM and NOx emissions.

To avoid secondary aerosols being released into the atmosphere, the ESP should be designed properly and specific energy input (SIE J/L) can be helpful.

In wood pellet boiler tests, sub-6 nm particle nucleation began at 6 J/L SIE, while higher SIEs (48 J/L negative, 35 J/L positive) achieved 78% NOx removal and reduced particle concentrations to 300 particles/cm³ (0.15 µg/Nm³).

ESP systems demonstrate effective dual reduction of NOx and PM from small-scale combustion.

EAC2025_PO1-106_164_Molčanov.pdf

PO1: 107

CFD modeling of a perpendicularly oriented EHDA system in a pressurized lateral gas flow

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Electrohydrodynamic atomization (EHDA) (or electrospray) uses strong electric fields to generate fine droplets with a narrow size distribution, increasing evaporation efficiency in industrial processes such as odorization, combustion, and humidification. This study develops a COMSOL model to analyze droplet motion in a natural gas odorization system. Initial simulations focus on gas flow and droplet transport, with ongoing work incorporating electric field effects and droplet interactions. The results aim to optimize system design by evaluating parameters such as nozzle geometry, duct configuration, and gas flow dynamics to improve the efficiency of EHDA-based odorization.

EAC2025_PO1-107_1026_Moreira.pdf

PO1: 108

Droplet behavior and characteristics in high-flow rate electrospray processes

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Wet scrubbers are widely used for the removal of both particulate matter and gaseous pollutants, although their efficiency in capturing fine particles is limited. Electrospray is a potential method to enhance the collection efficiency of wet scrubbers by introducing charged droplets. This study investigates the droplet characteristics produced by high-flow electrospray and the removal of fine particles in a wet scrubber. Charged droplets were characterized under various electric field strengths, liquid flow rates, and solution conductivities. Additionally, optimum conditions for stable droplet formation and enhanced collection efficiency were identified.

EAC2025_PO1-108_701_Kim.pdf

PO1: 109

Spreading aerosol nanoparticles through mobilizing substrates for wafer-scale nanoprinting

Shirong Liu, JiCheng Feng

Shanghaitech University, China, People's Republic of

Due to industrial demand for 3D nanostructures, this work realizes their printing over an entire wafer through mobilizing the substrates to adequately spread aerosol nanoparticles via a printing head. We demonstrated the extreme ability for printing of a drastically great number of periodic nanostructures, 100 million over a 4-inch wafer within just 1 h. Besides, we showed material flexibility for realizing the printing of multimaterials within a single nanostructure. This innovation enables the printing of uniform nanostructures over a virtually infinitely large area with ultra-fast printing speed, upgrading Faraday 3D Printing to match industrial demand.

EAC2025_PO1-109_1182_Liu.pdf

PO1: 110

Sustainable Aliphatic Polyketone/Nylon6 fibrous Membrane for Emulsion Separation

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[1]Department of Environmental Engineering, National Ilan University; [2]Department of Materials Science and Engineering, National Taiwan University

Oily wastewater pollution poses a severe threat to humans and marine life due to toxic substances like petroleum hydrocarbons. This study explores electrospun aliphatic polyketone (PK) and nylon 6 (PA6) composite fiber membranes for filtration applications. PK/PA6 membranes exhibited excellent mechanical properties, heat resistance, and reusability, with high separation efficiency. Water flux tests showed PK had high permeability, while pressing reduced pore size for better selectivity. PK, an eco-friendly polymer with a 61% lower CO_2 footprint than PA66, enhances sustainability by reducing fossil fuel dependence, demonstrating the potential of electrospinning in green material manufacturing.

EAC2025_PO1-110_679_Chiu.pdf

PO1: 111

Volatile organic compounds emission factors for boreal forest surface fires in laboratory experiments

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Biomass burning is a major contributor to greenhouse gases, volatile organic compounds (VOCs) and carbonaceous aerosols, into the atmosphere. It is the second largest source of VOCs, yet emission factor (EF) estimates for European boreal wildfires remain limited for VOCs. The aim of this study was to measure VOC emissions from boreal forest surface fires in a laboratory setting for different combustion phases using a proton transfer reaction time-of-flight mass spectrometer (PTR-TOF-MS) and report emission factors for boreal forest surface fires.

EAC2025_PO1-111_1011_Somero.pdf

PO1: 112

Light absorption dynamics of wildfire-like BrC from wood combustion

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Here, the light absorption of wildfire-like Brown Carbon (BrC) emitted by wood combustion is elucidated using an integrated generation platform coupled with a real-time monitoring and time-integrated sampling instrumentation. The optical properties of Brown Carbon (BrC) are controlled by varying the wood mass and the content of volatile organic carbon, generating particles that can explain the variation between different wildfires in terms of light absorption. The optical properties of BrC obtained here can be interfaced with climate models to determine the contribution of wildfire PM to global warming.

EAC2025_PO1-112_875_Moularas.pdf

PO1: 113

Condensable PM formation inside the masonry heater and in the emission gases

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Condensable particulate matter (CPM) emissions from masonry heaters pose environmental and air quality concerns. CPM consists of fine particles that condense into liquid or semi-liquid droplets, influenced by fuel type, combustion conditions, and heater design. Emission measurements vary significantly depending on the sampling method: solid particle (SP) or dilution tunnel (DT). DT captures both solid and condensable organics, preventing underestimation. This study analyzed PM and OGC emissions from the burning chamber of the masonry heater and simultaneously from hot and diluted flue gas, to estimate the condensation processes inside the burning chamber and after the dilution tunnel.

EAC2025_PO1-113_1150_Maasikmets.pdf

PO1: 114

3D-printed Filters for Particulate Emissions Reduction in Biomass Combustion

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This study presents a novel soot mitigation method for biomass combustion in domestic stoves, addressing air pollution and health risks. Three 3D-printed filter geometries, (A) straight, (B) 45° rotated, and (C) gyroid, were tested in a stove rig to evaluate their effectiveness in reducing particulate matter (PM). All designs achieved over 50 wt.% PM reduction, with design (B) performing best across all combustion stages. Particle size distribution analysis showed that filters (B) and (C) effectively reduced sub-100 nm particles. No back-pressure build-up was observed, confirming the feasibility of these filters for soot reduction without clogging.

EAC2025_PO1-114_626_Hakami.pdf

PO1: 115

Electro Hydrodynamic Fabricated Ecofriendly Polymers for PM0.1-0.5 Capture

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This study develops a transparent fiber filter using polyketone (PK) and polyamide 6 (PA6) via electrospinning for window screens. The filter balances air filtration efficiency and transparency while utilizing natural ventilation. Key parameters, including polymer ratio, spinning time, and hand pressing, were optimized. Results showed fiber diameters decreased from 535 nm to 461 nm with increased PA6 content. Filtration efficiency exceeded 90% before pressing and 98% after, with the highest observed quality factor reaching 0.052 Pa^{-1}. Transparency reached 75.7% under optimal conditions, demonstrating the potential for energy-efficient indoor air purification.

EAC2025_PO1-115_604_Wu.pdf

PO1: 116

Field testing of air filters for efficiency of removal aerosol particles in an air handling unit

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Buildings should be characterized by nearly zero energy consumption, hence there is a risk that the pursuit of energy efficiency may negatively affect IAQ. Hence, it is necessary to properly clean the air using filters in the ventilation units. We perform tests of air filters/filter systems under the conditions of their use in building ventilation units in accordance with the ISO 29462:2022. During the field tests, the installed air filters section system in the air handling unit did not reach the final air flow resistance value of 300 Pa and removed particles below 2.5 µm with an efficiency of 74.11%.

EAC2025_PO1-116_199_Jankowski.pdf

PO1: 117

A Detailed assessment of catalytic reduction of organic emissions from a wood stove using PTR-ToF-MS and FTIR

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Residential wood combustion (RWC) significantly contributes to air pollution, prompting stricter regulations. This study evaluates emissions from a modern catalytic wood stove using dual FTIR spectroscopy, PTR-ToF-MS, and gas analyzers. Emissions peaked during cold ignition. The catalyst reduced CO by 37–64% (depending on phase) and total hydrocarbons by ≤34%, with higher efficiency during flaming phases as temperatures rose. Aliphatic hydrocarbons and carbonyls dominated VOC emissions, remaining significant post-catalyst. Despite persistent carbonyls, results highlight the catalyst's effectiveness in reducing pollutants, particularly CO, supporting its role in mitigating RWC emissions and advancing cleaner residential heating technologies.

EAC2025_PO1-117_877_Zaman.pdf

PO1: 118

Analysis of pressure drops and dust-holding capacities of nano-micro composite filters during dust loading

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The pressure drops and dust-holding capacities of individual filtering layers in a composite filter were experimentally measured during dust loading. The results revealed that the pressure drop of the composite filter was primarily influenced by that of the nanofiber layer, while its dust-holding capacity was predominantly affected by the amount of dust deposited in the microfiber layer. This study provides insights into the role of individual filter layers in optimizing the design of composite filters.

EAC2025_PO1-118_687_Kwon.pdf

PO1: 119

Development of a High Electric Field Type Electrostatic Precipitator with High Gas Velocity for Diesel Exhaust Particles

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This study investigated an energy-saving in an electrostatic precipitator (ESP) for diesel exhaust particles (DEP), focusing on achieving a collection efficiency greater than 80% at a gas velocity of 10 m/s. Experiments were carried out to clarify the effects of electrode length and gas velocity on the collection efficiency. As a result, it was showed that the collection efficiency achieved 88% at the gas velocity of 2 m/s and 75% at high gas velocity of 10 m/s without energy consumption.

EAC2025_PO1-119_197_Ito.pdf

PO1: 120

Effect of reputation frequancy on suspended particle trajectory in nanosecond pulsed discharge with DC bias

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Electrostatic Precipitators (ESPs) are used for indoor air cleaning and exhaust gas treatment. This study examines the effect of repetition frequency on particle trajectories in a wire-to-plate ESP with a DC-superimposed nanosecond pulsed corona discharge. Using COMSOL Multiphysics, particle trajectories were analyzed at 200 pps and 1000 pps. Results show that as frequency increased, particle charge also increased, leading to improved collection efficiency. At 1000 pps, efficiency reached 100%, while at 200 pps, it was only 45%. Charged particles were attracted to the grounded electrode due to electrostatic forces, demonstrating the impact of frequency on ESP performance.

EAC2025_PO1-120_251_Kitamura.pdf

PO1: 121

Application of granular bed theory to predict the filtration performance of porous filters

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This study investigates the prediction of the filtration performance of porous filters using granular bed theory. The porous filter is modeled as a hexagonal cell structure, where pores are located at the center, and the surroundung filter medium forms the packing material. The Ergun equation is used to estiimate the pressure drop across the filter, while the log-penetration equation predicts collection efficiency based on single sphere theory, The results demonstrate that these equations can be effectively applied to predict the filtration performance of porous filters.

EAC2025_PO1-121_686_Park.pdf

PO1: 122

Atmospheric Particle Fluxes in the High Arctic Across Three Surface Types

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This study focuses on turbulent particle flux measurements conducted in the central Arctic during the ARTofMELT research cruise. The measurements aimed to quantify vertical aerosol exchange between open water, sea ice, and the atmosphere. Data were collected from May 9 to June 12, 2023, using two measurement systems: an eddy covariance system with an MCPC mounted on the ship's foremast and a gradient system with a CPC to measure aerosol concentration, windspeed, and temperature. The results revealed that wide leads exhibited net particle emission, closed ice surfaces exhibited net deposition, and narrow leads exhibited both emission and deposition fluxes.

EAC2025_PO1-122_878_Mathes.pdf

PO1: 123

Characterisation of Physical and Optical properties of Arctic Dust Aerosols at Villum station

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Arctic dust is emerging as a new type of aerosol in Arctic regions as rapid temperature changes in the Arctic cause snow and ice to melt faster, leading to a larger exposed land area. In this study, we will present optical properties of the aerosols measured during an intense campaign in Greenland, and by combining it with information on local meteorology, back-trajectory analysis and size distributions, discuss emission sources based on the Ångström matrix results, with particular focus on unraveling local dust events.

EAC2025_PO1-123_953_Teng.pdf

PO1: 124

Investigating the Impact of heating on Semi-Volatile Organic Species in Cloud Condensation Nuclei Counter

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streamwise-CCNC developed by DMT Inc., may not accurately capture the co-condensation effect due to particle heating, resulting from the temperature gradient being in the same direction as the sample flow, potentially leading to the evaporation of SVOC's from droplets, underestimating CCN activity. No experimental validation of this effect has been conducted to date. In this study, we examined the impact of heating in a streamwise CCNC on the loss of SVOC's by analysing kappa derived from streamwise CCNC measurements under varying temperature gradients. The results were compared with kappa values obtained from AMS measurements and those predicted by the EAIM-III.

EAC2025_PO1-124_638_Sapkal.pdf

PO1: 125

Chemical characterization of fogs in the hyper arid zone of Namibia

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Fog is a vital source of water for local ecosystems in the Namib desert. It forms when the stratocumulus clouds collapse over Atlantic ocean. However, climate change may alter fog occurrence and composition. The chemical composition of fogs at Henties Bay and Gobabeb was studied during the AEROFOG project in 2024. Organic and inorganic parts were analyzed, showing that Henties Bay fogs were marine-influenced, while Gobabeb fogs were influenced by both marine and crustal sources. Organic carbon in fogs was higher than in seawater, with coastal fogs showing volatile DOC that could be linked to microorganisms or surfactant-driven processes.

EAC2025_PO1-125_512_Gérardin.pdf

PO1: 126

Evaluation of different sampling methodologies for the characterization of ice nucleating particle concentration using GRAINS, the new INP spectrometer at the AGORA Observatory

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This work presents the development of the GRAnada Ice Nuclei Spectrometer (GRAINS) at the AGORA Observatory in Southeast Spain, which allows to calculate INP concentrations from 0 to -25°C. GRAINS has been validated with the use of standard samples, such as NX Illite, which shows very good agreement compared to other immersion freezing devices. Different sampling methodologies were carried out at the urban background station of AGORA (UGR, 37.2°N, 3.6°W, 680 m a.s.l.). For that, two different types of filters and three different methods for the analysis in GRAINS were used, showing good agreement in the resulting INP concentrations.

EAC2025_PO1-126_129_Bazo.pdf

PO1: 127

Intercomparison experiments of two INP spectrometers (INSEKT and GRAINS) at AIDAd chamber

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In this work, we present the intercomparison of two immersion freezing devices: the well-known Ice Nucleation Spectrometer of the Karlsruhe Institute of Technology (INSEKT) and the new GRAnada Ice Nuclei Spectrometer (GRAINS). The comparison of the two devices has been done by evaluating the ice nucleating ability of different minerals and dust particles, such as Arizona Test Dust (ATD) or Soil Dust South Africa (SDSA01), among others. The experiments were conducted at the AIDAd chamber (Aerosol Interaction and Dynamics in the Atmosphere dynamic). INP concentrations obtained with both spectrometers show comparison factors around 2, which is considered as good agreement.

EAC2025_PO1-127_459_Bazo.pdf

PO1: 128

The Influence of Precipitation on Black Carbon Aerosols

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This study investigates the wet removal of Black Carbon (BC) aerosols using long-term (2021–2024) and short-term measurements at rural, urban, and mountain sites. Instruments including Aethalometers (AE33, AE51), a Disdrometer, and a Fog Monitor were used to analyze BC concentration, precipitation, and cloud microphysics. Analysis of 846 rain events at NAOK revealed a 16% reduction in BC and a 9% decrease in particle number concentration (PNC), with the strongest scavenging observed for 50–200 nm particles. Seasonal variations showed lower BC during wet conditions, emphasizing precipitation's role in BC removal. Transient recovery post-rainfall suggests a temporary impact on aerosol levels

EAC2025_PO1-128_292_Julaha.pdf

PO1: 129

INP parameterization comparison: boundary layer vs free troposphere

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As a preliminary study for high-resolution Ice Nucleation Particle (INP) measurements using the online instrument Portable Ice Nucleation Experiment (PINE), we investigate changes in parameterized INP concentration with height at the National Atmospheric Observatory of Košetice (NAOK), a rural background measurement site in Czechia. We use a tall tower facility to measure at 4m and 230m above the ground and the DeMott et al. (2010) parameterization, which is based on the number concentration of particles larger than 0.5 µm and temperature. Our results from December 2024 show higher INP concentration in the free troposphere than in the planetary boundary layer.

EAC2025_PO1-129_433_Durat.pdf

PO1: 130

Atmospheric Aerosol Composition and Formation in an Alaskan Boreal Forest

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Boreal forests, covering 27% of the world's forested area, are key contributors to atmospheric aerosol dynamics through gaseous emissions, which vary by region. North American forests are isoprene-dominant, while European forests, especially in Finland, are more monoterpene-dominant. Observations at Delta Junction, Alaska, since 2023, can provide insights into aerosol processes in this unique environment. During summer 2024, PM2.5 aerosols were dominated by organics, with wildfire events in June–July causing increased concentrations. By August, sulphate and ammonium contributions rose. Further analyses will explore wildfire-related events, new particle formation (NPF), and particle growth dynamics, improving our understanding of boreal forest-atmosphere interactions.

EAC2025_PO1-130_1086_Thomas.pdf

PO1: 131

Atmospheric ions indicating continuous new particle formation in the Mediterranean coastal environment

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This study examines New Particle Formation at the Finokalia research station in Crete using ion number size distributions from a Neutral Cluster and Air Ion Spectrometer over three-year period (2020-2023). The study revealed that NPF events occurred on 37% of observed days, with seasonal peaks in winter and spring. Negatively charged ions were more reliable indicators of NPF events. Additionally, recent approaches suggest that "Quiet" NPF events, which are not traditionally classified as NPF events, can contribute significantly to particle number concentrations These findings highlight the necessity for a fundamental shift in the classification and analysis of NPF events.

EAC2025_PO1-131_590_Markoulakis.pdf

PO1: 132

Composition of air ions during new particle formation events in Cyprus

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Observations from Cyprus demonstrate frequent NPF in Agia Marina Xyliatos (AMX), with >60% of days exhibiting particle formation (Baalbaki et al., 2021; Deot et al., 2024). The occurrence of NPF events at AMX has been associated with meteorological factors, precursor vapor availability, and air mass history. However, the underlying mechanism driving infrequent NPF during summer remains to be explained.

Furthermore, this study will provide novel insights into the role of nucleating vapors and their clusters, such as bisulfate, ammonia, and amines, which could be the primary contributors to NPF formation at our site.

EAC2025_PO1-132_298_Deot.pdf

PO1: 133

Contribution of new particle formation events to cloud condensation nuclei concentrations at U.S. observatories

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New particle formation (NPF) events contribute to the uncertainty of aerosol-cloud interactions in radiative forcing. To reduce this uncertainty, this work quantifies the contribution of NPF events to cloud condensation nuclei (CCN) concentrations using data from multiple US stations. NPF events are identified and characterized and their impact on CCN is assessed through various methods. The results are compared with model simulations (WRF-CMAQ) that allow the selective inclusion or exclusion of particle nucleation.

EAC2025_PO1-133_272_Zabala.pdf

PO1: 134

Methanesulfonic acid chemistry and new particle formation : a global model study

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Atmospheric methanesulfonic acid (MSA) originates from the oxidation of dimethyl sulfide (DMS), a key natural sulfur compound released by marine phytoplankton. MSA contributes to aerosol growth and cloud interactions, influencing Earth's radiative balance. However, its role remains underrepresented in climate models. This study evaluates four DMS oxidation mechanisms within the EMAC Earth system model, comparing outputs to field measurements and the impact of MSA new particle formation on the climate. Enhanced MSA production at mid-to-high altitudes, particularly over the Southern Ocean, potentially impacting climate forcing through altered cloud condensation nuclei dynamics.

EAC2025_PO1-134_597_Ruhl.pdf

PO1: 135

Uncertainty Quantification of autoCONSTRAINTS derived Reaction Coefficients with MCMC

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This study focuses on quantifying the uncertainty in reaction rate coefficients derived using autoCONSTRAINTS and Markov Chain Monte Carlo (MCMC) methods. VOC autoxidation, a key factor in secondary organic aerosol (SOA) formation, significantly impacts air quality. The autoAPRAM framework, coupled with MCM v3.3.1, models VOC degradation, but reaction rates introduce uncertainties. By constraining rates and identifying sensitive and non-sensitive constants, the study enhances model accuracy and improves atmospheric predictions. Results show how rate sensitivity influences SOA formation, providing insights for targeted experimental validation. Detailed findings will be presented at the conference, with figures illustrating key outcomes.

EAC2025_PO1-135_320_Ashu.pdf

PO1: 136

Internally Mixed Aerosols in Urban Area of Katowice Conurbation (Poland)

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Aerosol particles in the atmosphere often exist as internally mixed particles due to dynamic and chemical transformation processes. As part of ACTRIS facilities, multiple measurement campaigns were conducted over the Katowice conurbation using a mobile laboratory in a manned hot-air balloon. Aerosol samples were collected via an aspirator. Individual aerosol particles were analysed using scanning electron microscopy (SEM) with energy-dispersive spectroscopy (EDS). Internally mixed aerosols may form through cloud processes, including droplet coalescence. Samples collected up to 1900 meters above sea level contained sulfates and chlorides likely formed *in situ* in the urban atmosphere via gas-to-particle conversion.

EAC2025_PO1-136_993_Kalinichenko.pdf

PO1: 137

Secondary particle formation in the aqueous phase – Conversion of catechol in the presence of iron

Sabine Lüchtrath, Rico Wutke, Andreas Held

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The role of iron in the multiphase system of the atmosphere remains poorly investigated. Previous studies have demonstrated that ferric iron leads to the formation of secondary brown carbon through its reaction with catechol at pH 3, thus having a direct impact on the Earth's radiative budget. In this study, we observed the formation of insoluble, greyish particles in the presence of both ferrous and ferric iron under dark and light conditions. Furthermore, we found that the presence of hydrogen peroxide fundamentally alters the mechanism.

EAC2025_PO1-137_885_Lüchtrath.pdf

PO1: 138

Sensitivity Analysis of a New Inorganic Multiphase Chemical Model

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This study enhances the accuracy of simulating atmospheric particles by integrating multiphase inorganic chemistry into the BoxMART model. The key advancement is the incorporation of physicochemical processes, which more realistically represents the dynamics and interactions of inorganic particles in the atmosphere. Through sensitivity analysis, we explored the impact of various conditions on aerosol

formation and evolution. The results indicate that changes in these conditions significantly affect aerosol behavior. This improvement is crucial for understanding of aerosol dynamics and contributes to atmospheric aerosol chemistry. Integrating multiphase chemistry into the model significantly enhances its ability to simulate atmospheric chemical processes.

EAC2025_PO1-138_664_Cui.pdf

PO1: 139

Towards automated inclusion of representative autoxidation chemistry in explicit models

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We are aimong to develop the most complete and chemically explicit model for RO2 autoxidation that can be achieve with our current knowledge.

This model will be included in the existing code Generator for Explicit Chemistry and Kinetics of Organics in the Atmosphere (GECKO-A), and we aim for it to include autoxidation reactions of both the H-shift and C=C ring-closure types.

We hope that a complete and explicit code such as ours will be very useful for the modelling community when more specialized truncated models
are developed.

EAC2025_PO1-139_173_Franzon.pdf

PO1: 140

Implementation of a particle resuspension model in a Large Eddy Simulation code

Victor Bourgin, Mohamed Sellam, Amir Feiz
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Particle resuspension is an indirect source of pollutant exposure in urban areas. In order to better understand resuspension dynamics in urban environments, a resuspension model has been coupled to a Large Eddy Simulation code. A discretized formulation of the well known Rock'n'Roll model was developped for this specific purpose. This formulation was validated and provides a good foundation to study the sensitivity of the Rock'n'Roll model to its parameters. Our work aims to provide guidelines to create healthier urban environments and understand how evolving transportation technologies will shape pollutant exposure patterns.

EAC2025_PO1-140_997_Bourgin.pdf

PO1: 141

Influence of long-range transport over the sea on submicron aerosol chemical composition

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The study presents investigation of submicron aerosol chemical composition changes during long-range air mass transport events across the Baltic Sea between two sites: Hyltemossa (Sweden) and Preila (Lithuania). Having backward air mass trajectories across Hyltemossa and Preila modelled using HYSPLIT and two sets of in-situ sensors (ToF-ACSM, AE33 in Hyltemossa and Q-ACSM, AE31 in Preila), allowed us to investigate the same air mass before and after crossing over the sea. The proposed classification of the connected flow events enabled us to quantitively assess the net result of atmospheric processes taking place during long-range transport over the sea.

EAC2025_PO1-141_233_Minderyte.pdf

PO1: 142

Optimizing Black Carbon emissions on a global scale using TM5-MP and CTDAS

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Black Carbon is a short-lived aerosol that influences air quality and climate warming, along with greenhouse gases.The vast range of its emissions sources play a significant role in the estimation of its fluxes. Accurate estimation and modeling of BC emissions remain challenging. In the study, inverse global modeling, using TM5-MP model integrated with CTDAS , is used to optimize BC emission estimates based on the CMIP6 inventory. Emission corrections are computed regionally using observational data from filter-based techniques and aethalometers, then validated against AERONET measurements to assess model performance improvements.

EAC2025_PO1-142_995_Gkouvousis.pdf

PO1: 143

Simulating the Effect of Bark Beetle Infestation on Secondary Organic Aerosol (SOA) and Ozone

Jana Wackermann, Marie Luise Luttkus, Roland Schrödner, Ralf Wolke
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Spruce bark beetle increasingly cause wounding at tree stems, which leads to the release of very high BVOC emissions. A new biotic stress parametrization, which accounts for the exponential spreading of bark beetles along one seasonal cycle and applies increased emission potentials for Norway spruce, was integrated in the CTM COSMO-MUSCAT. The stress parametrization was tested and compared to a reference setup. The increased monoterpene and sesquiterpene emissions led to elevated SOA concentrations on regional and continental scale, with variations between day and night. The ozone concentration was observed to decrease in spruce abundant regions.

EAC2025_PO1-143_852_Wackermann.pdf

PO1: 144

An improved Europe-wide spatiotemporal machine learning modelling for PM2.5 using European open databases

Tetiana Vovk, Maciej Kryza
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Our study develops a spatiotemporal machine learning model to improve the accuracy of hourly $PM_{2.5}$ predictions across Europe from 2021 to 2023, leveraging European open datasets. Key predictors include meteorological, environmental, pollutant, and land use data. The

developed Extreme Gradient Boosting (XGBoost) model outperforms existing numerical model-based datasets (such as CAMS Ensemble) in capturing $PM_{2.5}$ variability, as confirmed by spatiotemporal cross-validation results. Future work will extend the model to 2003–2023, enhancing long-term trend analysis. The publicly available dataset will support air quality research, policy evaluation, and public health assessments by providing high-resolution, accurate $PM_{2.5}$ estimates across Europe.

EAC2025_PO1-144_397_Vovk.pdf

PO1: 145

Development and Evaluation of Coupled Climate Simulations Using Machine Learning Enhanced Aerosol Model

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Aerosol-cloud interactions occur on a microscopic scale yet affect cloud systems on a scale of kilometers. Accurate modeling on such a large scale requires a lot of computational resources. A simple aerosol model enhanced with machine learning will be developed to solve this problem. Such a model learns to imitate the results of more complex models while remaining computationally lighter. The aerosol model will be integrated into the kilometer-scale climate model Integrated Forecasting System (IFS). The aim is to improve the accuracy of IFS without significantly increasing its computational cost.

EAC2025_PO1-145_460_Halonen.pdf

PO1: 146

Numerical Simulation Analysis on SO2 and Sulfate Aerosol Source Apportionment in the Tibetan Plateau

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This study utilized the source-oriented WRF-Chem model to conduct a thorough source apportionment analysis of SO_2 and sulfate aerosols over the Tibetan Plateau from June to September 2012. $SO_2$and sulfate aerosols were categorized into seven groups. The results revealed that the primary non-local contributor of SO_2 and sulfate aerosols was the East source, constituting 28.34% and 19.81%. Significant contributions also came from the South source, amounting to 26.20% and 14.96%. The Southeast, West, Central, and Other sources contributed 6.96%, 0.90%, 4.20%, 2.77% and 5.19%, 1.22%, 3.11%, 4.42% to the modeled SO_2 and sulfate aerosols, respectively.

EAC2025_PO1-146_376_Lu.pdf

PO1: 147

Spatial and temporal variability of ultrafine particle number concentrations and their link to air quality close to Munich airport in 2023

Shengyi Hou, Markus Friedrich, Anke Nölscher

University of Bayreuth, Germany

Airports can affect local air quality by emission of ultrafine particles (UFP, <100nm). Here, we analyse the spatial and temporal variability of UFP close to Munich airport for the year 2023 using measurements of particle number concentration, particle size distribution, ozone, nitrogen oxides, meteorological data, and traffic/airport operations. Long-term, seasonal, and diurnal trends reveal distinct behaviours of UFP, including rush-hour peaks and site-specific differences, highlighting the impacts of airport operations, traffic emissions, and atmospheric conditions.

EAC2025_PO1-147_480_Hou.pdf

PO1: 148

Impacts of changes in land use and land cover between 2001 and 2018 in winter haze pollution in North China Plain and surrounding areas-A case study

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Combing satellite data and WRF-Chem simulations, we assess LUCC impacts (2001–2018) on $PM_{2.5}$ in North China Plain (NCP). Satellite observations show 5%–20% increased forest cover and up to 25% urban expansion in NCP. Average $PM_{2.5}$ decreased by 5.2 μg m^{-3} (3.9%), with urban reductions of 15.5 μg m^{-3} (14.8%). Urbanization-driven sensible heat flux (HFX) rose by 10.7 W/m^2 (47.5%), elevating planetary boundary layer height (PBLH) by 54.8 m (13.1%). Enhanced vertical dispersion from PBLH deepening dominated $PM_{2.5}$ mitigation, outweighing wind effects. Results highlight LUCC's role in modifying boundary-layer dynamics to reduce pollution, supporting LUCC integration into air quality policies.

EAC2025_PO1-148_588_Yu.pdf

PO1: 149

Composition, sources and formation process of atmospheric aerosol in marine atmosphere

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Our study investigates the sources and interactions of atmospheric aerosols in the coastal regions of China, with a particular emphasis on the impacts of anthropogenic activities and oceanic emissions. It quantitatively analyzes the factors affecting the pH of marine atmospheric aerosols and assesses the contribution of marine biogenic emissions to the total organic aerosol mass. The sources and secondary formation processes of saccharides, organic acids, organic amines, and organic sulfides are discussed, along with their influencing factors. Additionally, the molecular characteristics of marine atmospheric organic aerosols are characterized, and their dynamic evolution processes are discussed.

EAC2025_PO1-149_140_Li.pdf

PO1: 150

A mass-spectrometric study of the formation and aging of organic aerosol from vanillin oxidation

Julia David[1], Anna Breuninger[1], Franziska Köllner[2,3], Oliver Eppers[2], Oliver Appel[2,3], Jonas Wilsch[2], Fatih Ekinci[2,3], David Wasserzier[4], Stefanie Hildmann[4], Luca D'Angelo[1], Mario Simon[1], Jialiang Ma[1], Thorsten Hoffmann[4], Johannes Schneider[2], Alexander Vogel[1]

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Biomass burning (BB) significantly impacts air quality, health, and climate, yet the oxidation products and transformation processes of its emitted compounds remain largely unexplored.

This study examines the atmospheric aging of vanillin, a BB tracer from lignin pyrolysis, using a potential aerosol mass oxidative flow reactor (PAM-OFR). Oxidation with ozone and hydroxyl radicals generated over 60 reaction products, analyzed via online Orbitrap mass spectrometry, aerosol mass spectrometers, and offline liquid chromatography. A comparison between laboratory experiments and ambient measurements from the Po Valley revealed a substantial overlap for both online and filter measurements.

EAC2025_PO1-150_262_David.pdf

PO1: 151

First study of the composition of cloud water collected at Monte Cimone observatory during the MC3 campaign in October 2024.

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New insights on cloud water composition from the sampling campaign (MC3), funded by ACTRIS ATMOACCESS, that took place at Monte Cimone (CMN, Italy) in October 2024. Chemical and microbiological characterization of 26 samples was carried out to study the influence of air mass origin on cloud chemical composition, reactivity, and on the distribution of microorganisms present in the cloud water

EAC2025_PO1-151_179_Nibert.pdf

PO1: 152

Characterization of $PM_{2.5}$-Associated Dicarboxylic Acids and Sugars: Insights into Biomass Burning and Air Quality

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This study examines the temporal and seasonal variations of $PM_{2.5}$-bound dicarboxylic acids (DCAs) and sugars in Agra, a highly polluted Indo-Gangetic Plain (IGP) city. Biomass burning, secondary aerosol formation, and meteorological factors drive their concentrations, peaking post-monsoon and in winter. Diagnostic ratios confirm primary and secondary sources, while air mass analysis highlights long-range aerosol transport from northwestern India and other continents. These findings provide critical insights into atmospheric chemistry, climate implications, and air quality regulation. The study underscores the need for targeted mitigation strategies, particularly during high-emission periods, to reduce pollution and its associated health risks.

EAC2025_PO1-152_1147_Agarwal.pdf

PO1: 153

Characteristics and levels of carbonaceous aerosols from real-time measurements during Diwali festivity

Vidit Suryakant Parkar, Abhishek Chakraborty
Indian Institute of Technology Bombay, India

Carbonaceous aerosols (CA) significantly impact atmospheric processes, including radiative forcing and air quality. CA consists of organic matter and elemental carbon, with brown carbon (BrC) acting as a photosensitizer producing reactive species. BrC's optical variability introduces uncertainties in climate models. A continuous CA measurement system was used in Mumbai during Diwali 2023 & 2024, revealing rapid pollution spikes due to firecrackers and biomass burning. CA sources were categorized, showing SOABrC increased post-Diwali. This first-of-kind study from India gives insights into CA's intricate dynamics, environmental impact and the need for further research on its health risks and atmospheric interactions.

EAC2025_PO1-153_1144_Parkar.pdf

PO1: 154

Emission factors of organic aerosols from a prescribed burning of European boreal forest

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Wildfires are one of the largest source of atmospheric aerosols affecting both air quality and the climate system. Due to climate change, the frequency of wildifres have increased drastically in the past decade. Characterizing such biomass burning (BB) emissions is, therefore, crucial for understanding their impact on the atmosphere. In this study, we measured BB aerosols emitted from prescribed burning of boreal forest to obtain the emission factors (EFs). The aerosol mass concentration showed an substantial increase during fire reaching ~1000 times higher than the usual conditions at this location. EFs for the aerosols showed clear dependency on the MCE.

EAC2025_PO1-154_868_Kommula.pdf

PO1: 155

Influence of the anthropic settlements on European Arctic climate in terms of Light-Absorbing Aerosol concentrations and Heating Rate

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The Arctic region is warming faster than the rest of the globe and an important role is played by local concentrations of atmospheric aerosols (e.g. BC) through their indirect and direct effets. Therefore, we took part in two AREX summer campaigns in 2018 and 2019 in order to experimentally determine the surface BC concentrations and their HR over the Arctic Ocean around Svalbard Islands and within the anthropized fjords of Spitsbergen. We found that there are significant differences between the anthropogenic fjords / hotspots considered in this study and the Arctic ocean background due to the role of local sources

EAC2025_PO1-155_650_Losi.pdf

PO1: 156

Tethered Balloon Observations of Vertical Aerosol Distributions at Neumayer III, Coastal Antarctica

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The Southern Ocean significantly impacts global atmospheric circulation, with Antarctic cloud cover playing a key role in the surface radiation budget. However, poor understanding of aerosol-cloud interactions leads to biases in climate models. During the ORACLES field campaign at Neumayer III, a tethered balloon system was used to measure aerosol properties up to 900 m altitude. Results from 66 flights indicate that the aerosol distribution is strongly influenced by wind direction, with marine aerosols dominating under oceanic airflow, while katabatic winds transport lower concentrations of aerosols from inland. This dataset provides valuable insights into Antarctic aerosol characteristics and cloud interactions.

EAC2025_PO1-156_796_Temel.pdf

PO1: 157

Airborne measurements of the spatial distribution and variability of ultrafine aerosol particles in Svalbard during melting season 2024

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Aerosol particles contribute to an incomplete understanding of the Arctic amplification. To improve the comprehension of aerosol processes in the lower troposphere, airborne measurements of ultrafine aerosol particles (UFP) were conducted in Ny-Ålesund, Svalbard, during the melting season from May to June 2024. The occurrence of UFP in the size range of 4-19 nm ($N_{4\text{-}19}$) was observed frequently during the campaign. This presentation focuses on a first case study on 24 May 2024, showing high concentrations of $N_{4\text{-}19}$ exceeding 10,000 particles per cm^3, including a high temporal and spatial variability within a few hundred meters.

EAC2025_PO1-157_547_Schuchard.pdf

PO1: 158

Condensation-freezing Ice Nucleating Particles at Ny-Ålesund: seasonality and sources investigated by the Dynamic Filter Processing Chamber

Matteo Rinaldi[1], Alessia Nicosia[1], Marco Paglione[1], Karam Mansour[1], Stefano Decesari[1], Mauro Mazzola[2], Gianni Santachiara[1], Franco Belosi[1]

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Ice-nucleating particles (INPs) play a critical role for Arctic clouds, by initiating ice crystal formation, a process that governs cloud phase, optical properties, and lifetime. This study presents atmospheric INP concentration data from Ny-Ålesund (Svalbard), collected over three years (2018-2020), during 6 intensive campaigns, covering three seasons (spring, summer and autumn). Ambient INP concentrations were measured offline, in condensation freezing mode at water saturation ratio of 1.02, by means of the Dynamic Filter Processing Chamber at the activation temperatures of -15, -18 and -22°C.

EAC2025_PO1-158_183_Rinaldi.pdf

PO1: 159

Dust sources in Iceland: Insights from the High-Latitude Dust Experiment in 2021/2022

Kerstin Schepanski[1], Konrad Kandler[2], Mara Montag[2], Kilian Schneiders[2], Pascal Kunze[3], Agnesh Panta[2], Adolfo González-Romero[4], Cristina González-Flórez[4,5], Martina Klose[6], Xavier Querol[7], Andres Alastuey[7], Jesus Yus-Díez[8], Sylvain Dupont[9], Pavla Dagsson-Waldhauserová[10,11], Carlos Pérez García-Pando[4,12]

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Although research on dust aerosol and related feedback processes has been carried out using a variety of approaches, knowledge of mineral dust particles emitted at high latitudes is still limited, despite its pivotal impact on polar environments. Here, we present results from the high-latitude dust experiment which took place in 2021/2022 in Iceland offering insights in dust emission processes and their controls. Findings from our study shed light on the complex web of interactions that are defined by the variability of dust source characteristics and wind speed distribution, ultimately contributing to the understanding of dust emission in cold climate regions.

EAC2025_PO1-159_275_Schepanski.pdf

PO1: 160

High Gaseous Methanesulfonic Acid in Antarctic Air: Evidence of Evaporation from Particle Surfaces During Katabatic Outflows

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Dimethyl sulfide (DMS) oxidation in the marine atmosphere produces methanesulfonic acid (MSA) and sulfuric acid (SA), impacting aerosol formation and cloud properties. This study presents high-resolution measurements of gaseous MSA during two Southern Ocean voyages (CAPRICORN-2, 2018; MISO, 2024) using NO3-CIMS. Periods of elevated gaseous MSA were observed at high latitudes and coincided with cold, dry Antarctic outflows, high aerosol acidity (pH ~ -1), and enhanced cloud condensation nuclei (CCN). E-AIM modeling confirms MSA volatilization from aerosols as a key source of gas-phase MSA, linking atmospheric conditions to MSA partitioning and aerosol chemistry.

EAC2025_PO1-160_696_Miljevic.pdf

PO1: 161

High spatial resolution measurements of the aerosol climate-relevant parameters from mid-latitudes to the Arctic, up to 90°N (GAIA)

Fabio Giardi[1], Cosimo Fratticioli[1,2], Vera Bernardoni[3], Marcus Acton-Bond[3], Marco Potenza[3], Luca Ferrero[4], Niccolò Losi[4], Luca Di Liberto[5], Ferdinando Pasqualini[5], Alessanfro Bracci[5], Spartaco Ciampichetti[5], Maurizio Busetto[5], Angelo Lupi[6], Piotr Markuszewski[7], Janna E. Rückert[8], Ingo Schewe[9], Giulia Calzolai[1]

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GAIA project aims at developing and integrating new experimental and modelling tools to give information on georeferenced climatic impact of different aerosol sources and types in all sky conditions from Mid Latitudes till the Arctic Ocean. During summer 2024 GAIA performed two measurement campaigns on board the German icebreaker Polarstern (AWI), reaching up to 90°N, and the Oceania vessel (IOPAN). Results from these campaigns will be presented.

EAC2025_PO1-161_1008_Giardi.pdf

PO1: 162

Source areas and effect on snow albedo of mineral aerosol deposition on snow in North Western Greenland

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In March 2024 a sampling campaign of surface snow was accomplished in North-western Greenland. Snow samples are filtered and analyzed by SEM and for ions and elements. In parallel PM10 samples are collected and chemically characterized. Dry deposition seems the main mechanism of dust deposition on the snow in the considered time range. By combining the measured dust concentration in the surface snow with modelled and measured reflectivity spectra we try to quantify the influence of deposited dust on the snow albedo. Besides, by chemical analysis of aerosol and snow samples, the possible source areas of mineral dust are investigated.

EAC2025_PO1-162_754_Becagli.pdf

PO1: 163

Zooplankton grazing increases atmospheric primary aerosol production in the high Arctic

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Sea spray aerosol (SSA) particles are a main source of aerosols; they influence cloud formation and cloud properties. Ocean microbiota potentially have an impact on SSA production and flux, but our understanding of the mechanisms is still limited. In this multidisciplinary study conducted in the central Arctic during MOSAiC expedition, air-sea interactions were measured by means of in-situ bubble-bursting experiments. For the first time, we studied the effect of zooplankton grazing on aerosol production. We found that experimental water subjected to zooplankton grazing had a 2-fold increase in SSA production relative to controls without zooplankton.

EAC2025_PO1-163_865_Dallosto.pdf

PO1: 164

Characterizing Particulate Matter Concentrations in Southern Iceland

Agnes Panta[1], Pavla Dagsson-Waldhauserová[2], Frederik Weis[1], Maximilian Weiss[1], Henrik Hof[1], Volker Ziegler[1]

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The Copernicus Atmosphere Monitoring Service (CAMS), part of the European Union’s Copernicus Programme, provides high-quality data on air pollution, greenhouse gases, and climate forcing.

The CAMS National Collaboration Programme (NPC) in Iceland is intended to improve the country's air quality monitoring systems and increasing public awareness of environmental issues and their wider effects on climate and health.

Within the framework of NCP, we installed one AQ Guard Smart Aerosol Spectrometers to observe particulate matter variability in Mýrdalssandur - a newly identified dust source area. We have measured Cn, PM1, PM2.5, PM10, and TSP and meteorological parameters at high temporal resolution.

EAC2025_PO1-164_888_Panta.pdf

PO1: 165

Pristine Antarctic Cloud Condensation (CCN) and Ice Nucleating Particle (INP) Concentrations and Properties at Neumayer Station III

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Since 2019, TROPOS has been carrying out continuous in-situ measurements of cloud condensation nuclei (CCN) and ice nucleation particles (INP) at Neumayer Station III (NM III, 70° 40′ S, 8° 16′ W), located in Atka Bay on the Ekström Ice Shelf, in order to improve the data base and thus the knowledge of the locally important particle formation processes for both. The annual cycle of CCN and INP, characteristics and importance of local sources are presented, together with a parameterisation for Antarctic INP.

EAC2025_PO1-165_841_Henning.pdf

PO1: 166

A molecular journey from the Baltic Sea to Svalbard: HRMS on organic aerosols collected on board the Oceania vessel

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The light-absorbing properties of organic aerosols (OA) are a topic of increasing interest among the scientific community. In this work, we invastigate the molecular composition of MeOH-water soluble OA collected at the bow of the Oceania vessel along its journey from the Baltic Sea to Svalbard. An analysis of potential brown carbon compounds is conducted to assess relationships with light-absorption properties.

EAC2025_PO1-166_415_DAngelo.pdf

PO1: 167

Black carbon in the Arctic (Ny-Ålesund): An Assessment Comparing AE33 and LIDAR Data

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Arctic amplification leads to a rapid warming of the Arctic. Light-absorbing aerosols (LAAs), including black carbon (BC), are key uncertainty factors in this phenomenon. This study analyses BC concentrations and their correlations with meteorological parameters, at Ny-Ålesund in 2022. Continuous BC measurements were performed with an AE33 etalometer, and LIDAR data from MPL and WindCube instruments were analysed. Preliminary results suggest a limited correlation between BC and LIDAR data, highlighting the difficulties in comparing ground and elevation measurements produced by AE33 and LIDAR respectively. A possible solution could be organising tethered balloon launches to perform vertical profiles of *BC* concentration.

EAC2025_PO1-167_980_Cerri.pdf

PO1: 168

Chemical Composition of Size-Segregated Aerosols During Second Turkish Artic Scientific Expedition (TASE-II)

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The Arctic region is experiencing warming at an unprecedented rate compared to the rest of the planet, leading to significant changes in sea ice coverage (Smith *et al.*, 2015). Atmospheric aerosols play a crucial role in modifying the energy balance of the atmosphere through various mechanisms. The radiative forcing of aerosols is significantly influenced by their chemical and physical characteristics. Consequently, it is crucial to investigate these properties, especially in Arctic regions. The objective of this study is to determine the chemical composition of aerosols onboard in the Arctic Ocean during the second Turkish Arctic Science Expedition (TASE II).

EAC2025_PO1-168_844_Dikmen.pdf

PO1: 169

Continental river runoff over the Arctic Ocean enhances atmospheric aerosol formation

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The warming Arctic climate is highly sensitive to the presence of cloud condensation nuclei (CCN). A major source of Arctic CCN is New Particle Formation (NPF), however, the sources of vapours driving NPF are still unclear. The Arctic Ocean—the smallest and shallowest of the world's oceans—receives approximately 10% of global river runoff, which is rich in terrigenous dissolved organic matter (tDOM). Here, we explore the association between a 9-year (2010-2018) record of atmospheric aerosol size distributions taken at Tiksi (Russia) and its overlap with air mass trajectories analysis combined with ocean remote sensing data.

EAC2025_PO1-169_821_Brean.pdf

PO1: 170

GAInfrA: A Versatile Mobile Laboratory for Aerosol, Clouds and Radiation Studies in Extreme Environments

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The GAIA project developed GAInfrA, a custom mobile laboratory for aerosol, cloud, radiation, and meteorological measurements. Deployed on the German icebreaker *Polarstern* (June–October 2024), it continuously collected high-resolution data on aerosol properties, radiation budgets, and vertical profiles. Designed for extreme Arctic conditions, GAInfrA features dedicated sampling lines, an integrated power system, and remote access for continuous monitoring. Its design was optimized using SolidWorks simulations. The system proved highly reliable, collecting high-quality data for over 90% of the campaign, providing valuable insights into aerosol-radiation interactions and their role in climate dynamics

EAC2025_PO1-170_990_Pasqualini.pdf

PO1: 171

Long-term Trends of Key Chemical Species in the High Arctic and Possible Drivers

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The warming in the Arctic is amplified, especially in winter, which can be up to 4 times higher than the rest of the globe. In this study, we utilize weekly high-volume samples and filter pack samples from Villum research station from 2008 to 2023 to investigate the long-term trends of key chemical species and their potential drivers. Elemental carbon shows the strongest decline in spring. Elemental carbon, sulfate, and lead exhibit stagnation or a slight increase after 2016, a trend also observed in the absorption coefficient at Zeppelin Station. However, the causes behind this shift in 2016 remain under investigation.

EAC2025_PO1-171_996_Zhang.pdf

PO1: 172

Preliminary Results from the CleanCloud Campain in Greenland – Villum Research Station

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Our study focuses on the preliminary results of the CleanCloud campaign, which was based at the Villum Research Station in collaboration with the NASA ARCSIX aircraft mission in 2024. We present the cloud and aerosol microphysical characteristics determed by using a synergy of in situ instruments to obtain the aerosol microphysical characteristics (size distribution, CCN concentrations, and bioaerosol number concentration) and remote sensing instrumentation like lidar systems to determine the aerosol's profile, a Doppler lidar for turbulence and cloud scale dynamics, a radar for the cloud microphysical properties, and satellites to retrieve the spatio-temporal evolution of the clouds.

EAC2025_PO1-172_926_Foskinis.pdf

PO1: 174

Validation of methods for simulating aerosol samples from remote dust sources using a resuspension chamber

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Studying high-latitude dust sources is challenging due to their remote locations, where aerosol samplers cannot be deployed. These sources remain poorly characterized, despite their increasing relevance to climate change. To address this, we simulated aerosol samples from soil materials using a custom resuspension chamber at the University of Perugia. The system resuspended soil particles, which were collected on filters for chemical and physical analysis. The method was validated with certified reference materials and tested with various soil samples to assess the impact of particle size and mineral composition on the digestion process and isotopic analysis (Sr, Pb).

EAC2025_PO1-174_1000_Bruschi.pdf

PO1: 175

A Simple Surface-bulk Partitioning Model for Estimating Size-dependent Surface Tension of Deliquesced Aerosol Particles

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Atmospheric aerosols influence climate by acting as cloud condensation nuclei (CCN), with their activation governed by the Köhler curve. While hygroscopicity is well studied, the impact of size-dependent surface tension on CCN activation remains unclear. This study develops a model based on Langmuir adsorption theory to predict surface tension in surfactant-containing droplets. Model validation using experimental

data for NaCl-SDS solutions shows that fitted Langmuir parameters improve surface tension predictions. The results highlight the importance of accounting for size-dependent surface tension when evaluating CCN activity and demonstrate that appropriate adsorption parameters can be determined from microdroplet measurements.

EAC2025_PO1-175_425_Minamikawa.pdf

PO1: 176

Cloud Condensation Nuclei properties and variability at Mt. Cimone station

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This study investigates aerosol properties affecting Cloud Condensation Nuclei (CCN) activity in the Mediterranean free troposphere. Based on long-term observations at Mt. Cimone (2165 m a.s.l.) within the ACTRIS framework, it explores seasonal CCN variability and the processes regulating it. Results reveal an overall order of magnitude variation in CCN concentration throughout the year, likely modulated by planetary boundary layer dynamics. Köhler theory is applied to assess aerosol hygroscopicity, considering chemical composition and size distribution. This work provides the first comprehensive characterization of CCN in Italy, improving understanding of Aerosol-Cloud Interactions and their role in global radiative forcing.

EAC2025_PO1-176_491_Magnani.pdf

PO1: 177

Cloud droplet spectra measurements: comparison in low stratiform clouds

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Atmospheric aerosol (AA) interactions with atmospheric water remain uncertain despite their importance. To enhance understanding, standardized measurement techniques for cloud droplet spectra (CDS) and liquid water content (LWC) are needed. A three-month in-situ campaign at Mount Milešovka, Czech Republic, compared three instruments: Fog Monitor 120, Cloud Droplet Analyzer, and Particulate Volume Monitor. Measurements of Effective Diameter, Mean Volume Diameter, and LWC showed consistency with prior data. Cloud droplet number concentration was also analyzed. Results will be further examined in relation to wind speed, direction, and air mass sources.

EAC2025_PO1-177_959_Zikova.pdf

PO1: 178

Polysaccharides - Important Constituents of Ice Nucleating Particles of Marine Origin

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The ice nucleation activity of polysaccharides were investigated and the freezing spectra compared to the ones of marine microorganisms. We could find agreement between the two indicating a major contribution to the freezing behavior in the marine microorganism caused by polysaccharides. A parameterization was derived and applied in a global model. The model data was compared to available observations.

EAC2025_PO1-178_568_Schrödner.pdf

PO1: 179

Can CCN activation of insoluble particles be predicted based on water adsorption measurements?

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The CCN properties of water insoluble particles can be characterized using the FHH adsorption activation theory. The theory can in principle be used to predict CCN activation if the FHH parameters are obtained from experimental adsorption isotherms. However, experimental critical supersaturations are often lower than those predicted using the adsorption isotherms. Here we investigate experimentally if the predictions can be improved using information about the surface structure of the cloud nucleating particles. We find that the corrected predictions lead to overestimation of the CCN activity of metal oxides and minerals. Possible reasons for the overestimation are discussed.

EAC2025_PO1-179_876_Laaksonen.pdf

PO1: 180

CARGO-ACT – towards a global interoperability for aerosol, cloud and trace gas research infrastructures

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The overarching goal of the EU HORIZON-funded CARGO-ACT project is to deliver a clear roadmap for sustainable global cooperation between key organisations in Europe and in the United States to provide all users, in the scientific community and beyond, with the best possible services for accessing and using information from monitoring climate- and air quality-relevant properties of aerosol, cloud and trace gases in the atmosphere. As a first step towards global convergence, CARGO-ACT brings together the European Research Infrastructure on short-lived Aerosol, Cloud and Trace Gases (ACTRIS) with four US counterparts (ARM, NOAA-GML, MPLNET and ASCENT).

EAC2025_PO1-180_191_Paramonov.pdf

PO1: 181

Cloud-Aerosol-Interactions in a Nitrogen-dominated Atmosphere (CAINA) – New particle formation, Activation, and Turbulence

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In spring 2024, an international field experiment on the influence of nitrogen on cloud properties will take place on the Dutch coast. The region has very high concentrations of agricultural nitrate near the ground in spring. TROPOS will participate with the helicopter-borne platform ACTOS to collect cloud water and measure aerosol particles and cloud droplets. In detail, the number size distributions of aerosol particles (PNSD), total particles number concentration and cloud droplet size distributions (DNSD) are measured, as well as the total number concentration of particles, the liquid water content and the main meteorological parameters.

EAC2025_PO1-181_892_Wehner.pdf

PO1: 182

Ice-nucleating particles at a background site in the southeast Tibetan Plateau

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The characteristics and possible sources of ice-nucleating particles (INPs) at a background site in the southeast Tibetan Plateau were investigated during a summer campaign in 2023. INP number concentrations near the ground were measured by an on-line instrument, the Portable Ice Nucleation Experiment (PINE), over a temperature range of -19°C~-31°C with a high temporal resolution. It was found that anthropogenic sources brought in INPs active at low temperatures. Filter samples were also collected during the campaign and freezing experiments were conducted, revealing the existence of heat-sensitive INPs at high temperatures.

EAC2025_PO1-182_497_Ran.pdf

PO1: 183

Ice-nucleating properties of mineral dust particles from Taklimakan Desert

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Sand dust samples were collected in the Taklimakan Desert and re-suspended in chamber to investigate their ice-nucleating properties. Off-line analysis by INSEKT showed that those samples had similar ice-nucleating properties in the range of -28°C ~-20°C, but might behave differently at temperatures above -15°C. Other properties of dust particles will also be investigated to generate a dataset of dust properties in arid areas of China, which would improve our understanding on the effects of dust on the environment and the climate.

EAC2025_PO1-183_954_Deng.pdf

PO1: 185

Investigations on the cirrus cloud seeding abilities of K-feldspar dust particles

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This study investigates the ice nucleation abilities of K-feldspar mineral dust particles in the cirrus cloud regime to assess their potential for cloud thinning (seeding). Nano-sized aerosol particles were produced from two types of K-feldspar raw samples using a dry-dispersion setup and a wet-atomizer to compare the effects of sample generation methods. Dry-dispersed nano-sized K-feldspar particles actively nucleate ice slightly above saturation conditions (by ~0.15) for temperatures <233 K, while wet-atomized particles show suppressed ice nucleation. These results suggest the potential for using dry-dispersed nano-sized K-feldspar particles for cirrus cloud seeding and climate warming mitigation.

EAC2025_PO1-185_657_Gao.pdf

PO1: 186

Synergistic Observations of Aerosol-Cloud Interactions During Long-Range Transported Dust Events

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Aerosol-cloud interactions during dust events influence cloud microphysics and precipitation, impacting climate models and weather predictions. Dust aerosols serve as cloud condensation nuclei (CCN) and ice nucleating particles (INP), modifying cloud properties. This study examines three dust events at RADO-Bucharest using remote sensing, in-situ measurements, and weather analysis. Multi-wavelength Lidar retrieves dust profiles, CloudNET assesses cloud properties, and ERA5 reanalysis with HYSPLIT tracks dust transport. Cloud properties are analyzed before, during, and after dust events to evaluate CCN availability, cloud phase changes, and precipitation effects. Findings enhance aerosol-cloud interaction parameterizations in climate models and weather predictions.

EAC2025_PO1-186_673_Ciocan.pdf

PO1: 187

Does decreasing of sulphur concentration influence the amount of low clouds?

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Recent studies have tried to find the factors that influence the increase in global air temperature. These factors could be, among others, a reduction of sulphur emission from special ship fuel and reducing of low cloud amount. The probability of results in the current research concerning the interaction between sulphur aerosols and low-cloud formation established the basic hypothesis for this study in central Europe. This study is focused on the long-term measurement of sulphur concentration and the potential connection to low-cloud formation.

EAC2025_PO1-187_139_Šmejkalová.pdf

PO1: 188

Investigating Marine Aerosol Variability and Climate Feedbacks: A Multi-Site Analysis Using Particle Composition and Size Distribution Data

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This study investigates marine aerosol variability and climate feedbacks across four sites: Graciosa Island, Ascension Island, Mace Head, and Zeppelin Mountain. Using Aerosol Chemical Speciation Monitor (ACSM) data, particle size distribution, and back trajectory analysis, researchers aim to isolate marine-influenced aerosols and examine their interactions with meteorological factors. Preliminary findings highlight temperature's role in influencing marine organic aerosol concentrations and cloud condensation nuclei availability. The study reveals inter-site differences in aerosol properties, contributing to improved modeling of aerosol-cloud interactions and climate feedback mechanisms. Funded by Horizon Europe, the Academy of Finland, and other agencies.

EAC2025_PO1-188_965_Singh.pdf

PO1: 189

10 years of particle number size distribution in the urban supersite of Bologna in the Po Valley (Italy)

Arianna Trentini, Dimitri Bacco, Fabiana Scotto, Vanes Poluzzi
ARPAE, Italy

The particle number concentration and aerosol size distribution (3-800 nm) have been available since 2013 in the Bologna Supersite in the Po Valley (Italy). The present study aims to analyze the evolution of the aerosol size distribution over time and to investigate whether there is a variation in the concentration and number of nucleation events.

EAC2025_PO1-189_998_Trentini.pdf

PO1: 190

Atmospheric conditions that drive NPF events: a case study

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Tartu University, Estonia

We selected six nearby days in March 2024 with NPF events, characterized by similar meteorological conditions. Still, these NPF events were different, despite the similar conditions, and certain NPF features also depended on the location. We study the reasons of these differences.

EAC2025_PO1-190_1138_Luts.pdf

PO1: 191

Bi-directional vertical transport of cluster ions during new particle formation

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This study presents the first eddy covariance flux measurements of positive and negative cluster ions during a particle formation event. The fluxes were generally directed oppositely, with positive ions moving downward to the surface and negative ions upward. Thus, the forest canopy acts effectively as a source for negative and a sink for positive ions. Before the particle formation, decreasing ion concentrations and deposition of both ions were observed, suggesting that sink processes were dominant. Additionally, vertical transport velocities due to turbulence, in comparison to due to the electrical field, were dominant for negative and about equal for positive ions.

EAC2025_PO1-191_737_Kretschmer.pdf

PO1: 192

Diurnal cycle of new particle formation in the upper troposphere above the Amazon

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Recent studies highlight the role of isoprene in new particle formation (NPF) in convective cloud outflows over the Amazon. Using the CloudChem box model, we investigate organic NPF events (transport of precursors + nucleation) in the upper troposphere at different times of the day. Nocturnal convection mainly removes isoprene through mixing. Daytime transport is more complex and involve more mechanisms. Results suggest lower particle concentrations after daytime convection due to possibly larger condensation sinks. Sensitivity to in-cloud OH and further mechanisms require investigation to refine our understanding of diurnal NPF dynamics.

EAC2025_PO1-192_1023_Chassaing.pdf

PO1: 193

Enhanced new particle formation in Milan due to low pollution and atmospheric mixing

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The study investigates New Particle Formation (NPF) in Milan, a polluted city in the Po Valley, Italy, over one year (2023 – 2024) by analyzing particle number size distributions. The results reveal a clear seasonal cycle, with winter showing higher concentrations of larger particles due to higher atmospheric stability and heating emissions, while summer exhibits stronger NPF, favored by increased mixing. The analysis shows that strong ventilation, low pollution and low airmass residence time in the Po Valley and exposure to anthropogenic sources promote NPF. These findings enhance our understanding of urban air quality and enable comparisons with other cities.

EAC2025_PO1-193_407_Agro.pdf

PO1: 194

First Determination of New Particle Formation in Istanbul

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Istanbul, a major metropolis with over 16 million inhabitants, faces complex air pollution from diverse sources. New particle formation (NPF) is a key source of ultrafine particles (UFPs). This study is the first in Türkiye to examine particle number (PN) and NPF events. PN size distribution (10–400 nm) was measured using NanoScan SMPS at urban background, urban, and traffic sites. UFP contributions were highest at traffic (89 %), followed by urban (83 %) and background (77 %). NPF events contributed 27 % at urban, 23 % at background, and 12 % at traffic sites.

EAC2025_PO1-194_1059_Coşgun.pdf

PO1: 195

New particle formation in urban background conditions in the Po valley

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We investigate the occurrence and intensity of new particle formation (NPF) in an urban background environment within the Po Valley. We set up the neutral cluster and air ion spectrometer (NAIS) in Bologna, the largest urban agglomeration in the Southern part of the Po valley. The analysis revealed the winter season recorded the highest number concentrations which could be attributed to the more stable low-level boundary layer. Applying the nanoparticle ranking analysis to the number concentrations and pollutants measured alongside revealed that some of the days in higher ranks could be days of high pollution disguised as NPF events.

EAC2025_PO1-195_466_Oliewo.pdf

PO1: 196

Observations of atypical decreasing mode diameter events at a rural background site in Cyprus

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Accurate climate projections are hindered by uncertainties in atmospheric aerosol processes, which modulate radiative forcing and cloud microphysics. Approximately 50% of global tropospheric cloud condensation nuclei (CCN) originate from new particle formation (NPF) events, yet their mechanistic drivers remain insufficiently constrained. Atypical decreasing mode diameter (DMD) events exhibit reverse dynamics to NPF events. During the SPICY campaign (April–May 2024), NPF and DMD events occurred on 52.3% and 13.1% of days, respectively. It appears that malonic acid, nearly an order of magnitude higher during DMD events, may inhibit aerosol nucleation by outcompeting sulfuric acid in cluster stabilization pathways.

EAC2025_PO1-196_543_Kanawade.pdf

PO1: 197

Differences of New Particle Formation in Seoul and Seosan, South Korea

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New particle formation (NPF) is a significant source of secondary particulate matter ($PM_{2.5}$), which causes severe air pollution in winter in South Korea. Understanding the mechanisms and characteristics of NPF is essential to mitigate the $PM_{2.5}$ haze problems.

Mechanisms and characteristics of NPF in South Korea were investigated through four intensive monitoring campaigns during different seasons in 2020-2022 at Seoul and Seosan sites. Real-time measurements were conducted to obtain physicochemical properties of particles, concentrations of gaseous pollutants in the atmosphere, and meteorological data. Condensation and coagulation sinks, growth, formation, and nucleation rates were calculated from the real-time data.

EAC2025_PO1-197_380_Ha.pdf

PO1: 198

Estimation of particle growth rate using cross-correlation

Janne Lampilahti, Santeri Tuovinen, Katrianne Lehtipalo, Pauli Paasonen, Veli-Matti Kerminen, Markku Kulmala
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Particle growth rate (GR) is essential for understanding atmospheric new particle formation (NPF) and can be determined from size-resolved number concentration measurements. Traditional methods, like mode fitting and appearance time methods, require expert-provided initial guesses, making the process subjective and time-consuming. This study presents a simple GR calculation method using cross-correlation between size channels to identify time shifts, eliminating the need for initial guesses. This automated approach enables efficient processing of large datasets and reduces subjectivity in GR analysis.

EAC2025_PO1-198_550_Lampilahti.pdf

PO1: 199

Humidity driven spontaneous OH radical-initiated oxidation of organic aerosols

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Several studies have reported the spontaneous OH formation at the air-water interfaces of aqueous droplets. In our work we investigated the ability of this chemical process to oxidize organic aerosols containing carboxylic acids. We found that only in the presene of water vapours, the air-water interface that is created upon the water uptake onto the pure organic droplets, initiates the OH radical production and the spontaneous oxidation of the organic. Product formation is negligible in dry conditions. Our findings suggest that spontaneous OH production at the air-water interface of organic nanodroplets may be a significant oxidation pathway, especially during night-time.

EAC2025_PO1-199_772_Angelaki.pdf

PO1: 200

Characterisation of VOC over the Great Barrier Reef

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This study focuses on characterisation of VOC emissions from coral reefs and their potential contribution to the aerosol particle population over the Great Barrier Reef (GBR). We present first-time observations of VOC composition over the GBR based on high time-resolution VOC observations. We focus our analysis on the effect of heat stress and coral spawning on coral VOC emissions.

EAC2025_PO1-200_689_Okuljar.pdf

PO1: 201

Competitive multiphase reactions of deliquesced aerosol particles in the presence of SO2 and NO2 regulated by aerosol pH

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We study multiphase oxidation of SO_2 by NO_2 (R1) and heterogeneous NO_2 hydrolysis (R2) at various aerosol pH values, which produces sulfate and nitrate, respectively. As pH increases from 5.8 to 6.3, sulfate formation rates exponentially increase by ~2 orders of magnitude. Nitrate is observable below pH = 6, and nitrate formation rates increase exponentially with decreased pH by ~2 orders of magnitude. We find that sulfate production dominates over nitrate production at high pH, whereas nitrate production is dominant at low pH (<6), highlighting that reactions R1 and R2 are competitive and highly dependent on pH.

EAC2025_PO1-201_381_Emori.pdf

PO1: 202

SOA precursor emissions in and above a forest consisting of beech and Douglas fir and their relation to aerosol particle numbers and composition

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Biogenic volatile organic compounds play a dominating role in the formation of secondary pollution due to their large emissions and high reactivity. The mechanisms controlling emissions of VOCs, especially monoterpenes, and their influence and contribution to the formation and aging of SOA in forests are still unclear. Therefore, we studied VOC emissions, aerosol particle number concentrations and compositions in a relatively healthy mixed forest consisting of beech and Douglas fir. We will discuss the influence of tree type and environmental parameters on VOC emissions and subsequent SOA formation.

EAC2025_PO1-202_567_Shi.pdf

PO1: 203

Growth of coating thickness driving absorption enhancement in the urban city of Barcelona

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This study, part of the CAIAC project, examines black carbon (BC) properties in Barcelona during a two-week campaign in July 2021. Measurements of rBC mass concentration, size, and coating thickness show that aerosol absorption is influenced by particle properties and meteorological conditions. The mass absorption cross section increases linearly with mean coating thickness, highlighting the role of internal mixing. Stagnant conditions with higher concentrations correlate with smaller, thinly coated rBC particles, lower external mixing with OC, and lower absorption enhancement. In contrast, more ventilated conditions lead to larger, more coated, externally mixed rBC particles with higher absorption enhancement.

EAC2025_PO1-203_763_Renzi.pdf

PO1: 204

Impact of Agricultural Emissions on Rural and Urban Air Quality (IMAGE)

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Air quality is of paramount importance to human health. Many air pollutants are linked with human activity such as agriculture, including secondary particulate matter and ammonia which have been heavily linked with human health concerns and climate impacts.
The contribution and proportions of trace gases to $PM_{2.5}$ fraction through secondary aerosol formation is underdeveloped in an Irish context.

Impact of Agricultural Emissions on Rural and Urban Air Quality (IMAGE) fills this gap in our knowledge by determining the concentrations of both PM, its size fractions and the contributing trace gases present in the atmosphere.

EAC2025_PO1-204_271_Corona Ramirez.pdf

PO1: 205

CFD and Experimental Investigation of Time-Controlled Aerosol Delivery from a Nebulizer in respiratory airways

Miloslav Belka, Ondrej Misik, Frantisek Lizal, Jakub Elcner, Miroslav Jicha

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Timed aerosol delivery enhances targeted lung deposition and reduces upper airway losses. This study examines the impact of time-controlled aerosol release from a nebulizer in a realistic 5-year-old child model using CFD and experiments. Large Eddy Simulations with Lagrangian particle tracking were performed to quantify deposition during normal breathing. Aerosol was released during defined inhalation phases to evaluate deposition sensitivity to timing. Experiments used fluorescein-labeled aerosol and a nebulizer with a programmed delay.

Results show that upper airway deposition is strongly influenced by release timing and initial particle velocity. CFD–experiment agreement supports phase-targeted delivery for improved inhalation therapy.

EAC2025_PO1-205_1216_Belka.pdf

PO1: 206

Formation and Aging of Nitrogen-Containing Organic Aerosol

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Here, nitrate-mediated photooxidation of some important nitroaromatics in atmospheric aqueous phase under different pH and temperature conditions were investigated. The dynamic changes in light absorption of nitroaromatics were measured, the photolysis rates and oxidation products as well as the aging processes were characterized. Besides, the nighttime formation processes of secondary organic nitrates were investigated based on size-resolved measurements with a soot particle long-time-of-flight aerosol mass spectrometer. Moreover, N-heterocyclic compounds from aqueous-phase reaction of dicarbonyls with amines and ammonium under different pH were also studied. We identified for the first time 155 new N-heterocyclic compounds and their formation pathways were characterized.

EAC2025_PO1-206_1219_Huang.pdf

PO1: 207

PM10-bacterial infection interaction in A549 cells: A One Health perspective

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Air pollution and antimicrobial resistance (AMR) are critical public health issues. In León (NW Spain), coal combustion contributes to particulate matter (PM10) emissions, potentially influencing bacterial behaviour. This study assessed PM10 effects on human lung cells (A549) and Staphylococcus aureus USA300. PM10 exposure reduced A549 cell viability, while S. aureus infection capacity increased, suggesting enhanced virulence. Although bacterial growth remained unaffected, results indicate PM10 may modulate pathogen-host interactions, potentially promoting AMR. These findings highlight the need for a One Health approach to address the interplay between environmental pollution and bacterial virulence.

EAC2025_PO1-207_1060_Rodríguez Rodríguez.pdf

PO1: 208

Analysis of PM2.5 concentrations in African countries: findings from 2019 to 2024

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The study analyzes the annual $PM_{2.5}$ concentrations recorded between 2019 and 2024 in Algeria, Ethiopia, Uganda, and South Africa. The results show pronounced spatial and temporal variations. Uganda consistently reported the highest concentrations, exceeding 100 µg/m³ in most years. In 2023, a general decline in concentrations was observed in most countries, except for South Africa. The observed concentrations exceed the WHO's annual guideline of 5 µg/m³. The study highlights the urgent need to strengthen air quality monitoring networks in Africa.

EAC2025_PO1-208_1134_Osa-Akara.pdf

PO1: 209

Atmospheric particles, airborne bacteria and fungi at Akrotiri monitoring station (Crete, Greece)

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Atmospheric particles cover a wide size range with the smaller ones being in the nanoscale while dust particles lie in the micron size range. Their dynamics depend strongly on their size therefore different behaviours and interactions may be observed at different sizes. Besides particles, biological entities such as airborne bacteria and fungi are a significant contributor to the atmospheric environment. Their role in atmospheric interactions is under investigation whilst pathogens are known for their detrimental effects in human health.In this work, airborne particles, bacteria and fungi were measured simultaneously at Akrotiri monitoring station.

EAC2025_PO1-209_215_Chatoutsidou.pdf

PO1: 210

Impact of a bioethanol fireplace on indoor pollutant concentrations under different operating conditions

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Bioethanol fireplaces are increasingly used for their sustainability and design advantages; however, their effects on indoor air quality require further evaluation. This study quantified key pollutants (CO, CO_2, NO_x, carbonyl compounds, and PM_{10}) under controlled conditions, assessing different burner configurations and bioethanol formulations. Combustion led to significant pollutant increases, with single-chamber burners emitting higher CO and NO_x levels, while double-chamber burners produced more PM_{10}. Acetaldehyde and formaldehyde frequently exceeded guideline thresholds. Indoor-to-outdoor total carbon ratios consistently exceeded one, indicating potential health risks associated with bioethanol combustion in low-ventilation environments.

EAC2025_PO1-210_254_Vicente.pdf

PO1: 211

High Resolution Optical Light Scattering Measurements of Atmospheric Particulate Matter in the Proximity of an Industrial Area near Taranto Italy

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The use of a fine particulate matter monitoring system based on a real-time and dimensional scanning acquisition system has shown interesting potential in the recognition of events of increase in fine particulate matter concentration. The study of the dimensional distribution has allowed us to make some statistical considerations by applying multivariate analysis models that are the basis for further in-depth analysis of source apportionment. Finally, the gravimetric comparison with a dataset consisting of 50 samples acquired between March and May 2024 has highlighted a good correlation even during conditions of Saharan event contributions that occurred in the study period

EAC2025_PO1-211_1036_Esposito.pdf

PO1: 212

Effects of the hygroscopicity and mass scattering efficiency of secondary organic aerosols on light scattering

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In this study, we quantified the dry-state mass scattering efficiencies (MSEs) of both primary and secondary organic aerosol components and organic aerosol hygroscopicity, thus systematically evaluating contributions of SOA factors to aerosol scattering and visibility degradation in ambient air.

EAC2025_PO1-212_440_Liu.pdf

PO1: 213

Estimating the growth characteristics of commonly used pesticide (Glyphosate) aerosols

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Glyphosate is a widely used herbicide that persists in the environment due to its low volatility, remaining in the liquid phase and interacting with water vapor. It is one of the most employed herbicides in the last years, and can be part of more than 700 pesticide products.This theoretical study estimates its hygroscopic growth under different humidity conditions, showing that glyphosate can absorb water and potentially influence cloud formation and atmospheric processes. These predictions provide a foundation for comparison with ongoing experimental studies. Understanding glyphosate's water uptake behavior is important for assessing its role in atmospheric chemistry and climate.

EAC2025_PO1-213_744_Mishra.pdf

PO1: 214

Study and Identification of Benzene Emission Sources in a Complex Industrial Area in Taranto (Italy)

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Recent reports have raised concerns about increasing concentrations of benzene in ambient air within Tamburi neighbourhood, in the city of Taranto. Tamburi neighbourhood is located south-east of a significant industrial complex that includes a refinery, an integrated cycle steel plant and thermoelectric power plants. Through intensive monitoring campaigns with transportable instrumentation (micro-GC), main diffuse and fugitive emission sources of benzene were investigated. In the steel plant, the analyses revealed high benzene concentrations associated with the coke production process and the treatment of coke gas and by-products. The novelty of this study lies in the use of intensive monitoring campaigns with transportable instrumentation (micro-GC).

EAC2025_PO1-214_1191_Nocioni.pdf

PO1: 215

Characterization and Source Apportionment of Ambient Air Particulate Matter (PM2.5) across Lagos, Nigeria using PMF

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Lagos, $_{\text{Nigeria}}$ is a rapidly developing megacity with increasing industrialization and traffic leading to substantial air quality issues. Using $PM_{2.5}$ compositional data from samples collected at 6 sites over a year from 2020 to 2021, source apportionment results were obtained. Nine source types were identified using elements, ions, organic and elemental carbon and molecular marker concentrations. The sources were identified as ndustrial Metal Processing (17.2%), Soil Dust/Crustal Matter (29.3%), Waste Burning (3.0%), Biogenic Emissions (3.7%), Cooking Emissions (5.8%), Gasoline Vehicle Emissions (4.0%), Diesel Vehicle Emissions (3.5%), Industrial Emissions (21.9%), and Biomass Burning (11.6%).

EAC2025_PO1-215_339_Odu-Onikosi.pdf

PO1: 216

Aerosols collection through dynamic fog aggregation: the case of asbestos

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Dynamic fog aggregation has been used to collapse asbestos aerosols. This enables the use of this technology both for sampling and for decontamination and prevention.

These results demonstrate that even a simple mild manipulation of asbestos plates causes its aerosolization. Additionally, this technology opens new opportunities to prevent asbestos spreading and to collapse asbestos aerosols from air what is of paramount importance for demolitions and debris removal.

EAC2025_PO1-216_361_Pérez-Díaz.pdf

PO1: 217

PM in restaurant kitchen air - preliminary results

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The chemical composition of respirable particulate matter (PM4) and total particulate matter (TPM) was investigated in the kitchen of a restaurant located in Bytom, Poland. Measurements were conducted over 26 days. The results showed significant differences between indoor and outdoor PM, particularly for PM4. The mass content of organic carbon was lower in ambient PM compared to indood PM, and the mass fraction of water-soluble anions and cations was also lower in kitchen PM. Emissions from indoor sources significantly increased concentrations of the PM components studied, with TPM in the kitchen being 4 times higher than in ambient air.

EAC2025_PO1-217_647_Rogula-Kopiec.pdf

PO1: 218

Particulate matter in the selected fire station in Poland: concentration and size distribution

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The aim of this paper is to determine and compare the mass concentration and size composition of particulate matter (PM) inside and outside selected fire stations in Poland. The findings of conducted analyses substantiate the notion that the concentrations and mass size distribution of PM in the fire station deviates from the concentrations and mass distribution for the urban background, a phenomenon that is attributable to the unique characteristics of the fire station and the prevalence of internal sources within it.

EAC2025_PO1-218_632_Bralewska.pdf

PO1: 219

Water- and methanol-extracted brown carbon in PM2.5 in southwest Europe

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This study examines the characteristics of brown carbon (BrC) from biomass burning in southeastern Spain, where residential wood burning is common in winter. A total of 302 daily $PM_{2.5}$ samples were collected between July 2023 and March 2024. Methanol and water-soluble organic carbon absorption (MSOC and WSOC) were analyzed to determine BrC. The results showed that the contribution of MSOC to organic carbon was similar at rural and urban sites, with a significant correlation between absorption and levoglucosan concentrations, a biomass burning tracer, indicating that biomass burning significantly contributed to brown carbon during the cold period.

EAC2025_PO1-219_364_Gomez-Sanchez.pdf

PO1: 220

Impact of smoking regime (ISO/HCI) on the emissions of PM and carbonyls of new tobacco products

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Hellenic Open University, Greece

The smoking profile is a parameter that has a high impact on the compounds emitted. This study compares the impact of smoking regime on the emissions of two types of new tobacco products: Heated Tobacco Products and vaping of dry herbal products.

These results show that there is a high difference on the emissions of carbonyls and particles from the two smoking regimes, with ISO producing systematically lower emissions.

As none of the two regimes can represent the real use of tobacco products, the systematic use of the two regimes in tobacco research can give more comprehensive results.

EAC2025_PO1-220_1039_Zervas.pdf

PO1: 221

First results of airborne pollen grain observations in a coastal location in Crete, Greece

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Bioaerosols, especially pollen, affect human health, making monitoring crucial for allergenic risk assessment and climate impact studies. Traditional optical microscopy is time-consuming and requires expertise. This study explores automated digital imaging for pollen identification in Heraklion, Crete, using the NanoZoomer S20 scanner. Airborne pollen was collected over two years (May 2022–July 2024) using a Burkard spore trap. Samples were processed and scanned for qualitative and quantitative analysis. Results were compared with concurrent data from Nicosia, Cyprus, and historical records from Thessaloniki, Greece, assessing seasonal variations and potential biases in traditional methods. Findings enhance Mediterranean aerobiological research.

EAC2025_PO1-221_1005_Papoutsidaki.pdf

PO1: 222

A novel approach for spectral-based source apportionment of ambient aerosols: A demonstrative study

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We present an alternative, spectral-based source apportionment model for calculating the mass concentration of wood burning and fossil fuel aerosol in the ambient. The model was applied to data collected from a rural area in Hungary during a two-month continuous campaign in the winter period. The proposed model is based on the parallel measurement of the size distribution, absorption response of the ambient aerosols, and the thumb-of-rule relation between the elemental carbon (EC) and total carbon (TC) of fossil fuel and wood-burning aerosols. The proposed model is compared with the traditional Aethalometer model applied to the same dataset.

EAC2025_PO1-222_1213_Tibor.pdf

PO1: 223

Optical and chemical properties of aerosol from on-road experiments of heavy-duty vehicles in India: Key inputs for climate assessment

Mohd Shahzar Khan, Gazala Habib, Aisha Baig Warsi, Mohd Imran, Mehebub Un Nabi, Rahul Kumar
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In on-road transport sector, diesel-powered HDVs are major contributors to light-absorbing black carbon emissions. Previous inventories often rely on emission factors derived from dynamometer studies, which may not accurately represent real-world driving conditions. This study presents emission factors and climate-relevant properties of aerosols emitted from on-road operations of diesel-powered trucks and tractors using the Versatile Source Sampling System (VS3). The emission factors of $PM_{2.5}$ and BC were estimated as 1.2 – 2.4 and 0.5 – 1.3 gkg^{-1} respectively. The mass absorption cross section for trucks were observed as 0.9 – 6.5 $m^2/gPM_{2.5}$. This paper also presents organic carbon (OC) emission factors.

EAC2025_PO1-223_1169_Khan.pdf

PO1: 224

Size-Dependent Dynamics of Urban Aerosols: Correlations Between Chemical Composition, Bacterial Communities, and Antibiotic Resistance Genes Over an Annual Cycle

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A year-long study in urban Bolu, Turkey, utilized six-stage size-segregated filters to sample airborne particulates. We profiled biotic components—bacterial community structure via metagenomic sequencing and antibiotic resistance gene (ARG) markers through quantitative PCR—and abiotic constituents—ionic, carbonaceous, and sugar-alcohol compounds by chromatography—across seasons and size fractions. Statistical analyses revealed significant correlations between specific microbial taxa and chemical species. Coarse particles harbored higher abundances of human-associated bacterial genera and ARGs, whereas fine particles were enriched in diverse ionic and carbonaceous compounds. These findings underscore size- and season-driven interactions shaping urban air quality.

EAC2025_PO1-224_1228_Habeebrahuman.pdf

PO1: 225

Comparative Characterization of Persistent Free Radicals in PM2.5 and PM10 Aerosols between Subtropical Tainan, Taiwan and Temperate Moscow, Russia

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Persistent free radicals (PFRs), as chemically stable yet highly reactive constituents of atmospheric aerosols, are emerging environmental health hazards due to their capacity to induce the formation of reactive oxygen species (ROS) (Chen et al., 2020). Their presence is strongly associated with the chemical composition and sources of aerosols, particularly with combustion-derived particles that exhibit significantly higher PFR concentrations than non-combustion sources.

EAC2025_PO1-225_1300_Tsai.pdf

PO1: 226

3D-Printed impactor

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For the drone-based aerosol sampling, light-weight samplers are needed. We designed an impactor with a 1 micrometer cut-off diameter and printed it on a stereolithography 3D-printer. The printing accuracy was within 5% of the desired nozzle diameter. With a polydisperse test-aerosol, the impactor was sucessfully tested.

EAC2025_PO1-226_1294_Maier.pdf

PO1: 227

A holistic approach to assess the impact of port activities on air quality: The case of Piraeus Port, Greece

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Ship emissions and their impacts on the environment is a key issue for atmospheric research and climate policy. Particles and gases emitted by ships can contribute to various environmental issues such as acidification and eutrophication of water and soil in coastal regions, climate cooling due to the sulfur content of marine fuel as well as climate warming caused by the emissions of greenhouse gases and absorbing black carbon. This study synthesizes findings from multiple measurement campaigns conducted in recent years in the Piraeus Port area to evaluate the impacts of port activities on air quality, pollutant sources, and population exposure.

EAC2025_PO1-227_1262_Grivas.pdf

PO1: 228

Characterization of particulate emissions during asphalt milling and paving in Southern Sweden

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Asphalt is a widely used material. In this study, we investigate key tasks related to road construction: milling, sweeping, paving, and rolling by employing two measurement strategies in the near-field area. Our results show that asphalt milling generates both coarse and fine particles, likely originating from combustion-derived soot, resuspended aged asphalt organics, and surface dust. Asphalt paving lead to bitumen fumes consisting of elevated levels of semi-volatile organic compound, distinct from typical traffic emissions. Such an integrated approach provides detailed insight into occupational exposure to pollution, and will contribute to further identify emission sources.

EAC2025_PO1-228_1266_Polat.pdf

PO1: 229

Critical analysis of carbonaceous aerosols from residential wood burning using offline and online measurements

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This study aims to critically compare multiple measurement techniques for quantifying carbonaceous aerosols, which is challenged by typical UK urban pollutions, and evaluate the uncertainties accordingly. Preliminary results show good agreements between Thermal Optical Analysis and online measurements of total carbon. However significant discrepancies were observed between EUSAAR2 and NIOSH Element Carbon quantification. Lack of significant difference between day and night indicating discrepancies are not driven by sources. Comparisons between online and offline analysis suggests single particle soot photometer calibration factor and Mass Absorption cross-section need to be adjust to better account wood combustion environments.

EAC2025_PO1-229_1256_Cheng.pdf

PO1: 230

Development of an open-source, modernized, airborne optical particle counter instrument

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Aerosol size distributions using Optical Particle Counters (OPCs) are a key type of measurement taken during airborne atmospheric measurement campaigns, however some of the most commonly used instruments are aging and therefore difficult to maintain and operate. In this poster we present work on the development of a updated, open-source instrument based on Lorenz-Mie theory light scattering principles, using modern, off-the-shelf components and modular design, and suitable for airborne usage. The motivation is to reduce reliance on aging instruments, and build a community of users around a versatile, adaptable, instrument which can be easily maintained and configured by operators.

EAC2025_PO1-230_1280_Rae.pdf

PO1: 231

Emerging Dust Sources in the Middle East: Quantifying the Impact of Iraq-Syrian Desert Dust Storms on Air Quality in Eastern Mediterranean

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The Iraq-Syrian Desert is emerging as a significant but underexplored dust source affecting the Eastern Mediterranean. We analysed hourly PM_{10} data (2011–2025) from 34 air quality stations in Türkiye, identifying high-PM_{10} episodes using statistical peak detection. Satellite observations (MODIS, VIIRS, TROPOMI, CALIOP) and HYSPLIT trajectories confirmed dust origins and transport pathways. WRF-Chem simulations revealed atmospheric structures enabling long-range transport. Some events from the Iraq-Syrian region caused PM_{10} levels up to 800 μg/m³ in southeastern Türkiye. Results highlight the increasing influence of this region on air quality, with implications for climate and health, urging improved monitoring and regional collaboration.

EAC2025_PO1-231_1252_Kılıç.pdf

PO1: 232

In-situ characterization of the optical properties of flame synthesized TiO2 NPs using light emission spectra

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Flame Spray Pyrolysis is an emerging flame aerosol technique for synthesizing nanoparticles(NP). Understanding the NP formation process in the flame allows precise tunability of the NP characteristics. In-situ laser diagnostics can provide access to the temporal and spatial evolution of NP characteristics along the flame but is difficult to implement because the NP optical properties evolve along the flame. In this work, the natural emission of Titania (TiO_2) NPs in the flame, together with data from laser induced incandescence and CFD simulations, is employed to provide useful insights into the evolution of the NP optical properties during flame synthesis.

EAC2025_PO1-232_1298_Choudhury.pdf

PO1: 233

Integrated Strategies for Detection and Manipulation of Ultrafine Particles Using Physical Forces and Fiber-Tip Nanophotonic Sensors

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Eindhoven university of technology, Netherlands, TU/e

Ultrafine particles (UFPs, <100 nm) pose significant health risks but are challenging to detect due to their low mass and high diffusivity. This project develops a fiber-tip nanophotonics sensor for UFP detection based on refractive index changes. Scanning mobility particle sizer serves as the benchmark for sensor validation using controlled polystyrene aerosols. To enable reliable detection within the sensor's small active volume, we investigate UFP delivery strategies using inertial impactors, electrostatic forces, and acoustic manipulation. Combined

with CFD simulations and microfabrication, this multidisciplinary approach offers a compact, high-sensitivity alternative to conventional systems for real-time UFP monitoring.

EAC2025_PO1-233_1229_Taghipour.pdf

PO1: 234

New particle formation over the Southern Ocean: insights from long-term measurements in Punta Arenas, Chile

Gabriela R. Unfer[1], Frank Stratmann[1], Silvia Henning[1], Thomas Conrath[1], Boris Barja[3], Mira Pöhlker[2]

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A long-term atmospheric dataset collected at Cerro Mirador, Chile (2019–2023), revealed clear seasonal patterns in particle number size distributions (PNSD), with higher concentrations in summer and lower in winter. In Summer, four main PNSD types were identified, three of them linked to new particle formation (NPF) processes, under predominantly westerly winds. A persistent presence of 20–30 nm particles suggests frequent regional NPF, while local NPF occasionally occurs in “banana-shaped” patterns. These findings help improve the understanding of aerosols in the Southern Ocean region, where cloud representation in climate models remains a major challenge.

EAC2025_PO1-234_1241_Unfer.pdf

PO1: 235

Parameters controlling the representation of Arctic cloud-forming aerosols in UKESM

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Enhancing the representation of aerosols in Global Climate Models is important for reducing uncertainties associated with aerosol-cloud interactions. This study identified and examined the dominant parameters controlling cloud-forming aerosols over the Arctic region within the United Kingdom Earth System Model (UKESM). The role of 37 aerosol-cloud-relevant parameters in determining accumulation-mode number concentration and diameter was examined using a Perturbed Parameter Ensemble. Key parameters were identified which controlled number and size properties, which contextualised simulated seasonal biases when compared against size-distribution measurements from Arctic observational sites. This research indicates areas for further model development in constraining physical processes, and natural/anthropogenic emissions.

EAC2025_PO1-235_1295_Wadlow.pdf

PO1: 236

Monitoring of UPFs in a site affected by biomass burning

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ARPAT, Italy

This study describes the monitoring results at the LU-Capannori site, affected by a high amount of emissions from biomass combustion. It is observed that during night peaks, the most contributory particulate mode is the Aitkins mode, with a high correlation between PM1 and BC due to biomass combustion. In each of the four campaigns, UFP levels are much higher than the WHO recommended values, both hourly and daily, furthermore the temporal evolution and the correlation with the other pollutants monitored at the site demonstrate that biomass combustion is the factor that mostly contributes to exceeding the threshold.

EAC2025_PO1-236_1291_Collaveri.pdf

PO1: 237

Feasibility of an inexpensive single-particle SIBS instrument

Eetu Naukkarinen, Antti Rostedt, Jorma Keskinen

Tampere University, Finland

This work evaluates the feasibility of using spark-induced breakdown spectroscopy (SIBS) for real-time elemental analysis of individual airborne aerosol particles. The SIBS is offering an inexpensive and compact alternative to aerosol mass spectrometry and laser-induced breakdown spectroscopy (LIBS). A cost-effective SIBS system was developed, incorporating an inductive spark generator and spectrometer-based optical detection. In experiments, potassium and sodium were successfully detected in individual multi-salt particles, with a particle-to-spark hit rate of 0.1/s for particles larger than 2 µm. While promising, the practical applications of the prototype are limited by the low plasma temperature (~3500 K).

EAC2025_PO1-237_1250_Naukkarinen.pdf

PO1: 238

Modelling metals (Cu, Fe, Mn) concentrations over Europe

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Certain metals (Cu, Fe and Mn) are suspected of playing an important role in the health effects of PM. Therefore, it is important to be able to simulate atmospheric concentrations of these metals. We developed European emission inventories for these 3 metals, then simulated their concentrations for over 2 years. Evaluation against observations shows that the model accurately simulates copper, whereas significant biases exist for iron and manganese. Road traffic (abrasion processes) is the predominant source for these metals but the role of other sources such as rail traffic and industry needs, to be investigated.

EAC2025_PO1-238_1267_Foret.pdf

PO1: 239

Open-pit mine dust aerosol monitoring using MODIS and Sentinel-5p satellite retrievals

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Mining operations produce dust, impacting air quality, health, and climate. The EU Horizon-funded MOSMIN project uses satellite and ground-based data to monitor such effects. This study applies MODIS MAIAC AOD and Sentinel-5P AI to assess dust activity over two open-pit mines: Roșia Poieni (Romania) and Talabre (Chile). While MODIS offers finer spatial detail, it struggles with bright surfaces and cloud cover. Sentinel-5P detects absorbing aerosols but at a coarser resolution. Combined, they reveal elevated aerosol levels and dust transport beyond source areas. These findings support synergistic EO approaches to enhance mining impact assessment.

EAC2025_PO1-239_1240_Deaconu.pdf

PO1: 240

Optical and Compositional Characterization of Carbon Nanoparticle Aggregates in Films Produced via Electric Field-Assisted Flame Synthesis

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Optical and Compositional Characterization of Carbon Nanoparticle Aggregates in Films Produced via Electric Field-Assisted Flame Synthesis

EAC2025_PO1-240_1301_Parisi.pdf

PO1: 241

Preliminary findings on the adhesion of bacteria to particulate matter in the polluted atmosphere of Gliwice, Poland

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This study presents preliminary findings on the adhesion dynamics of airborne bacteria to particulate matter (PM) in the polluted atmosphere of Gliwice, Poland. Airborne bacteria were sampled using a 6-stage Andersen cascade impactor, with particle concentrations simultaneously measured using a particle counter. The results show a strong correlation between coarse PM and larger bacterial particles in the aerosol, suggesting that small, respirable bacteria (≤3.3 µm) may adhere to coarse particles. These findings highlight the need for further investigation to better understand the mechanisms of bacterial adhesion to PM in urban environments.

EAC2025_PO1-241_1208_Brągoszewska.pdf

PO1: 242

Saharan dust Transport Events over Southern Italy: a comprehensive analysis based on model simulations and experimental data

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During the spring of 2024, two dust storm events were observed over southern Italy, as detected by MODIS/AQUA satellite imagery and the WRF-Chem model. During both episodes, elevated daily mean PM_{10} mass and particle number concentrations were recorded at the ECO Observatory of Lecce. To characterize the sources of the measured particulate matter, the FLEXPART model and the aerosol vertical profiles were employed. Aerosol dry deposition samples (collected in Lecce site of X Med-Dry network) were analysed by electron microscopy with energy dispersive X-ray to obtain size, shape and elemental composition of single particles.

EAC2025_PO1-242_1286_Cesari.pdf

PO1: 243

Soot nanoparticles: transforming a harmful pollutant into a sustainable nanocomposite-based sensor

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The aim of this study is to upcycle carbon soot particles produced through hydrocarbon combustion and to explore their potential as electroactive nanomaterials. The soot particles undergo acidic pre-treatment to introduce surface functional groups that facilitate gold deposition. A sustainable colloidal chemical approach is then implemented to decorate the soot (NPs) with gold nanoparticles (Au NPs). The novel hybrid nanocomposites have been fully characterized and their electroanalytical properties were tested in the detection of H_2O_2, a key biomarker in biological processes, and diclofenac (DFC) drug, a pharmaceutical water contaminant responsible for serious human health and environmental concerns.

EAC2025_PO1-243_1255_Migliorini.pdf

PO1: 244

Sub-micrometer urban aerosol analysis by nanoelectromechanical systems-based Fourier-transform infrared spectroscopy (NEMS-FTIR)

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We demonstrate rapid collection and chemical characterization of sub-micrometer urban aerosols using nanoelectromechanical systems-based Fourier-transform infrared spectroscopy (NEMS-FTIR) with the EMILIE™ (Invisible-Light Labs GmbH). Combined with a mini-MOUDI™ impactor (Model 135-10B, TSI GmbH) and aerosol impactor adapter plate, particles down to 10 nm were sampled for less than 30 minutes and analyzed by different size fractions. Spectral features revealed common organic and inorganic aerosol constituents, including black carbon, whose concentrations were estimated via spectral fitting of a reference spectrum of Diesel soot. Results show clear temporal differences in chemical composition (midday vs. rush hour & size fractions, respectively).

EAC2025_PO1-244_1248_Luhmann.pdf

PO1: 245

Tracing textile-origin VOCs in airborne particulate matter: Non-Targeted profiling via HS-SPME GC-Orbitrap.

Marina Cerasa, Catia Balducci, Benedetta Giannelli Moneta, Silvia Mosca, Mattia Perilli, Marco Giusto, Tiziana Sargolini, Tommaso Rossi, Adriana Pietrodangelo
CNR IIA, Italy

The CELLOPHAN project investigates the chemical fingerprint of plastic materials from major industrial sectors to support airborne microplastics research. We applied HS-SPME GC-Orbitrap HRMS to characterize VOC emissions from textile blends sampled during industrial operations. Four cotton-based fabrics (with polyester or acrylic) were incubated to simulate emissions under warm conditions. The method enabled the untargeted detection of over 100 compounds, with clear differences among fabrics. Cluster and correlation analyses identified specific emission markers. The workflow was also tested on PM_{10} filter samples, confirming its potential to trace textile-derived VOCs in complex environmental matrices.

EAC2025_PO1-245_1268_Cerasa.pdf

PO1: 246

Towards an improved historical emission dataset for modelling air quality in urban areas during the industrialization

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Is there a link between industrial-era air quality and contemporary socio-economic outcomes in German cities? Answering this question requires spatial data on urban air pollution at the end of the 19th century. The regional chemistry-transport-model ICON-MUSCAT is used to model historical air quality in Germany using an improved emission dataset based on the emissions of the Community Emissions Data System (CEDS). Improvements of the spatial distribution of the sector-wise emissions are performed with the help of population data and historical maps that provide the location of factories etc. within the city, as well as the extent of populated areas.

EAC2025_PO1-246_1303_Seidel.pdf

PO1: 247

Comparison of atmospheric PM10 measurements obtained by online and offline ED-XRF instrumentation.

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This study compares online and offline elemental composition measurements of PM_{10} using the same ED-XRF technique but different sampling supports: Teflon tape for the Xact® 625i analyser and quartz filters for the benchtop ED-XRF. The online system, operating at the ECO observatory with 3-hour time resolution, also records meteorological parameters, allowing source-related interpretations. Daily averages from the Xact are compared with offline measurements to assess agreement and data quality. In addition, we present the first high temporal resolution dataset of elemental concentrations at ECO, focusing on specific tracers of sources such as African dust, biomass burning, road traffic, and fireworks.

EAC2025_PO1-247_1304_Deluca.pdf

PO1: 248

CFD simulation of non-exhaust particles dispersion in the wake flow of a passenger car

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Non-exhaust emissions (NEE) from tyre and brake wear and resuspended particles are a major source of traffic-related PM, particularly in urban areas. As wheels strongly influence airflow around the vehicle, simulating their motion is essential for accurate predictions. This study uses CFD simulations to assess the turbulent dispersion of brake-wear particles from a passenger car, providing insights into their transport and potential exposure risks. Results show that particles primarily accumulate on both sides of the vehicle due to longitudinal vortices. Inside wheelhouses, larger particles settle quickly on surfaces, while smaller ones remain airborne longer, extending their suspension in the air.

EAC2025_PO1-248_1265_Doumaz.pdf

PO1: 249

Integrated measurements of atmospheric aerosol properties over Naples urban area using near surface and remote sensing devices

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The APINA (Aerosol Properties by Integrated measurements in Naples Area) campaign investigates atmospheric aerosol properties in the urban area of San Giovanni a Teduccio, Naples. Conducted through collaboration between CNR, University of Naples "Federico II," and University of Basilicata, the study combines surface and remote sensing instruments to assess aerosol optical and microphysical properties. The campaign focuses on pollution sources like black carbon from traffic and harbour emissions, as well as long-range transport phenomena. Results aim to improve understanding of urban air quality, seasonal variability, and the environmental impact of anthropogenic emissions.

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Tracing Sources of Elemental PM2.5 in the Sarajevo Basin: Results from the SArajevo AEROsol Experiment (SAAERO)

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The high-resolution Xact 625i data facilitated better identification of complex pollutant sources at the Sarajevo site (BIH) strongly influenced by meteorology. In the frame of the first systematic extended study of fine aerosols in Sarajevo during 2022—2023 (Sarajevo AEROsol Experiment: Composition, Sources, and Health Effects of Atmospheric Aerosol, SAAERO) we identified following winter PM2.5-el. sources: fresh and aged biomass (41%), heavy oil/regional (35%), industrial (17%), traffic (4%), dust (2%) and firework (1%). The study provided valuable insights for developing effective pollution mitigation strategies in this pollution hotspot.

EAC2025_PO1-250_548_Glojek.pdf

PO1: 251

Chemical characterization of atmospheric aerosols in Antarctica

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Aerosols play a crucial role in climate dynamics, yet their sources and distribution in Antarctica remain underexplored. This study analyzes size-segregated elements in Antarctic aerosols to assess seasonal variations and potential sources. Seven samples were collected at Faraglione Camp (November 2019–January 2020) using a cascade impactor. Elemental analysis via ICP-OES, GF-AAS, and DMA revealed distinct seasonal trends influenced by katabatic winds and pack-ice melting. Enrichment factor analysis indicated geogenic and marine contributions, with Cd, Cr, and Hg suggesting anthropogenic influence. These findings underscore the need for continued aerosol monitoring to evaluate long-range pollution transport and environmental impacts.

EAC2025_PO1-251_408_Massi.pdf

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Exploring Short-Term Exposure to Traffic-Related Air Pollution during Bicycle Commuting

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Transport-Related Air Pollution (TRAP) poses significant health risks, particularly for active commuters. This study compares TRAP exposure among cyclists using conventional (CvB) and electric-assisted bikes (EAB) in Lyon, France. By measuring pollutant concentrations and inhaled doses on high- and low-traffic routes, we found that UFP and black carbon doses were significantly higher in high-traffic areas. CvB users consistently inhaled more TRAP due to greater physical effort and increased breathing rates. The study is part of a broader project on cognitive effects of TRAP exposure. Further research with additional participants will refine these findings and explore seasonal variations.

EAC2025_PO1-252_1188_Al Marj.pdf

PO1: 253

Analysis of Aerosol Absorption Properties through an Integrated Experimental Approach during a Monitoring Campaign at a Central Mediterranean Site

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This study examines the carbon fraction of atmospheric particulate matter (PM), focusing on Black Carbon (BC), a byproduct of incomplete combustion with significant climate and health impacts. Sampling took place in Lecce (May–June 2024), with analysis conducted using advanced techniques, including the AE33 aethalometer, OC/EC analyzer, and Isotope Ratio Mass Spectrometry (IRMS). Results show seasonal variability in PM absorption, with BC as the primary contributor to solar radiation absorption. Strong correlations ($R > 0.50$) were found between PM components and absorption coefficients. Isotopic analysis identified key sources like traffic, biomass burning, and desert dust, supporting air quality mitigation strategies.

EAC2025_PO1-253_805_Peccarrisi.pdf