

SESSIONS DUST 2023 - BARI - ITALY

Last Update 2022-10-03

CM01 - IMPACT OF DUST ON TERRESTRIAL AND CRYOSPHERIC SYSTEMS: DEPOSITION AND GEOCHEMISTRY

The session will look at the impact of dust deposition on the geochemistry of soils, snow, and ice, and even lacustrine environments. Papers applying to this session could also deal with the impact of albedo change and melting of snow and ice and the consequences of dust import on vegetative growth and ecosystem development. A major focus will be the on the geochemistry and mineralogy of dust input and how it can affect the geochemistry and biogeochemistry of these systems.

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CM02 - INTERACTIONS BETWEEN DUSTS AND ATMOSPHERIC TRACE GASES: IMPACTS ON ATMOSPHERE AND DUST SURFACE PROPERTIES

Heterogeneous physical and chemical processes occur at the surface of atmospheric dusts of any origins (desert, oceans, volcanoes...). The uptake and the possible reactions of atmospheric gases on dust surface can affect first the composition of the atmosphere, and second the surface properties of the dust. These aspects can be addressed through (i) laboratory experiments, (ii) field campaigns and (iii) modelling.

This session welcomes inputs about interactions of atmospheric trace gases (VOCs, NO_x, SO_x, HO_x, O₃, H₂O, radicals...) with dusts, to addresses the impact of surface processes on: atmosphere composition, dust ageing, optical and hygroscopic properties of dusts.

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HE01 - EMERGING POLLUTANTS VEHICULATED BY ATMOSPHERIC PARTICLES: IMPACT ON HUMAN HEALTH

The session will deliver topics on different forms of emerging pollutants vehiculated by atmospheric particles. Specific attention will be placed on their possible health impact. Though the focus will be more on emerging pollutants, information and reports on known pollutants such as trace metals and PAHs can also be submitted for consideration. Efforts will be geared towards early life exposure and association with diseases. The session will also look at association between exposure to these pollutants and development of diseases in humans.

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HE02 - ATMOSPHERIC AEROSOL PARTICLES: NATURAL AND ANTHROPOGENIC SOURCES IDENTIFICATION AND MONITORING

Nowadays, atmospheric aerosol particles (referred also to as PM, Particulate Matter) have recently grown in scientific interest due to their harmful effects on human health and its involvement in pollution problems and global climate change. Particulate matter is a complex mixture of suspended solid and liquid particles with different physical and chemical properties (e.g., size distribution, chemical, geochemical and mineralogical composition). The composition of the particles varies widely depending on their source that can be anthropic, (e.g., industrial activities, road traffic and residential heating) or natural, (e.g., local soil, deserts, volcanoes, sea and forest fires). The determination of atmospheric particles chemical composition and their identification represent key tools for evaluating the environmental and health impacts, characterizing the atmospheric processes in which it is involved, and developing cost-effective and successful remediation measures. This session enters this context and aims to bring together researchers involved in the study of the PM_x (e.g., PM₁₀, PM_{2.5}, PM₁) and encourages contributions regarding PM in-situ measurement, chemical, geochemical and mineralogical characterization and morphological observation to the identification of natural and anthropogenic aerosol particles sources.

HE03 - TRACE ELEMENTS IN NATURAL DUST: INFLUENCE ON HUMAN HEALTH

Recent researches has outlined the harmful effect of trace elements into atmospheric dust on human health. This session focuses on harmful impact of trace elements of dust from natural environment on human health.

HE04 - SPATIO-TEMPORAL MODELING FOR ATMOSPHERIC PARTICLES DATA

Vehicular traffic, industrial activity and street dust are important sources of atmospheric particles, which cause pollution and serious health problems, including respiratory illness. Hence, techniques for analyzing and modeling the spatio-temporal behaviour of particulate matters, in the recent statistical literature, represent an essential support for environmental and human health protection. Contributions on modeling and prediction are of interest.

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HE05 - NEW ANALYTICAL APPROACHES TO ADDRESS HEALTH EFFECTS OF FINE DUSTS

The session welcome contributions related to new analytical approaches to address health effects caused by dusts with a special emphasis to fine and ultrafine dusts.

HE06 - DUST IN THE SEA - IMPACT ON BIOGEOCHEMISTRY AND CLIMATE

Dust laden nutrients deposited in surface waters affect phytoplankton with impact for their primary productivity, biomass and biodiversity. Primary productivity is a critical step for climate regulation. Given that iron limits primary productivity in up to 30 % of the ocean and that most of the dust being deposited bear a significant amount of iron, its solubility, reactivity and bioavailability are actively studied. Such research goals are part of the GEOTRACES international science program. In order to improve our understanding of the links between continental dust, the ocean and the carbon cycle, this session welcomes contributions on the fate of elements delivered by atmospheric dust to the ocean, their bioavailability and their implication for the primary productivity. As the consequences from global change on dust deposition and atmospheric processing remain unknown, contributions on the global impact of dust oceanic deposition nowadays but also in the future are also welcome.

HE07 - BIOMONITORING OF ATMOSPHERIC DEPOSITION OF COSMIC DUST

Moss biomonitors are widely used to trace atmospheric deposition of heavy metals, nitrogen, persistent organic compounds (POPs) and radionuclides (<http://icpvegetation.ceh.ac.uk/>). In the recent years several successful attempts were undertaken to study deposition of cosmic dust using the same moss biomonitors. This session invites contributions for monitoring long-term and large-scale deposition of air pollutants based on moss analysis.

IM01 - HIGH RESOLUTION ACTIVE OPTICAL REMOTE SENSING OF DUST AEROSOL LAYERS AND THEIR IMPLICATION TO CLIMATE

This session focuses on new observations of dust events on sub-km, and sub-diurnal scales enabled by active and passive optical remote sensing (lidar and multispectral satellite imagers) methodologies. Contributions describing original research results from ground-based, airborne, and space-based observational vantage points are solicited. In particular, geometrical and optical properties of dust layers are essential in climate, radiation budget, and cirrus cloud formation research. One of the session's goals is to survey the state-of-the-art remote sensing techniques for determining the vertical and horizontal distribution of clouds and aerosols (mainly dust) throughout the atmospheric column. Another topic that benefits greatly from those techniques is elucidating chemical and physical processes that occur in moderately and heavily dust-polluted environments. For this application, it is necessary to accurately describe the planetary boundary layer dynamics and depth evolution (a field in which lidar techniques excel). Other topics of interest for this session include: Process studies related to atmospheric composition, pollution, transport, dynamics and convective storm development.

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IM02 - IN-SITU CHARACTERIZATION OF DUST PROPERTIES

In-situ characterization of dust properties. Measurements, methods, and instrumentation related to the characterization of dust aerosol particles in a contact/collection-free manner

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IM03 - ADVANCED URBAN DUST MONITORING AND MITIGATION METHODS

Urban dust is a complex problem that has generated interdisciplinary research involving multiple fields, including atmospheric sciences, environmental chemistry, earth science, air pollution policy research, as well as public health fields. Research on advanced monitoring and mitigation methods of urban dust has grown considerably during the last few decades. However, scientists and policy makers continue to face several real-world problems, including developing effective advanced monitoring methods to assess the dust emission sources. This session invites researchers to contribute relevant research presentation focusing on advanced urban air pollution monitoring and mitigation.

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IM04 - IDENTIFICATION, MONITORING AND CHARACTERIZATION OF ASH/DUST PHENOMENA FROM SPACE: ADVANCES AND FUTURE PERSPECTIVES

Ash emissions and dust outbreaks strongly affect both environment and climate and may pose a serious threat to human health. Volcanic ash may also represent an important cause of air traffic disruptions. An efficient identification, monitoring and characterization of ash/dust plumes is then crucial to quantify and mitigate their impact on social and economic human activities. Satellite remote sensing provides an important contribution in this direction, through the full exploitation of data from satellite platforms orbiting around Earth. This session deals with present methods and procedures focusing on early, accurate identification and continuous tracking of ash/dust clouds from space. Abstracts addressing: (i) state-of-the-art satellite-based techniques and retrieval methods, (ii) artificial intelligence (AI) and machine learning (ML) capabilities, (iii) data and procedure from recent and next generation satellite systems, are encouraged

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MF01 - MICROPHYSICAL, CHEMICAL AND OPTICAL PROPERTIES OF MINERAL DUST

Dust is an important component of the Earth's climate system. However, many of its impacts on climate, such as radiative interactions, dust-cloud interactions and interactions with the biosphere are dependent on particle composition, size and shape. These properties may vary regionally and also be modified during atmospheric transport. All these properties also control the spectral optical properties of mineral dust, which are critical in determining how they interact with radiation through the direct and semi-direct radiative effects. This session will focus on understanding and quantifying composition, size and shape distributions of mineral dust aerosols and their role in affecting the shortwave and longwave optical properties and radiative effects of dust. We welcome contributions from laboratory experiments, fieldwork, remote sensing and modelling studies, both from local to global scales, and we also especially encourage contributions reporting on the combinations of different approaches.

MF02 - ATMOSPHERIC TRANSPORT AND MODIFICATION OF MINERAL DUST

Mineral dust is one of the major aerosol types in a global context. Besides its direct climate impact, by indirect effects it modifies cloud processes and precipitation, serves as nutrient supply for marine and terrestrial ecosystems, and affects human health. After emission, dust may undergo considerable changes by atmospheric processes, such as modifications of the particles like chemical reactions and mechanical mixtures, but also modifications to the dust aerosol body, like selective removal of particles, dilution and admixture of non-dust particle types. As consequence, the impact of dust on the global system may change considerably, e. g. by modification of the radiative transfer due to size distribution changes or mobilization of trace compounds by chemical processing. This session calls for field observations and modeling studies on mineral dust aerosol atmospheric modification. Topics can include near-source modifications as well as ageing during long-range transport, anthropogenic as well as natural ones. Single-site and networked observations, large field campaigns and time series observations are equally welcome. Pure modeling studies, insitu and remote sensing observations and any combined approaches are invited

MF03 - SAHARAN DUST

This session intends to bring together the scientific communities of air pollution modelling and atmospheric observations focusing on Saharan dust. The main aim of the proposed session is to evaluate the state-of-the-art (recent results and current problems) related to the investigation of desert dust advection over the Mediterranean basin and of the impact these natural particles have on the PM_x concentrations measured at ground level, from the regional to the local scale. Presentations covering the research area of air pollution modelling and observational techniques (including sensors development) are welcome. In this session, we invite contributions regarding the atmospheric processes taking place in the planetary boundary layer in the presence of mineral particles advected from the Sahara desert.

MF04 - ASIAN DUST

Asian Dust is often understood as large amounts of lofted mineral dust above Asia. But its sources and sinks are not necessarily only in Asia: the dust may also be advected from far away sources like the Saharan desert. Hence, Asian dust is more than a regional phenomenon. After the dust is lofted into the atmosphere, it will be transported and mixed with other atmospheric particle types. Its optical and chemical properties may be changed by aging on its way through the atmosphere. Asian Dust affects not only the atmospheric radiation budget, but also human health, and even economics. Thus, the Asian Dust needs a multiple-dimensional approach into several directions and scientists of different disciplines are working on this phenomenon. A comprehensive study of Asian Dust in the atmosphere is only possible with a combination of ground-based, airborne and space-borne measurements with additional regional and global modelling approaches. The goal of the proposed session is to bring scientists together and to gain more insight into the different aspects of Asian Dust: its properties, its sources, its transport mechanisms and processes, its effects on humans, and finally on its sinks.

TD01 - DUST STORMS: DRIVERS, CHARACTERISTICS AND IMPACTS

This session aims at showcasing recent research progress and augmenting existing knowledge in the role of atmospheric dynamics in dust storms and the radiative impact of atmospheric dust aerosols. It will provide a setting to foster discussion and help identify gaps, tools, and studies that can be designed to address these open questions within the community.

We invite contributions on all observational and numerical modelling aspects that address the links between atmospheric dynamics and the dust cycle. This may include studies of:

- The meteorological aspects that cause dust storms at various places around the world.
- The variability of the large-scale atmospheric circulation (such as polar jet, subtropical jet, troughs, heat lows) and impact on the dust activity and its variability,
- The characteristics of dust storms.
- The radiative impacts of atmospheric dust aerosols,
- Teleconnections and climate indices and their role in atmospheric dust variability in the dust belt.

TD02 - EXTRATROPICAL-SUBTROPICAL INTERACTION. DUST STORM FORMATION AND IMPACT OVER NORTH AFRICA AND EUROPE

The interaction between the polar jet and Hadley cell modulates mid-latitude circulations and weather. The relevance of such interactions for dust storm genesis and transport is the session focus.

An example of this strong extratropical-subtropical forcing is the penetration into North Africa of cold and high potential vorticity (PV) polar air, because of Rossby wave breaking, which facilitates dust storm formation in deflatable areas. This is associated with strengthening of upper-level ridges with the poleward transport of warm low PV subtropical air thus blocking airflow downstream and deflecting it into North Africa or the Middle East.

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UD01 - THE UNIVERSE OF DUST - OPEN SESSION

This symposium covers any other topic not included in the Sessions listed above.

UD02 - MINERAL DUST AND ANTHROPOGENIC PARTICLES AS CARRIERS OF VIRUSES AND BACTERIA

There are several studies documenting that natural and anthropogenic atmospheric particles are significant vehicles for microbial dispersal. Areal distribution and diversity of airborne microbial communities are influenced not only by source locations (dry/cold deserts, seas, lakes, inner land, peninsulas, etc-) and seasonal related changes but also by lithology of source areas. Also transport, that may take place over very long distances, impacts on microbial communities due to the environments over which the air mass is traveling.

At a smallest scale, household dust may be a vehicle of microbes able to spread antibiotic resistance. And particulate matter, which ever its origin, could be also able to influence pandemic incidence rates.

This session welcome contributions for discussing associations between viruses, bacteria, and organic/inorganic and natural/anthropogenic dust.

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UD03 - VOLCANIC ASH AND MINERAL DUST CLOUDS: SIMILARITIES AND DIFFERENCES , DETECTION, EARLY WARNINGS, ATMOSPHERIC INTERACTIONS, AIR POLLUTION, AND IMPACTS

Volcanic ash is a major product of explosive volcanic eruptions posing a range of hazards over widely varying spatial and temporal scales. Like mineral dust, during its transport and deposition from the atmosphere, ash undergoes various physicochemical processes that can influence its impacts on the receiving natural and human environments.

We welcome submission of abstracts from a broad range of disciplines relating to volcanic ash and mineral dust cloud processes, effects, detection, and early warnings, including field, laboratory, remote sensing, and modelling studies. We especially encourage submission of studies involving close cooperation between ash and dust researchers.

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UD04 - LIGHT SCATTERING AND REMOTE SENSING

This session covers modeling and measurement of the light-scattering properties of dust and how they are used in remote-sensing applications.

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UD05 - INTERPLANETARY DUST PARTICLES

Raman Tweezers (RTs) is used to manipulate micro and nano-plastics and individual cosmic dust particles. In doing this it is possible to identify their compositions and shapes, and to study their response to optical forces without any substrate effects. By RTs it is possible to characterise unambiguously single micro and nano-particles, overcoming the standard Raman spectroscopy capabilities, intrinsically limited to ensemble measurements. In particular scientists can search for biogenic signatures on the cosmic dust samples, which play a dominant role in the Universe, leading to the formation of galaxies, stars, planets and minor bodies and it is also the key to life's origins.

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UD06 - PALEODUST ARCHIVES: OBSERVATIONAL CONSTRAINTS ON THE GLOBAL DUST CYCLE

Mineral dust is a major component of the global atmospheric aerosol load. Dust emissions are influenced by climate change, and dust, in turn, can affect climate and biogeochemical cycles. Spatial and temporal variability of dust emissions and transport, as well as uncertainties in the particle size distributions and size-dependent physical and chemical properties, render dust an uncertain component of the climate system. Climate archives constitute natural dust samplers, and preserve precious information about past variability in the dust cycle. Under opportune circumstances, climate archives provide us with quantitative reconstructions of dust mass accumulation rates; when paired with additional information, such as measurements of particle size distributions, they have a great potential for reconstructing the global dust cycle. We invite contributions aimed at building up a quantitative observational reference framework from paleodust archives, as well as contributions from the modeling community with the potential to constrain and validate Earth System Models.