

THE DUST DOCTORAL NETWORK

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Mineral dust is a major atmospheric aerosol, and it gives us one of the most visible and detectable aspects of transboundary transport of atmospheric constituents, impacting visibility, radiation and climate. What is less evident are its quantitative impacts on health, transportation and energy production. Atmospheric dust is not fully understood at the fundamental level (microphysical properties, dust emissions, source regions) and hence atmospheric models fail to fully reproduce its impacts. Moreover, dust observations using ground-based instrumentation, remote sensing and aircraft are abundant, but not evenly distributed; in particular they are missing near the major dust sources. The techniques and methodologies to study dust are still under development, with each giving a different picture of a phenomenon with multiple facets. For example, it is now known that super-coarse and giant dust particles have gone undetected for a long time due to limitations in the measurement and modelling tools that have been in use for decades, and this misdetection alters the understanding and the prediction of a number of processes. Finally, dust affects the environment, society, and several economic sectors, with impacts on the transportation and energy sectors for example, the nature and cost of which is not fully understood and quantified. Several methodologies exist to study mineral dust, each giving its own differing picture of a complex phenomenon: numerical modelling, remote sensing, in-situ observations, laboratory research. To address some of these challenges, the first doctoral network on a European scale (to our knowledge) on the topic of dust has started its activity, bringing together expertise on mineral dust in the atmosphere, combining multidisciplinary aspects. The Dust Doctoral Network (Dust-DN) is a strategic international, interdisciplinary and intersectoral alliance of high-profile partners, able to leverage on unique state-of-the-art facilities and recent innovative spaceborne missions. Dust-DN will provide a careful blend between individual research projects and integrated combined training and networking, and a critical mass on dust-focused studies using complementary methodologies. Seventeen doctoral candidates will be exposed to differing research and working environments, multiple technologies and methodologies. They will be trained in the atmospheric sciences, dust science questions, transferable skills and on the partners' unique research infrastructure, enabling to tackle the bigger picture of dust challenges. The network comprises dedicated applied research projects, with direct contributions and impacts embedded with the societal and industrial sector. It involves 8 leading partners and 15 associated partners, from research, academia and industry, and representing 9 countries and the World Meteorological Organisation. Dust-DN officially started operations in November 2024 and it is funded by the European Union under the Marie Skłodowska-Curie Actions (grant agreement 101168425), and by the corresponding national agencies of the United Kingdom (UKRI) and Switzerland (SERI). Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union and Marie Skłodowska-Curie Actions (MSCA). Neither the European Union nor MSCA can be held responsible for them.