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An analysis of Saharan desert dust over Mediterranean Basin

F. Guarnieri (1,2), F. Calastrini (1,2), C. Busillo (2), M. Pasqui (1), V. Capecchi (1,2)

(1) IBIMET, National Research Council, Via G. Caproni 8, 50145 Firenze (FI), Italy (guarnieri@ibimet.cnr.it), (2) LAMMA Consortium, Via Madonna del Piano 10, 50019 Sesto Fiorentino (FI), Italy (calastrini@lamma.rete.toscana.it)

The suspended particulate matter may modify the air quality with consequences on human health, affecting visibility limiting visual range, governing the extinction of radiation above the sea in clear sky conditions and acting as cloud condensation and ice nuclei during cloudy atmospheres.
All year long, massive airborne plumes of desert dust from the Sahara and surrounding regions are exported to the tropical Atlantic Ocean and the Mediterranean Sea. Even though the North Atlantic Oscillation controlled inter-annual variations over Mediterranean Basin, the majority of dust intrusions on these areas are usually associated with the passage of either a cold or a warm low-pressure system. Dust transport begins over the Eastern Basin toward the end of the winter and early spring and spreads over the Western Basin in summer.
To describe the dust phenomenon, a comprehensive methodology has been applied to the case study of June 2006, when significant dust outbreaks occurred. On the selected periods, a numerical model-chain is applied to reconstruct the evolution of the Saharan desert dust. In this way, it was possible to reconstruct the dust spatial distributions, with a good description of the vertical concentration profile. Simulation results are compared with a global model (GOCART) and satellite images showing a good agreement on the localization of the zones affected by dust intrusions. Furthermore, the hourly simulation results are compared with some available data from AERONET network.
During the case study, the major dust concentration was transported above the boundary layer, while the dust deposition at ground level is lower, with a large intra-daily variation, due to HPBL dynamic.