



## **Regional modeling of aerosols using the air quality model BOLCHEM: Saharan dust intrusions over Italy**

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BOLCHEM is an air quality modeling system that comprises the meteorological model (BOLAM), an algorithm for airborne transport and diffusion of pollutants and two photochemical mechanisms: SAPRC90 and CB4. The meteorology is coupled on-line with the chemistry, thus, the chemistry is integrated simultaneously with meteorology without any interpolation in time or space as generally performed by the offline air quality models. This coupling ensures the preservation of information about atmospheric processes with small time scales such as cloud formation, rainfall, wind speed and direction, etc. In order to simulate the transport of Saharan dust over Italy, a dust emission scheme has been coupled to BOLCHEM. The dust forecast is a mandatory request for the air quality models since the mineral dust particles *i*) affect the ozone formation by uptaking gases as HNO<sub>3</sub>, H<sub>2</sub>O<sub>2</sub>, HO<sub>2</sub>, etc.; *ii*) alter the atmospheric radiation budget and consequently affect the convective activity and the latent heat fluxes in the areas where water evaporates from surface and *iii*) contribute substantially to the total aerosol mass usually employed in developing the EU regulations. The dust emission scheme presently implemented in BOLCHEM considers the distribution of preferential dust source areas, soil types and surface conditions like vegetation cover and soil moisture. The flux of dust at surface is calculated as a function of friction velocity that, in turn, depends on winds. This work describes the dust-BOLCHEM modeling system and shows the ability of the system to predict the dust events over Italy.