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Modeling the interactions between particulate matter and gases in the Euro-Mediterranean Region

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The Euro-Mediterranean region exhibits unique climatic and air quality characteristics associated with the geomorphology of the area, the regional climatic patterns, the location of air pollution sources and the coexistence of natural and anthropogenic pollutants. Various studies in the past have identified the scales of transport of anthropogenic and natural pollutants as well as their chemical transformations (mainly based on photochemical reactions). A series of questions have arisen from the fact that additional physical and chemical processes lead to the production of various pollutants and especially aerosols and PM. The main questions are related to the processes occurring along the characteristic paths of transport, the interactions among PM and gaseous pollutants and the production of various generations of pollutants. In order to address the above questions, new model development has been commended to include the appropriate processes that were absent from the chemical transport model. The large scale simulations revealed the importance of the loss of gases due to heterogeneous uptake on PM or due to alteration of photolysis rates. The amount of new aerosols generated from the interactions of gases and PM was considerable for several locations in the Mediterranean Region, providing insights on the possible implications on air quality and climate.