

Physicochemical Characterization of Coastal Aerosols over the Mediterranean Comparison with Weather Research and Forecasting-Chem Simulations

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Abstract : Estimation of the impact of atmospheric aerosols on the climate evolution is an important scientific challenge. One of a major source of particles is constituted by the oceans through the generation of sea-spray aerosols. In coastal areas, marine aerosols can affect air quality through their ability to interact chemically and physically with other aerosol species and gases. The integration of accurate sea-spray emission terms in modeling studies is then required. However, it was found that sea-spray concentrations are not represented with the necessary accuracy in some situations, more particularly at short fetch. In this study, the WRF-Chem model was implemented on a North-Western Mediterranean coastal region. WRF-Chem is the Weather Research and Forecasting (WRF) model online-coupled with chemistry for investigation of regional-scale air quality which simulates the emission, transport, mixing, and chemical transformation of trace gases and aerosols simultaneously with the meteorology. One of the objectives was to test the ability of the WRF-Chem model to represent the fine details of the coastal geography to provide accurate predictions of sea spray evolution for different fetches and the anthropogenic aerosols. To assess the performance of the model, a comparison between the model predictions using a local emission inventory and the physicochemical analysis of aerosol concentrations measured for different wind direction on the island of Porquerolles located 10 km south of the French Riviera is proposed.

Keywords : sea-spray aerosols, coastal areas, sea-spray concentrations, short fetch, WRF-Chem model

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