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Impact of aerosols on the future Euro-Mediterranean climate: results from the CORDEX FPS-Aerosol

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The Euro-Mediterranean region is subject to numerous and various aerosol loads, which interact with radiation, clouds and atmospheric dynamics, with ensuing impact on regional climate. However up to now, aerosol variations are hardly taken into account in most regional climate simulations, although anthropogenic emissions have been dramatically reduced in Europe since the 1980s. Moreover, inconsistencies between regional climate models (RCMs) and their driving global model (GCM) have recently been identified in terms of future radiation and temperature evolution, which could be related to the differences in aerosol forcing.

The present study aims at assessing the role of aerosols in the future evolution of the Euro-Mediterranean climate, using a specific multi-model protocol carried out in the Flagship Pilot Study "Aerosol" of the CORDEX program. This protocol relies on three simulations for each RCM: a historical run (1971-2000) and two future RCP8.5 simulations (2021-2050), a first one with evolving aerosols, and a second one with the same aerosols as in the historical period. Six modeling groups have taken part in this protocol, providing nine triplets of simulations. The analysis of these simulations will be presented here. First results show that the future evolution of aerosols has a significant impact on the evolution of surface radiation and surface temperature. In addition RCM runs taking into account the evolution of aerosols are simulating climate change signal closer to the one of their driving GCM than those with constant aerosols.