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Regional climatology and climate trends in the Arabian Peninsula based on observational and modeling analysis

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The Arabian Peninsula is considered to be one of the most important dust production regions. The “constant” presence of dust in the atmosphere is a key factor that makes the climate of the area quite interesting. At the same time its unique topographic characteristics and the limited amount of similar studies has enhanced our interest for the study of the local climatology. In this work, a regional climatology for the Arabian Peninsula has been prepared based on the state of the art atmospheric model RAMS/ICLAMS. The model includes online treatment of natural aerosol particles. The latter contribute in the calculation of the meteorological conditions through feedback mechanisms (direct, semi-direct and indirect effects). The model simulations cover a 30-year period starting in 1986 with a temporal resolution of 3 hours and a spatial of 9 km. The study area is extended to the Arabian Peninsula and the surrounding areas of Africa, Asia and Arabian Sea.
The study is focusing on both meteorological and dust parameters. The model simulations have been evaluated by using in situ measurements and satellite products indicating a good agreement. The discussion of the results is made in both regional and local scales throughout different seasons and periods, while a more comprehensive analysis is performed in areas of interest. Among the findings it is worth mentioning that the Northwestern Part of the Peninsula has experienced a temperature increase during the last decades. The relevant trends for the coastal areas of the southern part are considered to be statistically insignificant.