

Dust Climatology for the Arabian Peninsula

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Arabian Peninsula is quite interesting in terms of Climatology as it exhibits some unique characteristics. It is identified as one of the major regions where dust storm generation is remarkable. Dust amounts are quite high in the atmosphere during the entire year and interact with the climatology.

In this study, a regional climatology for the Arabian Peninsula has been prepared with the aid of a state of the art atmospheric model that runs with fully-coupled dust submodel. The modeling system is RAMS/ICLAMS. It utilizes the ERA-Interim global reanalysis data set of ECMWF. The model configuration includes three nested grids; one that covers the entire Arabian Peninsula and the surrounding areas of Africa and Southwest Asia with resolution of 9x9 kmxkm and two nested grid that cover the Eastern Province and Southwester area with resolution of 3x3 km. The temporal resolution used is one hour for all the meteorological and dust parameters and 30 minutes for precipitation. The period covered is thirty years (1986-2015)

The climatology analysis includes meteorological and dust parameters such as temperature, winds, humidity, precipitation, solar radiation, dust concentration and load, Aerosol Optical Depth. Soil temperature is analyzed up to 2 m depth. The results are evaluated using in situ measurements and satellite products resulting in a good agreement. A first analysis provides useful information about the areas under study, both in regional and local scales. A more comprehensive analysis is performed in areas of particulate interest leading to outcomes and products useful for both the scientific community and the industry. As it was found, the Northwestern part of the country has experienced already temperature rise with rates of 0.2-0.4 K per decade during the last three decades. These rates have been found statistically significant. Minor changes have been detected in the rest of the area moving to the South. Negative rates have been detected in some coastal areas that it can be attributed to the strengthening of sea breezes. Although, the minor positive and negative temperature trends in the central and southern part of the Peninsula were found to be not statistically significant either through the observational or model time series.