
Evaluation of a high-resolution dust regional reanalysis using in-situ and remote sensing observations

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Abstract

An advanced dust regional reanalysis has been recently released in the framework of the ERA4CS DustClim project at the high spatial resolution of 0.1°. The reanalysis has been produced by ingesting an innovative dust optical depth data set, derived from the MODIS Deep Blue products, in the dust module of the MONARCH atmospheric model. The reanalysis products cover a wide range of dust-related properties, both optical and physical, such as dust optical depth (DOD), dust PM₁₀ mass concentration and dust extinction profiles. One of the DustClim's main tasks is to provide a thorough evaluation of the reanalysis performance through the synergy of various measurement techniques. A wide variety of dust-filtered products, retrieved from independent data sets of in-situ and remote sensing aerosol observations was compared to collocated reanalysis fields. In particular, we have considered the following reference data sets: LIVAS and EARLINET dust extinction profiles; AEROIASI set of dust-related products; AERONET, MISR and MODIS DOD; INDAAF and EIONET-derived dust PM₁₀ concentrations.

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Here we present the results of our extensive validation of the dust reanalysis in terms of common metrics that are used to quantify the mean departure between modeled and observed quantities. By assessing its quality, we provide a useful reference to potential users of this novel reanalysis data set which is suitable for studies as well as services of air quality and climate.

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