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Assessing aerosol related uncertainties in the NextSENSE2 system

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NextSENSE2 operational system provides forecasts of surface solar radiation up to 3h ahead at high temporal (every 15min) and spatial (~5km x5km at subsatellite point) resolution, for a wide area including Europe, North Africa, and Middle East (MENA) region. For areas with rare cloudiness, especially during the dry period of the year, aerosols are the main attenuator of solar energy reaching the earth's surface, hence accurate aerosol related optical properties are important for accurately estimating the available solar energy potential. In this study, the accuracy of the aerosol optical properties used as input to the NextSENSE2 system is assessed, under clear sky conditions, using ground-based measurements from 10 stations from the AERONET network for a whole year (2017). The 1-day forecast of aerosol optical depth (AOD) from Copernicus Atmospheric Monitoring Service (CAMS) and the monthly mean climatological values of single scattering albedo (SSA), and Angstrom exponent (AE) are evaluated against the corresponding AERONET measurements, along with the related uncertainties introduced to modelled GHI. The outcomes of this study are useful for understanding the effect of aerosol optical properties on surface solar radiation estimates and hence improving the model input/outputs, especially for areas highly affected by aerosols and with low cloudiness.

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