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# Joint retrieval of hourly-resolved aerosol optical depths and surface reflectance using MSG/SEVIRI observations.

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A new aerosol algorithm is developed at EUMETSAT to derive simultaneously the surface bidirectional reflectance factor (BRF) and the hourly variations of the total column aerosol load from observations acquired by the SEVIRI radiometer on-board the Meteosat Second Generation satellites. In order to retrieve the aerosol optical thickness for each cloud-free observation, the algorithm makes the assumption that both the aerosol class and the surface radiative properties do not change during the course of the day. Hence, this algorithm infers the surface BRF from a forward radiative transfer model against daily-accumulated observations in the 0.6, 0.8 and 1.6 MSG/SEVIRI bands. These daily time series provide the angular sampling used to discriminate the radiative effects that result from the surface anisotropy, from those caused by the aerosol scattering. The inversion method relies on the Optimal Estimation method that balances the information derived from the observations and the prior knowledge on the system. This approach allows the tracking of sharp daily variations of the aerosol atmospheric load, in particular in the case of quickly developing dust storm fronts. In order to evaluate the method, the algorithm is run for various angular geometries and various aerosol diurnal conditions as observed by AERONET. In particular, the effects on the retrievals of providing a good quality prior information on the surface is assessed, together with the sensitivity of the retrieval error to the diurnal variation of the backscattering signature of the aerosols due to a changing geometry.