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Aerosol multi-sensor analyses and comparisons for GEOMON

A. Vermeulen (1), F.M. Breon (2), J. Descloitres (1), and J.M. Nicolas (1)

(1) ICARE Data and Services Center Universite des Sciences et Technologies de Lille 1 Polytech'Lille 59655 Villeneuve d'Ascq Cedex - France (anne.vermeulen@univ-lille1.fr), (2) CEA/DSM/LSCE, Gif-sur-Yvette, France

Within the framework of the Global Earth Observation and Monitoring project (GEOmon), ICARE helps collect, archive, disseminate aerosol satellite products, evaluate and analyze these products, and generate statistical analysis and comparisons with ground-based measurements. Aerosol products from current operational spaceborne instruments are considered: POLDER/Parasol, MODIS/Aqua, CALIOP/CALIPSO, SEVIRI/Meteosat-8 et 9, and MERIS/Envisat. We compared these aerosol products to ground-based measurements provided by AERONET, used as the reference data set. Aerosol retrievals over land and ocean surfaces come from different retrieval algorithms and were analyzed separately. The products were compared to AERONET data, both globally and at specific sites to evaluate the individual sensor performance depending on aerosol and surface types. The quantitative analysis is based on time series, scatter plots, and statistical indicators. We processed all satellite products available: the Aerosol Optical Thickness (AOT at 550, 670 and/or 875 nm depending on the satellite sensor), Angström exponent, fine mode AOT and quality indicator when available. The Angström exponent provides information on the aerosol size and the inherent information on dominant aerosol type.
Overall results indicate that the AOT is retrieved with an RMS accuracy smaller than 0.1 and a very small bias. Over oceans, MODIS and Parasol provide the best results. The SEVIRI product is not as accurate but it provides a unique temporal coverage. Over Land, MODIS provides an accurate total AOT, while Parasol gives the best fine mode AOT. Results are contrasted from one aerosol type to the other. Fine mode AOT compare very well to AERONET for biomass burning and anthropogenic aerosols, but poorly for dust.
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