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Comparison between Aerosol properties derived from MODIS/AQUA and POLDER/PARASOL over ocean.

D. Tanré (1), J.L. Deuzé (1), F. Ducos (1), J. Letertre (1), L. Remer (2), R. Levy (3), and S. Matoo (3)

(1) CNRS, Université Lille-1, VILLENEUVE d'ASCQ, France (didier.tanre@univ-lille1.fr, ph: 33 3 20 43 47 65), (2) Laboratory for Atmospheres, NASA – Goddard Space Flight Center, Greenbelt, MD, USA, (3) Science Systems and Applications Inc., Lanham, MD USA

Within the A-Train constellation of satellites, POLDER/PARASOL and MODIS/AQUA are the major sensors for retrieving aerosol properties from space. Both radiometers fly over the same area quasi simultaneously for almost 5 years. When MODIS is measuring the solar radiation reflected by the Earth-atmosphere system in up to six useful channels, from 0.55 to 2.2μm, PARASOL is taking advantage of its capability to view the same pixel with different geometrical conditions and by measuring the polarized radiances in 3 channels, 0.49, 0.67 and 0.86μm.

Before analyzing the derived geophysical products, we perform comparisons of the spectral reflectances. We first have to gather pixels to observe the same point on the ground ; one POLDER pixel contains about 42 (7x6) MODIS 1 km pixels at nadir. Then, reflectances are depending on different atmospheric effects that occur in spectral bands. Due to gaseous absorption and molecular scattering, measurements have so to be normalized to the same « atmospheric standard ». Then, the observation geometry has to be considered, which includes glint conditions. At this stage, the possible differences result from the calibration of the instruments.

Furthermore, there are several steps along the inversion scheme. The first step is to perform a cloud screening. Since spatial resolution of both sensors are different, sub-cloudy pixels not detectable by POLDER can corrupt the measurements when MODIS do not consider them in its averaging. Assumptions concerning the surface contributions (wind speed, foam reflectance and coverage, ocean color) can also impact the estimate of the aerosol reflectances used as inputs of the inversion. Finally, the inversion schemes are both based on a comparison between spectral, directional and/or polarized radiances and Lookup Tables (LUT) built for a set of aerosol models (size distribution and refractive index), different optical thicknesses (AOD) and geometrical conditions. We examine and quantify the corresponding impacts on the aerosol retrieval.

Finally, we combine the informations provided by the two instruments to better characterize aerosol dust particles and their transport over the Atlantic ocean.