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A coupled POLDER 2 / MODIS aerosol algorithm

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Although minor constituents of the atmosphere, aerosols are known to be major actors in the climate system and the hydrologic cycle. However, large uncertainties in the quantification of their effects remain. Indeed, there is a large variability in aerosol shape, size, optical and chemical properties and also in their distribution in the atmosphere. Only satellite observations allow to monitor aerosols on a global scale, spatially and temporally.

POLDER 2 (CNES) and MODIS (NASA), respectively onboard ADEOS 2 (NASDA) and Terra (NASA) orbital platforms, are two state of the art instruments devoted to observe Earth and its atmosphere, and particularly aerosols. POLDER 2 performs directional and polarized measurements in several spectral channels (mainly two of them are useful for aerosol studies: 670 and 865 nm), whereas MODIS measures radiances in only one direction and with no information on polarization but in more spectral channels (7 for aerosol monitoring, from 466 to 2119 nm). The two sensors have clearly different advantages, which are somehow complementary, and thus, comparing and mixing information from both instruments should be particularly interesting and bring a higher accuracy in retrievals of aerosol optical properties.

Our study focus on aerosol monitoring over ocean. Taking advantage of simultaneous observations (in time and in space), we have firstly compared POLDER 2 and MODIS geophysical products, and then, we have simulated POLDER 2 measurements (respectively MODIS ones) with MODIS (POLDER 2) inversion results as inputs of the simulation. Our work has illustrated the differences between the information provided by each instrument and have highlighted the impact of these differences on the critical steps in the inversion processes. The conclusions issued from this work have permitted to develop a coupled inversion: POLDER 2 and MODIS data are mixed in a single retrieval process, which gives rise to a better confidence in retrieved optical

properties. This coupled inversion will be applied to PARASOL (a similar instrument as POLDER) and MODIS data of the A-train constellation of satellites.