EUMETSAT aerosol missions and products: focus on 3MI, the multi-view polarimeter flying on Metop-SGA

Thierry Marbach[a,*], Oleg Dubovik[b], Bertrand Fougnie[a], Julien Chimot[a], and Bojan Bojkov[a]

[a]*EUMETSAT, Eumetsat-Allee 1, 64295 Darmstadt, Germany*
[b]*Univ. Lille, Laboratoire d'Optique Atmosphérique, 59655 Villeneuve d'Ascq, France*

[*]*Presenting author (thierry.marbach@eumetsat.int)*

Aerosol composition and associated spatial distribution are key parameters for the improvement of the air quality and climate products. Therefore, EUMESAT will increase the number of satellite aerosol parameters provided operationally, which are driven by the 3MI instrument. The Multi-Viewing-Channel-Polarisation Imager (3MI) is planned to fly on the Metop-SGA satellites as part of the EUMETSAT Polar System – Second Generation (EPS-SG) program in the timeframe beyond 2022. It is a radiometer dedicated to aerosol and cloud characterisation for climate monitoring, atmospheric composition, air quality and numerical weather prediction

This polarimetric instrument is a heritage of the POLDER instruments, with improved capabilities. The spectral range (12 channels) was extended from the visible-near-infrared (410 to 910 nm) to the shortwave–infrared domain (up to 2200 nm). The spatial resolution (4 km at nadir) and the swath (2200 × 2200 km^2) were also improved compared to previous POLDER instruments. As POLDER, 3MI will provide multi-polarisation (–60°, 0°, and +60°), and multi-angular (10 to 14 views) images of the Earth top of atmosphere outgoing radiance [1].

The level 1 products available to the users will be the geolocated Stokes vectors on the native geometry (Level 1B) and the geoprojected multi-directional and spectral Stokes vectors (Level 1C) [2]. Level-2 products will provide geophysical and microphysical parameters for aerosols and clouds. The presentation will overview EUMETSAT current and future aerosol missions and products with focus on the aerosol retrieval for the 3MI operational product using the GRASP algorithm [3].

References

[1] Fougnie, B., T. Marbach, A. Lacan, *et al*., 2019: The multi-viewing multi-channel multi-polarisation imager – overview of the 3MI polarimetric mission for aerosol and cloud characterization. *J. Quant. Spectrosc. Radiat. Transfer* **219**, 23–32.

[2] Lang, R., G. Poli, B. Fougnie, *et al*., 2019: The 3MI Level-1C geoprojected product – definition and processing description. *J. Quant. Spectrosc. Radiat. Transfer* **225**, 91–109.

[3] Dubovik, O., T. Lapyonok, P. Litvinov, *et al*., 2014: GRASP: a versatile algorithm for characterizing the atmosphere. *SPIE Newsroom*, DOI:10.1117/2.1201408.005558.

Mode of presentation: Invited