Abstract theme: B6.05 Radiative Transfer Modeling in the Optical Domain

Abstract title: Using Copernicus Atmosphere Monitoring Service in the Sen2Cor Atmospheric Correction Processor

Presentation request: Poster

Using Copernicus Atmosphere Monitoring Service in the Sen2Cor Atmospheric Correction Processor

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The Sentinel-2 mission is fully operating since June 2017 with a constellation of two polar orbiting satellite units. Both Sentinel-2A and Sentinel-2B are equipped with an optical imaging sensor MSI (Multi-Spectral Instrument) which acquires high spatial resolution optical data products. The Sentinel-2 mission is dedicated to land monitoring, emergency management and security. It serves for monitoring of land-cover change and biophysical variables related to agriculture and forestry, monitors coastal and inland waters and is useful for risk and disaster mapping.

Accurate atmospheric correction of satellite observations is a precondition for the development and delivery of high quality applications. Therefore the atmospheric correction processor Sen2Cor was developed on behalf of ESA. Sen2Cor is designed for mono-temporal processing of Sentinel-2 L1C data products providing Level-2A surface (Bottom-of-Atmosphere) reflectance product together with Aerosol Optical Thickness (AOT), Water Vapor (WV) and Scene Classification (SCL) maps. Sen2Cor can be downloaded from ESA website for individual processing by the users. In parallel, Sen2Cor is used by ESA for systematic L2A-processing of Sentinel-2 acquisitions over Europe since June 2017. ESA is preparing an operational global L2A-processing with the integration of Sen2Cor in Sentinel-2 ground segment (PDGS).

A key-parameter for accurate atmospheric correction is the knowledge of the spatially and temporally very variable aerosol content of the atmosphere. Sen2Cor estimates the aerosol optical thickness (AOT) at 550 nm using dark reference areas, most preferably dense dark vegetation (DDV) pixels. In case there are not enough DDV-pixels available in the granule, then a fallback solution is required. The former fallback solution was to generate an AOT map based on the start visibility set in the configuration file. This fallback solution is one of the limitations of Sen2Cor aerosol retrieval, because it can introduce large errors into the atmospheric correction. Another limitation of this approach is a potential tile borders effect, which sometimes occurs due to the independent processing of neighboring granules.

An evolution of Sen2cor atmospheric module is foreseen for introducing the use of the data from the Copernicus Atmosphere Monitoring Service (CAMS) of ECMWF. CAMS delivers several operational services, including daily production of near-real-time analyses and forecasts of global atmospheric composition.

Since February 2017, a prototype which implements the direct use of the CAMS AOT at 550nm for the fallback solution has been developed and is being validated over a set of sites. The poster will remind the method of integration and assimilation, and present the current results of the validation. In addition the progress on an enhanced version of the prototype will be reported, which aims to introduce aerosol

components in Sen2Cor in place of fixed aerosol types, and deduce their mixing from CAMS data. In a last part will be discussed the integration of such a prototype into an operational environment.