EGU21-12608
https://doi.org/10.5194/egusphere-egu21-12608
EGU General Assembly 2021

Consistent retrieval of cloud/aerosol single scattering properties and surface reflectance

Marta Luffarelli and Yves Govaerts
Rayference SPRL, Brussels, Belgium (marta.luffarelli@rayference.eu)

The CISAR (Combined Inversion of Surface and AeRosols) algorithm is exploited in the framework of the ESA Aerosol Climate Change Initiatiave (CCI) project, aiming at providing a set of atmospheric (cloud and aerosol) and surface reflectance products derived from S3A/SLSTR observations using the same radiative transfer physics and assumptions. CISAR is an advance algorithm developed by Rayference originally designed for the retrieval of aerosol single scattering properties and surface reflectance from both geostationary and polar orbiting satellite observations. It is based on the inversion of a fast radiative transfer model (FASTRE). The retrieval mechanism allows a continuous variation of the aerosol and cloud single scattering properties in the solution space.

Traditionally, different approaches are exploited to retrieve the different Earth system components, which could lead to inconsistent data sets. The simultaneous retrieval of different atmospheric and surface variables over any type of surface (including bright surfaces and water bodies) with the same forward model and inversion scheme ensures the consistency among the retrieved Earth system components. Additionally, pixels located in the transition zone between pure clouds and pure aerosols are often discarded from both cloud and aerosol algorithms. This “twilight zone” can cover up to 30% of the globe. A consistent retrieval of both cloud and aerosol single scattering properties with the same algorithm could help filling this gap.

The CISAR algorithm aims at overcoming the need of an external cloud mask, discriminating internally between aerosol and cloud properties. This approach helps reducing the overestimation of aerosol optical thickness in cloud contaminated pixels. The surface reflectance product is delivered both for cloud-free and cloudy observations.

Global maps obtained from the processing of S3A/SLSTR observations will be shown. The SLSTR/CISAR products over events such as, for instance, the Australian fire in the last months of 2019, will be discussed in terms of aerosol optical thickness, aerosol-cloud discrimination and fine/coarse mode fraction.