Joint Retrieval Of Surface Reflectance And Aerosol Properties: Application To Proba-V Observations

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A novel algorithm for the joint retrieval of surface reflectance and aerosol properties is currently being developed and tested. This algorithm, named Combined Inversion of Surface and AeRosol (CISAR), includes a fast physically based Radiative Transfer Model (RTM) accounting for the surface reflectance anisotropy and its coupling with aerosol scattering. This RTM explicitly solves the radiative transfer equation during the inversion process, without relying on pre-calculated integrals stored in LUT, allowing for a continuous variation of the state variables in the solution space. For each processed spectral band, CISAR delivers the surface Bidirectional Reflectance Factor (BRF) and aerosol optical thickness, discriminating the effects of small and large particles. It also provides the associated uncertainty covariance matrix for every processed pixel. This algorithm has already been successfully applied for the processing of data acquired by radiometer onboard geostationary and polar orbiting satellites.

The potential of CISAR for processing Proba-V data will be analyzed in this presentation. CISAR requires multi-angular observations for the retrieval of surface BRF, which can be obtained from a temporal accumulation of Proba-V 1km observations. The present work specifically focuses on the possibility to derive aerosol properties and surface BRF from Proba-V observations with CISAR over different land cover types. For these processed cases, the information content of each Proba-V band will be analysed based on the prior and posterior uncertainty covariance matrices. The analysis will demonstrate in particular the capability of CISAR to decouple the fraction of the TOA BRF signals coming from the surface reflectance from the one originating from the aerosol scattering.