A Generic Approach For Inversion And Validation Of Surface Reflectance Over Land: Application To Landsat 8 And Sentinel 2.

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This paper presents a generic approach developed to derive surface reflectance over land from a variety of sensors. This method relies on the inversion of the radiative transfer equation in the Lambertian case, with no adjacency effects, that account for a simplified coupling of the absorption by atmospheric gases and scattering by molecules and aerosols as implemented in the 6SV radiative transfer code. The processing code relies on look-up tables generated by 6SV, for which the accuracy (~1%) has been well documented in several papers. The code uses ancillary data such as pressure and gas concentrations but relies on a per pixel inversion of the aerosol properties to assure the best possible accuracy for the surface reflectance, as aerosols can be highly variable both in space and time. This new aerosol inversion builds on the extensive dataset acquired by the Terra platform, combining MODIS and MISR to derive an explicit and dynamic map of band ratio’ s between blue and red channels and is a refinement of the operational approach used for MODIS and LANDSAT over the past 15 years. The aerosol inversion is generic and applicable to a variety of sensors. We use this approach to derive Landsat 8 and Sentinel 2 surface reflectance products. We then present the validation approach and results using AERONET data. Finally, we conclude by analyzing the consistency of the time-series of surface reflectance combining both sensors over agricultural areas and exploring the potential application of this new product.

Keywords: radiative transfer, aerosol, surface reflectance

