Toward a Consistent Data Records from Coarse, Medium and High Spatial Resolution Earth Observation Satellites

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Surface reflectance is one of the key products used in developing several higher-order land products, such as Vegetation Indices, Albedo and LAI/FPAR, it is therefore seminal to detecting trends in the biosphere and land surface and has been classed by NOAA as a “Fundamental Climate Data Record (FDCR) for Land”. Building a long-term surface reflectance data record of climate quality implies combining different instruments, sensors and satellites, accounting for different spatial resolutions and spectral characteristics, assuring consistent calibration, and correcting for atmospheric and directional effects. As the spatial resolution issue is addressed by aggregating the original data to a resolution still suitable for climate studies (e.g. 0.05 degree latitude, longitude), the instrument calibration becomes the first major hurdle one has to go through before being able to proceed any further.

In this work, we are using robust reflectance data records and inter-comparison methods that we have developed over the past several years (consisting of atmospheric correction, directional effect correction and spectral normalization) to establish and verify the inter-consistency of the reflectance products from the AVHRR sensors on-board NOAA 7, 9, 11, 14, 16, 17 and 18, the MODIS sensors on-board Aqua and Terra and the VIIRS sensors on-board Suomi-NPP and JPSS1 as well as OLCI/SLSTR from Sentinel 3. These approaches are also applied to high spatial resolution dataset from Sentinel 2A and 2B and Planet Lab.

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