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Land ECVs from QA4ECV using an optimal estimation framework

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In the ESA-DUE GlobAlbedo project (http://www.GlobAlbedo.org), a 15 year record of land surface albedo was generated from the European VEGETATION & MERIS sensors using optimal estimation. This was based on 3 broadbands (0.4-0.7, 0.7-3, 0.4-3μm) and fused data at level-2 after converting from spectral narrowband to these 3 broadbands with surface BRFs. A 10 year long record of land surface albedo climatology was generated from Collection 5 of the MODIS BRDF product for these same broadbands. This was employed as an a priori estimate for an optimal estimation based retrieval of land surface albedo when there were insufficient samples from the European sensors. This so-called MODIS prior was derived at 1km from the 500m MOD43A1,2 BRDF inputs every 8 days using the QA bits and the method described in the GlobAlbedo ATBD which is available from the website (http://www.globalbedo.org/docs/GlobAlbedo_Albedo_ATBD_V4.12.pdf). In the ESA-STSE WACMOS-ET project, FastOpt generated fapar & LAI based on this GlobAlbedo BRDF with associated per pixel uncertainty using the TIP framework.

In the successor EU-FP7-QA4ECV* project, we have developed a 33 year record (1981-2014) of Earth surface spectral and broadband albedo (i.e. including the ocean and sea-ice) using optimal estimation for the land and where available, relevant sensors for “instantaneous” retrievals over the poles (Kharbouche & Muller, this conference). This requires the longest possible land surface spectral and broadband BRDF record that can only be supplied by a 16 year of MODIS Collection 6 BRDFs at 500m but produced on a daily basis. The CEMS Big Data computer at RAL was used to generate 7 spectral bands and 3 broadband BRDF with and without snow and snow_only.

We will discuss the progress made since the start of the QA4ECV project on the production of a new fused land surface BRDF/albedo spectral and broadband CDR product based on four European sensors: MERIS, (A)ATSR(2), VEGETATION, PROBA-V and two US sensors: MISR & MODIS. For the European sensors, an uniform atmospheric correction scheme has been employed to generate spectral BRF products and these have all been mapped into MODIS spectral bands whilst the US sensors have employed their own level-2 BRF retrieval schemes with associated uncertainty information. Progress is also demonstrated on the use of TIP for fapar/LAI retrieval from the broadband BRDFs as well as fapar from AVHRR based on retrievals from MERIS and OLCI. In parallel, work has taken place at two of our partners on the production of a new geostationary broadband BRF and associated albedo and their fusion with AVHRR-LTDR for a 33 year record.

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