

MERIS land surface BRDF/albedo retrieval using data fusion with MODIS BRDF and its validation using contemporaneous EO and in situ data products

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A representative BRDF/albedo is required by ESA¹ for the improved retrieval of atmospheric products, such as water vapour, from the ENVISAT-MERIS instrument. This BRDF/albedo is required at 13 of the 15 spectral channels of MERIS.

An algorithm is described which has been applied to the generation of a global BRDF/albedo for these 13 spectral bands of MERIS over 16-day time periods at a resolution of 0.05° for the whole of 2003 which is currently being applied to the time period from June 2002 to December 2006. Inputs to this algorithm include Spectral surface Directional Reflectances, SDRs (Schröder et al., Preusker et al., 2005²).

Owing to the lack of sufficient directional samples for most of the Earth's land surface, even for a monthly time period, direct inversion of BRDF parameters for MERIS are not possible worldwide. Instead the 16-day Collection 4 MODIS BRDFs at 0.05° resolution (derived using either full inversions or magnitude inversions from the MODIS values) were employed in a magnitude inversion scheme for the 4 common MERIS (490±5 [b3], 560±5 [b5], 665±5 [b7], 865±10 [b13]) bands with MODIS (459-479 {b3}, 545-565 {b4}, 620-670 {b1}, 841-8766 {b2}). The impact of applying Terra-only compared to Terra+Aqua-combined are here compared and presented.

Spectral interpolation to the remaining 9 MERIS bands and to 3 broadband regions (0.4-0.7µm, 0.7-3µm, 0.4-3µm) is then performed. As spectral albedo data is required on monthly time-steps for most applications, a simple-minded weighting function based on the fractional time-period of each 16-day time period within a month was adopted for creating monthly products from 16-day products at 10km and 0.1°.

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² ESA MERIS workshop 2005, http://envisat.esa.int/workshops/meris_aatsr2005/

Global products on a 16-day time-step have been generated for the whole of 2003 using both Terra-only and, where available, Terra+Aqua-combined Collection 4 MODIS-BRDFs. These EO products have been compared against contemporaneous MODIS spectral albedos (over 16-days) which have been gap-filled for 2003 (Moody et al., 2005). It is planned in the future to compare these against Collection 5 products, as and when these become available. Satellite intercomparisons have also been performed for monthly products of the monthly MERIS spectral albedo products for common bands against MISR level-3 and POLDER level-2 products and the results will be shown. Finally, inter-comparisons are shown of these EO products against ground-based albedometer measurements for a site in Finland³ and for several worldwide sites available through the CAVE⁴.

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⁴ <http://www-cave.larc.nasa.gov/cave/cave2.0/Reference.html>