

Accuracy of the MERIS 3rd reprocessed products

Processing	Product name	Goal	Estimated quality	Validation	Method / Reference	Contribution from
Ocean Products	Water Leaving Reflectance	Case 1: 0.002 RMSE in blue band (ATBD 2.7, Iss 5.1, July 2011) or 5% RPD (Gordon, 1997)	Case 1 waters, for wavelengths up to 560 nm: • RPD < 5% • RMSE < 4.10-3 Case 2 waters • RPD < 11% except at 412 nm (27.5%) • RMSE < 6.10-3	Validated	Use of the MERMAID database Comparison to SeaWiFS and MODIS for monthly time series	C. Lerebourg (ACRI-ST) C. Mazeran (ACRI-ST) E. Kwiatkowska (ESA/ESTEC)
	Algal Pigment Index I	Theoretical goal is to detect 10 classes of chlorophyll concentration with each of the 3 orders of magnitude between 0.03 and 30 mg/m3 decade, i.e. -13%. Actual performance of OC4Me algorithm (ATBD 2.9, v4; 3 Jul 2011) is however to detect chlorophyll concentration within a factor of 0.5 to 2 (i.e. signed relative error between -50% and +100%).	RPD = -12% RMSE = 0.279 MAD = 0.086	Validated	Use of the MERMAID database Comparison to SeaWiFS and MODIS for monthly time series	C. Lerebourg (ACRI-ST) C. Mazeran (ACRI-ST) D. Antoine (LOV) E. Kwiatkowska (ESA/ESTEC)
	Algal Pigment Index II	Factor 2	Site dependent, over all sites within expected range	Provisionally validated	Comparison with CoastColour and MERMAID	R. Doerffer C. Brockmann (BC) A. Ruescas (BC)
	Total Suspended Matter					
	Yellow substance					
	Photosynthetically Active Radiation (PAR)	+/- 3%	+/- 3%	Provisionally validated	Comparison to in-situ measurements and RT simulations	Marc Bouvet
	Aerosol optical thickness	15% accuracy or 0.02 for moderate values (-0.1-0.2), (ATBD 2.7 Iss 4.1 Feb 2000)	Retrieved in situ values of AOT(870) > 0.03 RMSE = 0.08 MAD = 0.04	Provisionally validated	Use of the MERMAID database (AERONET-OC) Comparison to SeaWiFS and MODIS for monthly time series	C. Lerebourg (ACRI-ST) C. Mazeran (ACRI-ST) D. Antoine (LOV) E. Kwiatkowska (ESA/ESTEC)
Water Vapour	< 20% rel. To WV 10% over glint		Provisionally validated			
Aerosol Angström Coefficient	Not specified in ATBD	Retrieved in situ values of AOT(870)>0.03 and alpha > 0.0 RMSE = 0.66 MAD = 0.25	Provisionally validated	Use of the MERMAID database (AERONET-OC) Comparison to SeaWiFS and MODIS for monthly time series	C. Lerebourg (ACRI-ST) C. Mazeran (ACRI-ST) D. Antoine (LOV) E. Kwiatkowska (ESA/ESTEC)	
Cloud products	Cloud optical thickness	0.1 - 5.0		Not validated		
	Cloud albedo	0.01		Not validated		
	Cloud Top Pressure	20hPa	Precision of 30hPa for low clouds, potential overestimation of cloud top-pressure for high clouds.	Provisionally validated	Validation using airborne LIDAR measurements. The validation campaign was limited to low clouds over Germany.	Dr. Rasmus Lindstrot (FUB) Dr. Rene Preusker (FUB) Prof. Jürgen Fischer (FUB)
	Cloud Type			Not validated		
Cloud reflectance			Not validated			
Land products	Rayleigh corrected reflectance			Not applicable		NA
	Aerosol optical thickness	Standard published accuracy of aerosol products over land (i.e. MODIS) : AOT(443, 550 nm)=0.05 + 0.15* AOT	Validation against AERONET matchups: - (March, June, Sept., Dec. 2008) MEGS 8.0: N=836, r2=0.609, RMSE=0.180, Gfrac=0.37 * (filtered, *(AOD) <0.1): N=770, r2=0.664, RMSE=0.17, Gfrac=0.39 * Variability: June 2003 Gfrac=0.52, June 2008 Gfrac=0.29, Dec. 2008 Gfrac=0.61 - (2004-2010) MODIS coll. 5: N=5448, r2=0.871, rmse=0.137, Gfrac=0.62 (Breon et al., 2011)	Validated	Validation against AERONET matchups	D. Ramon (HYGEOS) Contribution of the ESA CCI aerosol project
	Aerosol Angström Coefficient		The Angström exponent over land is not validated and poorly correlated to AERONET.		The Angström exponent over land is not validated and poorly correlated to AERONET	
	MGVI/FAPAR Rectified Channels	MGVI: The accuracy goal of MGVI is set to +/- 0.05 against FAPAR estimated by radiative transfer model. When comparing to interception ground-based estimates, the goal is +/- 0.1  Rectified Channels: As these numbers are not 'measurable' parameters, the stability over long times is set to 5%.	MGVI: The estimated quality is +/-0.1 in average when comparing with ground-based estimates. However, this value depends on the radiative transfer regime over various land cover sites. The algorithm is designed with the 'green leaf' concept and delivers instantaneous FAPAR values at time of overpass.  Rectified Channels: The quality for the stability of rectified channel over	Not applicable	Performance assessment with FAPAR products derived from MODIS and SeaWiFS, using the same JRC algorithm. Comparisons of MGVI values against few ground-based estimates of interception (BIGfoot project and a site in Senegal).  Stability of rectified channels checked over CEOS desert calibration sites and compared with MODIS surface albedo.	Nadine Gobron (EC-JRC)
	MTCI - Meris Terrestrial Chlorophyll Index - BOA vegetation index		Good		Bottom-up approach based on 3 steps: field data collection, HR remote sensing data processing, MTCI validation. Validation performed on more than 5 sites. Strong relationships obtained between chlorophyll content and MTCI	Dr. Jadunandan Dash (Univ. Southampton) Dr. Francesco Vuolo (Univ. Southampton) Dr. Gary Watmough (Univ. Southampton) William Frampton (Univ. Southampton)
	Surface pressure	5 hPa	Precision of 15hPa, no bias in mid latitudes, positive bias (<=25hPa) in high latitudes, negative bias (<=25hPa) in tropics.	Validated	Comparison to surface pressure maps derived from digital elevation models, corrected for the variable sea level pressure (extracted from ECMWF)	Dr. Rasmus Lindstrot (FUB) Dr. Rene Preusker (FUB) Prof. Jürgen Fischer (FUB)
Total Column Water Vapour (TCWV)	10% rel. To WV amount	Precision of 2 mm for cloud-free pixels for different reference data sets.	Validated	Validation using in-situ data such as GPS and microwave radiometer measurements [Fischer et al., 2010]	Prof. Jürgen Fischer (FUB) Ronny Leinweber Hannes Diedrich	
Surface classification	LAND CLOUD WATER	95%	73.5% – 99.5%	Validated	Validation using the PixBox dataset	K. Stelzer (BC)
Product confidence	PCD_1_13	- Confidence flag for water leaving/surface reflectance				
	PCD_14	- Confidence flag for water vapour				
	PCD_15	- Confidence flag for algal pigment index 1 / MGVI / CTP				
	PCD_16	- Confidence flag for YS or TSM / rectified reflectance				
	PCD_17	- Confidence flag for algal pigment index 2 / MTCI				
	PCD_18	- Confidence flag for PAR/Land surface pressure/cloud albedo				
PCD_19	- Confidence flag for aerosol type and optical thickness / COT					
Science flags	COASTLINE	- From Level 1b			Validation using the PixBox dataset	K. Stelzer (BC) C. Brockmann (BC) A. Ruescas (BC) M. Paperin (BC)
	COSMETIC	- From Level 1b				
	SUSPECT	- From Level 1b				
	OADB	- Out Of Aerosol model DataBase: no bracketing aerosol found				
	ABSOA_DUST	- Desert dust absorbing aerosol/Continental absorbing aerosol				
	CASE2_S	- Case 2 sediment dominated waters / Turbid water				
	CASE2_ANOM	- Anomalous scattering water				
	CASE2_Y	- Yellow substance loaded water				
	ICE_HAZE	- ice or high aerosol load			Idem COASTLINE flag	Idem COASTLINE flag
	SNOW	- snow			Idem COASTLINE flag	Idem COASTLINE flag
	MEDIUM_GLINT	- Medium Glint reflectance correction applied			Idem COASTLINE flag	Idem COASTLINE flag
	BPAC_ON	- Bright Pixel Atmospheric Correction				
	HIGH_GLINT	- No glint correction applied			Idem COASTLINE flag	Idem COASTLINE flag
	LOW_SUN	- Low sun angle				
	WHITE_SCATTERER	- White scatterers within water				
TOAVI_BRIGHT	- Bright flag from TOAVI spectral tests					
TOAVI_BAD	- Bad data from TOAVI spectral tests					
TOAVI_CSI	- Cloud, snow or ice from TOAVI spectral tests					
TOAVI_WS	- Water or deep shadow from TOAVI spectral tests					