

ESA designed the MERIS instrument specifically to provide measurements for coastal zone management and research. MERIS has delivered a unique global dataset of coastal zones at 300m spatial resolution, which deserves dedicated processing with internationally agreed algorithms, and provision of specific user products. This dataset will become an important contribution to further understanding of the coastal zone in climate change. Because of the amount of data the processing is a key part of the project.

CoastColour Processing Chain

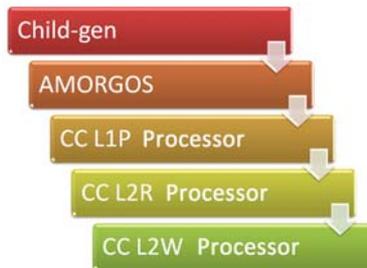
The processing of CoastColour products starts from standard MERIS FRS Level1B data products. These products are first tailored to the 27 CoastColour sites and afterwards the AMORGOS Tool is applied in order to improve the geo-location. Each product is then processed to a CC Level L1P product. This is a refined top of atmosphere radiance product compared with the standard Level 1b product. The L1P product provides

- improved geo-location
- improved calibration
- equalisation to reduce coherent noise
- smile correction
- pixel characterization information
- a precise coastline.

The CC Level L2R product is the result of the atmospheric correction and is based on the CC Level L1P product. It contains

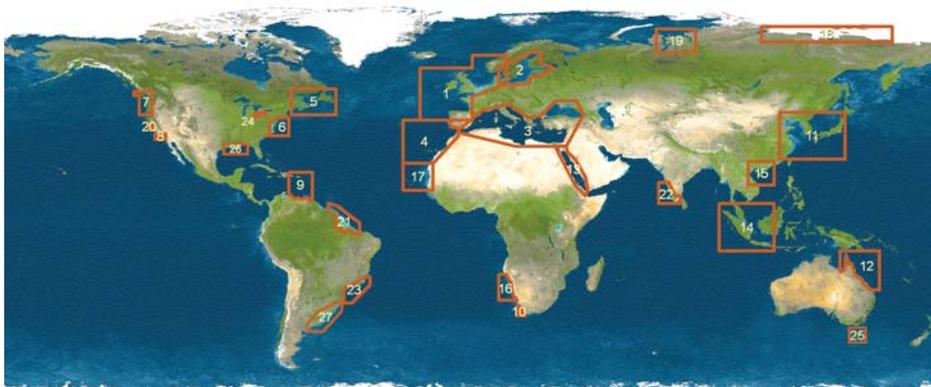
- water leaving reflectance
- normalised water leaving reflectance
- different information about atmospheric properties.

Derived from the CC Level L2R, the CC Level L2W product provides information about water properties such as IOPs, concentrations and other variables. The data will be made publicly available.



CoastColour Dataset

For the CoastColour project 27 sites have been identified to be included in the processing. These sites are globally distributed and allow a variety of user applications, including coastal ecosystem research, early warning for



aquaculture, sediment transport, water quality and pollution monitoring. For these sites, 6 years (2005 - 2010) of MERIS Level1 FRS data have been processed to higher levels. The input data is composed of about 73000 single data products which make up more than 44 TB. The data amount of the whole processed data sums up to nearly 230 TB.

CoastColour NRT-Service

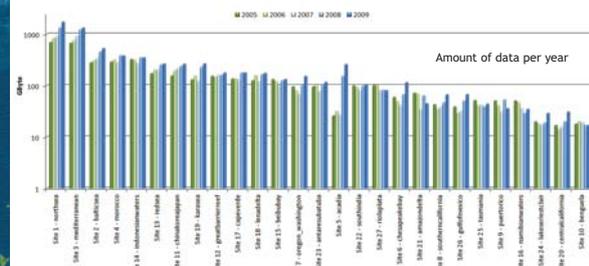
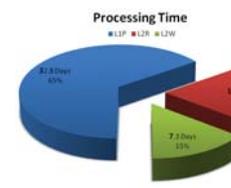
Beside the fixed dataset of CoastColour products, a Near Real Time (NRT) service is currently being established. It is starting mid October 2011 at the third User Consultation Meeting and will run until the end of the project (March 2012). The CoastColour data will be available on a rolling archive for two weeks. The data will be made publicly available. Access will be free and open.

Processing Systems

The processing of the CoastColour dataset is performed with the Calvalus system. This system originates from an ESA LET-SME project which aimed to exploit the MapReduce technology for its applicability for EO data. This technology has been designed for the processing of large amounts of data and is based on massive parallelisation of tasks and a distributed file system. Also online services provided by e.g. Google, Yahoo and Amazon rely on this technology. For Calvalus a cluster has been setup comprising 20 nodes, each equipped with 7.5 TB of disk space, a CPU with 4 cores running at 2.66 GHz and 8 GB RAM. Processing the full CoastColour



dataset on the Calvalus cluster takes ~50 days of computation time. On a desktop PC the computation would take ~2 years.



Input	Output			
	MERIS L1B	CC L1P	CC L2R	CC L2W
2005	6.0 TB	6.0 TB	15.0 TB	12.0 TB
2006	6.0 TB	6.0 TB	15.0 TB	12.0 TB
2007	8.2 TB	8.2 TB	20.0 TB	16.0 TB
2008	8.0 TB	8.0 TB	20.0 TB	16.0 TB
2009	8.5 TB	8.5 TB	21.0 TB	17.0 TB
2010	8.0 TB	8.0 TB	20.0 TB	16.0 TB