



ESA has launched the **CoastColour** project to fully exploit the potential of the MERIS instrument for remote sensing of the coastal zone. CoastColour is developing, demonstrating, validating and intercomparing different Case 2 algorithms over a global range of coastal water types, identifying best practices, and promoting discussion of the results in an open, public form.

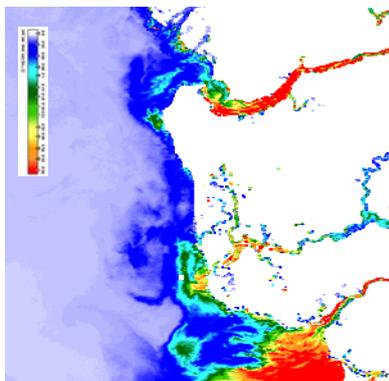


Newsletter Issue IV

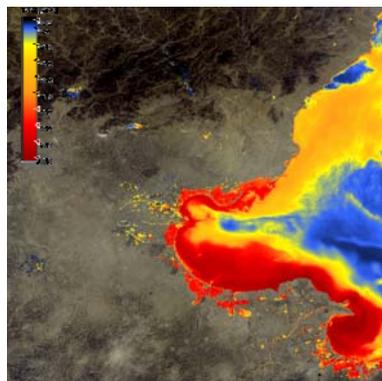
Background Image: Blue Marble © NASA

Content

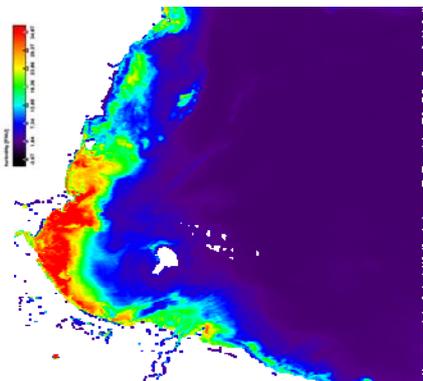
- 3rd CoastColour User Consultation Meeting
- CoastColour Round Robin Experiment
- Product Improvements
- Near Real Time Service
- Case study - NASA investigates CoastColour products of the Chesapeake Bay



Site17: West African Coast
Backscatter coefficient
of suspended matter



Site 11: China, Korea, Japan
Total suspended Matter,
April 2006



Site12: Great Barrier Reef
Turbidity, December 2011

3rd CoastColour User Consultation Meeting

Following on from the success of the first two meetings, the 3rd User Consultation Meeting was held in Lisbon, Portugal, from 19.-20. October 2011. A total of 68 participants from 22 countries attended the workshop.



The project team gave an overview of what had been achieved during the past year. This included the provision of a demonstration dataset, comprising products from the year 2006 with improved top-of-atmosphere radiances (CC L1P), atmospherically corrected reflectances (CC L2R) and bio-geo-physical water properties (CC L2W). Consolidation of the algorithms and the processing for the CC Level 1P product generation has been completed, whereas the demonstration CC Level 2 products will be reviewed and improved in an iteration loop before the final delivery in 2012.

Several users provided important feedback presenting the results of their validation of CoastColour products for their specific test site. CSIRO (Commonwealth Scientific and Industrial Research Organisation) attended the workshop representing Australia and presented a paper on the operational use of MODIS and MERIS for Earth observation of coastal waters in Australia. The CoastColour User from the Korean Ocean Research & Development Institute (KORDI) presented a comparison of the results obtained from MERIS and the Geostationary Ocean Colour Imager (GOCI) in regional seas around Korea. A validation of the CoastColour

regionalised algorithm for waters with high TSM (total suspended matter) concentration was presented by an Argentinian user for the highly turbid La Plata river estuary.

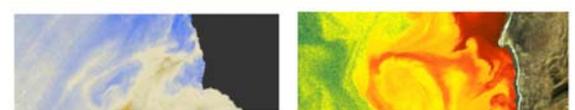
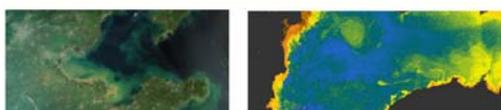
Following the main two-day meeting, the participants of the CoastColour Round Robin Experiment had a very detailed and fruitful workshop on algorithm comparison. Parallel to this workshop, a CoastColour Products Interactive Workshop and Training Course was given to a group of 25 users, and included guided hands-on exercises on CoastColour products using the BEAM software.

CoastColour Round Robin Experiment

In the Round Robin Experiment (CCRR) further discussions on algorithm performance have been driven forward during two dedicated workshops. A web conference was held in July, which enabled the Algorithm Providers (APs) to present their preliminary results. The APs had been asked to run their regional algorithm on the CoastColour Round Robin dataset, which includes - amongst others - simulated marine reflectance spectra.



The initial evaluation on these simulations showed some good, almost 1-1, retrievals as well as also some very biased retrievals, with the essential difference relating to whether the underlying model for inherent optical properties was recalibrated or not to





fit the simulated dataset. Following this initial step, a first harmonised validation and analysis of the differences of algorithm performance was presented at the 3rd UCM in Lisbon. It gave a basis for the CCRR workshop which took place directly after the Conference. During this workshop an important systematic categorisation of each algorithm according to the used IOPs, radiative transfer model and inversion methodology was developed. This was used to interpret the differences in performance of the algorithms. This exercise led to a significant improvement of the understanding of regional and global Case 2 algorithms.

The results of the first round of simulations are being written up. Following the discussions, it was agreed to update the definition of the simulated dataset, and to extend the range of concentrations.

A second round of simulations has, therefore, been proposed to clarify questions relating to the variability of specific inherent optical properties and participants will be invited to re-run their algorithms for a second round of processing before the final conclusions are reached in March 2012.

Product Improvements

Improvements of all the CoastColour algorithms are currently on-going. The feedback gathered at UCM3 gives valuable input.

- The Quasi Analytical Algorithm (QAA), developed by Z.P. Lee is now included in the L2W processor as alternative in-water processor.
- The Optical Water Type (OWT) classification (Moore et al 2009) is also implemented and currently under testing. For each of the eight Nomad-based classes dedicated neural network based in-water algorithms will be

applied and combined according to the class membership.

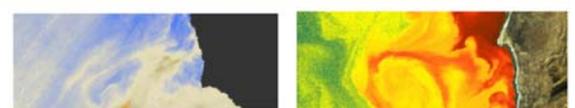
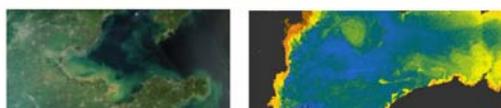
- An improved version of the neural network approach will use an iterative solution of a forward model, which is expected to be more accurate than the current inversion neural network.
- At Level 1P an improved cloud product generation will lead to a reduction of number of products per site but larger individual products, without loss of pixels for users.
- A new flag indicating the risk of mixed land-water pixel will be introduced in the L1P product.

The new L1P and L2 will be available in Q1 of 2012 for validation.

Near Real Time Service

During the UCM3 the Near-Real Time (NRT) Service was officially started, and will operate until end of March 2012. The service processes all available FRS data from the ESA Rolling Archives at ESRIN (RA-ES) and Kiruna (RA-KS) for all 27 CC sites. The data are being downloaded by a single server and partly from the Data Dissemination System (DDS) and incorporated into the Brockman Consult processing network for different processing chains. The estimated daily input is about 70GB/ 122 products. The Compute Server processes the data to all three levels (CC L1P, L2R and L2W) and uploads to the CoastColour Web- and FTP server within 16 hours after acquisition time. In contrast to other CC products the NRT products are not geo-corrected with AMORGOS, because the required restituted orbit state vector (OSV) is not available in near real time.

L2W data are processed with a prototype generic neural network. This is still under development and will change during the demonstration service.



After a period of two months NRT data are moved from the rolling archive to the CC archive. The latter comprises CC L1P products for the years 2005-2009 and, additionally, CC L2R and L2W products for the year 2006. Both the CC archive as well as the NRT data are publicly available via direct web access or via ftp server after filling out a registration form (www.coastcolour.org/products.html)

NASA investigates CoastColour products of the Chesapeake Bay

Chesapeake Bay is one of the largest and most productive estuaries in North America. The Bay is fed by a multitude of major and minor rivers and has a wide range of trophic states ranging from highly turbid conditions in the northern reaches to nearly open ocean conditions to the south. The Bay has been extensively studied by NASA using remote sensing measurements and is one of their key validation sites. In the framework of CoastColour NASA scientists B. Franz and J. Werdell have analysed the CoastColour demonstration dataset by comparing it with *in situ* data as well as with SeaWiFS and MODIS remote sensing products.

The image below shows the CoastColour MERIS product taken on 18.09.2006 of the Chesapeake Bay area.

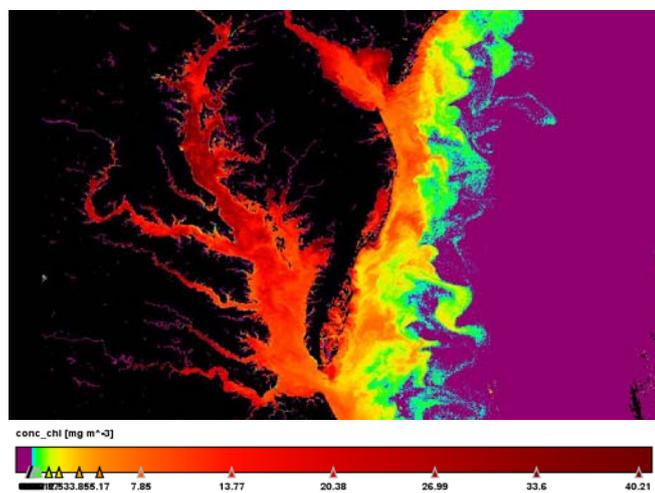


Figure 2: Chl concentration in the Chesapeakebay, 18.09.2006

The chlorophyll-a and TSM concentrations show the characteristic large difference between the oceanic water with values below 1g/m^3 TSM and 1mg/m^3 chl-a, to the coastal and bay waters with values larger than 5g/m^3 and 5mg/m^3 , respectively. NASA analysed a time series of *in situ* and remote sensing data from 2005 to 2008, which includes the 2006 CoastColour demonstration dataset. The graph below shows the monthly averaged data: the different satellite observations as colour coded solid lines and the *in situ* data as solid black circles.

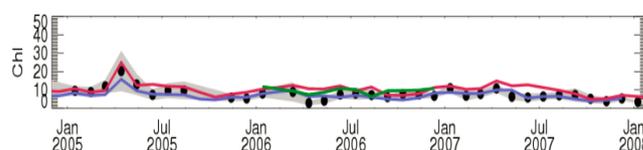


Figure 2: Monthly time-series of Chl, 2005-2008

From their analysis the scientists concluded that the remote sensing reflectances are in good agreement, that the chlorophyll-a concentration, absorption coefficient and the attenuation coefficient are largely similar with minor biases; also the suspended matter concentration agreed well with the median values. No major biases were found in any of the CoastColour products. NASA will continue the analysis with the complete CoastColour time series.

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The project is affiliated to LOICZ.



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