## **CoBIOS – Coastal Biomass Observatory Services**

## EU-Project under FP7.

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The CoBiOS project aims to integrate satellite products and ecological models into really user-relevant information service on high biomass blooms in Europe's coastal waters. Since the state of Europe's coastal waters are of concern in relation to the high amount of nutrients entering, resulting in high algae blooms finally followed by oxygen depletion in the bottom water. To this end CoBiOS will produce a harmonized and validated water transparency product based on satellite images for a large variety of coastal water types which will be used to force ecological models. While earth observation can provide information on the state of superficial algal blooms, the improved CoBiOS ecological models will make predictions on the fate of blooms, thus allowing assessment of e.g. the risks on hypoxia and dead zones. CoBiOS operates in overlapping model domains in the Northern part of Europe in order to derive uncertainty information from ensemble runs. The combined service will be demonstrated to groups of users and validated by a panel of key users.

In CoBIOS the following institutes across Europe are coordinating their efforts:

- 1. VERENIGING VOOR CHRISTELIJK HOGER ONDERWIJS, WETENSCHAPPELIJK ONDERZOEK EN PATIENTENZORG (VU-IVM) *the Coordinator* [the Netherlands]
- 2. UNIVERSITÄT HAMBURG (UHAM) [Germany]
- 3. SUOMEN YMPARISTOKESKUS (SYKE) [Finland]
- 4. Water Insight BV (WI) [the Netherlands]
- 5. DHI (DHI) [Denmark]
- 6. BROCKMANN CONSULT GMBH (BC) [Germany]
- 7. INSTITUT ROYAL DES SCIENCES NATURELLES DE BELGIQUE (MUMM) [Belgium]
- 8. GEOGRAPHIC RESOURCE ANALYSIS & SCIENCE AS\*GRAS (GRAS) [Denmark]
- 9. STICHTING DELTARES (Deltares) [the Netherlands]

The work of the University Hamburg is coordinated by Dr. Hermann Lenhart (scientific computation group) and Dr. Thomas Pohlmann (IfM). The simulation will be carried out with the coupled physical-biogeochemical or ecosystem model ECOHAM4 (Kühn et al., 2010), which was developed at the IfM, based on the hydrodynamical model HAMSOM (Pohlmann, 1996). The biogeochemical part represents the pelagic and benthic cycles of carbon, nitrogen, phosphorus, silicon and oxygen. The state variables included are: diatoms and flagellates, micro- and mesozooplankton, slowly and fast sinking detritus, labile and semi-labile dissolved organic matter and bacteria, dissolved inorganic carbon (DIC) and oxygen, as well as the nutrients NH4, NO3, PO4, SiO4.

ECOHAM4 is a very useful platform for the work in CoBIOS since it has been used to estimate the eutrophication status of target areas in the North Sea and to assess the impact of riverine nutrient reduction scenarios in an international model comparison in the frame of OSPAR ICG-EMO (Intersessional Correspondence Group on Eutrophication Modelling), see Lenhart et al., 2010. The model area comprises the whole North Sea and large parts of the Northwest-European Shelf ( $15^{\circ}W - 14^{\circ}15^{\circ}E$ ,  $47^{\circ}40^{\circ}N$ -  $64^{\circ}N$ ) with a horizontal resolution of about 20 km. A new application on a smaller domain (4 to  $13^{\circ}E$  and 50 to  $60^{\circ}N$ ) with a refined resolution of 3 km will be used for the COBIOS work.

The simulation within CoBIOS are aimed for:

- 1. provide information on the state (Earth Observation) and evolution and fate (models) of near coastal high biomass blooms
- 2. evaluate and predict the probabilities of nuisance (foam, biofouling of off-shore installations and ships), harmfulness (red tide, fish kills etc.), decayed biomass accumulation,
- 3. follow patterns of nutrients pollution (eutrophication)
- 4. predict potential hypoxia and anoxia events/locations that might lead to oceanic dead zones and massive fish kills.
- 5. predict when and where bloom harvesting would be economically feasible
- 6. indicate locations/periods where fishing would benefit from decreased transparency
- 7. indicate areas where blooms have lower than normal intensity due to pollution

Therefore the use of ECOHAM4 within the CoBiOS project has a high demand for computational power to achieve the integration of satellite products within the ecosytem model with the goal to represent high biomass blooms in Europe's coastal waters.

## References:

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