

Sentinel-3 products for detecting EUtROphication and Harmful Algal Blooms in the French-English Channel (S-3 EUROHAB).



TASK 2. Activity 2.5: Deliverable 2.5.1. Final Version of Harmful Algal Bloom and Water Quality Web alert system.

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EXECUTIVE SUMMARY.

Through the continuation of workshops with stakeholders in France and the UK, both in-person and on-line, the final version of the web-based alert system for harmful algal bloom (HAB) risk and water quality was built by Plymouth Marine Laboratory (partner 1). Feedback was obtained from a range of stakeholders including; shellfisheries, monitoring organisations, conservation groups, Marine management bodies and academia. The initial design simple and easy to visualise satellite maps, at a resolution of 1 km or 300 m, to indicate the presence of the following phytoplankton blooms: *Pseudonitzschia* spp., *Karenia mikimotoi*, *Phaeocystis* spp (provided by partner 1). It also included the water quality indicators; Chlorophyll-a, Particulate Inorganic Carbon, Turbidity (provided by partner 2; IFREMER-Brest), plus the water quality parameter primary production percentile 90, which was developed by partner 1. Meteorological parameters such as rainfall, wind speed and wind direction; physical parameters such as sea surface temperature, sea surface salinity and ocean mixed layer depth were also included. A new set of parameters were also added to final version of the web alert system on Scallop Fisheries vulnerability indices. These include an index of vulnerability to HABs for a range of different vessel types for the years 2012-13 and 2017-18, which are provided as indicative examples. Through Task 1, satellite algorithms for the detection of *Lepidodinium chlorophorum*, and environmental proxies for the detection of *Dinophysis* spp., were also developed by Partner 1. These were deemed of not sufficient accuracy to be included in the final version.

Meta-data for the web alert products are given in **Table 1**.

Table 1. Associated Meta-data for S-3 EUROHAB products in the final version of the web alert system.

Product	Metadata
Harmful Algal Bloom	
ASP species (<i>Pseudo-nitzschia</i> sp.,) HAB risk high res	Sentinel-3 OLCI Level 2 Ocean Colour Full Resolution (version BC003) - Sentinel-3 - Reprocessed, European Organisation for the Exploitation of Meteorological Satellites, DOI: 10.15770/EUM_SEC_CLM_0061. http://doi.org/10.15770/EUM_SEC_CLM_0061
ASP species (<i>Pseudo-nitzschia</i> sp.,) HAB risk low res	MODIS-Aqua Ocean Colour data Reprocessing 2018 https://oceancolor.gsfc.nasa.gov/reprocessing/r2018/aqua/ Processing details: https://www.sciencedirect.com/science/article/pii/S1568988313001790?via%3Dihub
Foam forming species (<i>Phaeocystis globosa</i>) HAB Risk high res	Sentinel-3 OLCI Level 2 Ocean Colour Full Resolution (version BC003) - Sentinel-3 - Reprocessed, European Organisation for the Exploitation of Meteorological Satellites, DOI: 10.15770/EUM_SEC_CLM_0061. http://doi.org/10.15770/EUM_SEC_CLM_0061
Foam forming species (<i>Phaeocystis globosa</i>) HAB Risk low res	MODIS-Aqua Ocean Colour data Reprocessing 2018 https://oceancolor.gsfc.nasa.gov/reprocessing/r2018/aqua/ Processing details: https://www.sciencedirect.com/science/article/pii/S1568988313001790?via%3Dihub
Oxygen depleting species (<i>Karenia mikimotoi</i>) HAB risk high res	Sentinel-3 OLCI Level 2 Ocean Colour Full Resolution (version BC003) - Sentinel-3 - Reprocessed, European Organisation for the Exploitation of Meteorological Satellites, DOI: 10.15770/EUM_SEC_CLM_0061. http://doi.org/10.15770/EUM_SEC_CLM_0061
Oxygen depleting species (<i>Karenia mikimotoi</i>)	MODIS-Aqua Ocean Colour data Reprocessing 2018 https://oceancolor.gsfc.nasa.gov/reprocessing/r2018/aqua/ Processing details: https://www.sciencedirect.com/science/article/pii/S1568988313001790?via%3Dihub

HAB risk low res	
Oxygen depleting species (<i>Karenia mikimotoi</i>) HAB risk low res 2	NPP-SUOMI VIIRS Ocean Colour data Reprocessing 2018 https://oceancolor.gsfc.nasa.gov/reprocessing/r2018/viirs/
Water Quality parameters	
Phytoplankton biomass	CMEMS Ocean Colour: OCEANCOLOUR_ATL_BGC_L3_MY_009_111 https://resources.marine.copernicus.eu/product-detail/OCEANCOLOUR_ATL_BGC_L3_NRT_009_111/INFORMATION Processing details: https://doi.org/10.1016/j.rse.2019.111343
Particulate Inorganic material	CMEMS Ocean Colour: OCEANCOLOUR_ATL_BGC_L3_MY_009_111 https://resources.marine.copernicus.eu/product-detail/OCEANCOLOUR_ATL_BGC_L3_NRT_009_111/INFORMATION Processing details: https://doi.org/10.1016/j.rse.2019.111343
Turbidity	CMEMS Ocean Colour: OCEANCOLOUR_ATL_BGC_L3_MY_009_111 https://resources.marine.copernicus.eu/product-detail/OCEANCOLOUR_ATL_BGC_L3_NRT_009_111/INFORMATION Processing details: https://doi.org/10.1016/j.rse.2019.111343
Primary production percentile 90	CMEMS Ocean Colour, OCEANCOLOUR_ATL_BGC_L3_MY_009_111 https://resources.marine.copernicus.eu/product-detail/OCEANCOLOUR_ATL_BGC_L3_NRT_009_111/INFORMATION SeaWiFS and MODIS photosynthetically available radiation (https://oceandata.sci.gsfc.nasa.gov/directaccess/) CMEMS global SST product SST_GLO_SST_L4_REP_OBSERVATIONS_010_011 (https://resources.marine.copernicus.eu/product-detail/SST_GLO_SST_L4_REP_OBSERVATIONS_010_011/INFORMATION)

	Processing details: http://dx.doi.org/10.1016/j.scitotenv.2022.158757
Meteorological.	
Rainfall	MSWEP: 3-hourly 0.25° global gridded precipitation (1979–2015) by merging gauge, satellite, and reanalysis data https://hess.copernicus.org/preprints/hess-2016-236/hess-2016-236.pdf
Wind speed	https://data.eumetsat.int/data/map/EO:EUM:DAT:METOP:OSI-150-B
Wind direction	https://data.eumetsat.int/data/map/EO:EUM:DAT:METOP:OSI-150-B
Physical parameters.	
Sea surface salinity	CMEMS Multi Observation Global Ocean Sea Surface Salinity and Sea Surface Density MULTIOBS_GLO_PHY_S_SURFACE_MYNRT_015_013 (https://resources.marine.copernicus.eu/product-detail/MULTIOBS_GLO_PHY_S_SURFACE_MYNRT_015_013/INFORMATION)
Sea surface temperature	CMEMS global SST product SST_GLO_SST_L4_REP_OBSERVATIONS_010_011 (https://resources.marine.copernicus.eu/product-detail/SST_GLO_SST_L4_REP_OBSERVATIONS_010_011/INFORMATION)
Ocean Mixed layer depth	CMEMS northwest European shelf (https://myocean.marine.copernicus.eu/)
Vulnerability indices.	https://portail.indigeo.fr/geonetwork/srv/eng/catalog.search#/metadata/c12ca075-e2aa-41b9-962c-99111897b86e