

OC-TAC PML PU proposition for OSR5 chapter 1

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Title of the proposed section: Eutrophication index for the North Atlantic Ocean

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Abstract (max. 500 words):

Eutrophication is defined as an excess of the nutrients - mainly phosphorus and nitrogen – present in a water body. Anthropogenic activities, such as farming, agriculture, aquaculture and industry, are the main source of nutrient input in problem areas. Eutrophication is an issue, particularly, in coastal regions and areas with restricted water flow, such as lakes and rivers. The impact of eutrophication on the marine ecosystem is well known: nutrient availability boosts plant growth - particularly algal blooms - resulting in a decrease in water quality. This can, in turn, cause death hypoxia of aquatic organisms, ultimately driving changes in community composition. Eutrophication has also been linked to changes in the pH (acidification) and depletion of inorganic carbon in the aquatic environment.

In this section we will derive an annual eutrophication index map for the North Atlantic Ocean using satellite-derived chlorophyll concentration. We will use the chlorophyll 90 percentile (P90) and chlorophyll 10 percentile (P10) as indicators of, respectively, eutrophication and oligotrophication. P90 and P10 are defined as dynamic thresholds such as 90% of the chlorophyll values are $< P90$ for P90, and 10% of the chlorophyll values are $< P10$ for P10. Using the satellite-derived chlorophyll products distributed in the regional Atlantic CMEMS REP Ocean Colour dataset (OC- CCI), we will compute a set of daily P90 and P10 climatologies on a pixel-by pixel basis for the region of interest. The period selected for the climatology is 1998-2017 and will be fixed for future studies and OMI updates. For a particular year, we'll compare every valid daily observation with the corresponding daily climatology on a pixel-by pixel basis, and determine if it is above the P90 threshold, below the P10 threshold or within the $[P10, P90]$ range. We will then calculate the percentage of valid observations above/below the P90/P10 thresholds. Finally, we

will derived an annual : if 50% of the observations for a given pixel are above the P90 threshold, the pixel will be flagged as eutrophic. Conversely, if it will be flagged as if 50% of the observations for a given pixel are below the P10 threshold, the pixel will be flagged as oligotrophic. A measure of the significance of these flags will be derived using probability tables considering the length and frequency of the eutrophication/oligotrophication episodes.

Data use:

- **CMEMS product (long-name, CMEMS product name):**

OCEANCOLOUR_ATL_CHL_L3_REP_OBSERVATIONS_009_067

- **Non-CMEMS product** (description (max. 100 words), scientific reference and or web link to data information; link to data source/download)

None.

Time period to be covered: 1997-2019

Why and for what is this topic important? (max. 150 words):

Eutrophication indexes are critical for ecological status assessments and water quality monitoring.

Stakeholders for the proposed topic (max. 100 words):

Water Framework Directive (WFD), Marine Strategy Framework Directive (MSFD), OSPAR, EEA.