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## Oceanic biogeochemical characteristic maps identified with holistic use of satellite, model and data

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Ocean province level plankton community exhibit heterogeneity across Arctic, Nordic, Atlantic Gyre and Southern Ocean provinces. GreenSeas research is an international FP7 consortium that includes Arctic, Atlantic and Southern Ocean based research teams who are analysing the planktonic ecosystem. We are looking at how the planktonic ecosystem responds to environmental and climate change. Using Earth Observation monitoring data we report new results on identifying generic plankton characteristics observable at a province level, and also touch on spatial and temporal trends that are evident using a holistic analysis framework. Using advanced statistical methods this framework compares and combines Earth Observation information together with an in-situ Oceanic plankton Analytical Database and up to 40 year ocean general circulation biogeochemical model (OGCBM) time series of the equivalent plankton and sea-state measures of this system. Specifically, we outline the use of the GreenSeas Analytical Database, which is a harmonised set of Oceanic in-situ plankton and sea-state measures covering different cruises and time periods. The Analytical Database information ranges from plankton community, primary production, nutrient cycling to physical sea state temperature and salinity measures. The combined analysis utilises current, 10 year+ Earth Observations of ocean colour and sea surface temperature metrics and interprets these together with biogeochemical model outputs from PELAGOS, ERSEM & NORWECOM model runs to help identify planktonic based biomes.

Generic planktonic characteristic maps that are equivalently observable in both the Earth Observations and numerical models are reported on. Both ocean surface and sub-surface signals are analysed together with relevant Analytical Database biome extracts. We present the current results of this inter-comparison & discuss challenges of identifying the province level plankton dominance with the satellite, model and data. In particular we discuss the strategic importance of systematically analysing the knowledge present in the existing key long term Oceanic observation platforms through such holistic analysis frameworks. These maps help to enhance and improve current biogeochemical models, our understanding of the plankton community structure and predictions used for future assessment of climate change.