

# Towards a global *in situ* monitoring of plankton using imaging systems: lessons learnt from the past 10 years of observation in Europe

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Plankton plays a key role in the biological pump and has a big impact on marine living resources. However, plankton is difficult to observe in a consistent manner across its extended size range and by the multiple observers that uses protocols that are not inter calibrated. Imaging sensors have the potential to provide key **“ecosystem essential ocean variables” eEOVs** (plankton biodiversity, morphological traits) that complement other sensors such as optical ones. Lab and *in-situ* imaging sensors have been deployed the 10 last years to provide insights into local dynamics in the frame of time series programs (from daily to decadal scales) and during oceanographic surveys across ocean basins. Combining observations from the different programmes has sometimes allowed to detect concomitant changes in different areas or provide a better spatial distribution of plankton communities. For example, such efforts were supported by the European FP7 JERICO, H2020 JERICO-NEXT, BRIDGES, EURO-BASIN programs. Most of the observation efforts were performed independently and hundreds of millions of images have been collected (and billions to come as sensors are getting more available). All those sparsely distributed images are usually not available for the users because of limited development in software solutions for identification, archiving and distribution, which are in a current improving process. Several attempts for developing web based services for image recognition, distribution and archiving have been performed ([ecotaxa.obs-vlfr.fr](http://ecotaxa.obs-vlfr.fr)) but only a fraction of the existing and future data can be treated by them. Based on the past ten years of

effort, we will present a synthesis of successful developments in using imaging systems to provide information on plankton community at local, regional and ultimately global scales. These examples will show how relevant they are for ecosystem monitoring (e.g. detection of ecosystem changes and regime-shifts) and services (e.g. aquaculture, fisheries, biological carbon pump). We will then build on these examples to discuss future developments with the aim of, better observing, harmonizing practices and developing state of the art marine data and information management in order to increase the connection with the relevant stakeholders and community of users among researchers, conservation managers and private companies.