

# Use Cases of Ecological Marine Units for Improved Regional Ocean Observation Data Integration within the Marine Biodiversity Observation Network (MBON)

We report on a series of use cases under way to augment and test the viability of the global Ecological Marine Units (EMUs). EMUs were commissioned in 2015 by the Group on Earth Observations (GEO) as a means of developing a standardized and practical global ecosystems classification and map for the oceans. They are a key outcome for the GEO Biodiversity Observation Network (GEO BON) and a recent contribution to the Marine Biodiversity Observation Network (MBON).

EMUs comprise a global 3D point mesh framework of 52 million ocean observations of salinity, temperature, dissolved oxygen, nitrate, silicate, and phosphate from the NOAA World Ocean Atlas. Many cite the need to scale down this global framework regionally and up temporally. Hence, over 15 teams of researchers are implementing EMUs in regional use cases, based on their own higher-resolution data for a richer geospatial accounting framework and visualization of species distributions.

Among these are use cases in temperate upwelling shallow subtropical and polar regions, where boundaries of surface seascapes are compared to surface EMUs at seasonal scales. The EU-funded

ATLAS project is comparing EMUs to species-based biogeographic clusters of vulnerable marine ecosystems in the North Atlantic to further refine the United Nations Educational, Scientific and Cultural Organization's (UNESCO) Global Open Oceans and Deep Seabed effort for this region. German researchers compiling 5,000–6,000 deep-sea distribution records from expeditions to the Sea of Okhotsk, the Aleutian Trench, and the Kuril-Kamchatka Trench are comparing their EMU use case with the ATLAS use case. Another use case seeks to add data NE Pacific carbonate chemistry and pteropod shell dissolution to the EMU 3D point mesh network to provide information on the responses of ecosystems to influences such as ocean acidification.

In summary, we are building a strong user community based on these use cases to improve understanding of global and regional drivers of biogeography, to refine tools to classify and prioritize areas for improved marine management including area-based management tools, and to enhance visualizations of ocean trends and/or forecasts.

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