

EMODnet: An EU regional data service providing free and FAIR, integrated marine data for the global ocean data ecosystem

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The European Marine Observation and Data Network, EMODnet, is a public marine data service of the European Union and a key marine knowledge initiative of the European Commission DG MARE. The guiding philosophy of EMODnet is to make marine data Findable, Accessible, Interoperable and Reusable (FAIR), providing a marine knowledge resource that is open to all. EMODnet today is an operational service with a single Portal (emodnet.ec.europa.eu) providing open and free access to high-value datasets and derived data products on the marine and coastal environment and human activities at sea, at European scale and beyond.

To deliver this, EMODnet experts work closely with Europe's Ocean Observation community to assemble *in situ* marine data from diverse data collection efforts and stakeholder groups, including the public and private sectors. EMODnet standardises and harmonises these data into integrated pan-European data layers and derived data products, utilising agreed European geospatial data standards (e.g., INSPIRE, controlled vocabularies and standards from EMODnet's foundational marine data management infrastructures e.g., SeaDataNet, Open Geospatial Consortium (OGC) and restful (OPeNDAP) data service standards), and international metadata ISO standards, to name a few.

The EMODnet offer covers data and information across seven broad thematic: bathymetry, biology, chemistry, geology, seabed habitats, physics and human activities at sea. The offer extends from the open ocean and deep sea/seafloor to the surface waters and coastal zone, including the land-sea interface, with *in situ* data offering high-resolution and profiles of the ocean that can be used not only for European and regional sea-scale but also for localised applications. As a result, the EMODnet service has a large and expanding user network with trusted marine data being used for research and innovation, to drive further understanding about our shared Ocean, used as evidence to underpin decision-making in ocean management and governance, including Maritime Spatial Planning, and used to support the private sector in its transition to more sustainable, green and climate-smart operations at sea. EMODnet collects and publishes use cases (<https://emodnet.ec.europa.eu/en/use-cases>) that demonstrate how the EMODnet service has been successfully used by various sectors including industry, public authorities, researchers and civil society.

EMODnet is also recognised as a best practice and an innovator in FAIR data and metadata services, not least due to its unified marine data service based on a distributed infrastructure of interoperable web services. This centralised approach is key to the EMODnet offer of FAIR multi- and inter-disciplinary marine knowledge and is underpinning a new wave of innovation in marine data services. At European level, EMODnet closely collaborates with the Copernicus Marine Service, and together they are delivering the marine data infrastructure for the European Digital Twin Ocean (EDITO), as a marine domain contributor to EOSC, the EU Green Deal data space and Destination Earth, among others. The centralised Portal is also a key milestone in EMODnet's contribution to global efforts, with EMODnet's common metadata catalogue being harvested by the Global Earth Observation System of Systems (GEOSS) and the Ocean Data Information System (ODIS) of IODE IOC-UNESCO, as a key contribution to the global ocean data ecosystem.

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