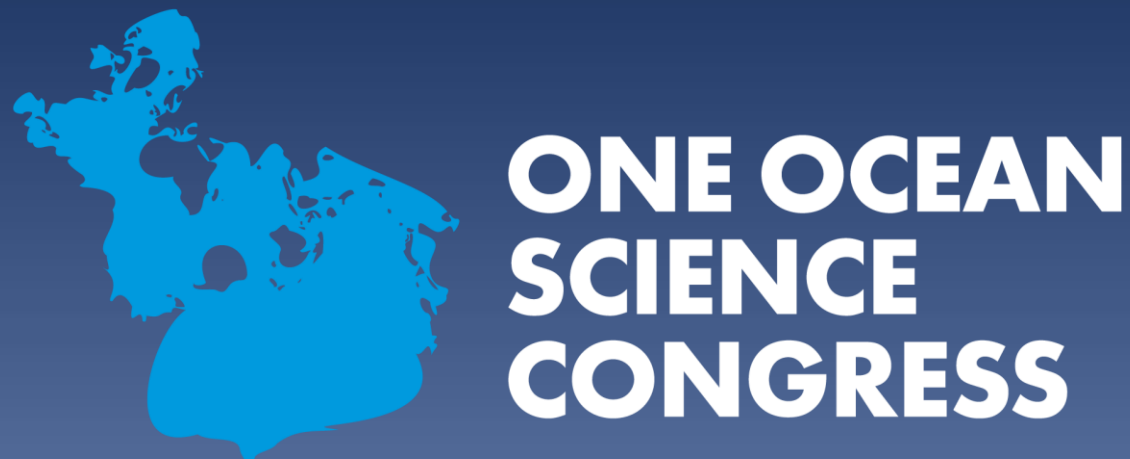


EMODnet river node: a near real time hydrological service designed for the coastal community



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1. Introduction

Rivers shape coastal ecosystems by supplying freshwater, nutrients, and sediments that support biodiversity and help prevent beach erosion. However, they also carry pollution, including chemicals, waste, marine litter, and microplastics, from inland to the ocean.

Rivers interact with coastal circulation, influencing water movement, stratification, mixing, and front formation. These effects intensify during extreme events like heavy rain, floods, and storms, which boost river flow and impact coastal areas. Climate change worsens this by increasing the frequency and intensity of such events.

Thus, it is crucial that state-of-the-art operational coastal numerical models include near-real-time river data to enhance hydrodynamic forecasts, which are key to support decision-making in environmental protection and search-and-rescue efforts during extreme events.

2. EMODnet near-real time river data service

In this framework, EMODnet Physics and Ingestion designed a dedicated River Data Node in collaboration with +ATLANTIC CoLAB. This is a **river product** designed to satisfy the needs of the **coastal community**. Currently, it integrates information from over 1,000 stations, supplied by 40 national and regional water administrations across 22 countries on three continents: Europe, North America, and South America (Figure 1).

Sources (river basins administrative authorities) are contacted to establish an operational data flow from their services towards EMODnet River Data Node . The system collects data from the hydrologic station nearest to each river's coastal area, excluding stations influenced by tides. **River outflow** may be a direct outflow measurement or a derived value from river water level (according a conversion law based on the river section). Some stations also provide **water temperature** and **water level**. Observations are combined with harmonized metadata based on existing vocabularies (Table 1).

Metadata field	Vocabulary exists	Link to vocabulary	Vocabulary governance
Platform id	*		EMODnet Physics
Station		https://www.bafg.de/SharedDocs/ExterneLinks/GRDC/C/grdc_reference_stations_zip.html?nn=201698	GRDC
Owner/provider Institution	Yes	https://edmo.seadatanet.org/	SeaDataNet
variable names	Yes	http://vocab.nerc.ac.uk/collection/PXX/current/where%XX=02;01;07	BODC:NVS
unit	yes	https://vocab.nerc.ac.uk/collection/P06/current/	BODC:NVS
Quality Flag Scheme	yes	http://www.oceansites.org/docs/oceansites_data_form_at_reference_manual.pdf	OceanSites
Time	yes	ISO8601	ISO
Datum	Yes	WGS84	ISO
Country	yes	ISO3166	ISO
License	Yes	https://creativecommons.org/	CC
INSPIRE	Yes	ISO 19115	ISO/INSPIRE

Table 1. Applied standards and vocabularies

Currently EMODnet Physics is assigning a unique id to river stations based on the country, river name and river station. Once river data is processed and standardised, the river information is updated and made available for direct Machine-to-Machine (M2M) using ERDDAP servers or to be explored under the Central Portal (GeoServer + GeoNetwork) (Figure 1). Data can be visualised and download directly from the EMODnet Central Platform (Figure 2). The end user have **full free access** to all the gathered information in **near-real time** in a **one-stop shop**.



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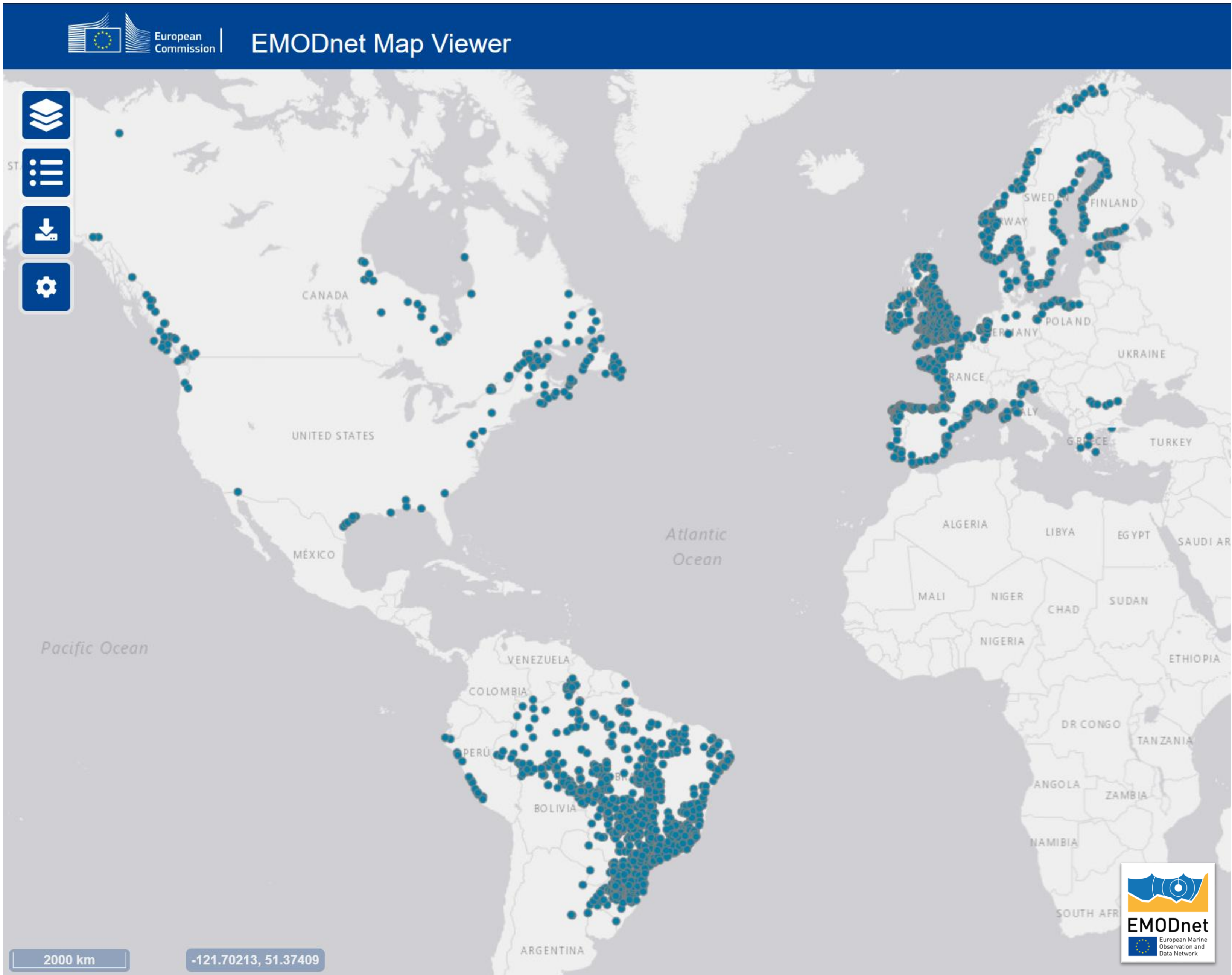


Figure 1. Current coverage of near-real-time river stations.



Figure 2. Near-Real Time river flow and water level for the Almourol Station in the Tagus River near its mouth. Original data are collected, standardized and enriched with metadata from servers of the Portuguese Environmental Agency (APA).

3. Conclusion

Rivers bridge the gap between land and ocean, influencing circulation patterns, biotic diversity, and essential processes such as eutrophication. For the first time, the coastal and ocean communities have access to a service that provides international standardized near-real time river data. The continuous development of EMODnet Physics River Node, reflects a crucial step towards comprehensive coastal and ocean management.