

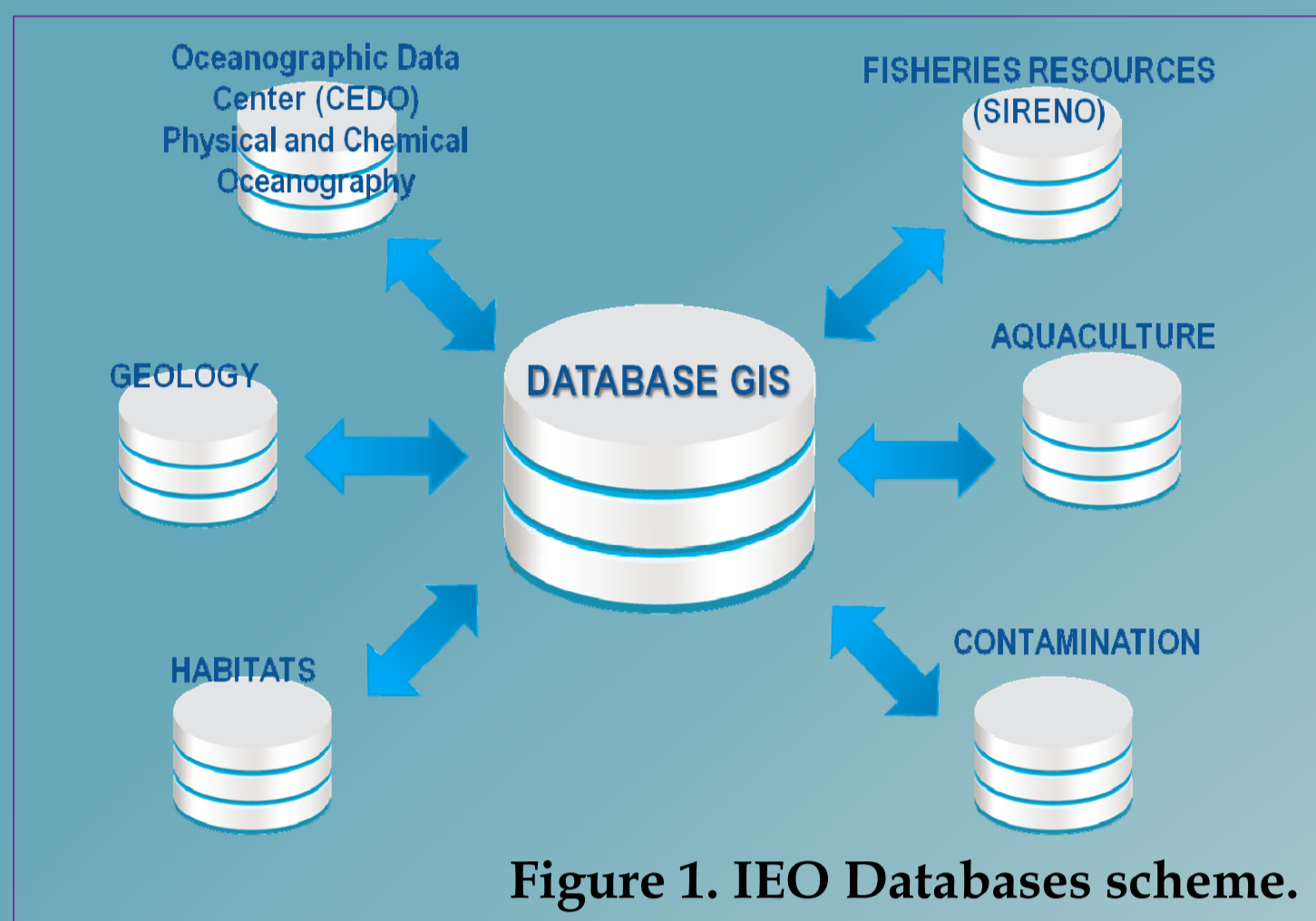
Tools for discovering and managing oceanographic data of Spanish Institute of Oceanography (IEO)



Olvido Tello-Antón^{1*}, G. Bruque¹, L.M. Agudo¹, I. Bermejo¹, J. Garrido² & EMODNET HRSM Group³
 (1) Instituto Español de Oceanografía. Sede Central. Corazón de María 8, 28002 Madrid, SPAIN (www.ieo.es)
 (2) Bilbomática
 (3) Partners of EMODNET-HRSM project



The Spanish Institute of Oceanography, founded in 1914, it is a public research organization dedicated to research in marine science, especially in relation to scientific knowledge of the oceans, sustainability of fishing resources and the marine environment. The researches performs multidisciplinary studies of the marine environment, as well as systematic and specific studies for special requirements (El Hierro submarine volcanic episode, spill Prestige, etc.). Different types of data are acquired depending on aim of the research, and several methodologies and data acquisition techniques are used. In 1964 the DATA CENTER of IEO (CEDO) (<http://indamar.ieo.es>) was created in order to organize the data about physical and chemical oceanography, to standardize this information and to serve the international data network SeaDataNet (www.seadatanet.org). And the rest of the information is organized into different databases according to the subject and the variables represented (geology, fisheries, aquaculture, pollution, habitats, etc.).



Due to the large amount of data collected over the 100 years of IEO history, there is a clear need to organize, standardize, integrate and relate the different databases, and to provide access to information. For that, in 1997 emerged the first initiative to organize the IEO spatial information in a Geographical Information System (GIS) and in 2010 this GIS was consolidated as IEO institutional GIS (Fig. 1).

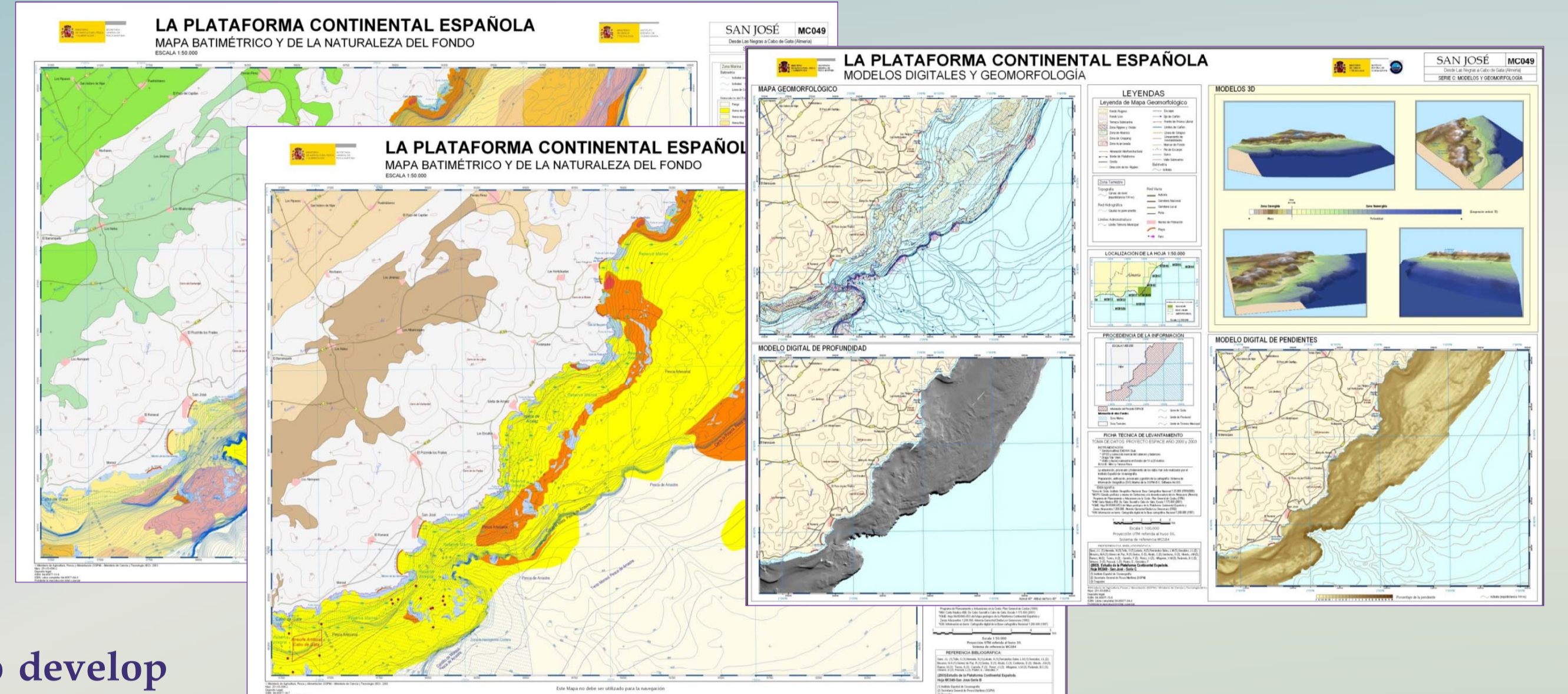


Figure 2. Cartographic series about Spanish continental shelf, developed from data integrated in IEO marine GIS, acquired from oceanographic surveys in ESPACE project. www.ieo.es/web/ieo/cartografia

The GIS allows the information to be organized, visualized, consulted and analyzed. Besides, it allows to develop high quality thematic cartography. The GIS is an essential tool in the decision making of aspect like protection of marine environment, sustainable management of resources and marine spatial planning.

The IEO Marine GIS has provided support several project and activities such as: ESPACE (Fig. 2), LIFE-INDEMARES (Fig. 3), Initial assessment of Marine Strategy Framework Directive (Fig. 4), El Hierro submarine volcanic process (Fig. 5), TPEA: Transboundary Planning in the European Atlantic (Fig. 6), several thesis among which PhD thesis in process (Tello, O.) IEO (Fig. 7).

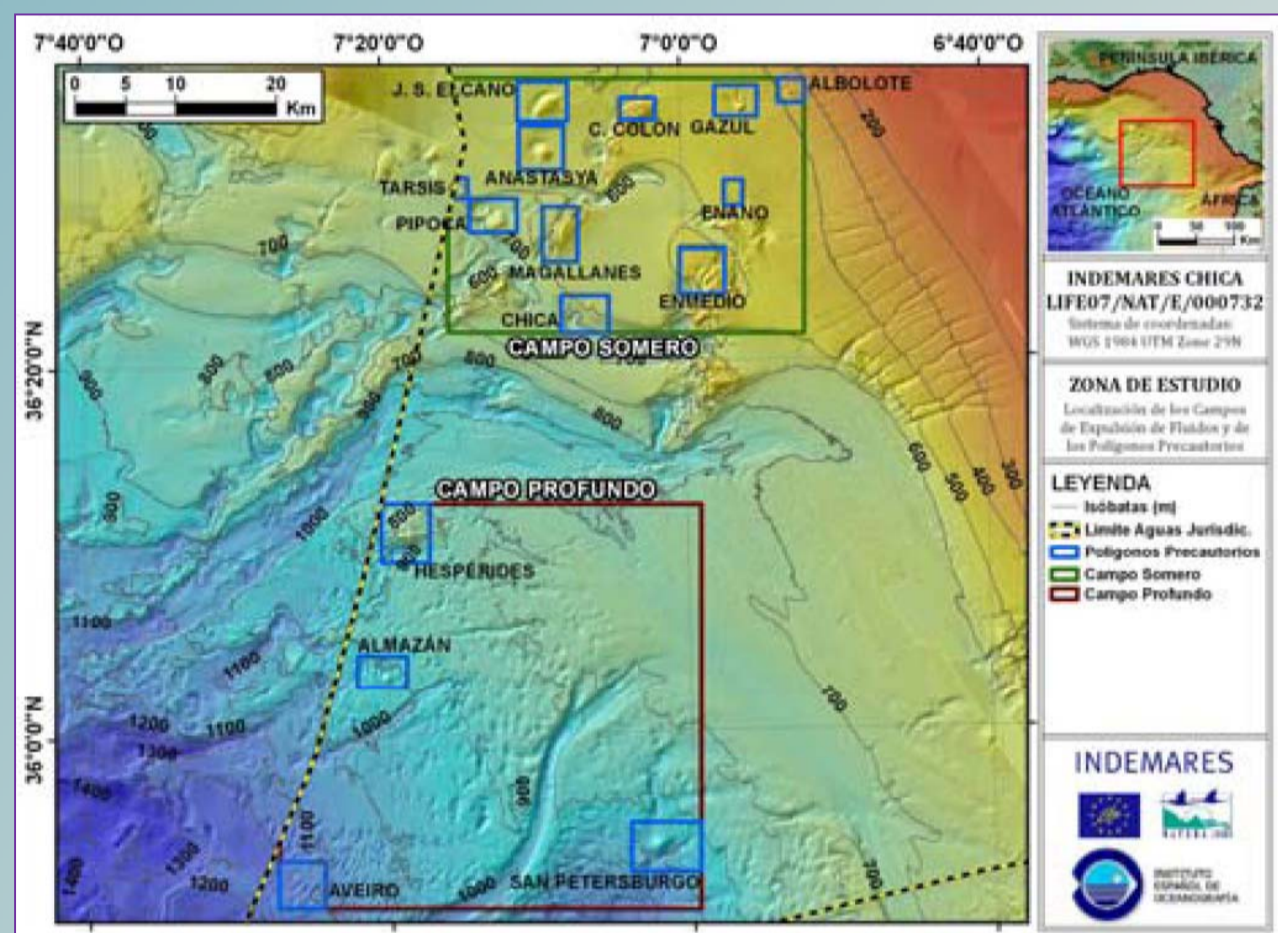


Figure 3. Mud volcanoes explored in LIFE-INDEMARES project. Information integrated in IEO marine GIS.

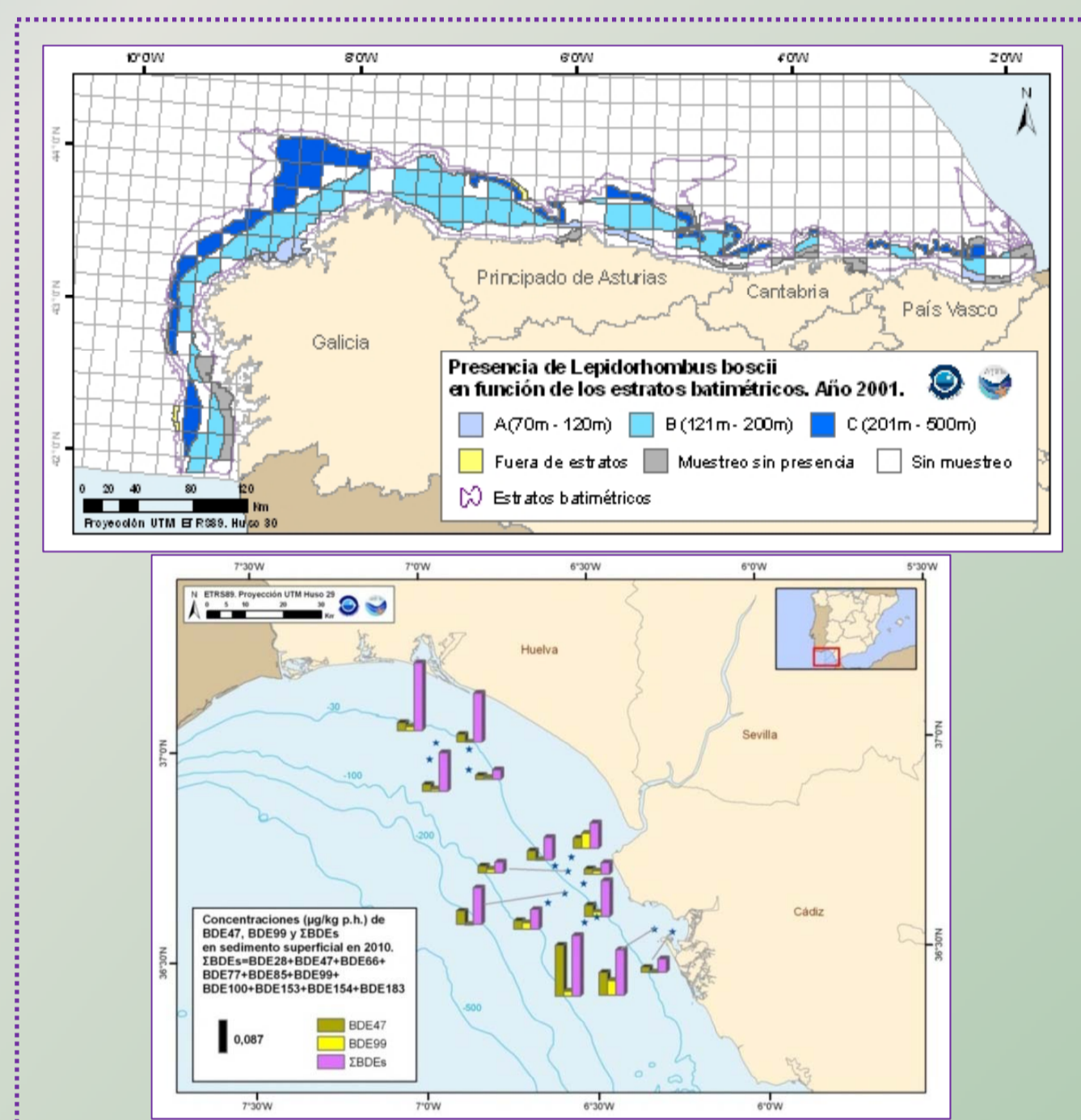


Figure 4. Cartography developed from the information gathered in Initial assessment of Marine Strategy Framework Directive, and recently integrated into IEO Marine GIS.

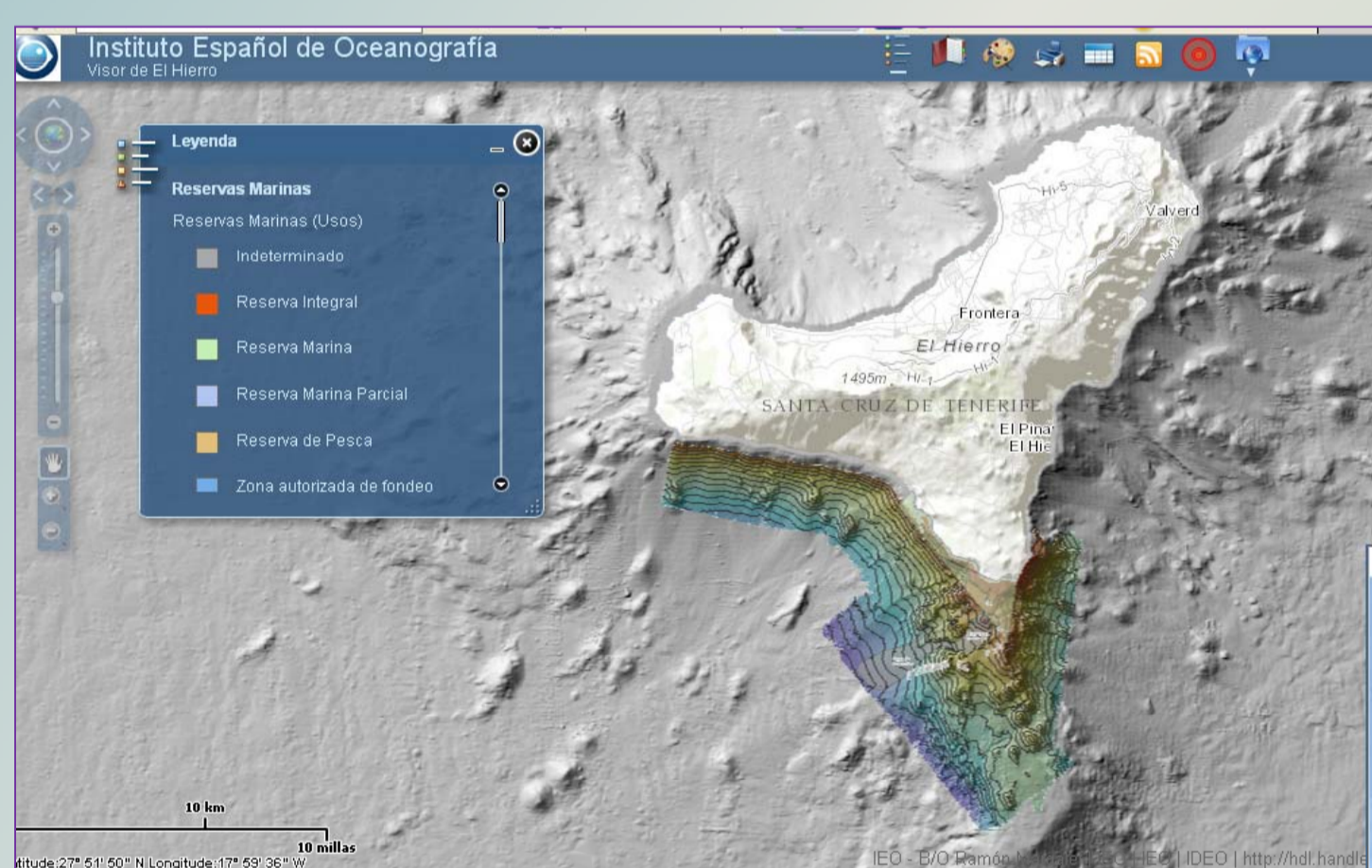


Figure 5. Data Viewer El Hierro submarine volcanic process.

Currently, the knowledge of marine environment, its protection and its spatial planning are extremely relevant issues. Therefore, several European initiatives such as EMODNET BATHYMETRY with the aim of elaborated a continuous DTM for the European seas. This DTM is accessible and downloadable through EMODNET Portal (Fig. 8), Growth Blue, Horizon 2020, etc., are being developed.

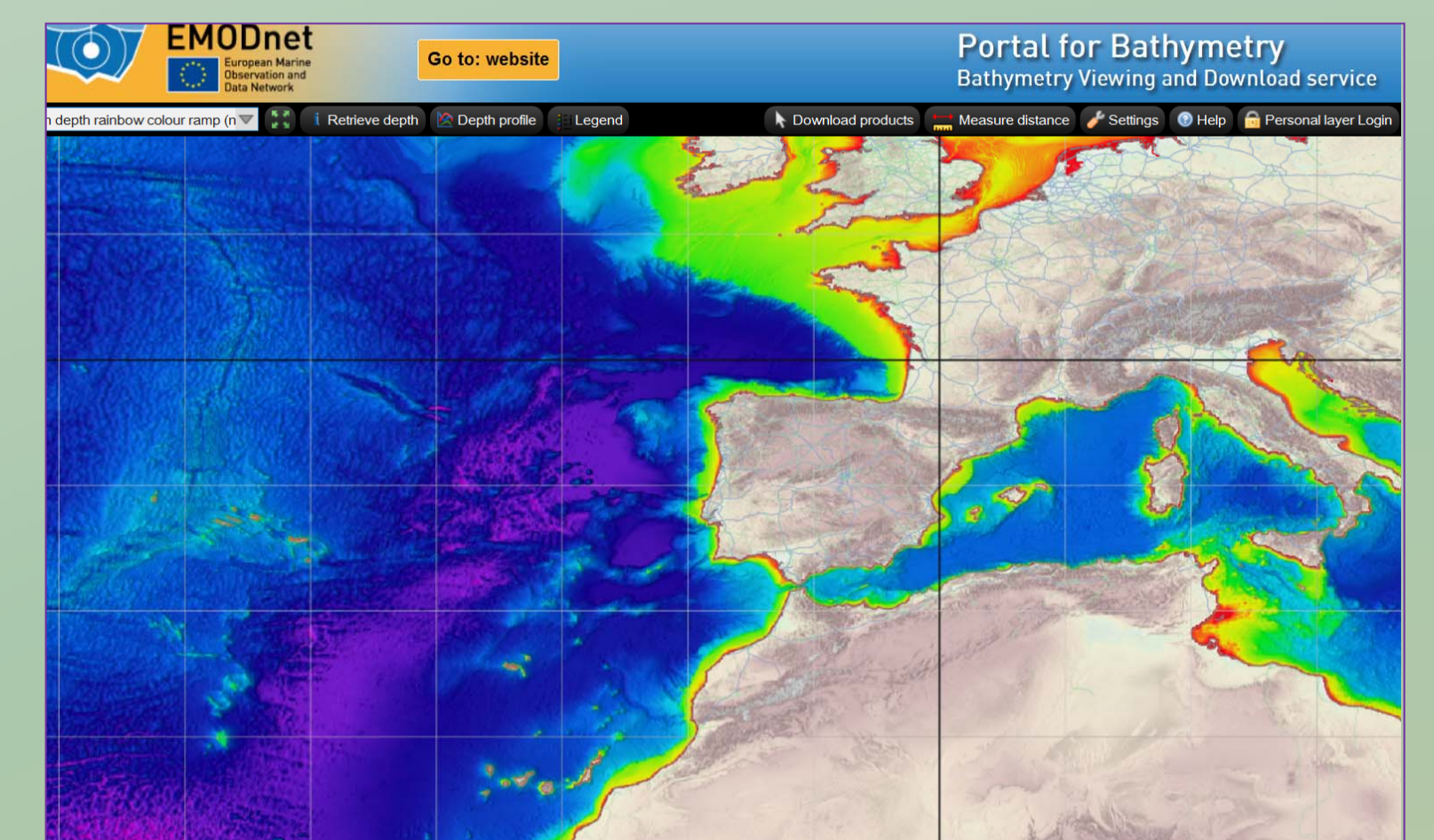


Figure 8. Portal for Bathymetry. DMT elaborated based on data from multiple institutions of several European countries, among them is the IEO. Currently in the framework of EMODNET-HRSM project. <http://www.emodnet-bathymetry.eu>

To carry out these initiatives is imperative that the marine information is standard, interoperable and accessible. Following this trend, the UE elaborated the INSPIRE DIRECTIVE 2007/2/CE, which provides guidelines and standards to share the information through Spatial Data Infrastructure.

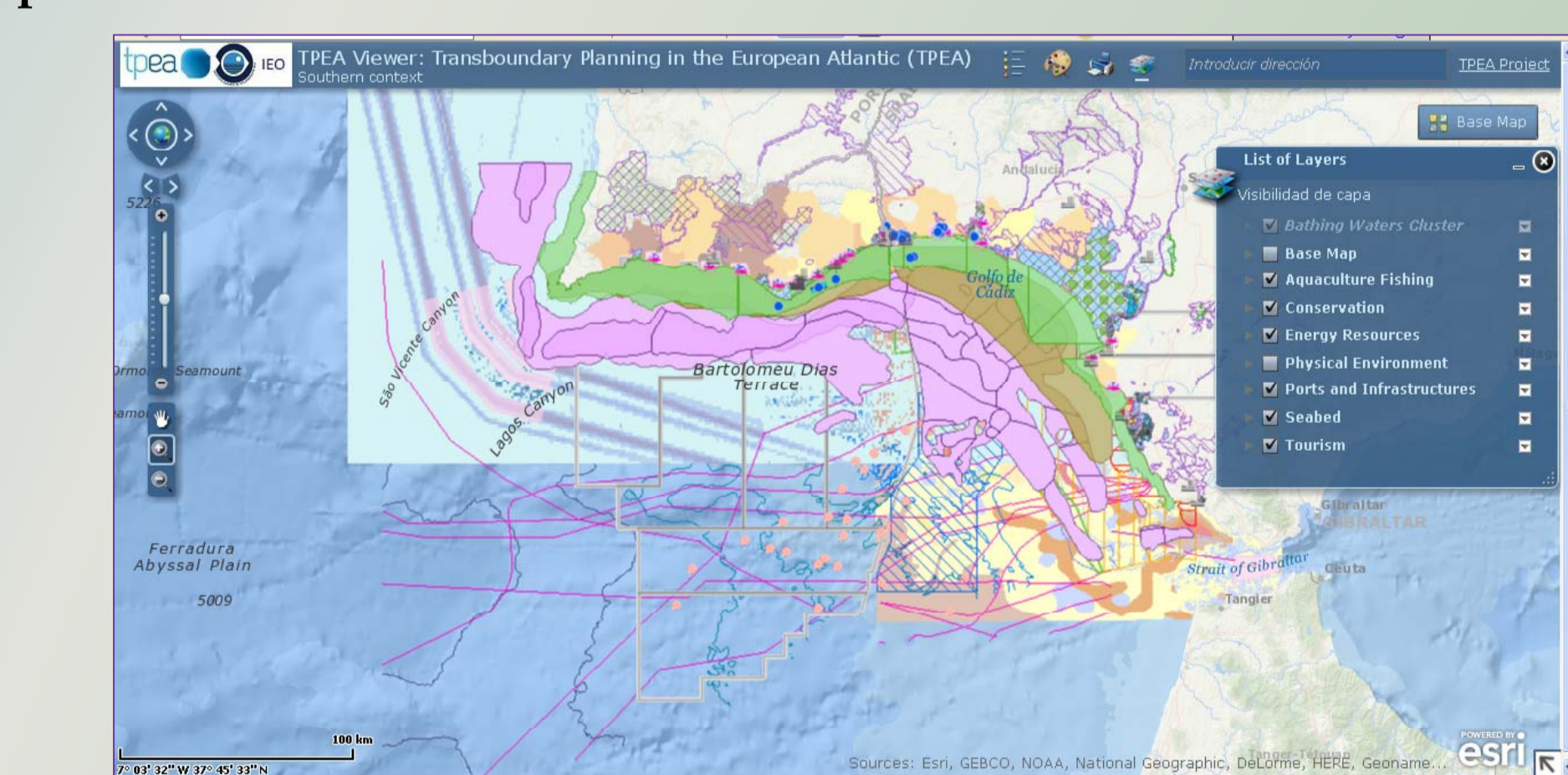


Figure 6. Data Viewer Transboundary Planning in the European Atlantic.

In this regard, the IEO in 2010, initiated the development of Spatial Infrastructure Data of IEO: IDEO (Fig. 9).

The principal IDEO aims are :

- 1) Organize, standardize, relate and integrate the IEO information.
- 2) Provide accessibility to information through Data Viewer and Web Map Services standard and interoperable

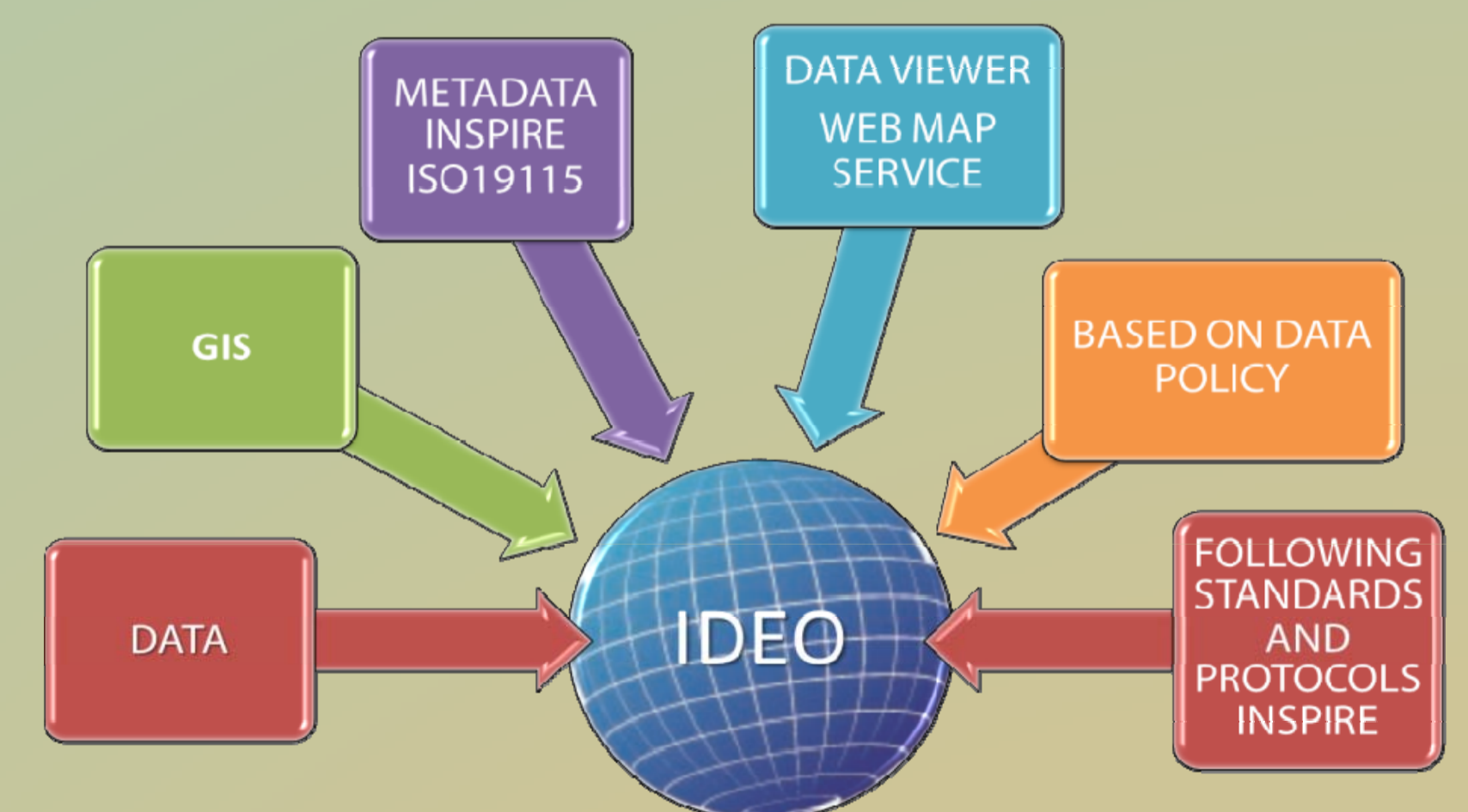


Figure 9. IDEO components.

The Viewer Base integrated on the Spatial Data Infrastructure of IEO has useful and advanced tools to discovering and managing the oceanographic data of IEO. Using React.js framework in the client side and the API for Javascript 4.6 from ESRI as map library, the IEO has developed a new customizable web application template. At the heart of all React applications are components (JSON file) . In the server side, .NET is used to handle users and roles and ArcGIS Server is used to generate map and geoprocessing services (Fig. 10).

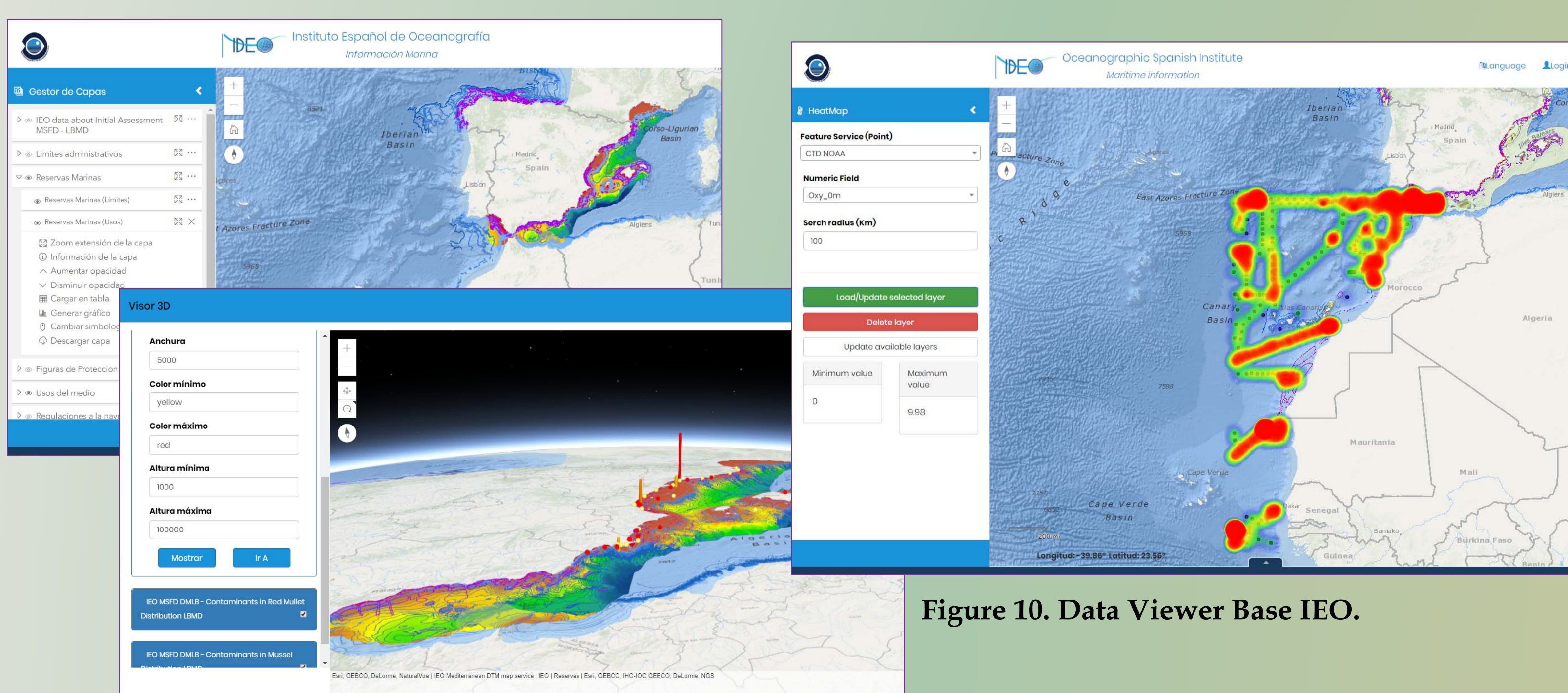


Figure 10. Data Viewer Base IEO.

In order to facilitate the access to the Spatial Data Infrastructure of IEO, the IEO Geoportal was developed in 2012. It mainly involves a metadata catalog and the access to the data viewers and Web Services of IDEO (Fig. 11) .



Figure 11. IEO Geoportal.

<http://www.geo-ideo.ieo.es/geoportalideo>