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Distributed Information System for Dynamic Ocean Data in Indonesia

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Information systems are widely used to enable access to scientific data by different user communities. MyOcean information system is a good example of such applications in Europe. The present work describes a specific distributed information system for Ocean Numerical Model (ONM) data in the scope of the INDESO project, a project focused on Infrastructure Development of Space Oceanography in Indonesia.

INDESO, as part of the Blue Revolution policy conducted by the Indonesian government for the sustainable development of fisheries and aquaculture, presents challenging service requirements in terms of services performance, reliability, security and overall usability. Following state-of-the-art technologies on scientific data networks, this robust information system provides a high level of interoperability of services to discover, view and access INDESO dynamic ONM scientific data. The entire system is automatically updated four times a day, including dataset metadata, taking into account every new file available in the data repositories.

The INDESO system architecture has been designed in great part around the extension and integration of open-source flexible and mature technologies. It involves three separate modules: web portal, dissemination gateway, and user administration. Supporting different gridded and non-gridded data, the INDESO information system features search-based data discovery, data access by temporal and spatial subset extraction, direct download and ftp, and multiple-layer visualization of datasets. A complex authorization system has been designed and applied throughout all components, in order to enable services authorization at dataset level, according to the different user profiles stated in the data policy. Finally, a web portal has been developed as the single entry point and standardized interface to all data services (discover, view, and access).

Apache SOLR has been implemented as the search server, allowing faceted browsing among ocean data products and the connection to an external catalogue of metadata records. ncWMS and Godiva2 have been the basis of the viewing server and client technologies developed, MOTU has been used for data subsetting and intelligent management of data queues, and has allowed the deployment of a centralised download interface applicable to all ONM products. Unidata's Thredds server has been employed to provide file metadata and remote access to ONM data. CAS has been used as the single sign-on protocol for all data services. The user management application developed has been based on GOSA2. Joomla and Bootstrap have been the technologies used for the web portal, compatible with mobile phone and tablet devices.

The INDESO information system comes up as an information system that is scalable, extremely easy to use, operate and maintain. This will facilitate the extensive use of ocean numerical model data by the scientific community in Indonesia. Constituted mostly of open-source solutions, the system is able to meet strict operational requirements, and carry out complex functions. It is feasible to adapt this architecture to different static and dynamic oceanographic data sources and large data volumes, in an accessible, fast, and comprehensive manner.