

# Critical Success Factors of the ReefTEMPS sensors-oriented environmental information system for a real operationality

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## Abstract

ReefTEMPS is a network of coastal oceanic sensors in the Pacific islands. These sensors record seven physical parameters, including temperature, pressure and salinity [1]. It is part of the French national research infrastructure for coastal ocean and nearshore observations named ILICO [2]. Some of the network's sensors have been deployed for over 40 years. Nearly hundred sensors are actually deployed in 14 countries covering an area of more than 8000 km from East to West. The data are acquired at different rates (from 1sec to 30 mn) depending on sensors and sites. They are processed and described using Climate and Forecast Metadata Convention [3] at the end of oceanographic campaigns organized for sensors replacement every 6 months to 2 years. The data are then stored into a historical database named DBOceano.

In 2011, we designed an information system [4] whose objectives correspond to the FAIR principles [5] : 1/ open and normalized data available under several standards, including the OGC-SOS, in order to make them accessible to many scientific communities, 2/ an information system based on Open Source applications and 3/ metadata sharing in recognized and sustainable online catalogues delivering DOIs.

The use of the OGC-SOS standard [6], by then in its version 1.0, seemed relevant to us. It was its first implementation in France in the field of earth observing systems. Among the notable difficulties encountered during this first deployment, the mapping of our data into the SOS services prevented us to use the 52°North client which meant that we were not interoperable. Another concern, the volume of the XML files generated by the GetObservation [7] SOAP services significantly slowed down the service making it almost unusable. On the other hand, the SensorML [8] Metadata dissemination service has proven to be very useful in documenting sensors.

In 2016, we performed a major update. In order to ease the deployment processes and the implementation of the latest versions of the technologies, the information system was first ported to Docker [9]. We switched to SOS version 2 [6], taking the opportunity to reorganize the data distribution structure in order to become interoperable with other SOS systems [10]. Finally, we turned to the 52°North server solution and its SensorThing API [11] to switch to REST web services and prevent file size overload.

We therefore provide metadata in accordance with the standards: iso19115 Marine Community Profile [12] (provided by AODN), SensorML and iso19115 on the SEANOE catalogue and data in the formats: SOS, WMS [13], WFS [14], OpeNDAP [15], and raw (CSV and image).

The new version is in production since June 2017: <http://reeftemps.science>. Since then, all our web services have been available through our internet portal, which allows time series to be searched by platform and by physical parameter. All acquired data are publicly accessible under the Creative

commons license Attribution-ShareAlike 4.0. Eight years of managing this operational sensor-based data infrastructure have led us to identify critical success factors. In our presentation, we will provide a detailed analysis of these factors that made the difference.

*Keywords: Sensor network, information system, coastal domain, FAIR, open data, OGC-SOS.*

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