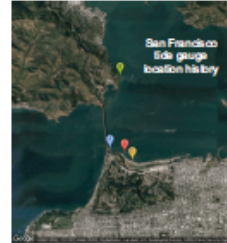
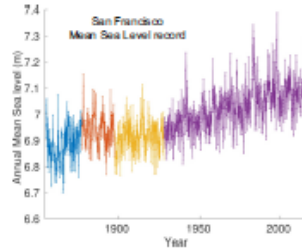
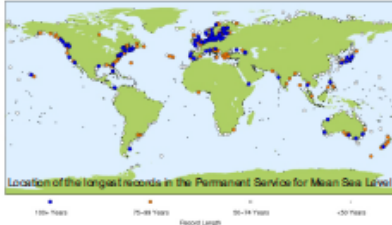


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Sea level records are some of the longest ocean observations available, with the earliest continuous time series beginning in the 18th Century. The length of data available makes creating one complete findable, accessible, interoperable and reusable (FAIR) record a challenge.



Are the data findable?

Data can be made findable through creating standalone discovery metadata records, such as European Directory of Marine Environmental Data (EDMED) or NASA's Global Change Master Directory entries. Alternatively, discovery metadata can be attached to the actual data file, such as in a netCDF file implementing the Attribute Convention for Data Discovery (ACDD). We can also make sea level data more accessible by assigning persistent and unique identifiers such as Digital Object Identifiers (DOIs). Sea level discovery metadata should make use of controlled vocabularies, ontologies and taxonomies e.g. the BODC Parameter Usage Vocabulary and the ICES Station Dictionary.

How do we make the data accessible?

Global sea level data are relatively accessible compared to other Essential Ocean Variables as they are deposited in the long established international data centres such as PSMSL. Data in all the GLOSS data centres are freely available and organisations comply with the obligations for GLOSS members.

How can we make data interoperable?

Currently the GLOSS data centres each deliver data in their own format, but we are looking to use a common standard format such as CF netCDF and/or common data models to deliver data. We are also looking at increasing the granularity of our usage metadata. We are developing systems that will use Sensor Web Enablement (SWE) standards to help fully describe how we transform an observable property (such as the length of a piece of wire, the return time of a radar pulse, or the electric charge generated by a crystal under pressure) into a sea level measurement. This will improve the description of a time series where the sensor and platform changes many times.

We also need to ensure that we are using standard vocabularies for simple properties, such as time (ISO 8601) and country names (ISO 3166-1), although for long time series even these can be complex: for example the operating country may have changed.

How do we make sea level data reusable?

By storing sea level data in one of the global sea level data centres, we ensure that the data remain useable for the foreseeable future. By keeping comprehensive usage and lineage metadata alongside a dataset we will increase the reuse of the data, but also ensure that proper credit for the creation and preservation of a dataset is given.

Letting a user know what the quality of the data are and the level to which they have been screened will give confidence in the reuse of the data. Unique identifiers for data sets will help in the transparency and replicability of studies.

Is there a trade off between data curation and ease of use? We need to distribute metadata that accurately describes how and where sea level is measured but "how" and "where" change over time and are sometimes uncertain.

Metadata should tell a coherent story of how measurements are taken and have changed over the course of time, warn users of potential issues with the data and should use common standards to increase interoperability.