The Global Sea Level Observing System

The Global Sea Level Observing System (GLOSS) is an international programme, established in 1985 by the Intergovernmental Oceanographic Commission (IOC) of UNESCO to provide oversight and co-ordination for global and regional sea level networks in support of international climate, oceanographic and coastal sea level research. GLOSS is co-ordinated by the IOC and is now one of the main observing components under the World Meteorological Organization (WMO)/IOC Joint Technical Commission of Oceanography and Marine Meteorology (JCOMM).<P>

The GLOSS programme seeksto increase the number of operational tide gauge stations reporting to the Permanent Service for Mean Sea Level (PSMSL) hosted at the Proudman Oceanographic Laboratory (Liverpool, UK), as well as the number of stations providing data in near-real-time for ocean monitoring and operational numerical modelling and forecasts.

The GLOSS programme is implemented through concerted actions by member states, typically through their national sea level authorities, and about 70 member states presently participate and contribute sea level observations to the GLOSS and PSMSL.

A main component of the GLOSS is its Core Network of 290 tide gauge stations, selected to provide an evenly distributed sampling of global coastal sea level variations. Close to 70% of the GLOSS observing network now report delayed-mode mean monthly sea level data with notable station gaps in Africa and the Caribbean/Central America.

In appreciation of the multiple uses of tide gauges, the GLOSS has also sought to provide water level data that meets the standards and requirements for tsunami warning and storm surge monitoring. Numerous GLOSS Core Network stations have for many years contributed to the Pacific Tsunami Warning System and, following the 2004 Sumatra Earthquake, the IOC and GLOSS have taken an active role in co-ordinating and implementing the water level network for the Indian Ocean Tsunami Warning System, where more than 50 stations now report data in real-time.

The GLOSS also provides global sea level data standards and archiving facilities with quality control of data, technical manuals and training material, advice and special workshops on technical issues, annual training courses on analysis and uses of sea level observations, technical visits and some assistance with installation/upgrades of sea level monitoring stations in developing nations.

Some highlights of GLOSS achievements since its start are: (i) the number of GLOSS Core Network stations delivering timely mean sea level data to the PSMSL has almost doubled since the 1990s; (ii) streams of GLOSS near-real-time data have been established, which enable calibration of all operational satellite altimeters in a timely manner; (iii) more than 50% of the GLOSS Core Network stations now deliver data worldwide in near-real-time (up from 0% in the 1980s); and (iv) GLOSS has played a major part in the development of new technologies for tide gauges and telemetry.

The acquisition of comprehensive regional and global sea level data sets, some in real-time, is in both public and private sector interests, in order to reduce coastal risks from surges, tsunamis and sea level rise. In that context, there are several ways that the hydrographic and offshore industry could contribute to GLOSS:

1.The industry has acquired a large volume of sea level observations. Some of this information is inventoried, and the data themselves are accessible, via the System of Industry Metocean data for the Offshore and Research Communities (SIMORC) project (web reference 1), but it is far from complete as not all industry members are signed up to it. One suspects that much of these data consist of short tidal records, but even they are potentially useful (for example, in development of local tidal models).
2.The industry could provide more access to offshore platforms for a range of operational oceanography, for example, tide gauges for storm surge monitoring or even tsunami warning. A lead seems to have been taken in the Gulf of Mexico. These encouraging developments need to be more general. For example, Nigeria, Brazil, Venezuela, Caribbean, West Australia, Southeast Asia and the Middle East are amongst the regions with extensive offshore infrastructure suitable for storm surge and tsunami warning.
3.The industry could host GLOSS-standard coastal tide gauges at sites that it owns. These would be permanent sites. A list of priority locations can be provided but obvious areas needing development are West Africa (for example, Nigeria, Cote d'Ivoire), the Caribbean, South America, North Africa and the Middle East. Some of these stations – and those in (2) – would double as components of a tsunami warning system. Unlike many GLOSS tide gauge sites, the industry locations most often would have good power and telecommunications links, and gauge installations would be relatively straightforward.
4.The industry could provide sponsor funding for the training of operators of GLOSS stations in developing countries, for installation to complete global networks and for the maintenance of those parts of networks that already exist, with the common aim of obtaining more complete and reliable long-term data sets.

For more information about the GLOSS programme, please visit web reference 2.

More information about the PSMSL is available at web reference 3.