Importance of quality control for sea level observations

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Sea level is a widely used oceanographic parameter. Sea level observations are important for several practical and scientific reasons, from basic knowledge for coastal erosion and defense projects to the understanding of tides, oceans dynamics and short-term climate change (Pugh, 1987; Rickards & Kilonsky, 1997). Furthermore, real and near real-time applications of sea level include tsunami and storm surge warnings (NOAA, 2103).

Under the scope of the Intergovernmental Oceanographic Commission of UNESCO (IOC), the Global Sea Level Observing System (GLOSS) was established in 1985 as the coordinator of global and regional sea level networks (Merrifield et al, 2009). The main component of the global network is the GLOSS Core Network (GCN), composed of 300 tide gauge stations distributed around the world (GLOSS, 2012). In addition to the 264 active GLOSS stations, the IOC Sea Level Station Monitoring Facility, hosted by the Flanders Marine Institute (VLIZ), receives real-time sea level data from another 613 stations worldwide. While the real-time data processing and storing is carried out by VLIZ, the long-term quality controlled sea level records is handled by the Permanent Service for Mean Sea Level (PSMSL)

Quality Control (QC) is necessary to maintain common standards and allow consistency and reliability of archived data (BODC, 2007). In relation to real-time data, QC ensures credibility and value of the data (IOOS, 2016). Sea Level QC can be divided in three levels: Near Real-time; Level 1 (after 1 hour to 1 month); and Level 2 (months to years). Level 1 and 2 of the IOC Sea Level Stations is performed by the University of Hawaii Sea Level Centre (UHSLC) and the British Oceanographic Data Centre (BODC), respectively.

The aim of the present thesis is to perform QC of Level 1 on a chosen number of stations of the IOC Monitoring Network, followed by a Level 2 QC including tidal predictions and residual analysis. Measured sea level values that deviate from the predicted may indicate errors but also tidal events like tsunamis and storm surges, thus having some quality control for the real and near real-time data. Sea level data is acquired from the IOC Monitoring Network in R Studio Server®. Initially, this work is focusing on 5 active stations. After having the QC treatment for the working stations, the procedure will be applied for the rest of the IOC Network Stations. Data treatment is performed with the open source software R (R core team, 2017). Quality Control procedures are gathered from the available literature, focusing mainly on tests described in the GLOSS [1] & BODC [2] Manuals.

QC of the stations is still an on-going work, and the results will be presented in the poster. The poster will show a case study of an IOC Station before and after the Quality Control treatment.

References

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