Tide Gauge Data Management for the Analysis of Ocean-based Disasters, their Mitigation and Management: A Standard Procedure

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Abstract

Observation of sea-level variation is an essential long-term global process, and is difficult to manage anthropogenic effects at in-situ data recording. Besides, the unremitting collection of data with desired frequencies and research quality is a challenge. Notably, obtaining accurate and firstly data, *i.e.* real-time and near-real time are important for analysing, prevention, mitigation and management of ocean-based disasters. This paper discloses a model procedure for tide-gauge data management pertaining to ocean-based disasters and recognition of special events while highlighting the usability and prospects. The hydrostatics pressure sensors were installed at known depths below the surface in serene environments without anthropogenic effects whereas tide-wells equipped wave absorbers. Surface wave height radar sensors were installed at known heights above the surface referring to an eternal bench-mark. The data collected [f; frequency = 1 minute] were transmitted via satellite communiqué where the resulted time series was obtained via the global sea level monitoring facility provided by the Intergovernmental Oceanographic Commission (IOC). The data were primarily processed by rectifying noises, null-data fields and outliers according to the IOC quality control standards. Afterwards, the tidal impact was examined while confiscating the residual variation. The process included assessing the astronomical forces of the Moon and the Sun using a *Harmonic analysis* of a time series, and quantifying the contribution of those tidal constituents. The pattern was appraised quantitatively, pertaining to the Luni-solar declinational diurnal constituent, the Principal Lunar declinational diurnal constituent, whereas the effects produced by the Moon (semidiurnal lunar), and the Sun (semidiurnal solar), whilst the spring and neap tide variations were determined. Ensemble empirical mode decomposition method was used to determine the inter-annual variability and related events. Data (f=1) were re-computed to diverse frequencies where event analyses, *i.e.*, both short-term and long-term variations were performed Accordingly, meteo-tsunami, tidal and seasonal variations, *El-Nino* Southern Oscillation (ENSO), whereas sea level rise were revealed and were identified as potential research areas.

Keywords: *Sea Level,Tide-Gauge Data, Data Management, Disaster Management*