

An Analysis of Long Term Mean Sea Level and Chart Datum Variability at Colombo, Sri Lanka

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Tide is the rhythmic rising and falling of sea levels caused by gravitational forces from the moon and the sun occurring regularly under various astronomical settings. Tidal data are standard elevation levels defined by a certain phase of the tide derived from long-term observations. This study aimed to investigate the variation of the long-term mean sea level (MSL) and chart datum (CD) at Colombo, Sri Lanka over a 37-year period from 1981. Here, it is utilized both the tide gauge data and satellite altimetry data obtained from the Sri Lanka Port Authority and AVISO database respectively. Then, TOTIS tidal software was used to analyze the hourly tidal data and S-Tide MATLAB package was used to analyze altimetry data. However, it did not identify a clear pattern in the relationship between MSL and CD variation in Colombo from 1981 to 2017. Nevertheless, when considering the value of annual observed MSL, the lowest was recorded as 0.46 m in 1986 and the highest value was 0.63 m in 2016 with respect to the published MSL of Colombo tide gauge. Further, there was a slight increase in the values of MSL and CD in long run analysis. The value adopted as the CD by the national hydrographic office is the Lowest Astronomical Tide (LAT) and the standard value at Colombo is 0.47m below the MSL. Nonetheless, the LAT value derived from the hourly tidal data for Colombo is lower than the published value and the LAT value derived from satellite altimetry data is slightly higher than that value. However, the exact details of the derivation of the original CD could not be found and further details on that to be explored from the respective authorities. Further, the missing data existing in the tide record may also affect the final results as well as the altimetry data may not be applicable in accurate datum determination due to the long repetition interval.

Keywords: *Chart datum, Tide, Mean sea level, Tidal analysis, Hydrography*