

Detection of GPS-Levelling Datum Variation using Heterogeneous Data: A Case Study in Sri Lanka

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Geodetic datum is a fundamental reference surface in positioning and plays an important role in relation to the survey activities of a country. Sri Lankan horizontal datum, SLD99, was established in 1999 using Global navigation satellite system, GNSS, technology, and the vertical datum (levelling datum) was fixed averaging 6 years of tidal observations from 1884 to 1890. This research investigates potential inconsistencies of Sri Lankan GNSS and levelling datums. For the analysis, heterogeneous data such as long-term tidal, GNSS, levelling, global geoid and Mean Dynamic Topography, MDT, heights around the coastal region were used. Tidal analysis reveals that the tidal Mean Sea Level, MSL, around the country is linearly varied with increasing rate of 3mm per year. By analysing GNSS, levelling, MDT and global geoid heights, it is found that there is a 1.884 m vertical deviation in Sri Lankan GNSS datum with respect to the latest realization of International Terrestrial Reference Frame, ITRF, and MSL based levelling datum is capable of representing global geoid features.

Keywords: *Geoid, Tidal Analysis, GNSS-levelling, MSL*