

## Analysis of Horizontal Accuracy of Sri Lankan Primary Control Network

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The primary geodetic control network of Sri Lanka, the backbone of geospatial activities, was established and maintained by the Survey Department of Sri Lanka. This was established in 1930 using triangulation and was later upgraded using Global Positioning System (GPS) technology in 1999. Over the past two decades, most geospatial activities in Sri Lanka have been conducted with reference to this Sri Lankan Datum 1999 (SLD99). With the ongoing drastic improvements of Global Navigation Satellite System (GNSS) infrastructure in Sri Lanka, an epoch-by-epoch realisation of the International Terrestrial Reference Frame (ITRF) is essential so that spatial data of global, local, national and regional origins can be easily integrated. This study examined the positional deviation of Sri Lankan primary geodetic control network stations concerning the ITRF realisation. A 72-hour GNSS observation campaign was performed over eight 'AA-grade' primary stations, and positional solutions were comparatively analysed through the Precise Point Positioning (PPP) technique. The results indicate a significant divergence of around 0.60 m and 1.10 m in the East and North coordinates, respectively, compared to the existing SLD99 datum. The deviation in the East direction is higher (around 1.18 m) at Colombo, situated in the western part of the country, while the deviation linearly decreases towards the eastern part of the country, reaching its minimal deviation of around 1.07 m at Ampara. The positional displacement in the Southern region is high (around 0.64 m) at Matara compared to moving along the northward direction, reaching the lowest value of around 0.42 m at Jaffna. Rather than the timely realisation of ITRF, the bias in computation and processing during the establishing of the geodetic control network and utilization of unimproved GNSS technology could be some reasons for this immense deviation in the Sri Lankan primary control network. Therefore, this study highlights the timely requirement to upgrade the Sri Lankan geodetic datum based on ITRF realization with the modern advancement of GNSS.

**Keywords:** *Sri Lankan national datum, International terrestrial reference Frame (ITRF), Global navigation satellite system (GNSS)*