Assessing the Impact of Base Station Proximity on Continuous Operating Reference Stations (CORS) Accuracy and Its Implications for Geospatial Surveying in Sri Lanka

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ABSTRACT

The Continuous Operating Reference Stations (CORS) system has significantly enhanced geospatial data accuracy by utilizing GNSS (Global Navigation Satellite System) technology to provide real-time corrections, essential for various applications such as urban planning, civil engineering, and environmental monitoring. However, the impact of the proximity between CORS base stations and the rover on the accuracy of RTK (Real-Time Kinematic) surveys remains underexplored. This study aims to bridge this knowledge gap by analyzing how distance variation from CORS base stations impacts RTK positioning accuracy in Sri Lanka. Control points were selected from survey departments, spanning distances from 5km to 30km from the CORS stations. Positional data were collected using various GNSS receivers and compared to known coordinates to evaluate accuracy. Additionally, several land parcels were surveyed using both the CORS method and other methods (Radio RTK and Total Station) to assess area measurement accuracy. The results demonstrate that the mean differences in Northing (dN) and Easting (dE) are minimal, with standard deviations of 0.0166 and 0.0190 respectively. Paired t-tests reveal no significant discrepancies, while regression analyses indicate positive spatial relationships with R-squared values of 0.531 for Northing and 0.502 for Easting. Notably, the results fall within the accuracy standards of the Departmental Survey Regulations of Sri Lanka. The findings underscore the high reliability of CORS for precise geospatial data collection, even at extended distances, making a significant contribution to the optimization of CORS setups in developing regions. This research ultimately aims to facilitate the widespread adoption and efficient expansion of CORS, particularly in developing regions where geospatial data accuracy is paramount.

Keywords: GNSS,CORS,RTK ,Boundary,Accuracy