

ACCURACY AND STABILITY ANALYSIS OF GPS AIDED GEO AUGMENTED NAVIGATION (GAGAN) FOR HYDROGRAPHIC APPLICATIONS IN SRI LANKA

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Abstract

With the growing demand for accurate and reliable positioning and navigation applications in various inland and offshore hydrographic surveying applications, there has been a significant move towards the use of real-time Global Navigation Satellite System (GNSS) with local and wide area differential positioning capabilities (DGNS). The common methods used in Sri Lanka in such applications for many years were the use of local DGNS technique or get the commercial DGNS service from international service providers. However, Satellite-Based Augmentation Systems (SBAS) are being developed worldwide for many purposes and having a unique advantage of wide area coverage. GPS Aided Geo Augmented Navigation (GAGAN) is an Indian implementation of SBAS. This study focused on analyzing the improvement in position solution with GAGAN corrections over Sri Lanka for Hydrographic survey applications. Further, to analyse the stability, performance and availability of GAGAN SBAS service, some field experiments were conducted at Jaffna and Colombo. Static observations were done using three different GNSS instruments and compared with the accuracy with respect to L1 and hand held GNSS standalone observations. Then, near shore tastings were conducted at Norochcholai. GAGAN augmented SxBlue IIB L1 and Seastar 8300HP L1 receivers were configured to transmit the NMEA 0183 data string at 1 Hz sampling frequency. Both receivers were linked with Hypack 2018 data accusation software and navigate along the 7 km pre-planned survey line. Position deviation of both GPS receivers were compared with the preplanned survey lines. At each of the field test, the GAGAN activated receiver has always shown a significant stability against the uncorrected observations. Further, the calculated average 2D positional error was lower than 1m and it is shown acceptable positional accuracy for less critical areas.

Keywords: Hydrography, DGPS, GAGAN, SBAS, Navigation