

New methods to access absolute accuracy of positioning systems used for hydrographic surveys

Hiroji Anand¹, Oguntuase Johnson¹, Komolafe Peter¹, Oderinde Olaoluwa¹, Bounds Kevin¹

¹ Division of Marine Science, School of Ocean Science and Engineering,
College of Arts and Sciences, University of Southern Mississippi, USA

An integrated GNSS+INS based positioning and orientation systems are integral to any multibeam bathymetric survey. Almost all systems provide estimated position accuracy in real-time and after post-processing. These estimated accuracies are utilized to compute the total propagated uncertainties of the soundings, which ultimately define the IHO standard.

In the past, to access the relative accuracy of the positioning systems, they are compared to the solutions from a relatively high accuracy system. However, not all vessels have access to high accuracy systems, and any error in the high accuracy system can be reflected as an error in the other systems. This research aimed to develop field methods that provide absolute accuracy of the positioning system without requiring any prior knowledge of seafloor or any high accuracy system.

This paper provides details of two new methods. In the first method, a series of multibeam survey lines are collected, similar to a traditional patch test, over a slope on a very shallow seafloor. The survey data is then processed to estimate multiple patch test parameters for multiple pairs of lines. The variation in the patch test results is directly associated with north, east, and height accuracies. Based on the seafloor depth, the absolute error in the position for each pair of the line is computed. The second method involves using robotic total stations located on a known point onshore to compute the position of a moving prism on the boat, which is then directly compared to the position provided by the onboard positioning system. The absolute positional accuracies of six different positioning systems from three different manufacturers are computed using the two new methods, and the results are presented in this paper.