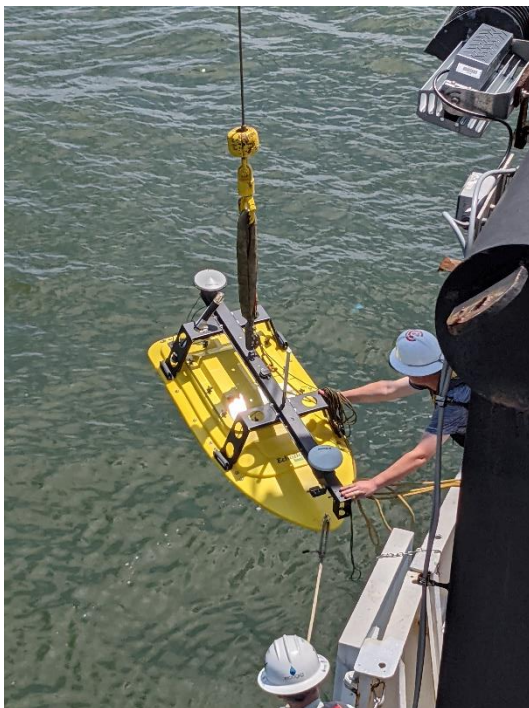


LM3GNSS hardware in collocated water-level measurements validation with pressure sensors in Mississippi Bight

Oguntuase Johnson¹, Nwankwo Uchenna¹, Howden Stephan¹, Wells David¹

¹ Division of Marine Science, School of Ocean Science and Engineering,
College of Arts and Sciences, University of Southern Mississippi, Stennis Space Center, USA
Johnson.oguntuase@usm.edu

This paper discusses the offshore water level measurements and accuracies using the so-called mass-market GNSS receivers here referred to as low-cost mass-market multi-frequency, multi-GNSS (LM3GNSS). Our previous work shows that LM3GNSS hardware provides vertical accuracy better than 15 cm at a 95% confidence level in the post-processed kinematic positioning (PPK) strategy. We also show accuracy in precise point positioning (PPP) strategy on a less dynamic platform is similar to the PPK strategy. Following a plethora of studies by the research community characterizing LM3GNSS hardware's positioning and navigation capabilities, there is a growing interest in using LM3GNSS hardware for water level measurement at remote locations. Therefore, three major questions arise: (1) what vertical positioning performance on a highly dynamic platform can we achieve with the PPP strategy using LM3GNSS hardware for water level measurements? (2) do we need a motion-sensing unit to account for the platform's attitude when the antenna lever-arm offset is considerably short? Finally, what is the optimal sampling rate, given the data storage and telemetry limitations when implementing real-time or near-real-time PPP for water level measurements offshore? In an attempt to answer the preceding questions, we deployed an Echo boat from R/V Point Sur on May 27, 2021, in the Mississippi Bight. The GNSS experiment, which lasted about 7 hours, was collocated with a TRBM bottom package equipped with ADCP and CTD, which continuously acquired data for more than 30 days. The collocated pressure- and GNSS-derived water levels measurements offer insights into the preceding questions.



Echo boat deployment from USM's R/V Point Sur after deploying a deepwater buoyance TRBM bottom package in the Mississippi Bight on May 27, 2021.



Echo boat's payload contains hardware setups involving two units of Septentrio Mosaic receiver, 1 Droteck (Ublox F9P), and an Applanix survey-grade GNSS+INS