

Satellite Radar Altimetry-based Significant Wave Height Monitoring of some proposed Jetties in Nigeria Coastal Waters

*¹Ojigi, M. L., ²Dodo, J.D. and ³Opaluwa, Y. D.

*¹Department of Geomatics, Ahmadu Bello University, Zaria, Nigeria

²Centre for Geodesy & Geodynamics, Toro, NASRDA, Bauchi, Nigeria

³Dept. of Surveying & Geoinformatics, Federal University of Technology, Minna, Nigeria

*Corresponding Author's E-mail: drlazmojigi@gmail.com

Abstract

Accurate Ocean wave information is important for guidance and safety of shipping traffic, establishment of design criteria for coastal engineering and defences, morphological investigations, weather forecasting, fishing and even tourism (Vogelzang, et al., 2000; ESA, 2011; Bonnet, 2015). Wave height and frequency are largely dependent on the speed and strength of the wind moving across ocean surface. There are various methods and measuring devices for wave heights estimation, namely, radar altimeters, pitch and roll buoys, step gauges, capacity wires, pressure cells, amongst others. Satellite radar altimetry approach has the greater advantages of the capability of collecting wave information at single-multiple points and multi-temporal synoptic view of wave fields at relatively cheaper costs in comparison to the traditional in-situ point measurements. For the reason of guidance and safety of shipping traffic and stability of structures, jetty sites require sufficient predictable knowledge of in-situ significant wave heights (SWH). This study therefore attempts the near-real time (NRT) monitoring of the Significant Wave Height at selected proposed jetties in the Nigeria coastal waters from satellite radar altimetry. Six (6) proposed jetty sites were investigated; three exists in Lagos area (UWWS, NNS-B and TBC) and two in Delta State (FOB-E and Forcados), and one in Bayelsa State (Akassa-Bight of Bonny). The daily/monthly NRT significant wave heights datasets from the global $1/8^{\circ} \times 1/8^{\circ}$ multi-mission satellite altimetry for the period of 14 September, 2009 to 10th October, 2017 were used. The datasets were processed through the LAS 7./Ferret 6.72 interactive software platform, and cloud computing facilities and visualisation. The average SWHs over the six (6) stations for the period under investigation were:

Station	ABB	FOB-E	Forcados	NNS-B	TBC	UWWS
Avg SWH (m)	1.248	1.292	1.254	1.265	1.266	1.267

These results showed no significant differences between UWWS, NNS-B and TBC in Lagos Area; but significances exist between the average SWH in the Lagos and Delta/Bayelsa areas respectively. The recorded wave heights were considered to be within a steady and safe threshold for relevant coastal structure installation and management in the study area.

Keywords: Satellite Radar Altimetry, Significant Wave Height, Jetties, Coastal Waters