World Academy of Science, Engineering and Technology
International Journal of Marine and Environmental Sciences
Vol:10, No:09, 2016

Determination of Tide Height Using Global Navigation Satellite Systems (GNSS)

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Abstract : Hydrographic surveys have traditionally relied on the availability of tide information for the reduction of sounding observations to a common datum. In most cases, tide information is obtained from tide gauge observations and/or tide predictions over space and time using local, regional or global tide models. While the latter often provides a rather crude approximation, the former relies on tide gauge stations that are spatially restricted, and often have sparse and limited distribution. A more recent method that is increasingly being used is Global Navigation Satellite System (GNSS) positioning which can be utilised to monitor height variations of a vessel or buoy, thus providing information on sea level variations during the time of a hydrographic survey. However, GNSS heights obtained under the dynamic environment of a survey vessel are affected by "non-tidal" processes such as wave activity and the attitude of the vessel (roll, pitch, heave and dynamic draft). This research seeks to examine techniques that separate the tide signal from other non-tidal signals that may be contained in GNSS heights. This requires an investigation of the processes involved and their temporal, spectral and stochastic properties in order to apply suitable recovery techniques of tide information. In addition, different post-mission and near real-time GNSS positioning techniques will be investigated with focus on estimation of height at ocean. Furthermore, the study will investigate the possibility to transfer the chart datums at the location of tide gauges.

Keywords : hydrography, GNSS, datum, tide gauge
Conference Title : ICGHOS 2016 : International Conference on Geophysical, Hydrographic and Oceanographic Systems
Conference Location : Singapore, Singapore
Conference Dates : September 08-09, 2016