

Ship-Based Oceanwide Observation of Sea Surface Heights in Consideration of Hydrodynamic Corrections

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SUMMARY

The latest development in GNSS PPP processing allows observing the heights of moving antennas aboard seagoing vessels with accuracies up to 5 cm and it is foreseeable that the quality will be improved in the future. Considering some essential hydrostatic and hydrodynamic corrections makes it possible to use these antenna heights as a good basis to derive ocean wide precise in-situ data of sea surface heights (SSH). If only a small portion of the more than 60.000 ships that sail the ocean at any time can be used for the determination of SSH a significant amount of additional ocean wide data could be obtained independently from remote sensing techniques. These data sets would have a very high resolution along the track of the ship and might be used to increase the sensitivity of satellite altimetry over short wavelengths in a combined analysis. Additionally, this data would provide a continuous validation of altimeter biases over vast areas in almost all oceans. The results of two experiments in the Atlantic and Pacific Ocean will be presented. The first one shows in a case study on a cruise vessel the necessary methods to correctly determine and consider the squat of a moving ship and to derive the correct GNSS antenna height above the water level. The second one will present an ocean wide determination of SSH from measurements on a cargo ship. The results from this experiment were compared with those from the Jason-2 altimeter and an altimeter bias was calculated from cross-over points with the ship track. Additionally, the quality of the spatial resolution will be shown for the crossing of the Hawaiian-Emperor seamount chain.