Geophysical Research Abstracts
Vol. 16, EGU2014-13811, 2014
EGU General Assembly 2014

Infragravity waves across the oceans

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The propagation of transoceanic Infragravity (IG) wave was investigated using a global spectral wave model together with deep-ocean pressure recorders. IG waves are generated mostly at the shorelines due to non-linear hydrodynamic effects that transfer energy from the main windsea and swell band, with periods of 1 to 25 s, to periods up to 500 s. IG waves are important for the study of near-shore processes and harbor agitation, and can also be a potential source of errors in satellite altimetry measurements. Setting up a global IG model was motivated by the investigation of these errors for the future planned SWOT mission. Despite the fact that the infragravity waves exhibit much smaller vertical amplitudes than the usual high frequency wind-driven waves, of the order of 1 cm in the deep oceans, their propagation throughout the oceans and signature in the wave spectrum can be clearly observed. Using a simplified empirical parameterization of the nearshore source of free IG waves as a function of the incoming wave parameters we extended to WAVEWATCH III model, used so far for windseas and swell, to the IG band, up to periods of 300 s. The spatial and temporal variability of the modeled IG energy was well correlated to the DART station records, making it useful to interpret the records of IG waves. Open ocean IG wave records appear dominated by trans-oceanic events with well defined
sources concentrated on a few days, usually on West coasts, and affecting the
entire ocean basin, with amplitude patterns very similar to those of tsunamis. Three particular IG bursts during 2008 are studied, 2 in the Pacific Ocean and 1 in the North Atlantic. It was observed that the liberated IG waves can travel long distances often crossing whole oceans with negligible dissipation. The IG signatures are clearly observed at sensors along their propagation paths.