Geophysical Research Abstracts
Vol. 14, EGU2012-12504, 2012
EGU General Assembly 2012

About the role of the source terms on the spatial structure of the wave field in hurricanes

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A numerical experiment has been carried out in order to study the structure of the wave field during hurricane conditions. High resolution wind data for a hurricane were obtained by the use of a Holland type asymmetric model. The third generation wind-wave model SWAN has been used in this study. A reference framework for the structure of the wave field in hurricanes is obtained using the NDBC directional buoy database in the Caribbean Sea and the Gulf of Mexico. This observational reference is used to assess the ability of the model to reproduce the complexity of the wave field observed in hurricanes. It is found that the numerical results are in good agreement with the observed wave field in the hurricane: higher waves are in the right forward quadrant of the hurricane, where the spectral shape tends to become uni-modal. More complex spectral shapes are observed in the rear quadrants of the hurricane, where a tendency of the spectra to become multi-modal is observed. As pointed out by other authors, the wave field in the hurricane is dominated by swell propagating at significant angles to the local wind directions, except on a small region between the first and fourth quadrants. A deeper insight on the role of the physics that controls the evolution of the wave field is assessed by the analysis of the effect of the source terms computed by the wave model in the four quadrants of the hurricane. This is a contribution to the project CB-168173, funded by CONACYT.