Geophysical Research Abstracts
Vol. 15, EGU2013-9402, 2013
EGU General Assembly 2013

Sea States in Explosive Storms

Jean-François Filipot and Cédric Ody
SHOM, Brest , France (filipot@shom.fr)

At mid-latitude, the most extreme waves are generated by rapidly intensifying (or explosive) storms (Cardone et al., 2011). The atmospheric part of these storms is well documented in the literature, while little is known about the wave field found within these meteorological systems.
A retrospective look at the six most intense (in term of maximum wind speed) North-East Atlantic storms having made landfall in Western Europe between 1987 and 2010, shows that they were all of explosive type. This study examines the characteristics of the waves grown by these six storms along with the ability of the spectral wave model WaveWatchIII (Tolman, 2009) in reproducing the related sea states.
The Climate Forecast System Reanalysis (CFSR) surface wind fields and sea ice coverages are used to produce the wave hindcasts. Storms tracks, obtained from the CFSR sea level pressure fields, are derived. Altimeter data and wave buoys measurements selected in the vicinity of the tracks are compared to wind and wave model outputs.
Surface winds reach exceptional levels for all storms while peak wave height magnitudes depend on the track followed by the storms. As expected, it is found that the wave model accuracy is constrained by the wind forcing quality. Further, while the peak wave height magnitude is well captured by the model, it is often shifted in time. The reasons for this shortcoming are debated in this study. The effect of resonance between the moving speed of these storms and the group velocity of the underlying waves is examined as well.
The possible impact of the wave age on the sea drag and the consequent storm surge is considered. In the same vein, the effect of the offshore storm wave steepness on the surf zone and on the wave setup are addressed. The explosive storm characteristics are finally confronted to those of typical tropical cyclones.