



Characterization of the spatio-temporal wind wave field including extremes during storm and typhoon conditions

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This research aims at characterizing the distinctive features of the spatio-temporal nonlinear wave surface during storm and typhoon conditions. We analyze wind-generated 3-D wave fields observed during the passage of an atmospheric front and the typhoon Talim in the Yellow Sea, which led to a wide directional and frequency spreading of the wave energy. Data were acquired in the Yellow Sea with stereo wave imaging systems aboard the ocean research stations Socheongcho-ORS and Gageocho-ORS. Observations include 3-D (i.e. 2-D + time) measurements of the sea surface elevation with high spatial and temporal resolution over a swath larger than any previous similar deployment. We examine the shape and the nonlinear properties of the wavenumber/frequency 3-D wave spectrum, and the characteristic spatial, temporal and spatio-temporal length scales of the wave field. We then focus on analyzing the probability of occurrence and the spatio-temporal size of the maximum and rogue waves we identified in the data. In particular, we provide an empirical estimate of the distribution and the horizontal extent of the sea surface spanned by rogue waves. The analysis is complemented by numerical model analysis of the wind and wave fields.

Reference:

Benetazzo, A., Bergamasco, F., Yoo, J., Cavaleri, L., Kim, S. S., Bertotti, L., Barbariol, F. and Shim, J. S.: Characterizing the signature of a spatio-temporal wind wave field, *Ocean Model.*, 129, 104–123, doi:10.1016/j.ocemod.2018.06.007, 2018.