GOW2.0: A global wave hindcast of high resolution

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The information provided by reconstructions of historical wind generated waves is of paramount importance for a variety of coastal and offshore purposes (e.g. risk assessment, design of costal structures and coastal management). Here, a new global wave hindcast (GOW2.0) is presented. This hindcast is an update of GOW1.0 (Reguero et al. 2012) motivated by the emergence of new settings and atmospheric information from reanalysis during recent years.

GOW2.0 is based on version 4.18 of WaveWatch III numerical model (Tolman, 2014). Main features of the model set-up are the analysis and selection of recent source terms concerning wave generation and dissipation (Ardhuin et al. 2010, Zieger et al., 2015) and the implementation of obstruction grids to improve the modeling of wave shadowing effects in line with the approach described in Chawla and Tolman (2007). This has been complemented by a multigrid system and the use of the hourly wind and ice coverage from the Climate Forecast System Reanalysis, CFSR (30km spatial resolution approximately). The multigrid scheme consists of a series of "two-way" nested domains covering the whole ocean basins at a 0.5º spatial resolution and continental shelfs worldwide at a 0.25º spatial resolution. In addition, a technique to reconstruct wave 3D spectra for any grid-point is implemented from spectral partitioning information.

A validation analysis of GOW2.0 outcomes has been undertaken considering wave spectral information from surface buoy stations and multi-mission satellite data for a spatial validation. GOW2.0 shows a substantial improvement over its predecessor for all the analyzed variables.

In summary, GOW2.0 reconstructs historical wave spectral data and climate information from 1979 to present at hourly resolution providing higher spatial resolution over regions where local generated wind seas, bimodal-spectral behaviour and relevant swell transformations across the continental shelf are important.

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