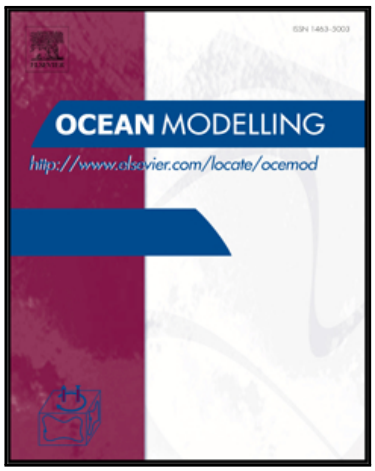

Wind forcing calibration and wave hindcast comparison using multiple reanalysis and merged satellite wind datasets

Justin E. Stopa

PII: S1463-5003(18)30145-8
DOI: 10.1016/j.ocemod.2018.04.008
Reference: OCEMOD 1305

To appear in: *Ocean Modelling*

Received date: 1 December 2017
Revised date: 8 March 2018
Accepted date: 28 April 2018

Please cite this article as: Justin E. Stopa, Wind forcing calibration and wave hindcast comparison using multiple reanalysis and merged satellite wind datasets, *Ocean Modelling* (2018), doi: 10.1016/j.ocemod.2018.04.008

Wind forcing calibration and wave hindcast comparison using multiple reanalysis and merged satellite wind datasets

Justin E. Stopa[a,*]

[a] *Laboratoire d'Océanographie Physique et Spatiale (LOPS), Univ. Brest, CNRS, IRD, Ifremer, Plouzane, France*

Abstract

Wave hindcasts are tools to study climate and are regularly used in offshore and coastal engineering applications. The growing number of wind datasets and reanalysis products create more opportunity for generating wave hindcasts. Each wind dataset or reanalysis product has different resolution, model implementation, and assimilation scheme and if the wave model implementation is not calibrated to the input wind field the resulting wave field can have large biases solely due to the wind. In this work, we calibrate the wind to wave growth parameter within the spectral wave model WAVEWATCH III for 10 reanalysis datasets and 2 datasets composed of merged satellite observations. The calibration is performed globally by minimizing the differences between altimeter wave height observations and the model output for the year of 2001. We place special emphasis on ensuring the largest sea states are well captured and are not underestimated because of the important engineering applications of these data. After the calibration we compare the datasets and find each product reproduces the average sea states similarly, but high sea states have large discrepancies. We demonstrate that the space-time distribution of the extreme waves are very different even after calibration. We summarize by providing recommendations of the most accurate wind datasets to generate wave hindcasts.

Keywords: wave hindcast, WAVEWATCH III, wave climate, COWCLIP, extreme waves, reanalysis inter-comparison

*Corresponding author
Email address: justin.stopa@ifremer.fr (Justin E. Stopa)