A note on evaluating model tidal currents against observations

Patrick F. Cummins, Pramod Thupaki

www.elsevier.com/locate/csr

PII: S0278-4343(17)30371-0
DOI: https://doi.org/10.1016/j.csr.2017.10.007
Reference: CSR3687

To appear in: *Continental Shelf Research*

Received date: 21 July 2017
Revised date: 2 October 2017
Accepted date: 13 October 2017

Cite this article as: Patrick F. Cummins and Pramod Thupaki, A note on evaluating model tidal currents against observations, *Continental Shelf Research,* https://doi.org/10.1016/j.csr.2017.10.007

A note on evaluating model tidal currents against observations

Patrick F. Cummins[1], Pramod Thupaki[2, 1]

[1]Institute of Ocean Sciences, Fisheries and Oceans Canada, Sidney, British Columbia, Canada
[2]Hakai Institute, Victoria, British Columbia, Canada

Abstract

The root-mean-square magnitude of the vector difference between modeled and observed tidal ellipses is a comprehensive metric to evaluate the representation of tidal currents in ocean models. A practical expression for this difference is given in terms of the harmonic constants that are routinely used to specify current ellipses for a given tidal constituent. The resulting metric is sensitive to differences in all four current ellipse parameters, including phase.

1. Introduction

One of the first steps usually taken to evaluate the performance of an ocean circulation model involves comparing modeled tidal motions with observations. Frequently, this involves the application of harmonic analysis to the available measurements of sea level displacement to extract the harmonic constants of the major tidal constituents. Comparisons with similarly analyzed model sea surface elevations can be used to assess the adequacy of the model, and to help tune model parameters. Similar comparisons are now often made for tidal currents due, in part, to the improved resolution of ocean models and the increasing availability of current measurements from ADCP moorings and HF radar (e.g., Mau et al., 2007). Such comparisons can be helpful to ascertain the effects of physical processes such as baroclinicity or coastally trapped waves on tidal motions, and to assess the influence of data assimilation procedures (e.g., Dunphy et al., 2005; Stammer et al., 2014).