**Ocean Science
Discussions**

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Comment

Interactive comment on "An oceanographer's guide to GOCE and the geoid" *by* C. W. Hughes and R. J. Bingham

Anonymous Referee #3

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1 GENERAL REMARKS

As previous reviewers have indicated, this is a worthwhile manuscript, explaining geodetic basics to oceanographers. As such it is of good quality, so much so that I wouldn't hesitate to use it as introductory reading in a geodesy class (for geodesists). However, and here I must concur with the other reviewers, it should be decided by the journal editor whether this type of manuscript, rather a primer than a research paper, is within the journal's mandate.

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2 TEXTUAL REMARKS

To improve readability I strongly suggest to add several more subsections (or paragraphs) with corresponding headers. For instance section 2 up till subsection 2.1 stretches over three columns. The reader could be guided better by dividing up the information in smaller chunks, e.g.:

- definition of geoid as level surface close to mean ocean;

- discussion on geopotential vs. height differences (by the way: this discussion resembles the height system discussion in geodesy itself, i.e. geopotential numbers vs. dynamic, orthometric or normal height.);

- decomposition.

Same story for section 3 up till 3.1: three columns that could use some more headers to guide the reader.

In particular subsection 3.1 (also three columns) would benefit from structuring:

- global vs. non-global base functions;

- omission errors;

- Gibbs' effects (by the way: can the other reviewers, denying Gibbs' effects, explain themselves? The authors would be thankful, I guess.);

- polar gap;

- permanent tide.

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I think a discussion of one of the most important issues about GOCE errors is missing from 3.1: *error covariances*. As a result of the estimation process, GOCE spherical harmonic coefficients will be correlated to eachother. In turn, this translates into a spatial geoid error covariance function which is not necessarily homogeneous or isotropic, although it will be mostly so in practice. An oceanographer should be aware of this. If the editor decides to publish, I would welcome some remarks on this.

Much of section 5 and the beginning of section 6 can be discarded. Only the normal gravity formula is of relevance

3 TEXTUAL ERRORS

Please use ϕ instead of θ. Geodesists mostly use the latter for co-latitude.

There is a citepMoritz80a without backslash.

Interactive comment on Ocean Sci. Discuss., 3, 1543, 2006.

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