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Ocean Science Discussions



# *Interactive comment on* "Internal tides and energy fluxes over Great Meteor Seamount" *by* T. Gerkema and H. van Haren

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REPLY TO REVIEWERS #2 & 3

We thank the reviewers for their comments which have helped us to improve the manuscript. One common remark concerned the focus of the manuscript; we have now rewritten the introduction and have put more emphasis on the problem of the indeterminacy in the energy profiles and have deferred a detailed discussion on the origins of the diurnal/inertial signal to Section 5. Also, we have removed most of the discussion on the quarter-diurnal signal, which is weak anyhow.

* SPECIFIC POINTS, reviewer #2:

The main concern of the reviewer was the shifting focus in the paper ("an apparent digression which is then claimed as perhaps the main point of the paper"). We have



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remedied this by rewriting the introduction. The principal aim of the paper lies in discussing the observations over Great Meteor Seamount and establishing the energy fluxes. For this latter point, it is necessary to also discuss the problem of the indeterminacy in the profiles; this may be regarded a digression, but a necessary digression. At the same time, it is of general interest.

Section 3: we now explain why the currents found by Mohn & Beckmann (2002) were stronger (Section 3, 3rd paragraph: "The magnitudes of the currents as such are much larger in \citet{mohn02}, due to the fact that their measurements were made over the top of the seamount, where water depth is smaller (by about a factor of five).").

Section 4: following the reviewer's suggestion, we have replaced "constant" with "uniform".

Section 5: we have added a new paragraph, discussing the (speculative) conversion rate over Great Meteor Seamount as a whole, and placing it in the global context (Section 5, last paragraph).

* SPECIFIC POINTS, reviewer #3:

We should first like to point out that our finding is not quite, as the reviewer states, that "the precise energy flux profile [...] depends crucially on the (unknown) constant". Our finding is rather that the ways of determining the constant, as described in the literature, are incorrect, leaving us with an unknown constant and an indeterminacy in the profiles.

1) The reviewer suggests that we should turn the "whole paper [...] inside out";, and start with the theory of Section 4.1, followed by "a couple of practical examples". We have refrained from following this suggestion, because this re-ordering would leave no logical place for the material of Sections 2 and 3.

2) It is true that one particular section (4.1) covers a topic whose relevance is not restricted to Great Meteor Seamount. However, the larger part of the paper clearly



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deals with internal tides and energy fluxes over Great Meteor Seamount, as indicated by the title.

3) We have deferred a detailed discussion on the diurnal signal to Section 5, and, following the reviewer's suggestion, now mention it only summarily in the abstract and introduction.

4) The reviewer asks what the impact of forcing would be on the argument of Section 4.1. For simplicity, we start in Section 4.1 with the unforced equations. However, the effect of the forcing is being discussed, namely in Section 4.2. There we take into account the buoyancy due to the forcing, B, which modifies b'. However, this contribution is immaterial to the problem of Section 4.1, since it affects the integrand of the second term on the right-hand side of (8), but not the presence of the constant of integration (i.e. the first term on the right-hand side).

5) In our setting (Section 4.1), the along-slope fluxes are zero, since we assume there is only energy propagation in x; we did this to simplify the problem.

We do not share the reviewer's concern that the findings of Section 4.1 may not be accepted by the scientific community. In fact, there is an irony here. After all, at least part of the community accepted 'the baroclinicity condition for pressure', even though its validity had not been demonstrated. Surely, then, it will accept a verifiable statement, proven by elementary means of calculus.

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Interactive comment on Ocean Sci. Discuss., 4, 371, 2007.