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Ocean Science Discussions

Interactive comment on "Deep currents in the Gulf of Guinea: along slope propagation of intraseasonal waves" *by* C. Guiavarc'h et al.

C. Guiavarc'h et al.

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We thank reviewer 1 for his/her helpful comments.

1. *'coastal-trapped' should be 'coastally-trapped'; throughout the paper.*
   This has been corrected.

2. *P. 63, description of Figure 2. The description of Figure 2, used to examine the spatial structure of the variability in the different frequency bands is a bit confusing, as it keeps jumping from band to band, and includes comments about what happens at different depths. I would first make the important points about what happens at 1000 m depth, based on Figure 2,then mention what is found at other depths. For example we see that the meridional scale of the anomalies along the equator decreases with decreasing frequency, and also the meridional*

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distribution of amplitude varies. Explain whether this is consistent with equatorial wave dynamics. Then describe the signal along the coast, and explain why the amplitude is larger at different frequency bands (depending upon the possibility of reflection at the eastern boundary). At this point, you can mention how things change with depth for the different frequency bands.
We thank the reviewer for this helpful suggestion. The description of Figure 2 has been rewritten accordingly. The figure itself has been improved.

3. *P. 64. Do you have any idea of why periods longer than 30 days are the most energetic at 4000 m depth?*
This is due to the complex vertical structure of the coastally trapped energy, which changes according to the frequency band. If different vertical modes dominate different frequency bands, the depths are which energy maxima are found also vary with the period. We find that this discussion is out of place in this section of the paper (it is entitled " horizontal structure "), so we have removed it.

4. *P. 66, line 11. 'the coastline forms a cape', not form*
changed

5. *Figure 4. What are the units? Around 2.5S the phase speed seems lower in the Guinea model than in the linear model, while south of 5S the signal in the linear model is slower, but it is hard to say with the scale of the plot. Maybe it would be useful to plot a line corresponding to a specific phase speed in both diagrams. Also, phase speed and amplitude seem to vary as a function of both latitude and time, and in different ways in the two models. Do you have any idea why?*
We have not attempted a detailed quantitative study of the phase speed, so we prefer to avoid to add lines that would be somewhat arbitrary and make the plot less readable. The propagation close to the equator is complex because the equatorial waves impige upon the boundary over a wide latitude band (Guiavarc'h et al, 2008 show that the coastal energy originates from the whole 5S-5N equa-

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torial band). Farther south, differences in phase speeds between the linear and nonlinear model may be due to changes in stratification in the latter (the structure of the vertical modes depends on the stratification).

6. *Section 3. It is not clear to me what your conclusions are concerning vertical propagation.*
   A partial conclusion has been added: In summary, the representation of the intraseasonal oscillations as propagative waves helps us to understand the structure of the signal along the equator (for example, why the upper layer of high energy deepens from the west of the basin to the east). However, the coastally-trapped waves along the boundary do not show any clear vertical propagation. The changes in the vertical structure along the coast away from the equator are explained to some extent by a decomposition in vertical modes; however details such as the energy intensification around topographic features cannot be represented by a linear model.

7. *P. 69, title of section 4 and throughout the rest of the paper. dissimetry should be dissymmetry*
   Corrected.

8. *P. 70, line 6. The 10-20 day signal should be the 10-20 day signal*
   We are not sure what the reviewer means, but we hope the style and grammar have been corrected.

9. *P. 70. In describing EXP3, it would be useful to emphasize that the lateral boundary conditions include signals propagating along the equator, as produced by remote forcing.*
   A sentence has been added.

10. *P. 71, line 10. significant is misspelled.*
    Corrected.

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11. *P. 72, line 12. Did you check the asymmetry of the boundary signal for period longer than 3 weeks in the models to see if the results are consistent with Kaufman et al. (1999)?*
In our model, we find evidence of energy transfer between equatorial waves and coastal waves along the northern coast of the Gulf of Guinea, but we have not tried to quantify precisely this process or its dependency on the period of teh waves. The Guinea model is not well suited for such a study because of its open boundary at 2.5W.

Interactive comment on Ocean Sci. Discuss., 6, 57, 2009.