

Interactive comment on “Deep currents in the Gulf of Guinea: along slope propagation of intraseasonal waves” by C. Guiavarc’h et al.

Anonymous Referee #2

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The paper main focus is to describe the characteristics of the biweekly oscillation along the African coast in the tropical Atlantic, and, with the help of model-simulations, explain the reason of some of those characteristics.

The problem is exposed using observations from two moorings (one north and the other south of the equator, both close to the African coast) and a realistic simulation of the circulation in the Gulf of Guinea, which turns out to simulate quite well the biweekly oscillation observed in the data.

The data and model show that the vertical structure of the biweekly signal is not only different between the equator and higher latitudes, but also between north and south. Specifically, the equatorial signal shows higher baroclinic mode (3 to 5) than the coastal

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signal in the south (modes 1 and 2), presumably because low order modes have longer decay times than high order modes. The differences between the north and south are that in the north, the signal is surface intensified and has a second maximum at around 800 m while in the south, the signal is bottom intensified with a second maximum at around 1000 m. The surface intensification in the north is explained by local winds and the differences in vertical structure at depth between north and south are linked to the shape of the coastline.

The biweekly waves are wind forced at the equator and propagate along the African coast as coastal trapped waves. Despite the fact that many of the characteristics of these waves indicate strong linearity, their persistence in time (in disagreement with the linear model) indicates strong non-linearity as well.

I find the results of this paper interesting and worthy of publication, but I think there is room for improvement.

Main criticisms:

1. The paper really only deals with biweekly waves; other period oscillations are not treated in depth. I strongly suggest that you concentrate in the biweekly oscillations only – the title should be changed accordingly.
2. The presentation and style of the manuscript can be greatly improved. The abstract is not attractive and the flow of ideas is particularly bumpy in section 2. There are also some misspellings and suggest that you have the manuscript proofread by a native English speaker.

Some specific issues:

1. Page 61, line 12: “The first question. . .” If you use “first” here, it’s better to use second, third. . . after. Otherwise, it’s difficult to see when you finish with the “first”. The same is valid for other parts of the manuscript.
2. Page 62, lines 24-25: The structure of biweekly oscillations at the surface has not

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been observed in satellite measurements. Your argument then about why you focus on the deep expression of the signal only is not valid.

3. Page 63, line 13: In the text you say you are presenting maps at 1000 m depth but in the figure you have 1150 m.

4. Page 63, lines 16-19: For clarity, consider revising this sentence.

5. Page 64, line 11: What do you mean by “significant energy”? The word “significant” is often associated with confidence intervals.

6. Page 64, last paragraph: I find it difficult to see your point because of the varying scales in the figure. Why not keep the scale constant?

7. Page 65, lines 29 and 66 lines 1-3: I can see the narrowing of the signal but not the increase in amplitude.

8. Page 66, line 14: Not sure the word “However” goes here.

9. Page 66, lines 20-21: I would write something like: For both models, the phase velocity of the waves propagates southward.

10. Page 67, line 4: Why “apparent” phase velocity?

11. Page 67, lines 5-6: This sentence comes out of the blue.

12. Page 67, line 10: I think you mean their Figure 10, not 11.

13. Page 69, line 14: The observations of Bunge et al. (2006) are at 10W.

14. Page 69, line 24: “The new mooring. . . has been was deployed. . . ”

15. I would remove Figure 7. It does not add anything to your discussion.

16. I suggest you avoid the words “striking”, “of course”, “clearly”.

17. Page 71, line 28: converted to instead of “converted as”.

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18. Page 72, line 7: Remove “respectively”.
19. Page 72, lines 20-22: I do not understand what you mean.
20. Page 75, line 25: wind events instead of winds events.

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