

Review of Dimoune et al.: “Revisiting the tropical Atlantic western boundary circulation from a 25-year time series of satellite altimetry data”

This study uses 25 years of satellite altimetry data to describe the mean surface circulation of the Western Tropical Atlantic. The authors describe in detail the seasonal cycle of different branches of the South Equatorial Current, the North Brazil Current and the Guyana Current at different zonal and meridional transects. A main novel result of this manuscript is the description of a current branch at 0-2°N, above the Equatorial Undercurrent. This surface branch was previously unremarked in the literature and appears to be an extension of the North Brazil Current retroflexion. Consistent with the literature, the results show that some of these branches have in-phase seasonal cycles, peaking in late winter/early spring, whereas others peak in fall. The interannual variability of the circulation is related to the Tropical Atlantic Meridional Mode.

This study is a relevant update of the mean and low-frequency variability of the surface circulation in a globally important region of the tropical ocean, where vigorous inter-hemispheric exchanges take place. The analysis is simple but robust and the manuscript is organized logically. I have to admit, however, that I had a hard time getting through the text, which is terse and acronym-laden. Besides addressing the technical points below, I strongly recommend the authors work on their text to make it accessible to those who do not work on the Tropical Atlantic oceanography every day.

Specific and technical points

1. Geostrophic currents near the Equator

The manuscript lacks a description of the robustness of the equatorial β -plane approximation for calculating geostrophic velocities at $\pm 3^\circ$ of the Equator. How accurate are these velocities? Can you really trust small changes in speed across the Equator (e.g., described in section 3)?

2. Intraseasonal variability

From figure 2, the intraseasonal/subseasonal variability (< 120 days) is as important as the seasonal variability. The authors should discuss the intraseasonal variability instead of the interannual variability.

3. Some methodological details are missing

The authors should improve their description of their estimation of various current properties. For example, how do the authors estimate the properties in table 1? Are the authors simply choosing the maximum velocity in the transect? How about the

current width? Are the authors eye-balling this property from year transect? Wouldn't fitting a functions (e.g., a gaussian) to the cross-track velocity profile be a more effective way to estimate those properties? Also, does the interpolation of satellite altimetry sea-level from along-track to regular grid smear the currents? What's the effect of this interpolation on the width and intensity of the currents? Please, discuss.

4. **Figures are diddicult to read**

Most figures are barely readable. The labels are tiny and oftentimes there are too many lines in the plots. The authors should increase the labels, rearrange the panels, and try to use less lines to improve readability.

5. **Tidal correction on the Amazon Shelf**

I think the “erroneous altimetry measurements” mentined around line 160 is actually poor tidal corrections on the Amazon Shelf. The authors should more clearly described what they consider unrealistic values. What critereon are the authors using to remove those values?

6. **Wind-driven currents**

As the name suggests, the GEKCO product contains both geostrophic and Ekman currents. If the authors are interested only in Ekman currents for figure 9, why don't the authors calculate those directly from ERA5?

Typing, English and minor technical corrections

1. line 43: change works with studies.
2. line 51: (...) North Brazil Under Currents (NBUC) which raises to the surface around → (...) North Brazil Under Currents (NBUC), which surfaces around.
3. line 77: meaning of “no more respected” is unclear. Do you mean “no longer satisfied”?
4. line 92: Do you mean understudied?
5. lines 108, 110 and elsewhere: “to allow” is a transitive verb—something or somebody allows somebody to do something else. So the dataset allows you to provide a more robust (...).
6. line 111: as follow → as follows.
7. line 125: Why the hat in Goês?
8. line 158: averaged on a monthly basis → averaged monthly.
9. line 183 and elsewhere: Pound → Pond. (Also, those should be 10-m winds, right?)
10. line 184/eq. (1) and (2): ples use τ , not ζ , to refer to wind stress. Also, x and y in eq. (3) should in subscript: τ_x and τ_y .

11. lines 196-197: why use zonally average wind instead of local winds?
12. line 218: why is Guyana in figure 2?
13. line 221 and elsewhere: Do you mean path instead of vein?
14. line 261: more than \rightarrow longer than.
15. line 261: less than \rightarrow shorter than.
16. Figure 2: you should mention in the caption that the colorbar of (c) is different than the ones of (b) and (d).
17. line 291 and elsewhere: **to name a current or current branch X** is a horrible idea. Please, be creative and come up with a more descriptive name.
18. line 393: lowest \rightarrow southernmost.
19. line 413: remove extra parenthesis.
20. line 428: currents intensity \rightarrow speed.
21. line 484: Further north \rightarrow Farther north.
22. line 517: recirculate \rightarrow recirculates.
23. line 591-592 and elsewhere: what does \pm stands for here? Standard derivation? Standard error?
24. line 630: Student test \rightarrow Student's test.
25. line 670: analysed \rightarrow analyzed.
26. line 743: ADCPs measurements \rightarrow ADCP measurements.
27. line 753: similar with \rightarrow similar to.
28. line 870: he \rightarrow the.
29. line 880: confirm \rightarrow confirms.