Re-Review of "Revisiting the tropical Atlantic western boundary circulation from a 25-year time series of satellite altimetry data" by Djoirka M. Dimoune, Florence Birol, Fabrice Hernandez, Fabien Léger, Moacyr Araujo [Paper # egusphere-2022-402]

The authors have generally corresponded well to most of my comments and suggestions. However, I still have a few concerns, which I think need to be addressed before considering this manuscript for publication.

First of all, I agree with the other reviewer that the choice of naming a current "X" is rather bad. I agree that the manuscript is already full of acronyms but finding one more for the "new" current does not make the change in my opinion and it would be much better to refer to some sort of … eastward surface current later than to X.

Secondly, while I strongly appreciate that the authors looked for other data sets to validate this product in the equatorial region, I think a bit more work has to be done on the section plots for the ADCP sections as I think they are now shown as part of the Supplementary Material. To my knowledge there are no shipboard ADCPs (sADCPs) which have data at the surface. You write that the first depth varies between 0 and 17m and an sADCP can not have data at 0m. You definitely have some blank bin and then depending on the bin size you have the first bin roughly I would say between 10-30m. In the plots you show you can also see that when the data is "at 0" it is just vertically pulled to 0m from somewhat like 17m like the others (you have these vertical lines in those plots). So, if your data set has identical values at 0m and 17m I would remove the 0m values as they give a wrong impression. What I also do not understand for your plots is that for the zonal component there is something odd with the colormap I think. How can you still have positive zonal velocities beyond the 0-contour line? For the meridional component it seems to work, but for the zonal plots something is strange.
And then you also have to take care in your formulation about the comparison as you can not really "compare" your velocities. You could maybe plot the surface velocities of your product on top of those sections and then you can "see" how well they fit. Whether an interpolation by eye from the ADCP data to your data seems sensible. I hope it gets clear what I am trying to say. What I envision I found e.g. in this paper:
Kopte, R., Brandt, P., Claus, M., Greatbatch, R. J., & Dengler, M. (2018). Role of Equatorial Basin-Mode Resonance for the Seasonal Variability of the Angola Current at 11°S, Journal of Physical Oceanography, 48(2), 261-281.
In their Fig. 1 geostrophic surface velocities from altimeter seem to be included in the plot of an ADCP. I think this would be a nice way of showing that these data sets somehow fit together.

My third suggestion is to recheck the language again. I found quite some mistakes in the third person with an "s" too much or missing. I am not quite sure whether I found all of them, so please give it a thorough read-through again.

Last, but not least I would like to suggest that you work a bit more on Figure 9. I gave some suggestions below how I think it could be improved a bit, because I think it's still quite full, which makes it a bit messy and hard to grasp. As this figure basically summarizes the result I think it should be a bit more easy to access.

In addition to these general remarks, I have some detailed remarks throughout the text:

Line 19: I would suggest to write characteristics instead of singularities.

Line 22-23: I am not sure whether there is a mistake here or maybe the phrasing is misleading : You say the maxima/minima occur within boreal winter/fall, when the ITCZ is at its southernmost/northernmost location.
Instead of using the boreal winter/fall expression which sounds like the ITCZ is at its southernmost/northernmost position directly within the next season, I would use the "months": The maxima/minima occur within February/August, when the ITCZ is at its southernmost/northernmost location.
At least the February/August definition is correct now for the ITCZ migration.

Line 80-86: I am still not quite sure about this paragraph. You start the introduction now as we agreed on that the WTA surface boundary circulation is a superposition of AMOC, STC and Sverdrup dynamics. In line 84 you now say the WTA surface circulation is wind-driven and highlight the components which are most important from the vorticity equation meaning Sverdrup. How does this fit together and secondly is this important here?

Line 90-92: Maybe rephrase this sentence. At least I understand that you want to say: The wind influence, which is related to the seasonal migration of the ITCZ, is reflected in the latitudinal shifts of the currents.

Line 96: , and also **on ..**

Line 112: AZM instead of ACM?

Line 144-145: , which uses the β-plane approximation as the Coriolis parameter vanishes close/at the equator.

Line 149-150: I think I would be a bit more careful here how you phrase the results on the comparison. You say satisfactory … okay maybe, if Lagerloef found similar comparisons and also called them satisfactory. The correlation might be of 0.71 for the zonal component alright, but the amplitude is a factor of 2 off most of the time. The meridional component is completely off showing opposite signs most of the time. So, I think you somehow also have to admit these deficiencies and make that clear in the phrasing of this sentence and then say but its similar to Lagerloef and hence probably okay as he called it satisfactory. By the way why do you show also the current meter data of 2019, if you have nothing to compare it with? Maybe then instead focus the plots on the comparison you have (2017-2018). An additional remark you could also compare the current meter data outside of your study area at e.g. 23°W or 10°W of the PIRATA buoys to check for the "equatorial consistency". Maybe there is more data overlap there.

Line 153: What do these numbers stand for? You say mean bias and standard deviation difference. What does that mean that you calculated here?

Line 159: Okay I see the point from above that's why you show the 2018/2019 part of the time series.

Line 160-161: Maybe rephrase this a little: “legitimizes our desire to know more about this flow”. Somehow this sounds a bit unscientific.

Line 183: You used tau_x and tau_y in the equations now, but not in the text.

Line 256: I would add an introductory phrase to the sentence, something like:” To further investigate the variability of the different current branches, we then … “

Line 272: This is the first time that I encounter this “X” current again and I agree with the other reviewer that calling a current “X” is a really bad choice. Please reconsider this. I do understand that this paper is already full of acronyms making it difficult to read, but one more or less does not make the situation worse.

Fig 3: I appreciate the improvement of the figure. However, I would still rephrase the second sentence in the caption to something like: “On the left side of each panel the time average over the section is shown (thick line) framed by the corresponding standard deviation (thin lines). The color shading shows ….” I think what is written is too complicated.

Line 305: paths -> path. The sentence starting with “These maxima …” is strange as it is now, please rephrase and make sure the brackets are set well.
Line 305 ff: I hope I understand now correctly: V_max = core velocity and location of V_max is core location;

strength/intensity time series is the average over the complete area between Vmax/2 and Vmax for every time step, correct?

Width of the current: Take the mean of the current over the section (left part of Fig.3) and check where it drops to zero. Do you take the average for that or you do that for every time step. I am not quite sure I understand; you come up with one number, so probably you do that for the average curve, but on the other hand you write about the time series for that, so please clarify.

Line 329: On the right side of each subplot …

Line 336: I do not see a monthly climatology of the current width in Fig. 5. See my comment above I also would not really know how this is obtained. In the end of the line: Our analyses …

Line 366: the NBC2 *intensifies* one month …

Line 367: This shows … contribution to the NBC ~~to the~~ north of the equator.

Line 374: tends to retroflect~~s~~ …This can justify the phasing of the annual cycle of the …

Line 387: .. seem~~s~~

Figure 5: the tick for April misses the “r”. It only says “Ap”

Line 423: .. and starts decreasing …

Line 444: In my understanding these winds are called the south east Trades and not the southerlies. In addition, I think this sentence is somehow irritating in the aspect to what is the cause of the changes. The ITCZ position is always north of the equator due to the asymmetric SST distribution. The migration of the ITCZ follows the zenith of the sun, which moves between the turning circles. As the ITCZ is the position, where the trades meet they also show a seasonal variability with latitude. Please somehow clarify these things.

Section 4.4: I very much appreciate that you looked at other data sets trying to verify the eastward surface velocities with other observations giving trust to the geostrophic product. However, I think for the PIRATA velocities you need to be careful how you formulate the “good” agreement. Here you should really strike that it is probably underestimated in your product, as the amplitude of the eastward velocities in the PIRATA record are much bigger. However, you can also have ageostrophic velocities included in the PIRATA velocities, which are not in your product. This has to be clearly stated.

Line 479: Which characteristics do you mean, I think only the intensity and core velocity are considered here?

Line 480: I think its not so great to make the reader go back to end of section 3 to look up how you defined the intensity/core velocity of the currents. If I recall correctly you calculated something like mean over area where ($V_{max}/2 < V < V_{max}$) for the intensity and V_{max} as the core velocity in the latitudinal part of the section, where the current is located on average. So I would try to simply add something like that here.

Figure 6/7: I was really hoping that some of this could be combined.

Line 517: relationships

Section 5: How did you decide which current branches to show in the plots belonging to this section? Probably the ones from the area in Fig. 2 which show most pronounced interannual variability? Although no then you would probably only show the currents from section 6 and maybe section 5. So what drives your choice?

Line 525: 1993-2017

Line 532: Isn’t it called the Student’s t-test?

Line 539-540: I am not quite sure I understand. What is the difference between “insignificant” and “none”? Please clarify.

Line 593: Please consider my comments about these plots.

Line 609/610: This is exactly what I am saying about the ADCP observations and why you can not have data at 0m.

Line 612-616: This paragraph is still not very conclusive to me how it is written. Okay, you say Ekman velocities are westward. So to observe somewhat strong absolute eastward velocities you need quite strong geostrophic eastward velocities as v_abs = v_ekman + v_geo. Maybe that is meant with we conclude that the velocities found here (which are geostrophic) should be underestimated. Okay, but maybe rephrase a little to make it clearer if this is meant. But how is that consistent with the X current found in Fig. 5b? I do not understand what is meant with this.

Line 619: maximum -> maxima

Line 631: currents

Figure 9: The width of the arrows is proportional to the current amplitude you say. What is meant here? Do you mean V_max or intensity or really their amplitude which then should be something like the difference between max and min? What determines the length of the arrows then as the length also differs?
Why are the acronyms explained here in the caption again? In all the other figures the reader is referred to the acronym table. Why are there sometimes 1 and sometimes 3 arrows for the NEC (blue arrows)?
I still do not understand why in the JAS figure there are three arrows in the NECC region. The nNECC, sNECC and ? In some places there are 2-3 arrows after each other probably all representing the NECC and in other cases like for the NBC there are some arrows which cover quite some length extent. How did you decide about these things? Is there a meaning behind that? I think it would definitely help to have less arrows as it makes the plots quite messy, so maybe consider to reduce them, if there is no specific meaning behind the amount of arrows per current branch.

Line 662/663: Please rephrase, somehow the defined in the end sounds odd.

Line 667: on the one hand

Line 687: But -> However,

Line 690/691: You probably mean the eastern part of the region you are investigating. Eastern part of the basin could also be in front of Africa.

Line 693: … opens the way **for** further investigations