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Earth System Dynamics
Discussions

Interactive comment on "Influence of position and strength of westerlies and trades on Agulhas leakage and South Benguela Upwelling" *by* Nele Tim et al.

Anonymous Referee #2

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This article claims to be about the Benguela upwelling region (and Agulhas leakage), but I find it to be mostly on analyses of wind stress strengths and position variability in data products and simulations, over historical climates as well as future scenarios. There are many interesting aspects and results in the paper, but I find them to be poorly presented and hard to follow. Often, the results are not explicitly shown in figures. For example an upwelling index is discussed but never shown. "Upwelling" even appears in the title but I think it does not receive much attention. There isn't even a figure that focuses on the Benguela region. The correlation with SST seems interesting, but it is only shown for one simluation. The different simulations, historical and future on top of data products are difficult to follow and receive only individual attention. In the

figures often only one simluation or dataset is shown and it is diffiult to get a grip on the comprehensive analysis and consistency, or not, over different historical and future scenarios (exception is table 1). This paper should be rewritten in a more structured way and figures should represent the results of all experiments and datasets, otherwise the number of simulations or time periods should be limited. If not a more quantitative analysis on upwelling and Agulhas leakage (with aspects different than already considered in other papers) is done, the subject is more something like "An analysis of westerly and trade winds strengths and position over the South Atlantic and Indian ocean in historical and future climates"..

Abstract: use present tense in abstract and distinguish what was done in other studies before and what the present article investigates.

Please include a figure at the beginning to introduce the broader region, the circulations, winds, processes involved and indicate the areas where you take what kind of averages.

page 2, line 28: what do you mean by "parallel" (two lines can be parallel) ? Change wording.

page 4, line 10: dependency —> variation

page 4, line 27-30: including the ocean velocities in the wind stress calculations could include a feedback in the coupled climate model simulation, is that important?

page 5, line 3-5: Confusing, there are four datasets, but you show only one in Fig 1 ?

page 6, line 7: contrarily, change word

It is difficult to keep track of the different averaging regions, at first sight it seems confusing, the difference between wind stress trend Fig 1 and 3. Fig 1 there is a decreasing trend, Fig 3 increasing.

The wind stress analysis could be presented in a more compact way (combine Fig 1-3

as subpanels in one Figure and describe in caption the specifics.

Fig 4 and temperature gradient analysis: I don't think this adds any interesting information. Given the dominance of geostrophy, there is bound to be a correlation between temperature gradients and wind stress. Why is this analysis important at this point?

section 3.2: change to variability in past and future climate

page 9, lines 1-7: what do you mean by "calculated for each century separately"? Why not show the curves? Unclear.

page 10, line 13: "our" analysis

page 12, line 18: due to geostrophy, strong SAT gradients are naturally correlated with strong winds, that is not a driving mechanism.

Your conclusions are very comprehensive, but a lot of them are never shown explicitly in the results. (The position of the winds is only weakly correlated with South Benguela upwelling intensity, In contrast, the strength of the trades is significantly correlated with Benguela upwelling, with more intense trades being linked to stronger upwelling in South Benguela.. and the whole paragraph).

page 13,line 9-12: these are conclusions from other studies, not from your results

page 14,line 13: "This is likely to affect the Benguela upwelling system in several ways,.." why don't you show it here, I thought this is the subject of the paper ?

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