

Interactive
Comment

Interactive comment on “Variability in the Subtropical-Tropical Cells and its Effect on Near-Surface Temperature of the Equatorial Pacific: a Model Study” by J. F. Lübbecke et al.

Anonymous Referee #2

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General comments:

- the paper addresses three scientific questions: sensitivity of the tropical circulation to OGCM resolution, mechanism of control of equatorial temperature by STC transport, and compensation between interior and wb pycnocline currents. These topics deserve one paper each. By merging them, none of the question is analyzed thoroughly enough and give an impression of overlooking the processes at play for both questions. One way to reconcile the resolution issue with the others is, at the end of the paper, to present a sensitivity of the results to resolution. And also to present the OGCM validation as tables with transport comparison.

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The paper starts with the study of the control of the equatorial temperature. However, the paper in the second parts drifts towards the discussion of the compensation mechanism between WBC and interior transport, and forget to exploit fully the results of the various OGCM experiments, as well as to explain better in detail the temperature control.

Overall, the author looked at several important aspects of the STC, but didn't make a real choice of in depth study, necessary however, in order to bring clear new ideas to the community. There are clearly enough interesting directions and first new results in the present work, but again, some must be chosen and other left for other studies.

Specific comments :

-Fig 2 useless since the percentage is constant and can simply be given in the text.

-Fig 1: As shown by Hazeleger, the TC are an artifact mainly of projecting averaged velocities on averaged sigma levels. You cannot publish such a erroneous figure, and must compute the averaged V_{xH} . Similarly, when speaking of STC, which is in very large part isopycnal in the interior, there is not much justification in showing a z-level stream function (except easier computation). The V_{xH} projected onto sigma level shows precisely what you're saying in your text from sigma span of STC to isopycnal nature of the TC, so the z-level is not the appropriate figure here.

-p536,l16: justify better the choice of 80m depth, in particular compare with mixed layer depth everywhere you use T80m.

-p 538, L 14: if the northern transport is 20 Sv in REF025 instead of 25 Sv in REF05 as visible, a 25% DECREASE is not little and the decrease with higher resolution worth saying and explaining. Compute the ratio precisely, with the above computation improvements.

-p 538,L 16:jumping from Fig1 to fig 4 -> change figure #

-Add isopycnals on figure 4 and 6 to illustrate the sigma range given in your text.

-p539: model circulation description, which doesn't provide clearly useful information for the mechanism studied: the "rich structure" of the wbc described here shall rather be found by the interested reader in the literature (to be cited by authors) presenting observation, since its details are not used in the rest of the paper but only the large scale structure (in addition, this depth range doesn't correspond to the core of the wbc current : 200-250 m from fig 6).

-p543: This page and Fig. 10 proposes to show the longitudinal structure of the STC transport variability, which is an good objective. Whereas Fig 10 provides interesting information, the text associated ("there seem to be no direct meridional flow...") indicates that this "statistical" approach prevented the authors to study and understand the basics behind it. I encourage the first author to analyze more the stream field (for example with Bernouilli functions as streamlines, or drifter trajectories) and see and get familiar with the interior flow. I believe that there shouldn't be such statement regarding transport as "there seem ..." when looking at a OGCM (not observation) with all the relevant variables available. A similar impression of not thorough enough study is given by the choice of a 50m threshold for the transport: the zero of the meridional velocity wouldn't be more relevant , or at least the mixed layer depth as a limit ?

-Fig12: this is an interesting description of the compensation in function of latitude. However again, the mechanism based on Sverdrup, Ekman, and geostropic transport combination, is not enough discussed and understood.

Interactive comment on Ocean Sci. Discuss., 4, 529, 2007.

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