

Interactive comment on “On the role of the south Pacific subtropical high at the onset of El Niño events” by Youjia Zou and Xiangying Xi

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Dear Anonymous Referee #3, Many thanks for your comments.

Comments from Anonymous Referee #3: 1) A central argument of the paper is that the North Equatorial Countercurrent (referred to as ECC by the authors) moves onto the Equator in response to a southward shift of the SPSH. This is most certainly not the case in reality (and the authors also do not provide convincing evidence that it is the case in their model). As for observed and simulated variations of the NECC on interannual time scales, I recommend the paper by Hsin and Qiu (2012) and the references therein. They indicate that the NECC indeed does move southward during Eastern Pacific El Niño events but not by more than about one degree.

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Response to Anonymous Referee #3 (1) You provided a reference for the ECC (or NECC) position not significant southward shifting during El Ninos against our view. You know that the paper written by Hsin and Qiu (2012) might be right in 2012, but this doesn't guarantee that it is always right with the developemnt of evidence obtained by the state-of-the-art techniques. Here we offer a more clear picture for the evolution process of the NECC position in latitude (see the figure in attachment).

The satellite observations in situ show that the NECC in Nov 1996 was in the normal position 5~8°N (blue color) and remained in this position in Dec 1996, Jan and Feb 1997 but with considerably anomalous southward currents (green color, likely in an oceanic disturbed state). Subsequently the NECC passed latitude of 5°N in Mar. The southern edge of the NECC clearly shifted southward beyond the equator in Apr, with a stronger intensity and a broader range in latitude possibly due to northwest or westerly winds. The NECC finally fixed at latitudes of 4°S~6°N in May, representing the start of an El Niño, consistent with the beginning time of El Niño event in 1997. The NECC stayed at this position for nearly 13 months until the end of 1997 El Niño. The evolutions of the NECC position in latitude with time lend sufficient support to the notion of a southward shifted NECC during El Niños.

The evolution process can be clearly seen in a set of daily change maps of the NECC position . But it is not possible for us to arrange so many figures here.

The satellite observational records clearly show that the NECC at latitudes of 5~8°N disappeared and a new eastward current along the equator appeared at the same time in 1997. The synchronicity of an absence of the NECC in the normal latitudes and an emergence of a new eastward current along the equator is indicative of a southward shifted NECC.

please note that this is the satellite observation provided by NOAA, not an artificial work.

Comments from Anonymous Referee #3: 2) The authors spend quite an amount of

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text and supplementary figures on the fact that the trade winds do, on average, not converge on the Equator but north of it. This is standard textbook knowledge and by the way also the case in the Atlantic Ocean, in contrast to what the authors claim.

Response to Anonymous Referee #3 (2) We describe the trade winds symmetry about $5\sim 8^{\circ}\text{N}$ rather than 0° in order to explain why the northwest winds can be seen in north of the equator. Although this exists in the Atlantic, the amplitude is much smaller than in the Pacific.

Comments from Anonymous Referee #3: 3) The manuscript is rather hard to follow as it is not very well structured (main results are already discussed in the introduction, the methodology is completely missing from the main manuscript), the figures are tiny and the figure captions do not provide the necessary information. For example, in Fig. 3 it is not clear what depth or density range is shown and what time period is considered.

Response to Anonymous Referee #3 (3) We would like to further improve the quality of the figures and figure captions as well. The figures with sufficient resolution can be zoomed in as big as you want. Fig.3 shows the surface sea conditions in the equatorial Pacific at any period, representing general conditions in La Nina and various El Nino events. Because the GCM is employed from the other authors, therefore we suggest that it is not necessary to repeat the details of the methodology in the main text, instead, with references only.

If it is declined, the audience in this field would lose an opportunity to see a new view different from the traditional one, but this new view may be right with the development of the new technology and methods.

You see that this paper has been cited by 16 authors during the discussion stage, and this figure may increase quickly in a short period after formally published, representing its potential interests to the audience in this field.

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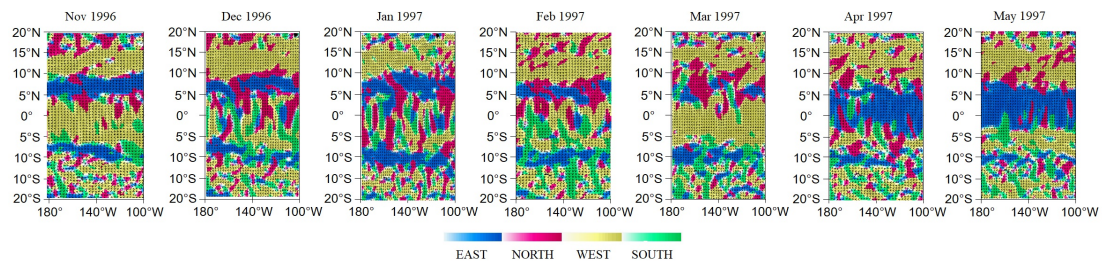


Fig. 1. Evolution of the NECC position in latitude

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