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Interactive comment on “The dynamic connection of the Indonesian Throughflow, South Indian Ocean Countercurrent and the Leeuwin Current” by E. Lambert et al.

Anonymous Referee #2

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This paper focuses on the dynamical connections between the Leeuwin Current, Indonesian Throughflow and SICC by analyzing the results from a GCM and a conceptual two-layer model. They pointed out that 1) the LC is strongly modulated by the eastward jet-like SICC and 2) ITF enhanced LC by through SICC. They raised a possible mechanism for the LC that ITF can accelerate the LC directly through Ekman transport and another one is through the SICC. This paper is quite interesting, full of information, but there are still some issues that should be addressed before publication.

1) About the model result analysis: it seems to me that there are details about the model analysis but lack of enough dynamical insight into the mechanism. The authors focus more on the different model design using GCM and two-layer model by altering

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their configurations, while they are not talking too much about the dynamics on the existence of SICC, which is believed to play a crucial role in modulating the LC. So the authors should dig into the model runs and clarify the linkage of ITF-SICC-LC. 2) About the ITF experiment: I am interested in the sensitivity run of ITF in the two-layer model. I am also curious about the result since there must be compensate flow back to the Pacific. Therefore the turn-back flow in the two-layer model definitely depends on the model configurations for the outcrop line. So I may suggest do some water property analysis on the ITF and SICC, as well as the LC of northern and southern segments to look for some connections. 3) The last sentence of the abstract mentioned ‘dynamically coupled’, but I believe that they are only ‘connected’ dynamically rather than ‘coupled’.

Interactive comment on Ocean Sci. Discuss., 12, 2231, 2015.

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