

## ***Interactive comment on “ENSO-correlated fluctuations in ocean bottom pressure and wind-stress curl in the North Pacific” by D. P. Chambers***

**Anonymous Referee #1**

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The paper discusses and quantifies the relation of interannual fluctuations in ocean bottom pressure (OBP) and wind stress curl (WSC) in the North Pacific to the El Niño Southern Oscillation (ENSO). In addition to the ENSO related anomalies, a long term trend was observed by GRACE, steric-corrected altimetry and satellite derived wind stress curl. The trend is suggested to have no apparent connection to ENSO. In general, the study was inspired by results by Chambers and Willis, 2008 and Song and Zlotnicki, 2008. The manuscript discusses a more detailed statistical analysis of the ENSO related interannual fluctuations and a long term trend in OBP and WSC in the North Pacific. There are three main points I would like to see addressed in the follow-up discussion: a) A few studies on short term variability and one study

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on ENSO related signals in the North Pacific (Song and Zlotnicki) are cited and discussed, however, the relation to crucial studies on interannual variability in the North Pacific is missing (e.g. Qiu, B. and T.M. Joyce, 1992: Interannual variability in the mid- and low-latitude western North Pacific. *J. Phys. Oceanogr.*, 22 1062-1079; Fu, L.-L., and B. Qiu, Low-frequency variability of the North Pacific Ocean: The roles of boundary- and wind-driven baroclinic Rossby waves, *J. Geophys. Res.*, 107(C12), 3220, doi:10.1029/2001JC001131, 2002.). In my opinion, the study would benefit from a deeper analysis of the existing literature that could constitute a base for a more refined physical explanation of underlying processes. b) The study utilizes GRACE data that are generated using an EOF projection method to reduce noise. These data have been demonstrated to be in better agreement with steric-corrected altimetry. In order to study the relation to ENSO, the author performs an EOF analysis of the GRACE data. Does the method used to reduce noise as it is based on projecting onto model EOFs therefore have an effect on this type of analysis? Are there any circular effects when using the method on the data as well as for the analysis? c) The analysis is mostly statistical and does not include a detailed physical explanation behind the processes leading to the trend in wind stress curl which is suggested to force the trend in OBP. I would like to encourage the author to elaborate in more detail on how this study exceeds the studies by Chambers and Willis, 2008, who discovered the trend, and Song and Zlotnicki, 2008, who discussed the OBP variations in this region related to ENSO.

Specific comments:

On page 1633, line 10-11. Ponte (1999) studies seasonal variability in OBP: how does this relate to interannual and longer term variability as discussed in this manuscript?

On page 1637, line 7-8 state that the EOF analysis allows to estimate the contribution of ENSO to the signal. The EOF analysis provides information on fluctuations that explain certain percentages of the signal. The first mode showing a relation to ENSO indicates that a high percentage of the total signal is connected to ENSO. However, part of ENSO related signals might also have been projected into other modes while

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not having a statistical significant relation to ENSO indices. The statement made in line 7-8 might be thus too strong.

On page 1637, line 19- page 1638, line 13, the author comments on ENSO events that do not coincide with OBP or WSC fluctuations in the North Pacific. Providing a physical explanation or a suggestion on what physical processes might be involved and why, would help to strengthen the message of this study.

Technical corrections:

References like Miller and Manuta for example are listed, but do not appear in the text.

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Interactive comment on Ocean Sci. Discuss., 8, 1631, 2011.