Referee #1:
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This is an interesting hypothesis that there has been a recent change in ENSO such that the Southern Ocean has become a major driver of events, rather than the classical recharge mechanisms that was prevalent prior to the 2000s.

I am concerned however that the hypothesis is not supported by the data analysis. There is so much time filtering of fields, correlations of different indices that are rather small, use of short time series and use of high order EOFs that only explain a fraction of the variance, it is difficult to follow what is going on. This makes it impossible to judge if the results are really meaningful or are just a statistical fluke. In addition, the manuscript is long and rambling and very hard to follow.

The author does not expect that the reviewer may use some slang for comments (like "fluke**"). The author would like to remind that the paper was submitted to "Ocean Science" rather to "Geophysical Research Letters" where there is a strict limitation for a paper volume.**

The paper has a clear and logical structure. At first, the brief survey of published papers demonstrating the link between processes in the Southern ocean and the tropics has been presented.

Than it was shown that the variability of the balance between wind stress and form stress in Drake Passage, together with the inverse barometer response to atmospheric pressure, result in significant short time scale variability of the meridional mass fluxes in the Pacific sector of the Southern Ocean north of 47°S, which leads to the appearance of anomalies in pressure and density in the Southern Ocean. These anomalies can be transported to the low latitudes of the Pacific Ocean. Here they interact with the stratification and can cause variations in the inclination of the thermocline in the tropical Pacific, which, in turn, can facilitate more intense development of ENSO effects.

The variability of the oceanic mass in the Pacific sector of the Southern ocean is negatively correlated with the wind forcing over the ACC (Stepanov, 2009a). The wind weakness is due to atmospheric pressure pattern blocking over the SE Pacific. The last can be characterised by the variability of atmospheric pressure at 280E, 35-45 S, which position is chosen according to the preferred propagation away from the Southern Hemisphere subtropical jet waveguides indicated by Ambrizzi et al., 1995. This variability precedes to NINO variability by 4 months.

The EOF analysis of atmospheric pressure patterns in the SE Pacific revealed an additional plausible mechanism explaining the change in ENSO characteristics in the 2000s. The reasons of choosing EOF1, EOF2 and EOF5 modes for the analysis have been described. The reviewer's criticism using of high order EOFs for the analysis likely can be due to by the paper by Overland and Preisendorfer (1982) who showed that for their analysis only the first four PCs were significant. However, as follows from Overland and Preisendorfer (1982), the significance of EOF modes depends on both length of observation data set and the choice of a number of eigenvalue statistics. Therefore a significance of our 5-th EOF mode has been checked: Monte Carlo test has been done similar to Overland and Preisendorfer (1982), but the results of the test have not been presented in the early

submitted manuscript. Now the result of this test showing statistical significance of EOF5 mode is added in this new version of the paper.

The EOF5 mode captures a meridional dipole pattern to the west of Drake Passage, which characterizes the variability of the strength of meridional shear of zonal wind that defines the growth rate of the air jet instability over this region. The high correlation (~0.8) between PC5 and NINO3.4 only for 2002-2011 period (while for 1989-2001 PC5 and NINO3.4 are not correlated at all) means that air jet instability over the region (leading to the formation of SLP patterns shown in Fig.5) became to be a significant contributor to the development of maximal phase of the ENSO after 2002 with lead time of about 8 months, i.e., this event is coincident with the time of ENSO onset.

Regarding to "so much time filtering of fields". The filtering procedure was applied only to SLP characteristics. The author did not invent something new: a standard approach for SLP filed has been used. To minimize intra-seasonal noise 5-month running average procedure for time series has been applied (e.g., see Trenberth, 1997, note that this smoothing leads to that time series of the SOI index correspond very well with changes in ocean temperatures across the tropical Pacific). Note also that all the correlations presented by the paper are statistically significant with a probability of 95%, which was determined through the effective number of degrees of freedom (results are similar when a Monte Carlo simulation of correlation coefficients is used).

While a physical mechanism is put forward for the link (page 962, para beginning line 9), I cannot tell if the preceding analysis has actually tested this mechanism. I would really encourage the author to consider a complete re-write, focussing on a couple of clear figures and a much shorter manuscript. I think the ENSO community could be interested in this hypothesis but, as the manuscript stands, they will not understand it and the paper will have zero impact.

The aim of the paper is to present a new hypothesis that a recent change in ENSO is due to processes occurred in the Southern Ocean. The hypothesis is new and it cannot be easily accepted by all scientists (perhaps the reviewer accepts this hypothesis and he does not need detailed description of this idea). Therefore to avoid some misunderstanding both a brief description of already published results by Stepanov (2009) (not all Universities/Institutes have a subscription to this journal) and results of the analysis of ERAInterim data had to be given that is impossible to do it in a shorter paper.

I would like to note that a physical mechanism is put forward not only at page 962, para beginning line 9 – Section 2 deals with the description of this mechanism.

As was said early the paper has a clear and logical structure. The paper by Stepanov (2009a) showed that the northward anomaly of the meridional mass fluxes in the Pacific sector of the Southern Ocean north of 47°S, associated with weak wind over the ACC, precedes the development of ENSO events by about 4 months. The analysis of ERAInterim data demonstrates that wind weakness over the ACC is due to the development of atmospheric pressure pattern blocking over the SE Pacific (Fig. 5). Statistically significant correlation between PC5 and NINO index only after 2002 means that the EOF5 mode, describing the variability of the strength of meridional shear of zonal wind to the west of Drake Passage, and characterizing air jet instability over this region, became to be a

significant contributor to the development of maximal phase of the ENSO after 2002 with lead time of about 8 months. It is worth noting that though EOF5 mode explains only 5% of the total SLP variability (that is in agreement with "probability distribution tail" that can describe such extreme events as ENSO), but the pressure difference between centres of regions with high and low pressure of EOF5 mode (Fig. 8c) is more than 50% of a similar difference of EOF1 mode (Fig.8a). Hence the variability due to EOF5 mode can be significant factor leading to the formation of SLP patterns shown in Fig.5.

The author has carefully revised the manuscript and tried to improve it. It is worth noting that the manuscript has been read by several native English-speaking colleagues (particularly see, e.g., Acknowledgments) who did not have any problems to understand the text.