

## ***Interactive comment on “Siple Dome shallow ice cores: a study in coastal dome microclimatology” by T. R. Jones et al.***

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Specific points Page 2683, Line 5. ENSO also affects the western part of the Pacific Ocean with greater precipitation over Indonesia/Malaysia during the La Nina phase. I'm not keen on the term “ASL-ENSO dynamic”. Don't you just mean the “atmospheric circulation variability associated with the ENSO teleconnection”?

ANSWER: Yes and agreed. We will remove the mention of 'dynamic' - it is vague and not useful.

Page 2688, Line 2. You should explain why you used the SOI index. These days the Nino 3.4 temperature is often favoured as a better measure of the ENSO cycle.

ANSWER: We have decided to use Nino 3.4.

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Page 2688, Line 9. You need to explain why there is such a focus on the December – March months. This is a strange period of the year to examine since it is when the ozone hole has had the greatest impact on the surface climate so giving a jump around 1980. It's also when the tropical – high latitude link is rather weak, with earlier work stressing the winter (the work of Steig) and spring (the work of Schneider) seasons as being most important. There is also a clear minimum in storm activity over the southern Pacific Ocean during the summer, so giving less accumulation.

ANSWER: We now use the Nino 3.4 temperature and focus on the entire year, rather than DJFM. Your points are well taken concerning the ozone hole and various seasons. Thank you.

Page 2689, Line 20. I always find terms such as “a systematic climate shift” and “large-scale ENSO reorganizations” rather unhelpful and don't really give any insight into the physical processes of what happened in the tropical Pacific.

ANSWER: Agreed, these will be removed from the paper.

Page 2690, Line 5. How robust is the relationship shown in Fig 5? Is there a significant relationship?

ANSWER: The relationship is not significant, and the graph will be removed.

Page 2690, Line 9. “opposite temperature signal as tropical ENSO SSTs.”. Which part of the tropics are you talking about here?

ANSWER: We have decided to remove the implied connection of the ENSO and the ASL, so this point no longer relates.

Page 2691, Line 1. “Mass accumulation is a direct measure of the amount of precipitation an ice core site experiences”. Shouldn't this be the net accumulation? i.e. the precipitation – evaporation – the effects of blowing snow.

ANSWER: Yes, that will be revised.

Page 2691, Line 26. There is an annual cycle in the zonal location of the ASL, with the low being over the Bellingshausen Sea during summer and over the Ross Sea in Winter (Turner et al., 2012).

ANSWER: After reading Turner, it is clear that the Bertler study is too simple to explain water isotopes at Siple Dome. We have decided to remove the implied connection between the ENSO, the ASL, and Siple Dome.

Page 2692, Top. This is far too simple a picture of how the ASL moves at different stages of the ENSO. Is there any evidence to back this up? Or is it all based on the Bertler paper? That paper only contained a simple schematic and no separate analyses of the ASL location during the El Niño and La Niña phases.

ANSWER: Agreed. We will not include that theory in our paper.

Page 2692. "ASL-ENSO system". Is this really a system? There is a teleconnection between deep convection on the Equator and the ASL area, but other factors play a part, such as the large, intrinsic variability of the mean sea level pressure in the area and the effects of the Southern Annular Mode.

ANSWER: Agreed, it will be removed from the paper.

Page 2692. "a completely different atmospheric circulation pattern is affecting the Inland Flank." Have you looked at back trajectories to try and understand this?

ANSWER: No, we haven't looked at back trajectories, but we have looked at recent satellite reconstructions, and our ENSO-ASL theory is far too simple. The circulation around Siple Dome is more complex than we have implied in our paper.

Page 2694.top. "During La Niña, the ASL circulation is strongest, which could pull atmospheric water vapour from more distant and warmer SST source regions. During El Niño, the ASL circulation is weakest, which could pull moisture from less distant and colder SST source regions.". This all seems very speculative. Why not just use the

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reanalysis data sets to look at the meridional component of the wind during el nino and la nina events? Then we would have some numbers to look at.

ANSWER: Agreed, it is too speculative, and will be removed.

Figure 11. The Southern Hemisphere reanalysis data sets have no meaning prior to 1979 since there was no satellite sounder data include and they just reflect the model climatology. So the data for 1962, 1974, 1976 and 1958 should be removed. Some indication needs to be given as to whether these differences are significant at the 5% level. The ICAO mean 850 hPa height is 1,457 m, so the differences are quite small. Also the Antarcticwide differences shown in Fig 11 look rather SAM-like to me, rather than the effect of ENSO variability, since the result of ENSO changes is a wave train from the tropics to the Bellingshausen Sea – the Pacific South American (PSA) pattern. It would be good to examine the phase of the SAM in these two sets of years. Rather than show the height differences between the El Nino and La Nina phases why not just show the mean 850 hPa height for the two phases? That would give a much better indication of the air mass trajectories.

ANSWER: Ok, agreed. This graph will also be removed, since there are not enough strong ENSO events after 1979 to come to any conclusions about the effect on climate at Siple Dome. We will however provide graphs of cross wavelet analysis of water isotopes with accumulation, ENSO, and SAM to determine any important shared variability.

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