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Interactive Comment

Interactive comment on "ENSO surface longwave radiation forcing over the tropical Pacific" *by* K. G. Pavlakis et al.

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General Comments

Pavlakis et al. (2006) "ENSO surface longwave radiation forcing over the tropical Pacific" complements the body of literature on interannual variations in the atmospheric energy budget (e.g. Trenberth et al. 2002). The authors specifically use a referenced (Pavlakis et al. 2004) deterministic radiative transfer model to examine downward longwave radiation (DLR) and net longwave radiation to the Earth's surface (NSL). The results are consistent with changes in precipitation observed during the evolution of El Nino events, which I will discuss further below. Overall, the paper is well written and addresses relevant questions within the scope of atmospheric chemistry and physics.

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Specific Comments

My specific comments revolve around the interpretation of a few figures, including the definition of “significance”.

1) NSL is defined over ocean (an oceanic emissivity of 0.95 and SST are used to compute NSL), but NSL values are shown over both ocean and land (Fig. 2 and elsewhere). Do the authors suggest that NSL is valid over land? Is the reader to ignore the land areas? Even though the discussion is specifically on the tropical Pacific, these issues need to be clarified.

2) Pavlakis et al. (2006) use +2 standard deviations to denote significance in their analysis of DLR variability during El Nino (page 12905, line 18). However, they state that during the early phase, August-September-October (ASO), the changes are significant (always occur during the ENSO warm phase) over Indonesia and western Java (page 12906, line 10). As can be seen from Figure 5e, the +2 standard deviation level only appears in the central Pacific. Thus, the statement is not true.

3) I would prefer that for the correlation maps (Figs. 8 and 9), only significant values be shown.

4) The end of section 7 was somewhat disappointing. The authors conclude this section with “We have found that only the time-series of total water vapor anomaly (Total water-A) leads the DLR-A [3.4] time-series by 3-4 months in contrast with the time-series of the other parameters that influence DLR.” What are the correlation values? What is the reason (even if only speculative) for water vapor controlling the leading relationship?

Discussion in Regards to Precipitation

I was particularly interested in the result that the time series of the mean downwelling longwave radiation anomaly in the western Pacific precedes that in the Nino 3.4 region by 3-4 months. My collaborators and I have also noted that the Maritime Continent dries

ACPD

6, S5592–S5595, 2006

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about 2-4 months prior to the mature El Nino (see Curtis et al. [2001] for the 1997-98 case study). I produced a figure analogous to Fig. 10b in Pavlakis et al. (2006), but for monthly precipitation anomalies from the Global Precipitation Climatology Project (please email me for a copy). The western Pacific (actually central Indonesia would be a more suitable name for the location 15-0 S, 105-130E) experiences a reduction in rainfall in the same ASO time frame. The authors may want to consider that even though clouds are of second order importance in determining DLR, the shifting of rainfall eastward during the evolution of ENSO would lead to a drying of the atmosphere and reduction of water vapor. Air temperatures may also drop if there is a substantial loss of latent heat release to the atmosphere from precipitation.

Technical Corrections

1) Page 12896, line 19, remove first “surface” (4th word in line)

2) Page 12907, line 9, I would replace the sentence beginning “This indexĚ”, with “The strength of the events are quantified as the three-month smoothed SST departures from normal SST”

3) Figure 9b is never referenced in the manuscript.

4) Page 12909, line 25, “minimum” instead of “deep”

References

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ACPD

6, S5592–S5595, 2006

Interactive Comment

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