P1.47 THE ENSO SIGNAL IN TROPICAL TROPOSPHERIC TEMPERATURE

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Abstract

Interannual anomalies in tropical tropospheric temperature have been shown to be related to interannual anomalies in tropical mean sea surface temperature (SST) by a simple moist adiabatic relationship (Hurrell and Trenberth 1998; Wentz and Schabel 2000). On physical grounds, it is less obvious than it might at first seem that this should be the case. We expect that the free tropospheric temperature should be sensitive primarily to SST anomalies in regions where the mean SST is high and deep convection is frequent (e.g., Wallace 1992), rather than to the tropical mean SST. The tropical mean also includes nonconvecting regions where the SST has no direct way of influencing the free troposphere. However, interannual anomalies of SST averaged over regions of high monthly mean precipitation are very similar to interannual anomalies of tropical mean SST. Empirical orthogonal function analysis of the monthly SST histograms for the period 1982-1998 reveals a leading mode, well separated from the others, whose structure is very similar to a simple shift of the annual and climatological mean histogram, without change of shape. Consequently, many different ways of sampling the histogram will yield similar anomaly time series, and the adequacy of the mean SST for predicting the tropospheric temperature appears coincidental from the point of view of the uncoupled atmospheric problem with given SST. There is a suggestion in the results that changes in the histogram shape may be significant for the tropospheric temperature anomalies associated with some large El Niño events, and that in those events it is indeed the SST anomalies in the convective regions which are most important in controlling the tropospheric temperature.

The complete manuscript (Sobel, Held, and Bretherton 2002) is available on the web, see below.

References

- Hurrell, J. W. and K. E. Trenberth, 1998: Difficulties in obtaining reliable temperature trends: Reconciling the surface and satellite MSU 2R trends. *J. Climate*, **11**, 945-967.

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