MLS-related Scientific Publication

Scientific Themes: Earth System Modeling, Climate Research

El-Niño as a Natural Experiment for Studying the Tropical Tropopause Region, A. Gettleman, W. J. Randel, S. Massie, F. Wu, W. G. Read, and J. M. Russell III, *J. Climate*, **14**, 3375–3392, (Aug., 2001).

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Summary and MLS contribution

This paper examines the interannual variability of convection, wind, temperature, and water vapor in the tropical tropopause region between 14 and 18 km. Observations from satellites and reanalyses are compared to the Community Climate Model version 3 (CCM3) general circulation model which uses sea surface temperature observations as an input. Convection, particularly over the tropical Pacific, is in phase with the El-Niño Southern Oscillation (ENSO). The CCM3 reproduces most of the variability seen in observations during an ENSO cycle. The figures shown below compare upper tropospheric water vapor measured by the Microwave Limb Sounder on the Upper Atmosphere Research Satellite with that from CCM3. The MLS observations and CCM3 results agree well.

This work benefits society by improving understanding of processes affecting interannual climate variability and, consequently, will help improve forecasts of year-to-year climate change.

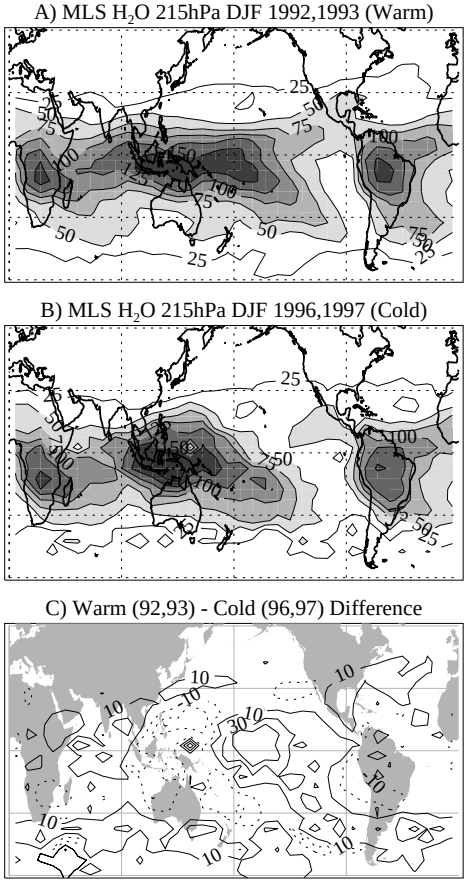

FIG. 13. Seasonal composites of MLS upper tropospheric humidity (UTH) in parts per million by volume (ppmv) during ENSO warm and ENSO cold events. Composites of monthly mean UTH for 4 December-February periods (A): ENSO cold events (1995–1996 and 1996–1997). (B): ENSO warm events (1991–1992 and 1992–1993). (C): difference between the two (in ppmv). Contour intervals of 25 ppmv for (A) and (B). Levels greater than 50 ppmv shaded. Contour intervals at ± 10,30 and 50 ppmv in (C).

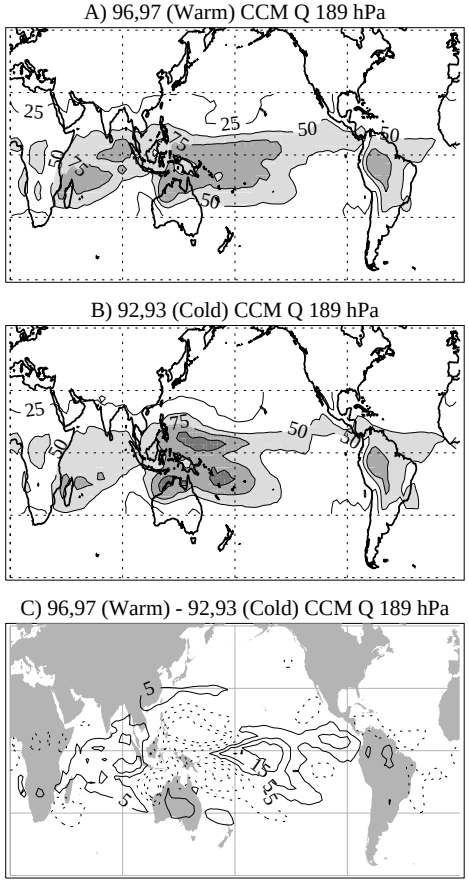

FIG. 14. Seasonal composites of CCM water vapor mixing ratio (Q) in parts per million by volume (ppmv) at 190 hPa during ENSO warm and ENSO cold events. Composites of monthly mean UTH for 4 December-February periods A) ENSO cold events (1995–1996 and 1996–1997). B) ENSO warm events (1991–1992 and 1992–1993). C) difference between the two (in ppmv). Contour intervals of 25 ppmv for (A) and (B). Levels greater than 50 ppmv shaded. Contour intervals at ± 5,15 and 25 ppmv in (C).

Errata: In Figure 13 and 14 captions, descriptions for panels (A) and (B) need to be interchanged. Figure 14 Panel (A) title should read: "A) 92,93 (Warm) CCM Q 189 hPa" and Panel(B) should read: "B) 96, 97 (Cold) CCM Q 189 hPa".