MLS-Related Scientific Publication

Scientific Themes: Atmospheric Dynamics and Climatology.

The SPARC Intercomparison of Middle-Atmosphere Climatologies. William Randel, Petra Udelhofen, Eric Fleming, Marvin Geller, Mel Gelman, Kevin Hamilton, David Karoly, Dave Ortland, Steve Pawson, Richard Swinbank, Fei Wu, Mark Baldwin, Marie-Lise Chanin, Philippe Keckhut, Karin Labitzke, Ellis Remsberg, Adrian Simmons, and Dong Wu, *J. Clim.* **17**, 986–1003, 2004.

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Summary

An updated assessment of uncertainties in ‘‘observed’’ climatological winds and temperatures in the middle atmosphere (over altitudes: 10–80 km) is provided by detailed intercomparisons of contemporary and historic datasets. These datasets include global meteorological analyses and assimilations, climatologies derived from research satellite measurements, historical reference atmosphere circulation statistics, rocketsonde wind and temperature data, and lidar temperature measurements. The comparisons focus on a few basic circulation statistics (temperatures and zonal winds), with special attention given to tropical variability. Notable differences are found between analyses for temperatures near the tropical tropopause and polar lower stratosphere, temperatures near the global stratopause, and zonal winds throughout the Tropics. Comparisons of historical reference atmosphere and rocketsonde temperatures with more recent global analyses show the influence of decadal-scale cooling of the stratosphere and mesosphere. Detailed comparisons of the tropical semiannual oscillation (SAO) and quasibiennial oscillation (QBO) show large differences in amplitude between analyses; recent data assimilation schemes show the best agreement with equatorial radiosonde, rocket, and satellite data.

This study highlights aspects of middle-atmosphere climatologies that relatively uncertain.

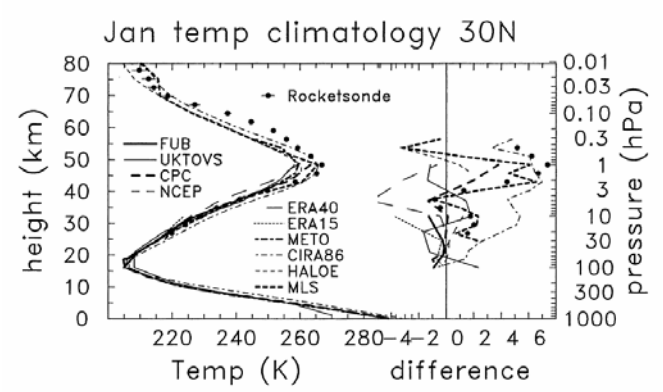

FIG. 6. Comparison of Jan average rocketsonde temperature statistics at 308N with zonal mean analyses. Right-hand side shows the respective differences from METO analyses up to 0.3 hPa.

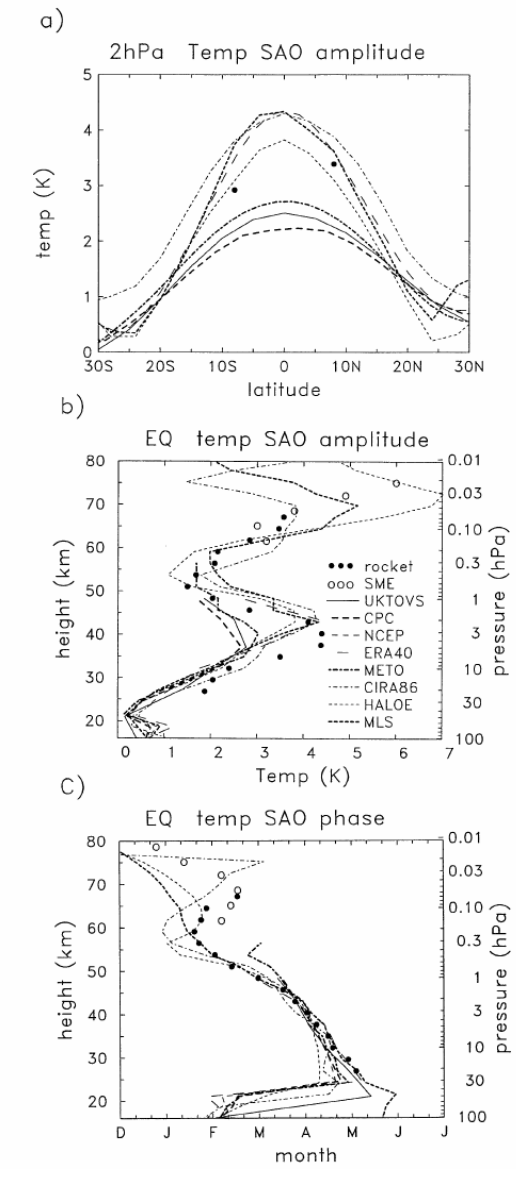

FIG. 9. (a) Latitudinal structure of the amplitude of the temperature SAO at 2 hPa derived from each dataset. The dots show the corresponding values derived from Rocketsonde data near 88S and 88N. (b) The vertical amplitude and (c) phase structure of the SAO at the equator are shown. Phase refers to month of the first maximum during the calendar year.