Influence of Sudden Stratospheric Warmings upon Sub-Seasonal Forecasts

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It has been well documented that during Sudden Stratospheric Warmings (SSW) the Northern Hemisphere polar stratosphere warms resulting in anomalously large geopotential height (GPH) anomalies (an alternative to the Northern Annular Mode). Initially, these GPH anomalies descend downward towards the tropopause. The stratospheric levels from 50 to 100 hPa exhibit persistently positive GPH anomalies for an extended period of 45 to 60 days following the onset of the SSW, representing a weakened stratospheric polar vortex. However, these positive GPH aloft do not persistently extend to the surface (for examples, see the NOAA Climate Prediction Center Stratospheric-Tropospheric Monitoring webpage). The in- and out-of-phase GPH anomalies in the troposphere have been characterized as "paint drips" (Baldwin and Dunkerton, 2001). The GPH anomalies following SSWs in the troposphere are of great interest for sub-seasonal forecasts. As Charlton and Polvani (2007) showed, there are significant climate changes across the NH during the period following an SSW. However, this pattern can vary significantly from one SSW event to another, dictated by other interactions in the troposphere. To further understand what geospatially is happening during the period following an SSW in the troposphere, we will evaluate several classic SSWs to understand how tropospheric oscillations, such as the Madden Julian Oscillation, enhance or interfere with the persistence of GPH anomalies. Information obtained from this evaluation can improve the understanding of SSW in sub-seasonal forecasting.

Key words, sudden stratospheric warming, sub-seasonal forecast

References:

Baldwin, M.P., and T.J. Dunkerton, 2001: Stratospheric harbingers of anomalous weather regimes. *Science*, **294**, 581-584.

Charlton, A. J., and L. M. Polvani, 2007: A new look at stratospheric sudden warmings. Part I: Climatology and modeling benchmarks. *J. Climate*, **20**, 449–469.

See also: NOAA/Climate Prediction Center Stratospheric-Tropospheric Monitoring Web Page: http://www.cpc.ncep.noaa.gov/products/stratosphere/strat-trop/