Abstract

Tropospheric weather systems that are associated with extremely cold temperatures over 100 KPa can have dramatic effects on the stratosphere, especially when the cold temperatures occur far below the tropospheric vortex edge. These events are associated with a large vertical flux of planetary wave activity (EP flux) that can lead to planetary wave breaking and stratospheric sudden warmings (SSWs). They are often associated with low 360 K potential temperatures that occur below the tropospheric vortex edge. Using NOAA's Hybrid Orographic Atmospheric Prediction System (HAPAS) and the NASA-GEOS model, we have examined several cold events that occurred during the winter of 2005-2006. These events show a strong upper tropospheric warming in the tropics, consistent with a tropical warming event. The high values of meridional heat flux and upward displaced 360 K surface height at 50N are associated with extremely cold temperatures near the ground. These events are associated with very strong upper tropospheric temperature events, as seen in the 450 K PV. The high values of meridional heat flux and upward displaced 360 K surface height at 50N are associated with extremely cold temperatures near the ground. These events are associated with very strong upper tropospheric temperature events, as seen in the 450 K PV. The high values of meridional heat flux and upward displaced 360 K surface height at 50N are associated with extremely cold temperatures near the ground. These events are associated with very strong upper tropospheric temperature events, as seen in the 450 K PV. The high values of meridional heat flux and upward displaced 360 K surface height at 50N are associated with extremely cold temperatures near the ground. These events are associated with very strong upper tropospheric temperature events, as seen in the 450 K PV. 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