

Space Studies of the Upper Atmospheres of the Earth and Planets including Reference Atmospheres (C)

The High Latitude Mesosphere and Lower Thermosphere (C2.1)

## **STRATOSPHERE-MESOSPHERE COUPLING DURING MAJOR STRATOSPHERIC SUDDEN WARMING**

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Three-hourly WACCM simulations are used to characterize a composite life cycle of the major Stratospheric Sudden Warming (SSW) event from the surface up to 130 km. The life cycle reveals the intimate coupling between the stratosphere and mesosphere, in addition to the stratosphere-troposphere connection much studied in the past. During the SSW onset, the polar zonal-mean wind reversal occurs at nearly all model levels: eastward to westward direction below 80 km and vice versa above. Concurrent anomalous warming appears throughout the stratosphere and above 90 km with cooling in the intervening mesospheric layer, consistent with stratospheric and thermospheric downwelling as well as mesospheric upwelling. As SSW matures, these anomalous patterns migrate downward in time greatly affecting the distributions of polar NO<sub>x</sub> and local ozone maxima layers in ways observed by satellites. We further analyze the behavior of planetary waves and the variability in the secondary ozone maximum, associated with the abrupt reformation of a high-altitude stratopause in the polar mesosphere.