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Understanding recent stratospheric climate change

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Two key aspects of stratospheric climate change are currently not fully understood: 1) why the long-term cooling in stratospheric temperatures is derived entirely from two discrete steps during 1982-4 and 1991-3; and 2) why the long-term cooling is evident at all latitudes despite the fact ozone losses are concentrated at middle and high latitudes. Here we exploit a statistical fitting technique that provides new highlights into both aspects of stratospheric climate change. The results reveal that the unusual time history of global-mean stratospheric temperature trends is due largely to global-wide ozone losses following the eruptions of El Chichon and Mt. Pinatubo. The results further reveal that horizontal structure of recent stratospheric temperature and column ozone trends are indicative of large scale changes in the stratospheric overturning circulation.