



Mid-litudinal transport of heat and minor constituents over Europe during extreme temperature events of the stratopause region

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Based on 12-years (2002-2013) Lidar measurements of temperatures over Kühlungsborn (54° N, 12° E; Mecklenburg; Northern Germany) and ALOMAR (60° N, 16° E; Norway) extreme temperature events of the stratopause region over Europe are determined in winter. Further with the help of MERRA reanalysis temperature data the statistical analysis is repeated and extended for different quantities of the 1979-2014 period including the transport of minor constituents.

We found that the Lidar measurements of extreme temperatures events are representative for phases of polar warming and subsequent cooling of the stratopause region. Furthermore many warm events show a strong heat transport from southwest to northeast causing sudden stratospheric warmings which are accomplished by enhanced water vapor and ozone transport from the subtropics to polar latitudes over Europe at the stratopause region and below.

Furthermore, a PJO series was constructed by the use of EOF 1 and EOF 2 decomposition of the polar cap temperature profile series as proxy for strong temperature anomalies in winter. The strong link between PJO anomalies and different transport of heat and of minor constituents over Europe is examined with the help of a regression analysis.