



Modelling the Polar Summer Tropopause with CLaMS

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In the frame of the International Polar Year 2008 the POLARCAT-GRACE (Polar Study using Aircraft, Remote Sensing, Surface Measurements and Models, of Climate, Chemistry, Aerosols, and Transport: Greenland Aerosol and Chemistry Experiment) has been carried out from Kangerlussuaq, Greenland. The main focus of this campaign was on surveying the Arctic summer tropopause as well as on detecting and probing forest fire plumes from Siberia and Canada. During the campaign observations of several atmospheric components like ozone, water vapour, nitrous oxide and aerosol were obtained.

Model simulations with the Chemical Lagrangian Model of the Stratosphere (CLaMS) are used for interpretation of observational data. Utilization of a suite of inert tracers initialized with origins of air masses with respect to Potential Vorticity and geographical position as well as tracers marking forest fire and pollution plumes give insight into the influence of transport processes on the Arctic upper troposphere and lower stratosphere.

Model results show a mixing layer below the thermally defined tropopause, consisting of shallow structures of mixed-in formerly stratospheric air, possibly being remnants of stratospheric intrusions, as well as upper level isentropic transport of tropospheric air of subtropical origin into the stratosphere.

Additionally tropospheric influence from East Asian pollution on the lowermost stratosphere triggered by special meteorological conditions is visible in the model results, in good agreement with observations.