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Polar stratospheric clouds over Finland in the 2012/2013 Arctic winter measured by two Raman lidars

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Already in December 2012, the Arctic stratospheric vortex reached temperatures sufficiently low for polar stratospheric cloud (PSC) formation over wide areas of Northern Europe and whole Finland. Within Finland, stratospheric aerosol lidar measurements have been and are performed with two Raman lidar systems, the PollyXT, owned by the Finnish Meteorological Institute (FMI) and situated well below the Arctic circle close to Kuopio (63 N, 27 E) and the MARL lidar owned by the Alfred-Wegener-Institute for Polar and Marine Research (AWI), and situated at the FMI Arctic Research Centre in Sodankylä (67 N, 26 E). The PollyXT has been designed as an autonomous tropospheric lidar system, but it has proven to be able to detect aerosol backscatter and depolarization at least as high up as 25 km.

Measurements are ongoing as far as low clouds allow for stratospheric analysis with both lidars until the end of PSC season in February. For the winter 2012/2013, PSC occurrence frequency, types and characteristics will be determined. Comparative analysis with Calipso lidar profiles covering Finland will be performed.

Preliminary results from December 17-24 show PSCs detected in Kuopio during seven days with the PollyXT lidar. The altitude of the clouds varied in the range of 17-25 km. In Sodankylä the measurements were running on one day during the period and PSCs were observed between altitudes 17-25 km. For the same time period (December 17-24, 2012) CALIPSO has observed stratospheric layers at all overpasses over Finland (9 tracks on five days). The clouds were observed between 18.5 and 26 km, with varying geometric and optical thickness.