

A N2-Raman lidar on board ULA for Arctic atmospheric studies

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A key scientific question relative to atmospheric studies in the Arctic is the quantification and the vertical distribution of aerosols and their interactions with clouds in the lower troposphere.

In May 2016, as part of the PARCS (Pollution in the ARctic System) project, we will conduct an experiment in order to assess the optical properties and concentrations of aerosols near the North-Cape in Norway.

This campaign will involve a new airborne N2-Raman lidar (355 nm) on board an Ultra Light Aircraft (ULA) and an original instrumental synergy between ground-based radar (95 GHz) and N2-H₂O Raman lidar. The airborne experimental preparation for this campaign was divided in two weeks: the first week of experiments above the Rhône valley in June 2015 and the second in the Maurienne valley in the French Alps in December 2015. The capability of the N2-Raman lidar to perform measurements from the ULA during daytime has been checked. After the first campaign of tests, the laser emitted energy per pulse has been upgraded to improve the signal to noise ratio.

Both the strategies and the main results of the two field campaigns will be presented. We will focus on the error budget for the retrieval of the aerosol optical thickness in the first atmospheric kilometer. We will present in addition the potential of such a lidar to monitor industrial pollution plumes in the planetary boundary layer. The airborne lidar measurements will be analysed taking into account the synergy with an in situ particle sizer (FIDAS) provided by the ADDAIR Company.