Properties of pure ice clouds in an alpine environment

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**Introduction**

The CLACE2013 field experiment was designed to investigate the physics and chemistry of aerosols, ice nuclei and cloud hydrometeors. It took place in January and February 2013 at the High Altitude Research Station Jungfraujoch in Switzerland (3580 m ASL). During the experiment, the temperature covered a range from -30°C to 0°C. Wind speeds covered the full range of the Beaufort scale (from calm to hurricane force).

**Instrumentation**

During CLACE2013, numerous cloud particle instruments from different universities / institutes were operated on the outer platform of the High Alpine Research Station Jungfraujoch. Presented are results from the holographic cloud probe GipfelHolo (MPI-C Mainz, open path) and the imaging cloud probe 2D-S (University of Manchester, constant flow through inlet). Both instruments record particle images from ~15 µm up to ~1 mm.

**Meteorological situation**

An upper trough filled with very cold air was centered over central Europe. During this case study, an almost constant northwesterly background flow with 5-6 m/s was present. Temperatures stayed around -26°C, decreasing to -27°C in the night hours. Time intervals with ice supersaturation / ice subsaturation alternated throughout the whole evening and night. No high or mid level clouds were observed when the diamond dust event started.

**Ice particle number concentration and size distribution**

![Number concentration vs. time and particle size (30 s running average)](image)

**Particle image examples**

- Columns
- Plates
- Irregular
- Spheroids

**Conclusions**

Similar to the observation of diamond dust in Antarctica at temperatures around -35°C by Lawson et al. (2006), we found columns being the dominant particle habit. The median of the cumulative size distribution is 100 µm (data from 2D-S), respectively 85 µm (data from GipfelHolo). The maximum of the cumulative size distribution is 75 µm for both instruments. Ice particle numbers decreased after 21:20 UTC and irregular particles from blowing snow became the dominant habit.

**Acknowledgements**

We want to thank the HFSJG staff and the INUIT and CLACE team for collaboration and assistance during the field experiment. This research is funded in part by DFG under the HALO-SPP program.

**References**


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