

*“Polarimetric signatures of ice microphysical processes and
their interpretation using in-situ observations”
(POLICE)*

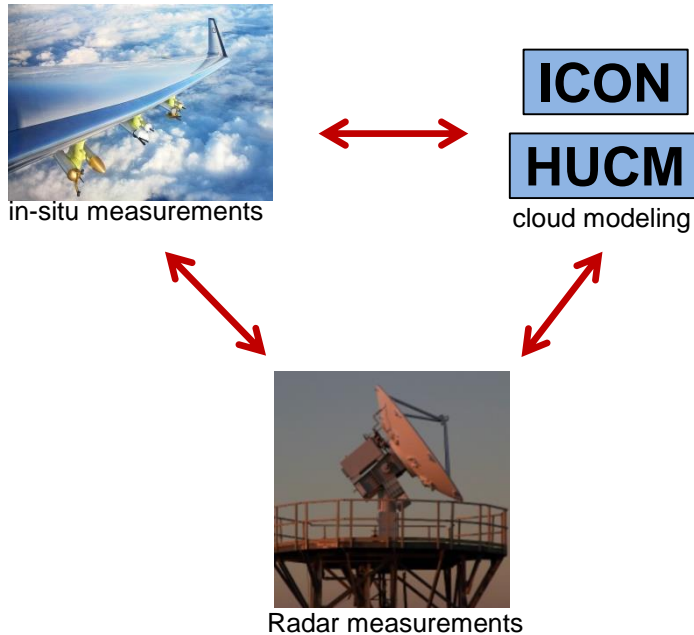
Manuel Moser, Christiane Voigt, Martin Hagen, Tina Jurkat-Witschas (Uni Mainz, DLR)
Silke Trömel, Clemens Simmer, Armin Blanke (Uni Bonn)

PROM Meeting

15.10.2020



POLICE – Motivation



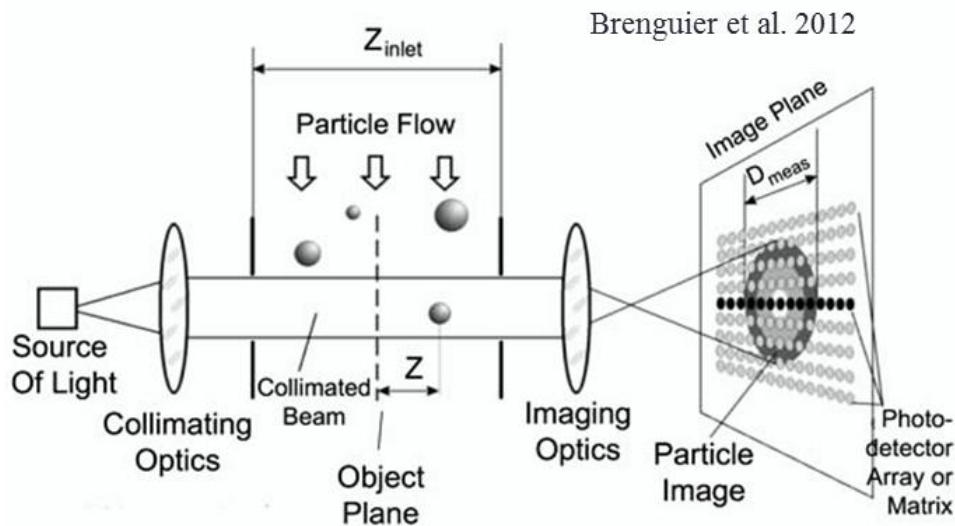
POLICE: major goals

- Evaluate hypotheses on the origin of enhanced K_{DP} in dendritic growth layer
- Discriminate between aggregation and riming processes
- Evaluate the representation of microphysical cloud properties in ICON-LAM

→ **Contribute in-situ cloud measurements**

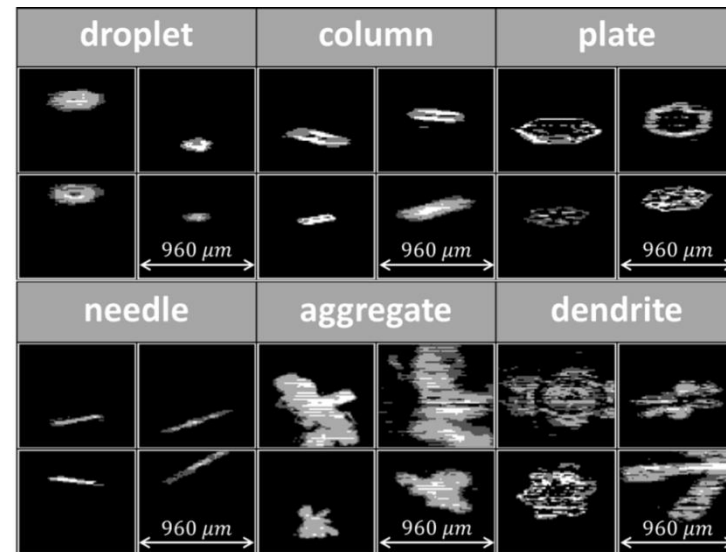
In-situ cloud instrument

Optical Array Probe:

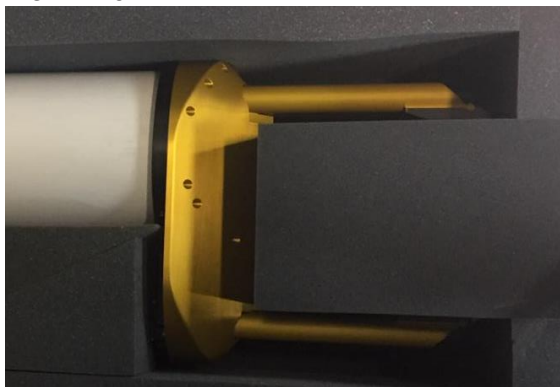


- „Scanning shadow of cloud particles“
 - State of the photo diode array read with $f \sim V_{plane}$
 - Particle size: - 15 μm - 960 μm (CIP)
- 100 μm - 1.28 cm (HVPS)
- N_c , PSD, MVD, LWC/IWC, shape,...

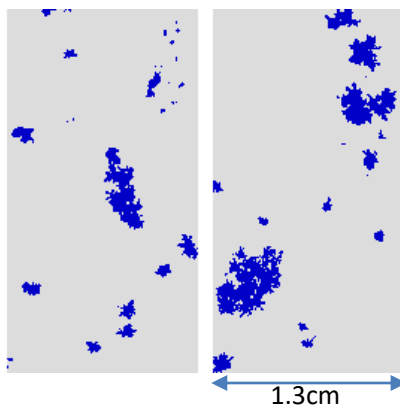
Example of OAP data (CIP-AFLUX data)



New HVPS



HVPS raw data

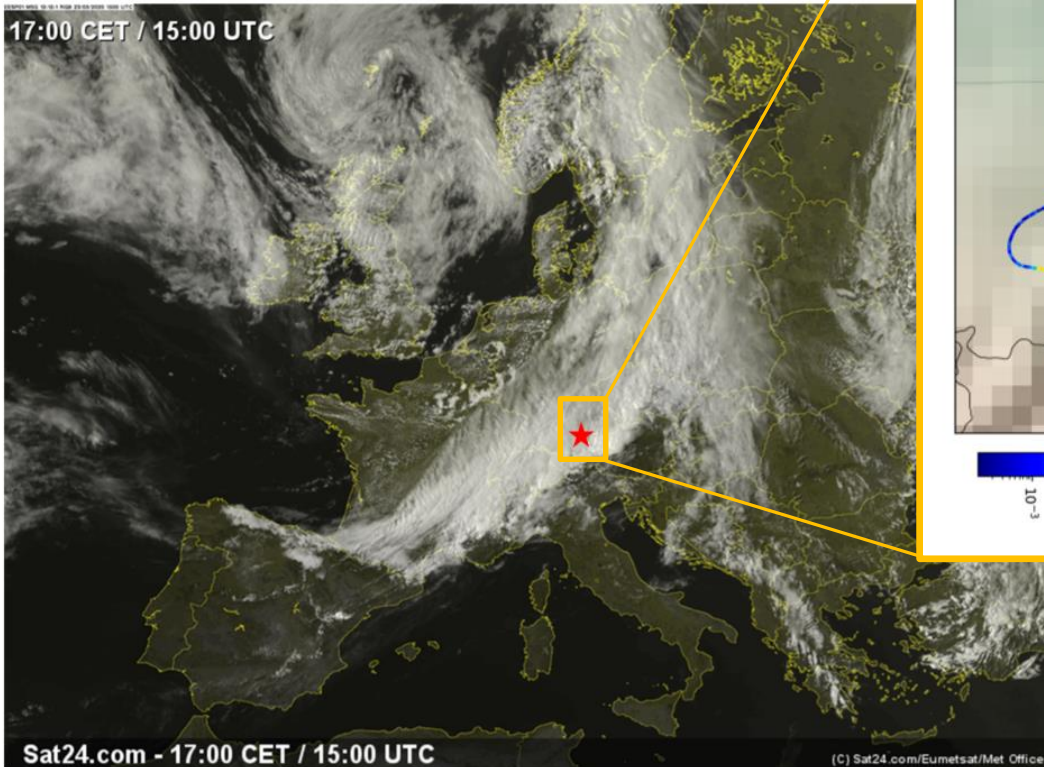


BLUESKY - Radar overflight Hohenpeißenberg

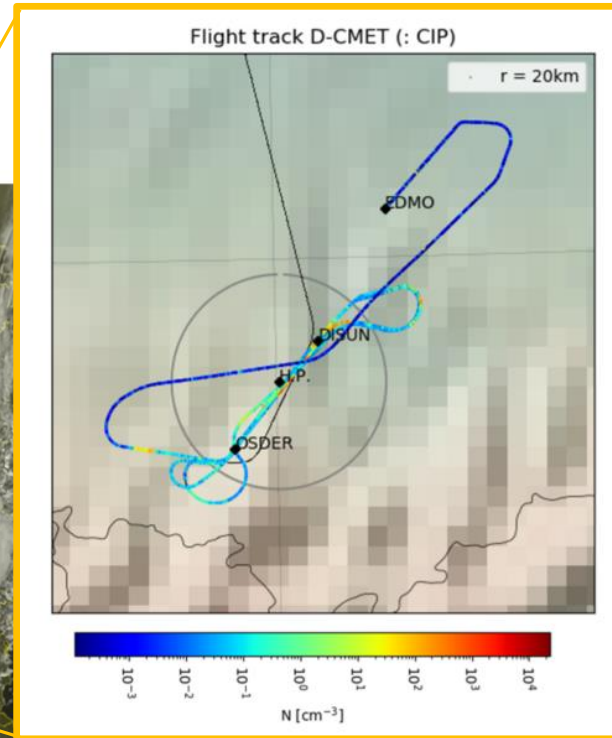


Overview:

EUMETSAT – 23.05.2020



★ Hohenpeißenberg



In-situ cloud measurements at:

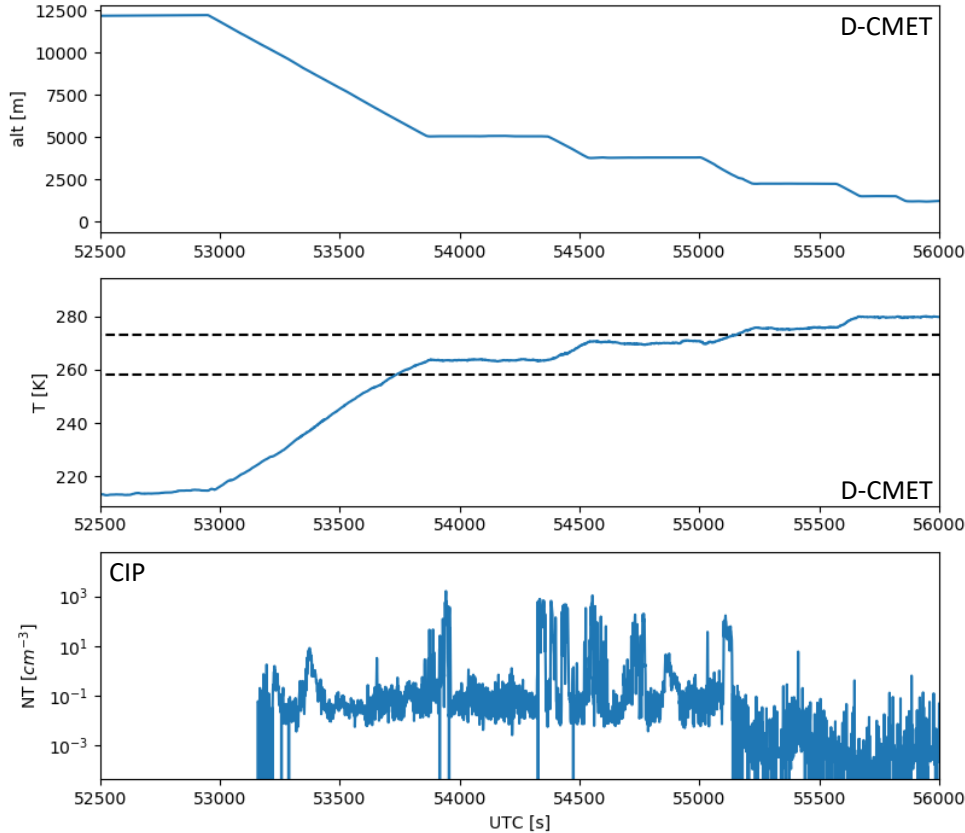
leg	1	2	3	4
T	264K	270K	276K	280K



BLUESKY - Radar overflight Hohenpeißenberg

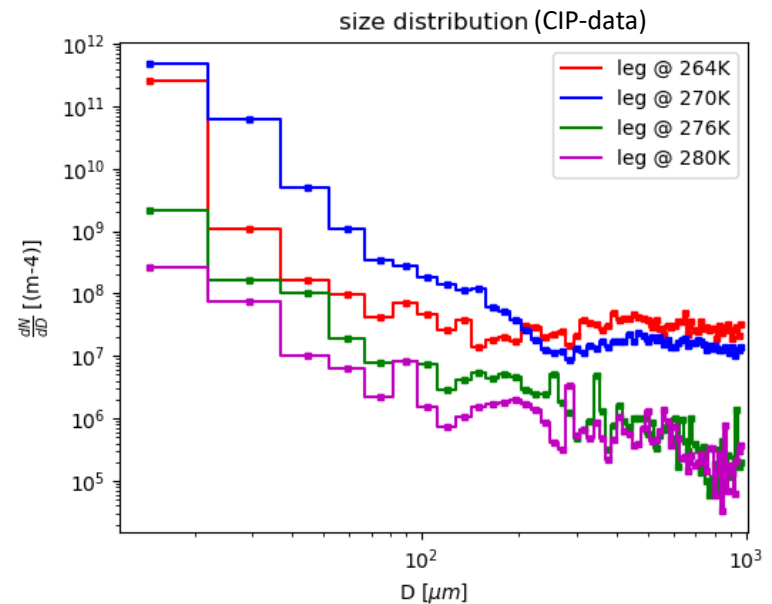


Preliminary data - 23.05.2020



PSD calculated for legs @ T = const. :

- Large different between $T < 0^\circ\text{C}$ and $T > 0^\circ\text{C}$
- $T > 0^\circ\text{C}$: Mode at $\sim 200\mu\text{m}$



BLUESKY - Radar overflight Hohenpeißenberg



In-situ 2D images from CIP

Radar data from QVP-scans*

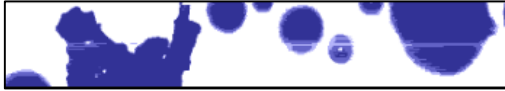
Mainly Aggregates from 2D Particles:



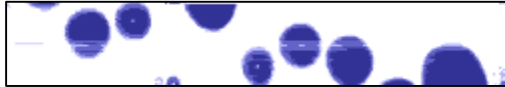
Rimed particles:



Melting layer:



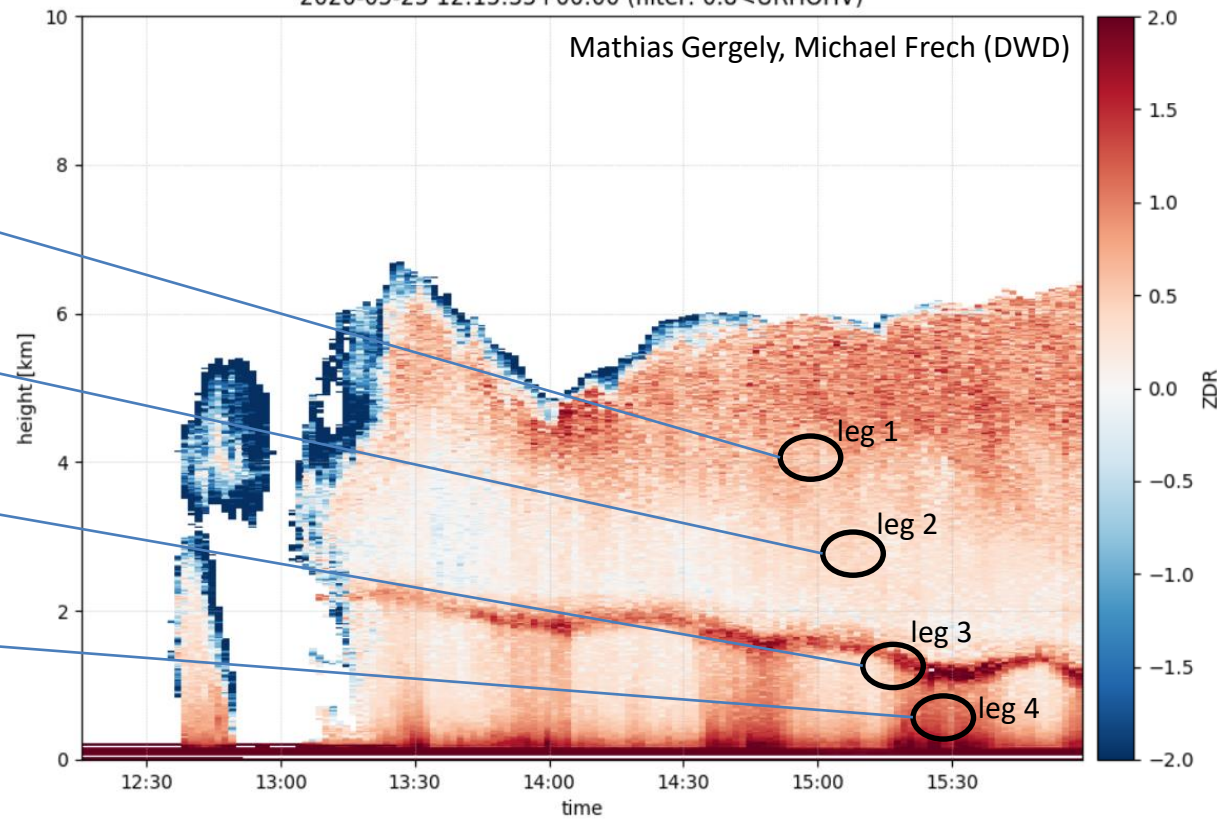
Rain:



ZDR for $RHOHV > 0.8$

2020-05-23 12:15:35+00:00 (filter: $0.8 < URHOHV$)

Mathias Gergely, Michael Frech (DWD)



Manuel Moser
POLICE 15.10.2020

Outlook

Future Campaigns:

- CirrusHL (HALO aircraft)
 - January 2021, OP + Kiruna
 - Focusing on Arctic Cirrus (natural + contrail)
 - Instrumentation: in-situ cloud, aerosol and trace gas, remote sensing and radiation
- Certification HVPS (FALCON aircraft)
 - Summer 2021 in Germany
 - Serval Flights over Germany – radar overflights planned



- Enlarge in-situ data set in melting- and dendritic growth layer
 - Precise study of microphysical processes with 2D hydrometeor images to evaluate hypotheses on the origin of enhanced K_{DP} signals
- Measurements in Aggregation and Riming regions
 - Develop discrimination algorithm (e.g. KI?)

