Precipitation type by various HTB instruments

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Need for precipitation type

- Road maintenance

- Aviation (3D)

- General public

- Hydrology

- NWP development and verification

- Ground observations are point observations

- Radar observations are not ground nor point ones

- Interpolation is not trivial

Both remote sensing data and ground observations are needed together with NWP

Precipitation type prediction in FMI

- Final precipitation type prediction products are not automatically processed from NWP fields

- Meteorologists' experience and intervention are still essential

- Postprocessing and visualisation tools are widely used

- New tools and applications are being developed continuously

Tools for precipitation type

In Testbed

- FD12P optical sensor
- Man-made observations
- Frequent soundings to get 0-degree height
- Dualpol radar
- POSS

Others at FMI

- NWP models:
  - direct output
  - relative topography of geopotential height
  - 0-degree height
- T/RH equations using ground observations and analysis (MESAN, Kriging)

# Man meets machine: T vs. probability of rain P(T,RH)
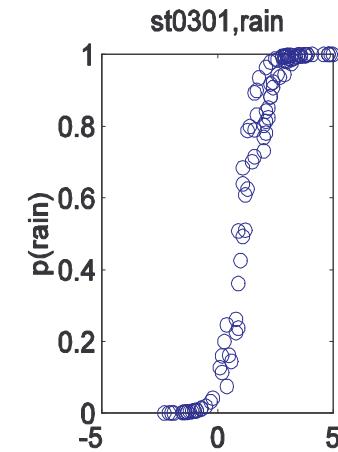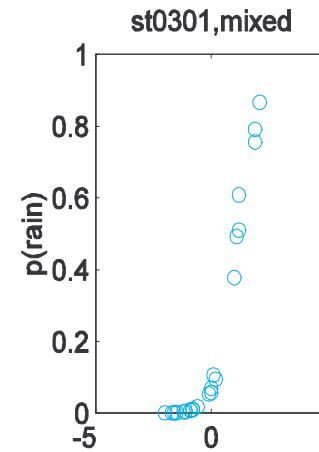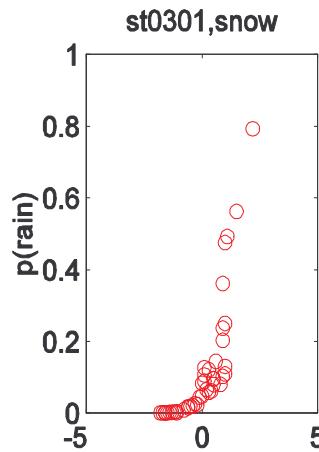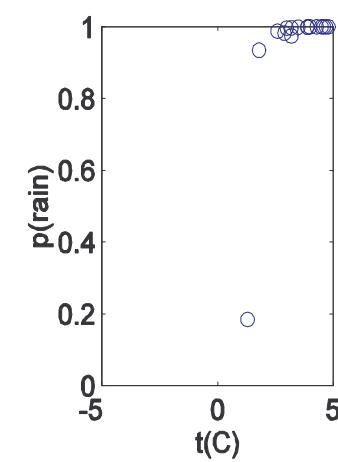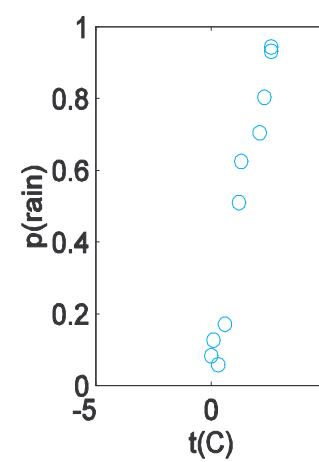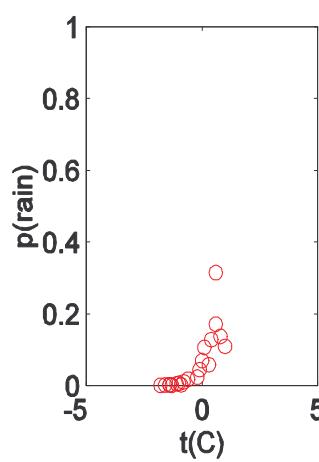
Helsinki-Vantaa
SYNOP

November 2005

Time series

Diurnal variation of zero level height and precipitation type on 15.11.2005.
**o = liquid phase, + = mixed phase, * = solid phase.**
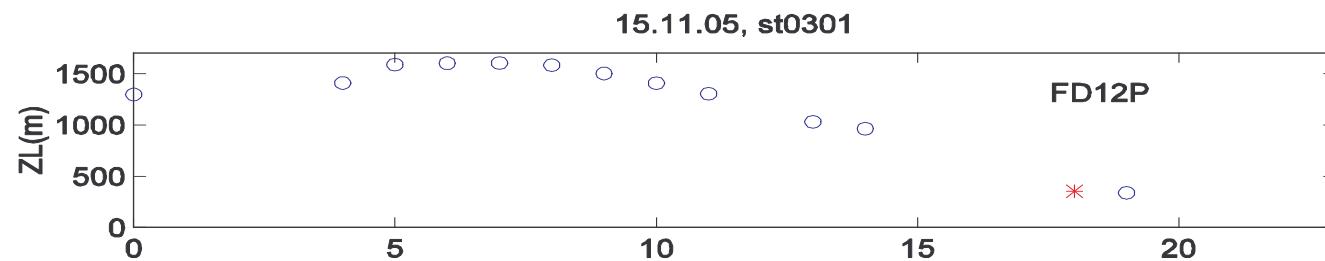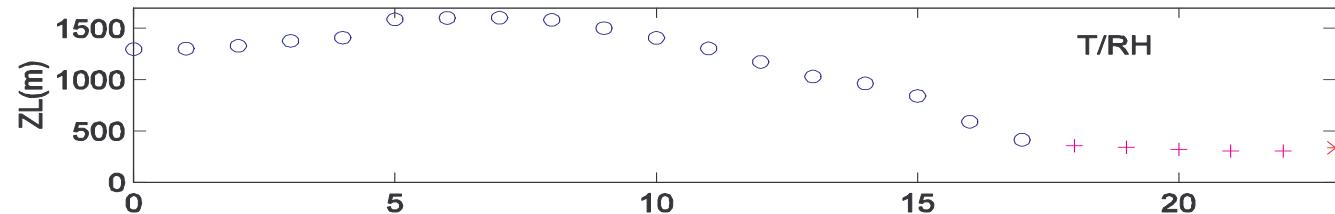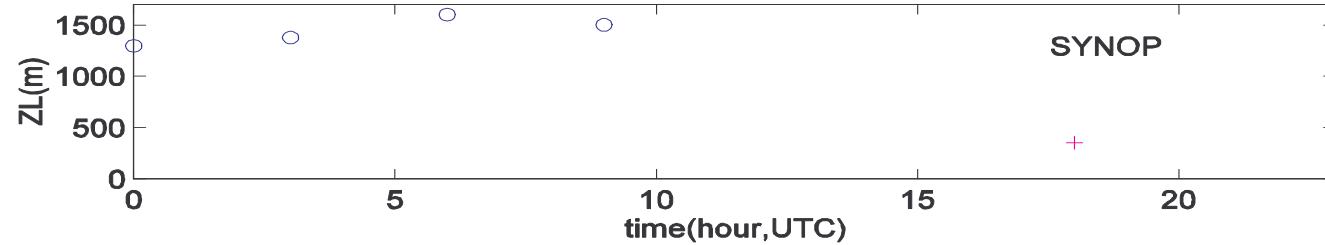
# Concurrent time series of reflectivity
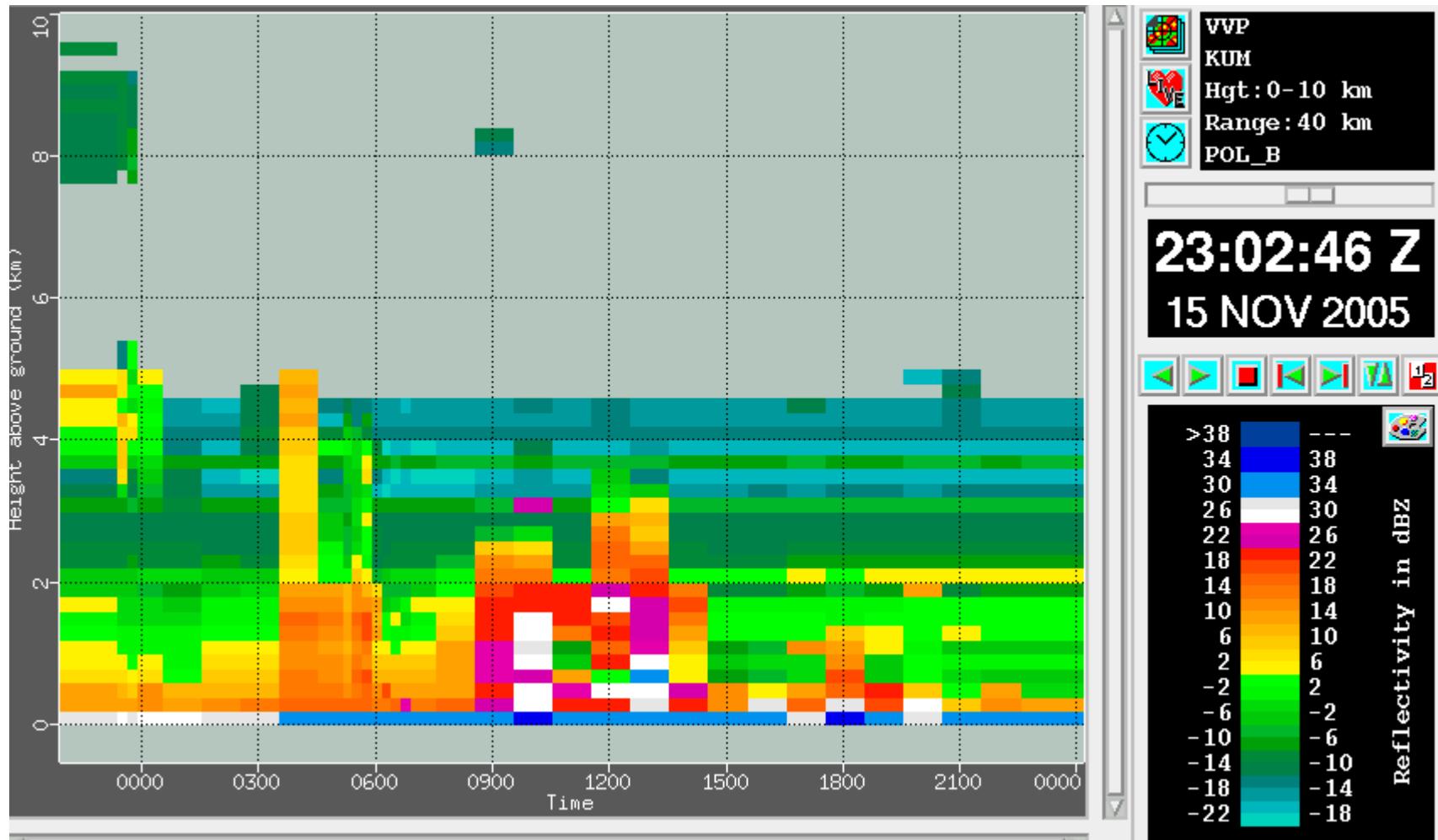
# Zero level height: snow/mixed/rain percentages
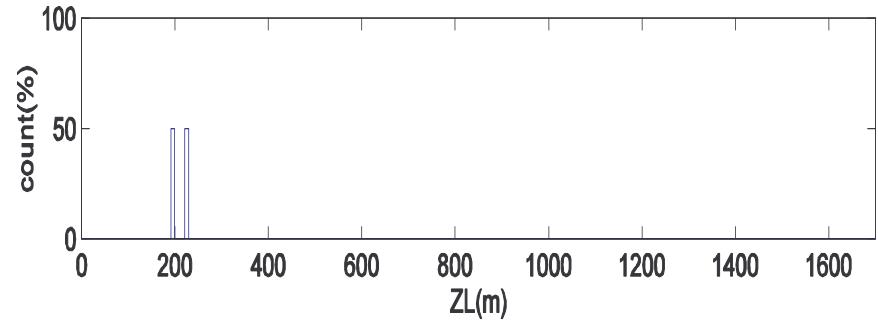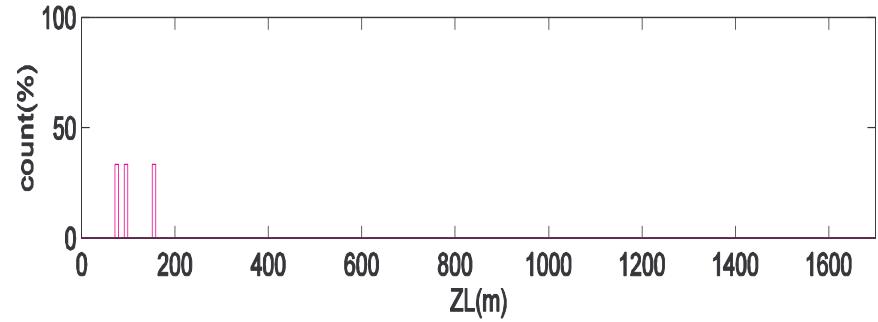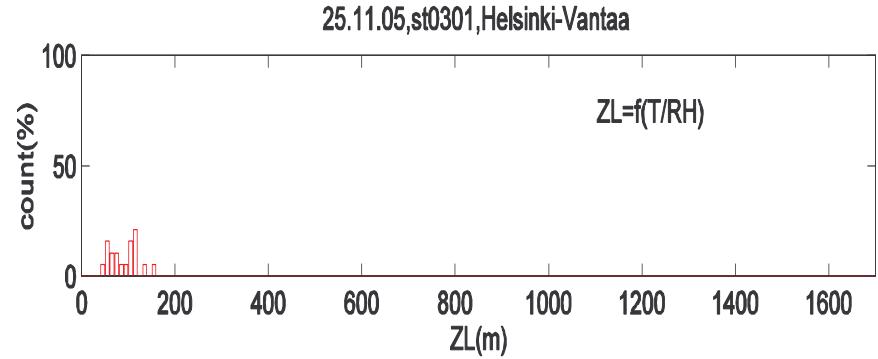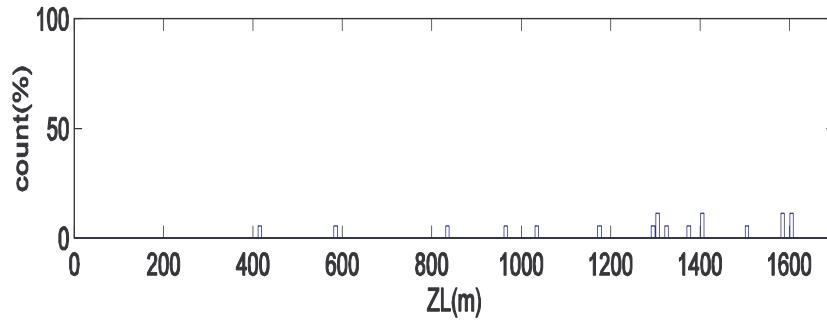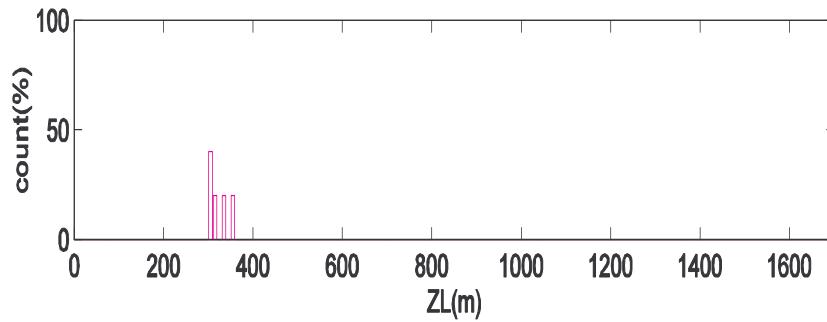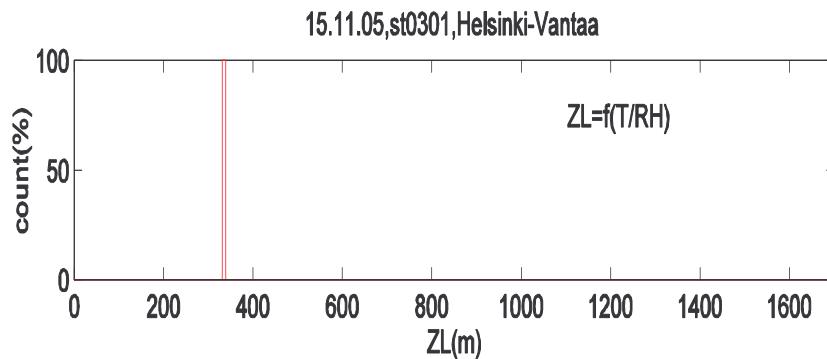
15.11.05,st0301,Helsinki-Vantaa

25.11.05,st0301,Helsinki-Vantaa

ZL=f(T/RH)

# Melting layer visible in radar (ρ_{HV} and dBZ)
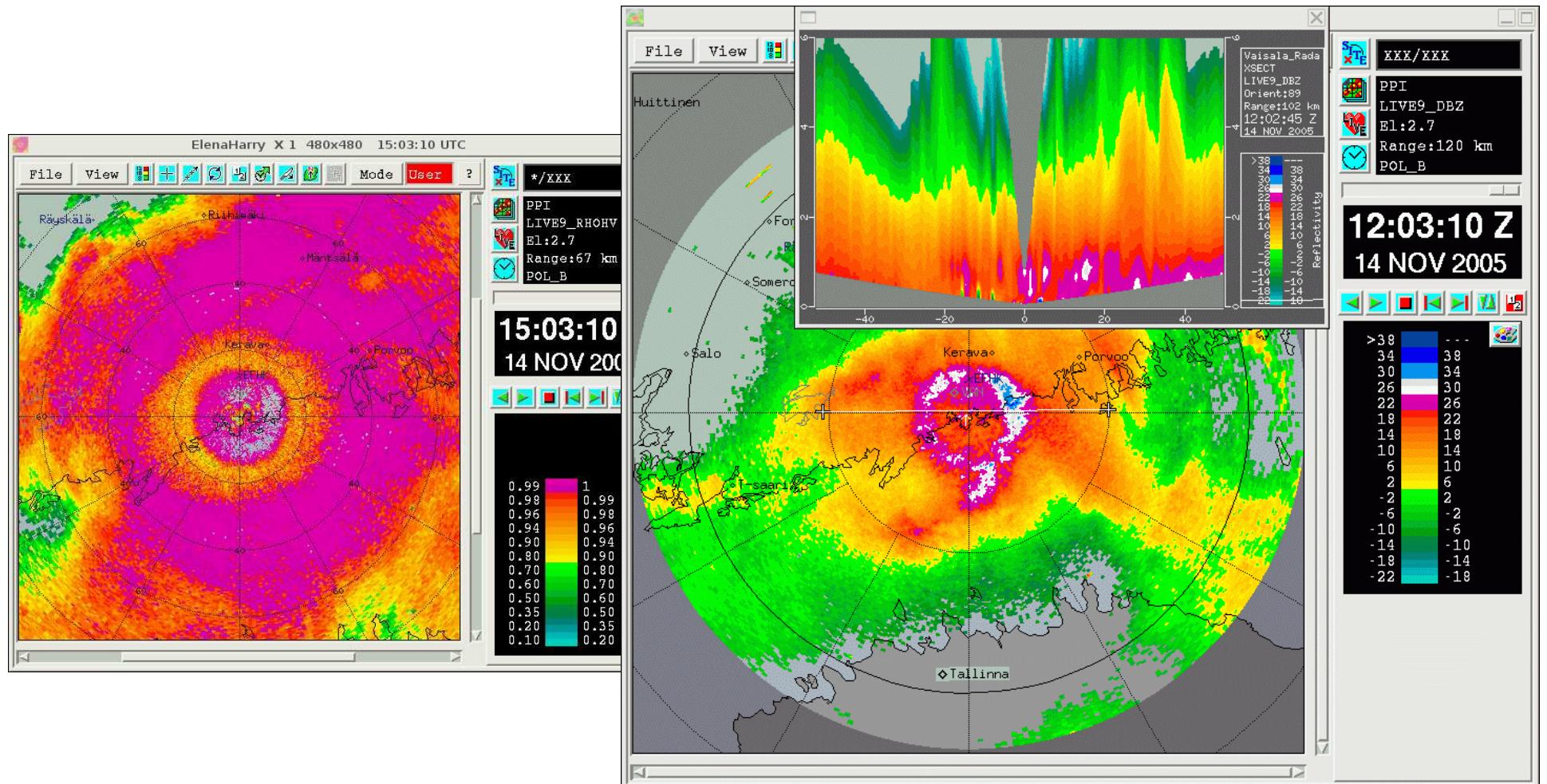
Ideal radar images without a bright band (aka snow)

By Reino Keränen, Jari Tuovinen, Tuomo Bergman and Janne Ylläsjärvi
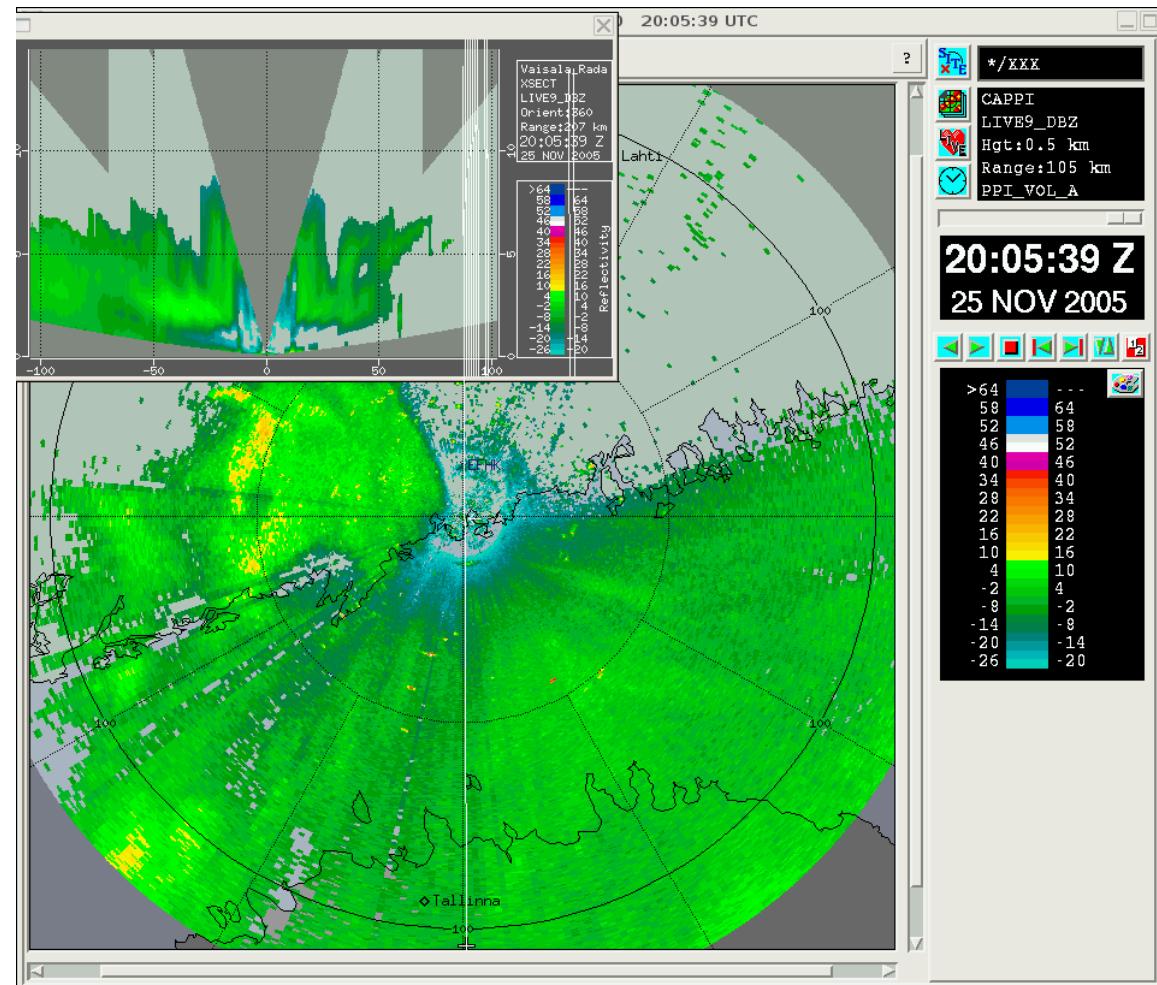
What is HydroClass™

- Vaisala's software to deduce the types of scatterers in the atmosphere using dual-pol. radar.

- Fuzzy logic approach

- Uses several polarimetric parameters:

$$Z_h, Z_{dr}, K_{dp}, \rho_{HV}$$

- Melting layer as an input
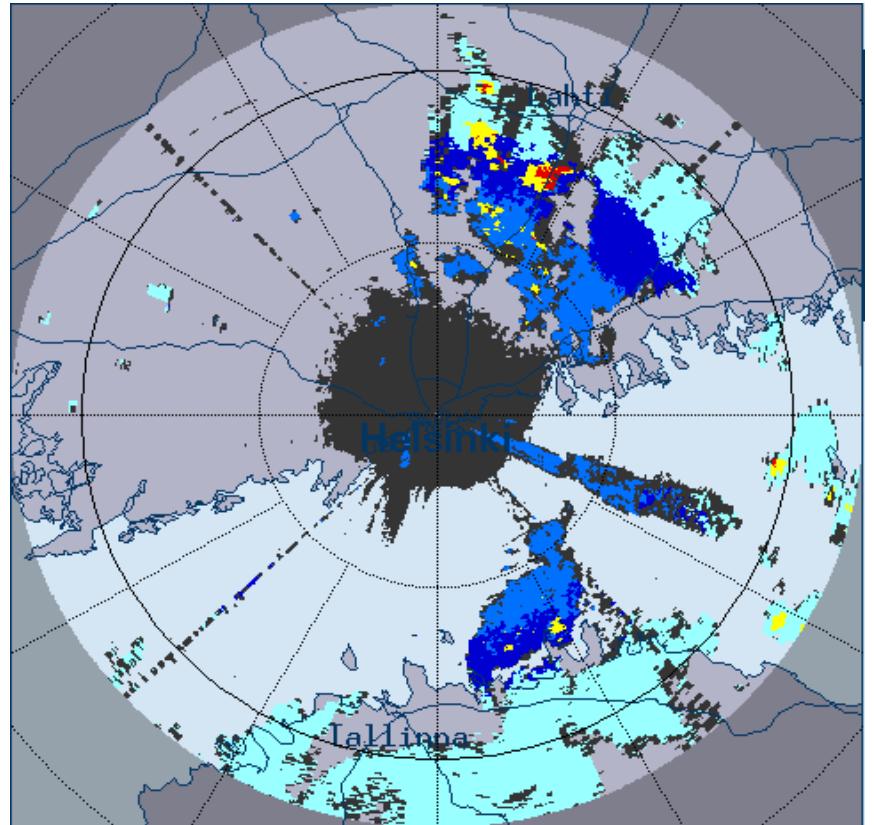
1) **wet snow**
2) **dry snow**
3) **graupel**
4) **hail**
5) **No Met**
6) **rain**

The work goes on...

A report in FMI series to be published

- a review of methods and case studies

The POMO-project

- target identification using dual-pol radar (snow, rain, hail, birds, insects...)
- Testbed material as "ground truth"