New cloud micro-physics scheme for NH HIRLAM

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Motivation

- For kilometre-scale modeling, non-hydrostatic extension for HIRLAM has been developed at the University of Tartu. Any existing HIRLAM setup could be modified to be non-hydrostatic, using this extension.
- Current study is effort to introduce more detailed microphysics module to the HIRLAM environment. Parameterization schemes available for HIRLAM contain only cloud water (and ice) as prognostic variables, which is suboptimal for high-resolution modeling.

Selection of physics package

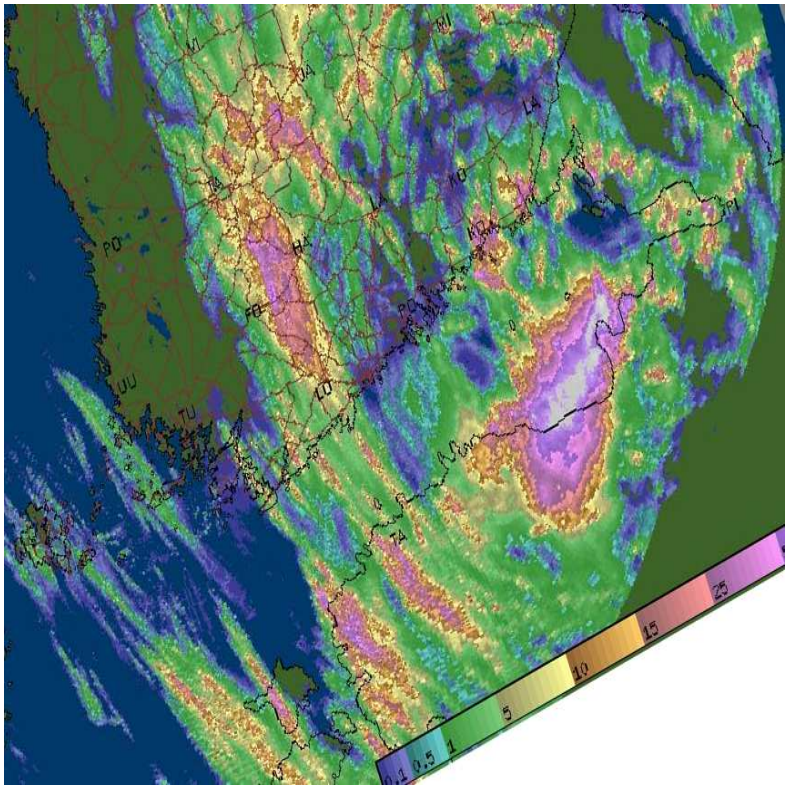
Prerequistics:

- computational efficiency
  - high resolution dynamics is computationally expensive by itself: change in resolution + non-hydrostatic components
  - detailed microphysics can be very expensive to compute (MESO-NH, AROME)
- yet detailed enough representation of microphysics and clouds
  - explicit representation of cloud particles and hydrometeors
  - description of phase changes and interactions between these particles
  - spatial extent and phase of clouds in 3 dimensions

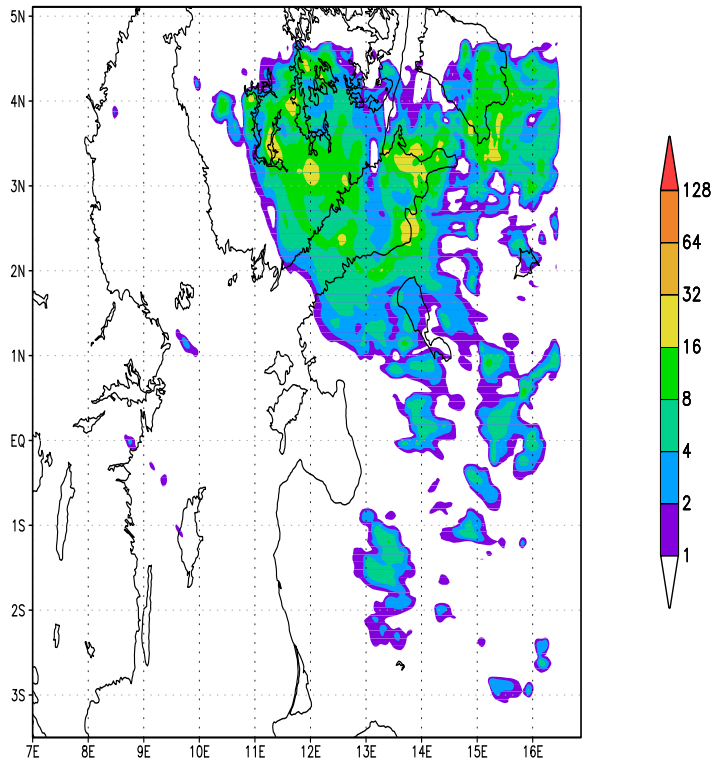
Status of model developement

- Microphyscs module based on Schultz 1995 is included into full 3D environment of HIRLAM system, NH HIRLAM version in progress
- hydrostatic HIRLAM is not expected to give very good results, but as an overall more stable system, it is used for development and testing
- physically reasonable simulations
- falling process of hydrometeors at higher resolutions does not work very well - speed lowered.

05. august 2003, precipitation, radar + simulation



(a) RADAR



(b) simulation