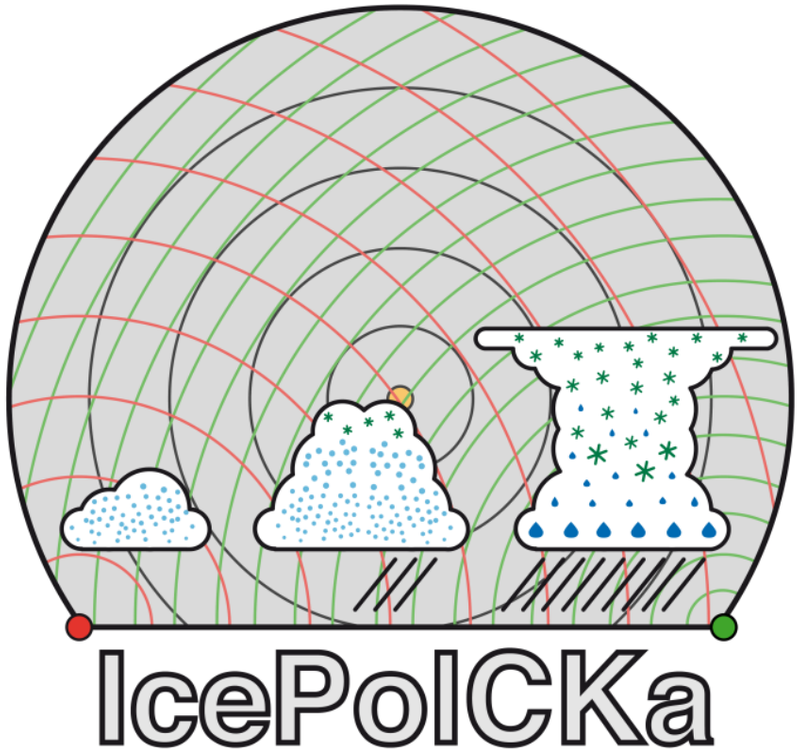
Investigation of the initiation of **c**onvection and the **e**volution of **p**recipitation using simulati**o**ns and po**l**arimetric radar observations at **C**- and **Ka**-band

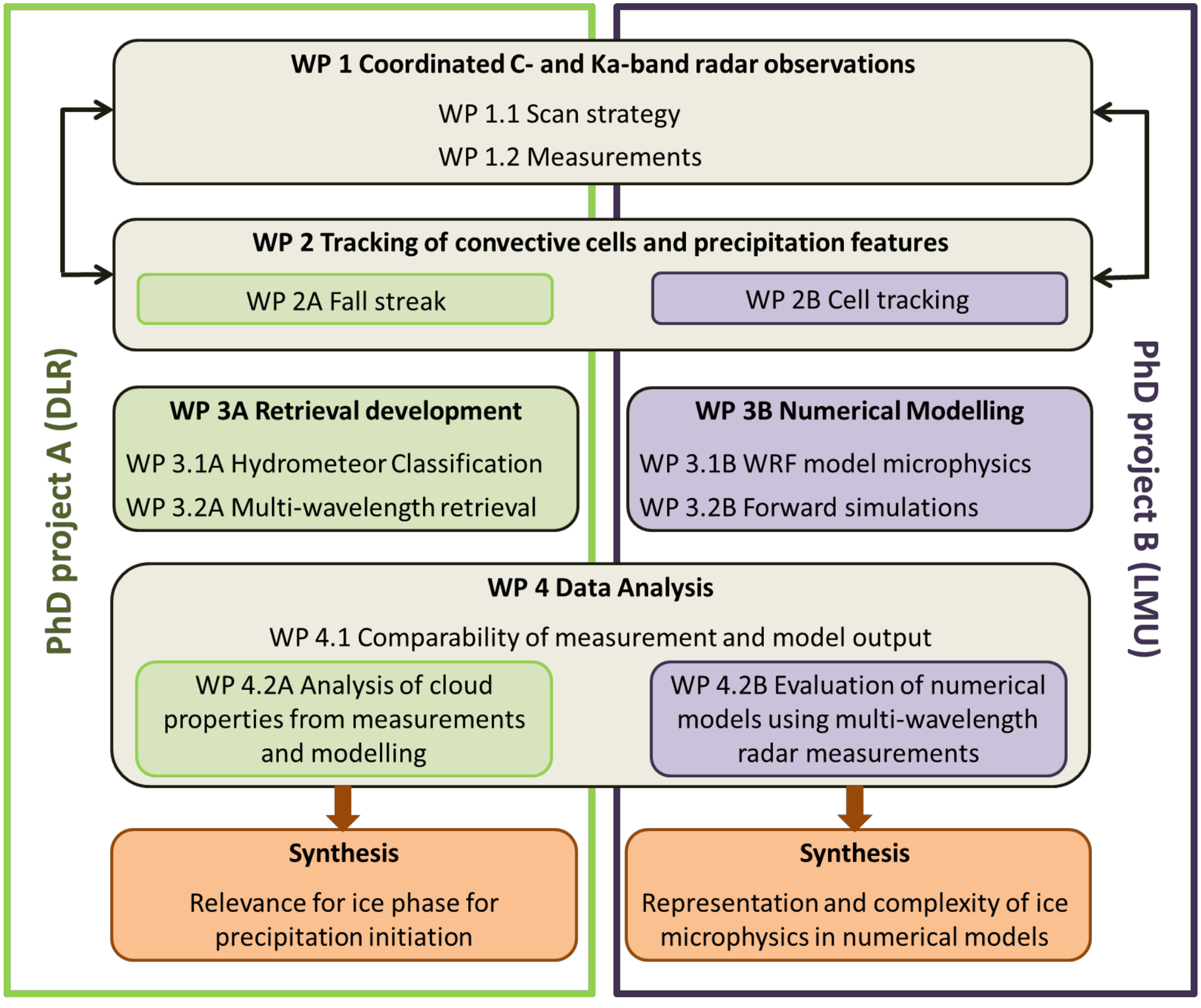
Tobias Zinner, **Christoph Knote**, Bernhard Mayer *LMU Munich*
Martin Hagen, Florian Ewald, Silke Gross *DLR, Wessling*



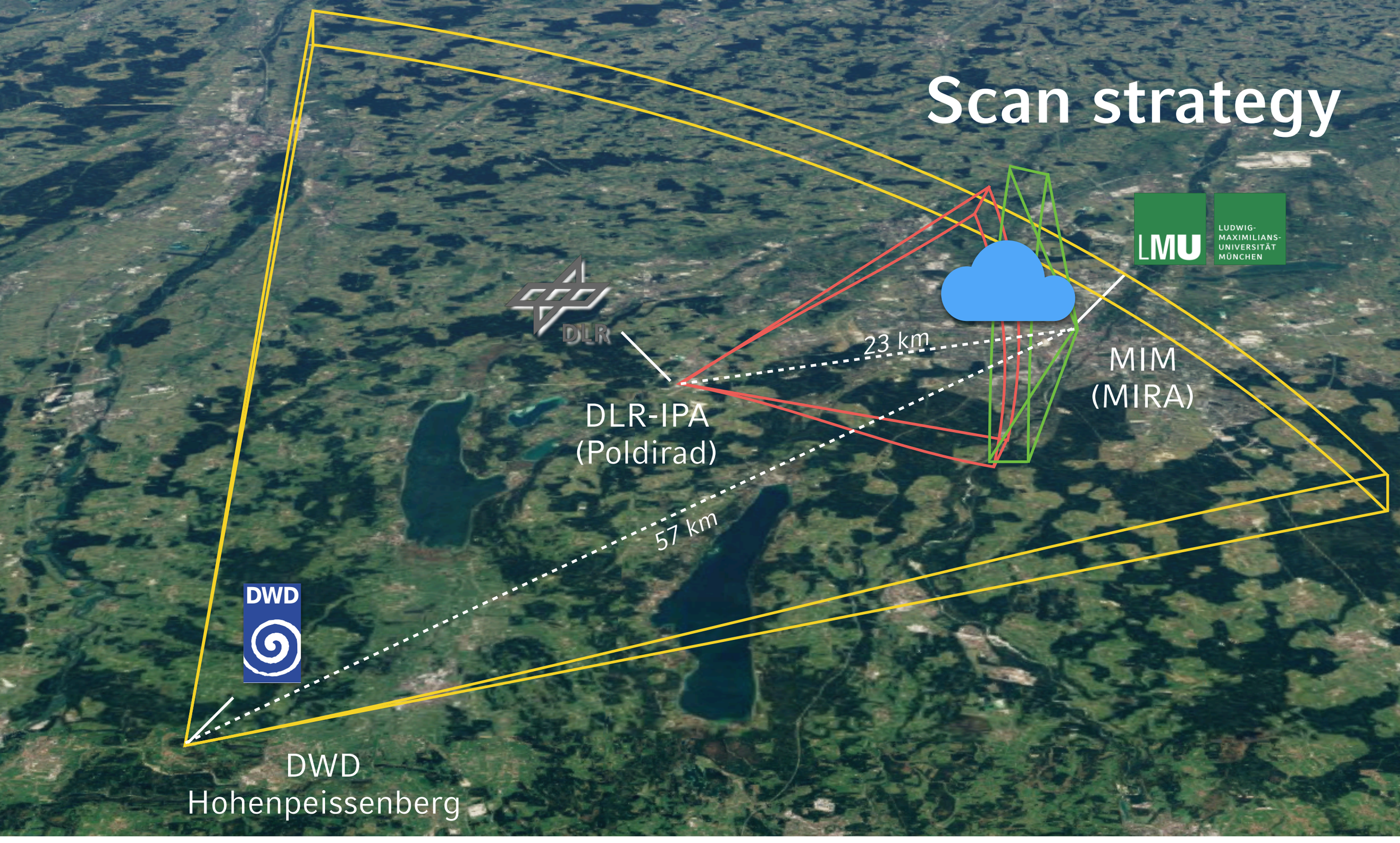
DLR

LMU LUDWIG-MAXIMILIANS-UNIVERSITÄT MÜNCHEN

IcePoICKa work plan



Scan strategy



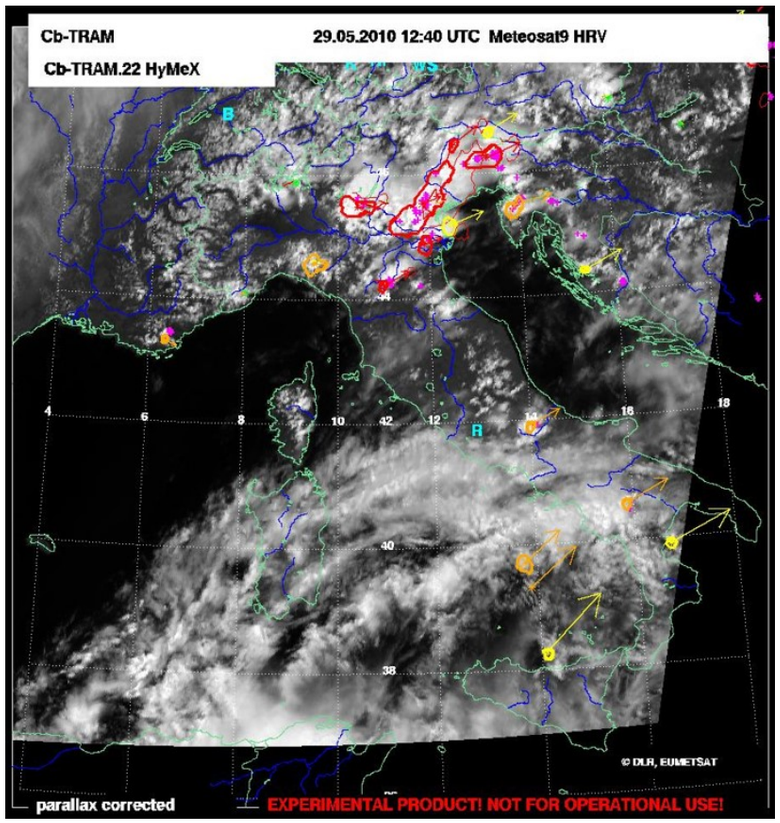
automated, synchronized, cloud-tracking observations
by Poldirad (DLR) and MIRA (MIM) - also off-axis

supported by targeted scans from Hohenpeissenberg DWD observatory

collaboration with Michael Frech (DWD)

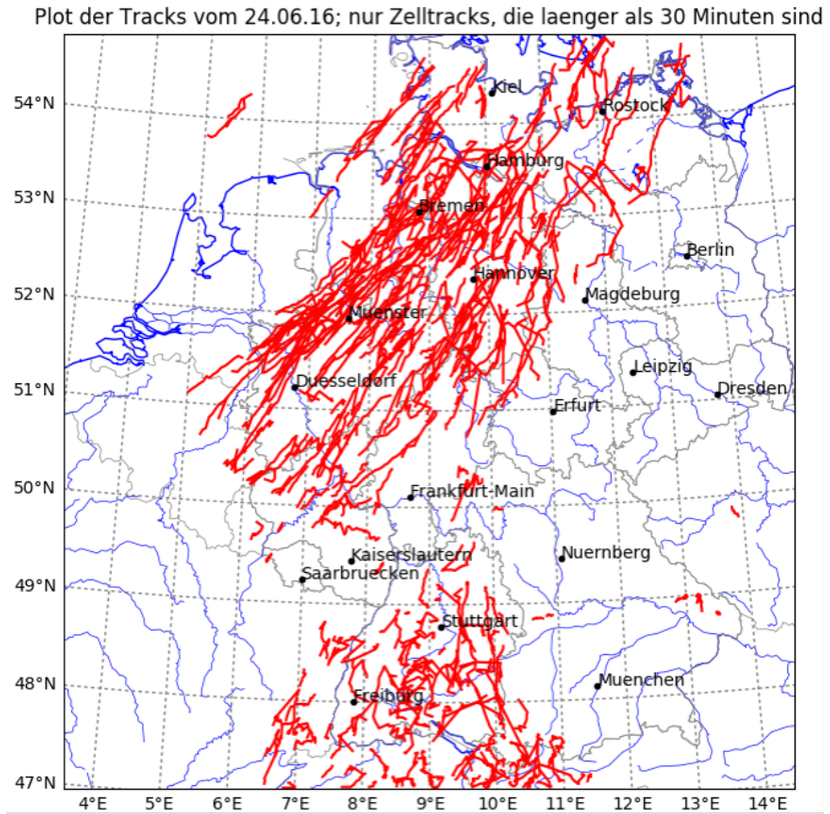
Tracking of objects in radar, satellite, model

optical flow based automated tracking methods



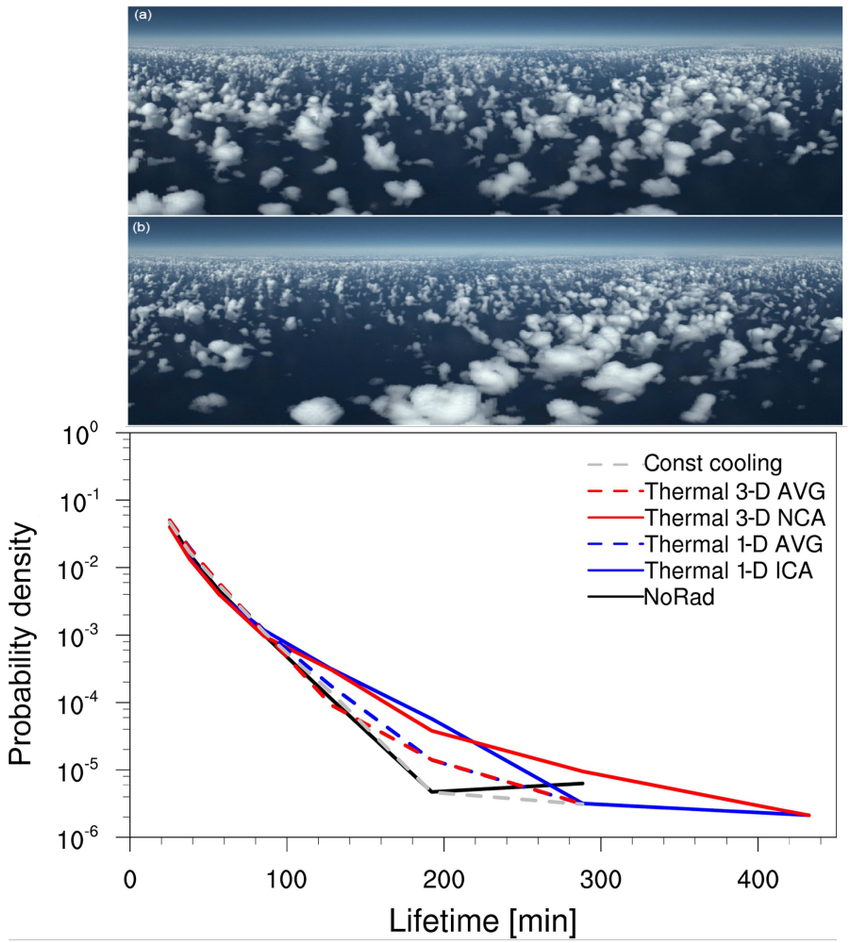
tracking of satellite cloud objects, Meteosat, 31.08.08

Cb-TRAM, Zinner et al. 2008, 2011, 2013



tracking of radar objects, DWD data, 24.06.16

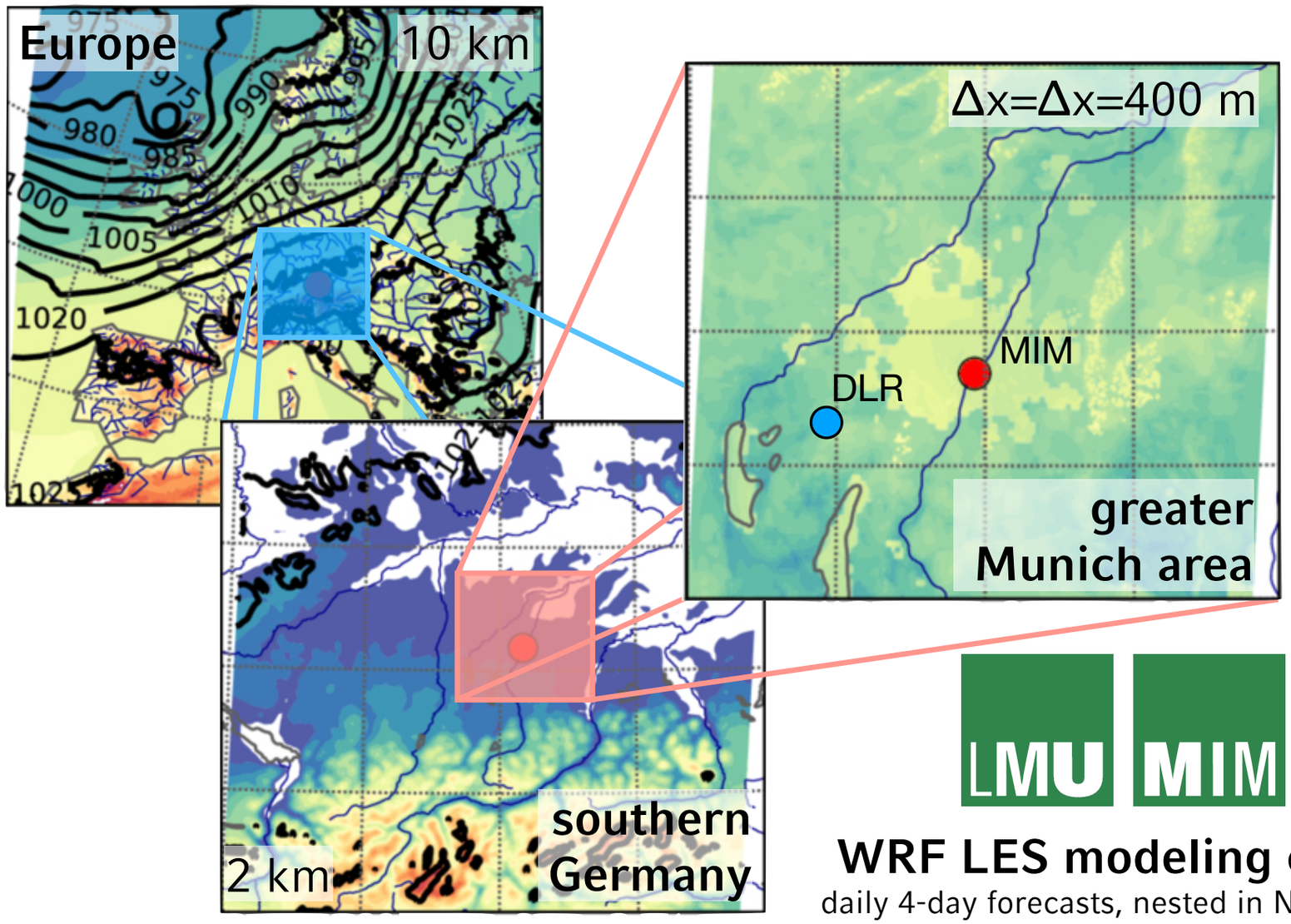
RadTRAM, Kober et al. 2009
BSc M. Laufmann, 2017

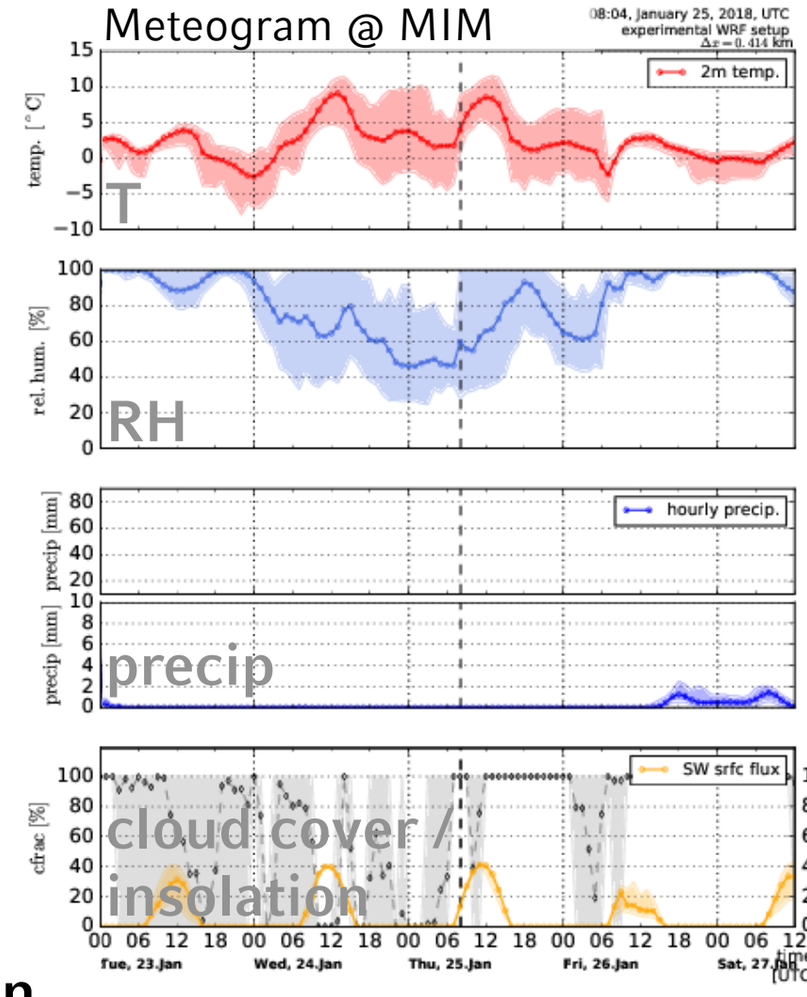


tracking of cloud objects, in 3D model data

Klinger et al., 2017

High resolution modeling with WRF





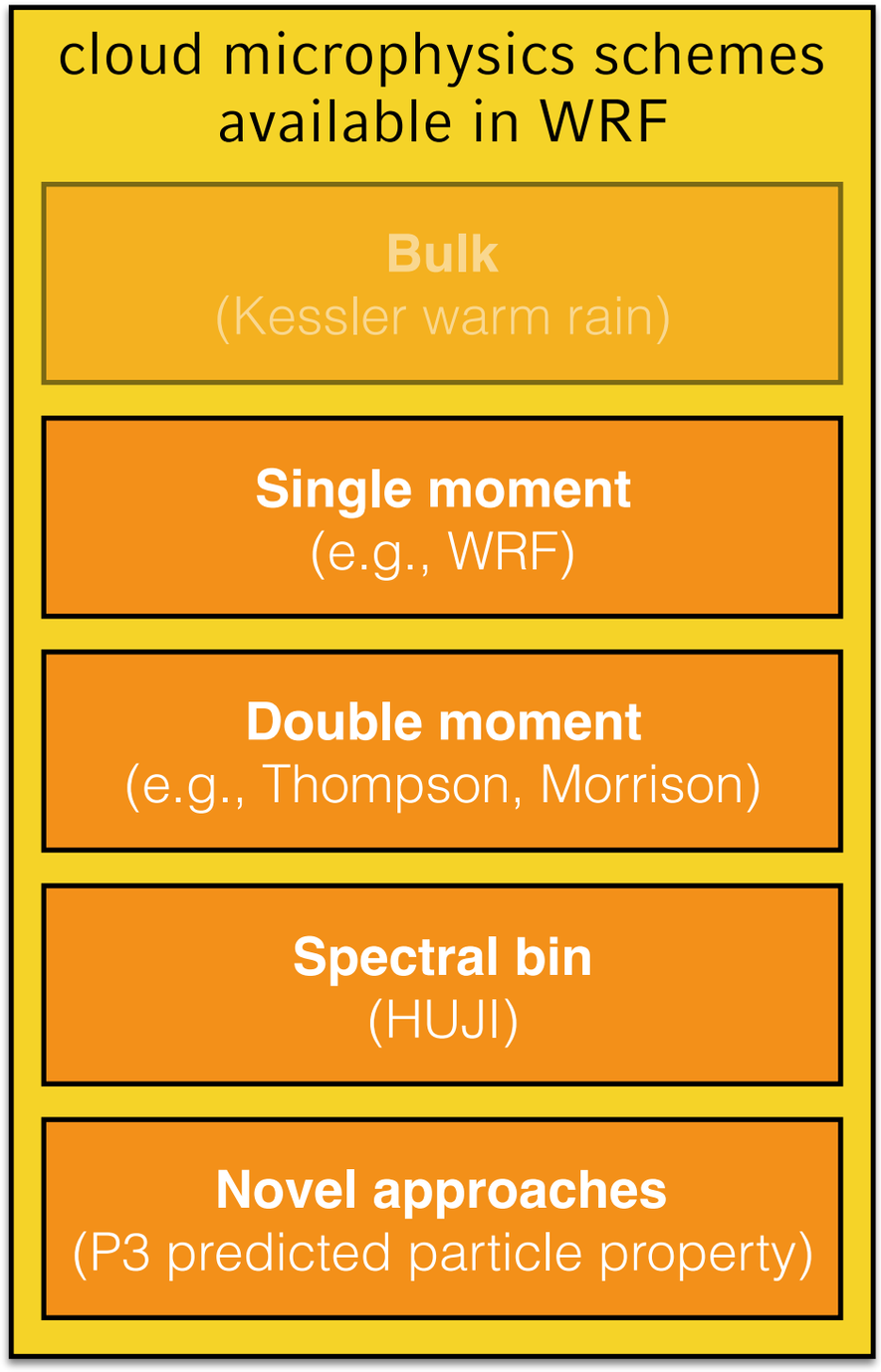
WRF LES modeling chain

daily 4-day forecasts, nested in NCEP GFS

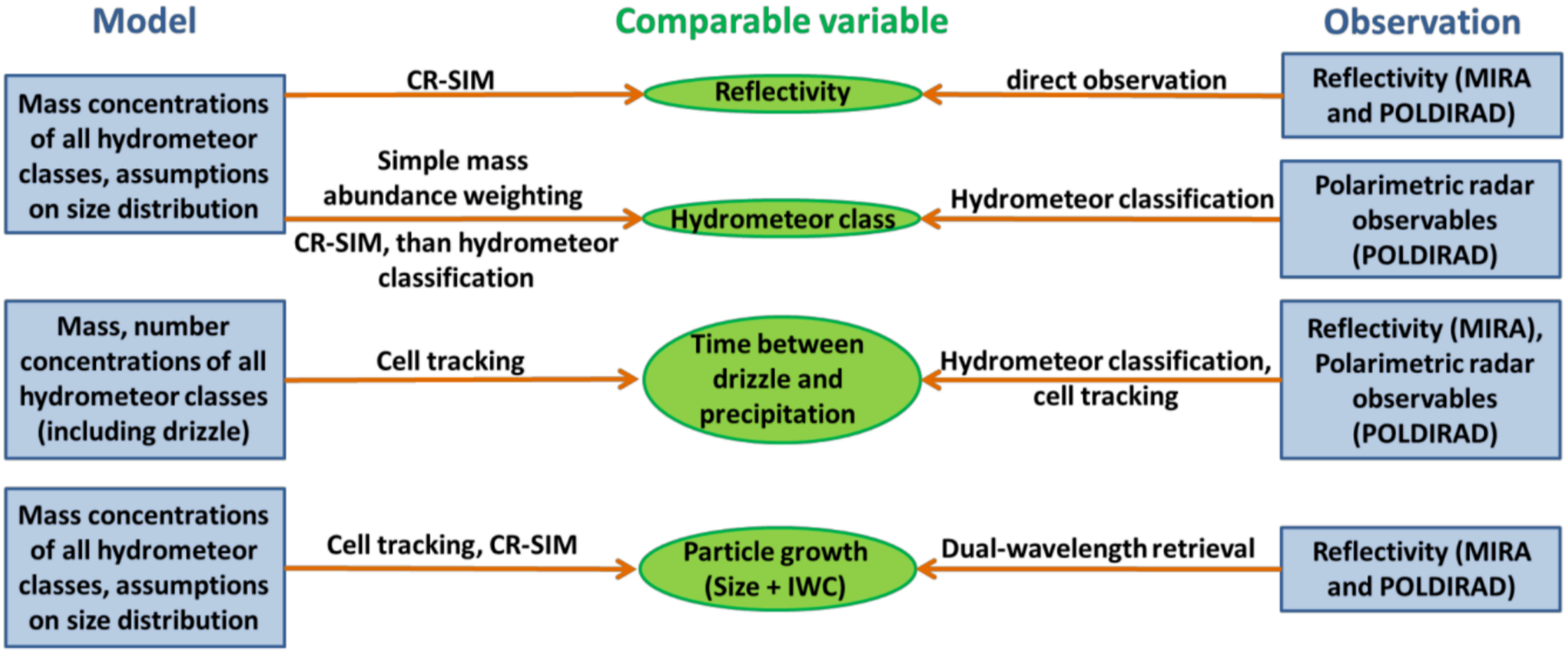
we already conduct daily 4-day WRF forecasts
for internal research support and educational aspects

Cloud microphysics scheme evaluation

- high-resolution (<1km) WRF simulations of observation periods
- identical runs, with cloud microphysics schemes of different levels of complexity
- create dataset large enough for statistical comparison with observations
- *software archeology necessary to investigate actual implementation and parameter set*



Deriving comparable variables



CR-SIM radar forward operator

Cloud Resolving Model **R**adar **Sim**ulator (CR-SIM)

Aleksandra Tatarevic and Pavlos Kollias
Mariko Oue

Applied Radar Science Group

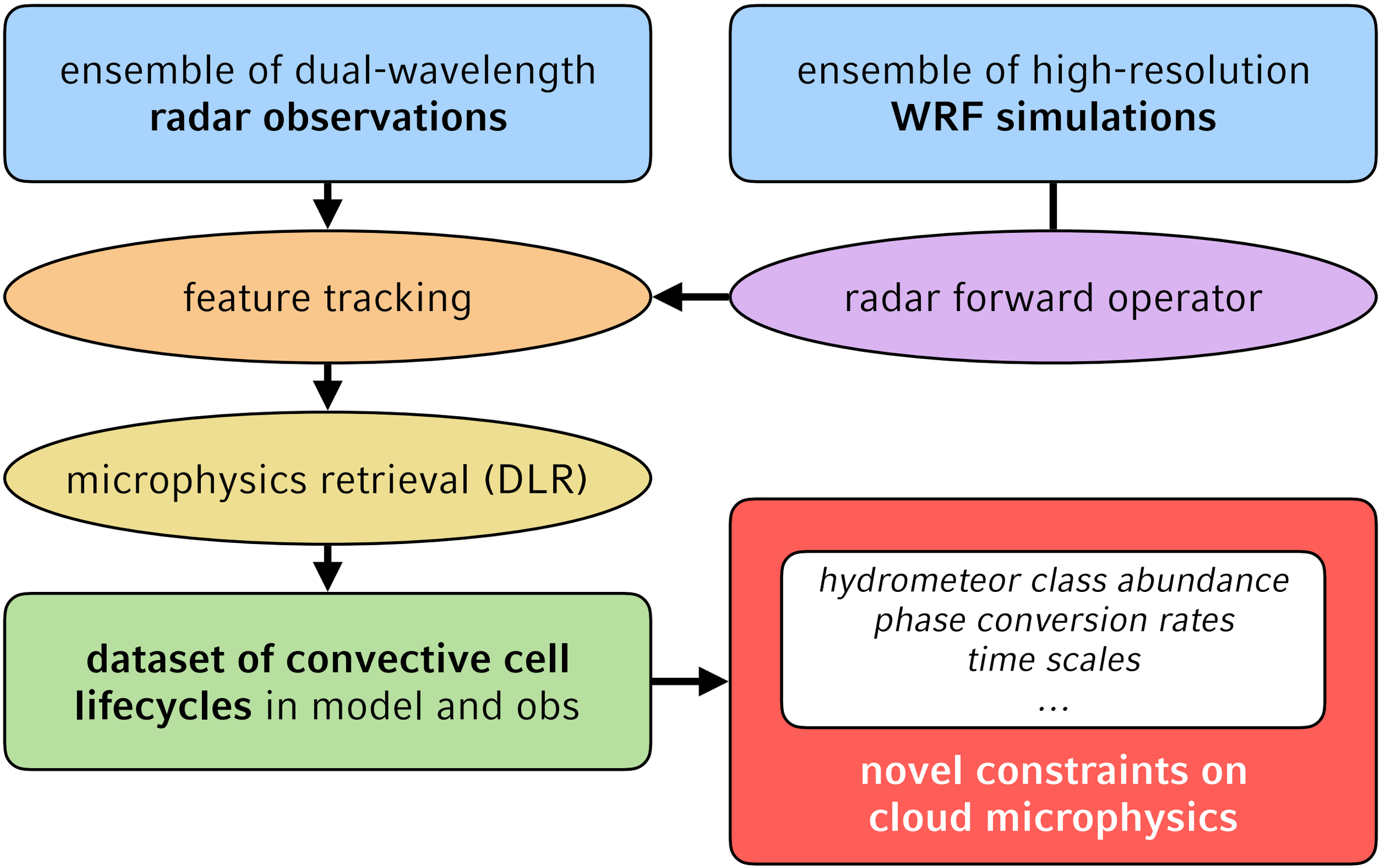
www.radarscience.weebly.com

BROOKHAVEN NATIONAL LABORATORY *Center for Multiscale Applied Sensing*

APPLIED RADAR SCIENCE GROUP

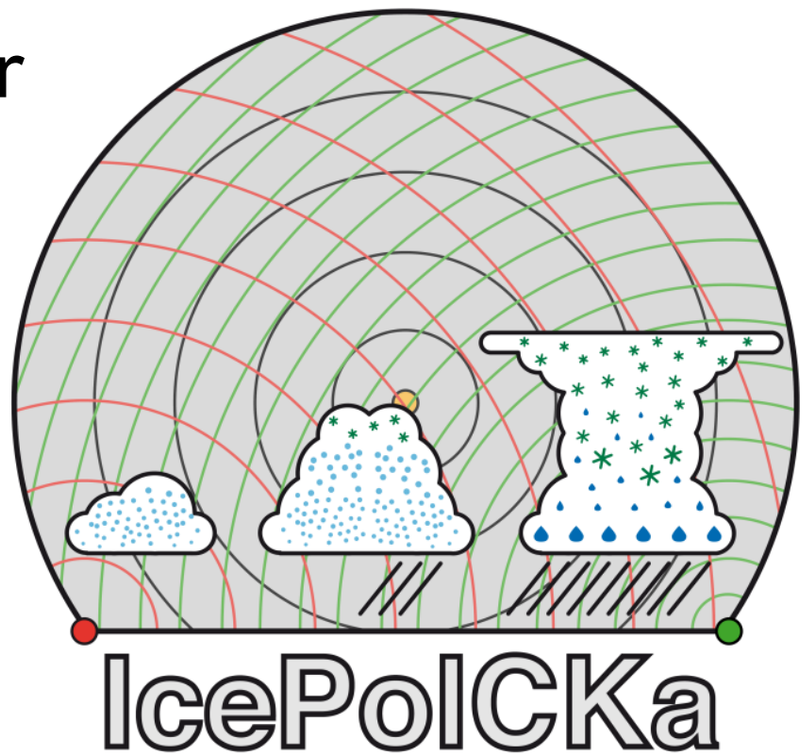
- well-known and tested, WRF-compatible
- ready to use data from more sophisticated microphysics schemes (double-moment, spectral bin)
- *developments will be necessary for polarimetric observations*

Analysis workflow



Summary

- ensemble of **polarimetric, dual-wavelength radar observations of convective cell lifecycle**
- ensemble of **numerical simulations at cloud-resolving scales**
- **evaluation of model cloud microphysics schemes** of different levels of complexity
- **scheme-independent, novel constraints for cloud microphysics scheme developments**



DLR

LMU LUDWIG-MAXIMILIANS-UNIVERSITÄT MÜNCHEN