

Partnership

- Karl Bumke (IFM-Geomar) Disdrometer observations (WP 3)
- Susanne Crewell (IGM) Overall GOP organisation
- Galina Dick (GFZ) GPS observations (WP 5)
- Jürgen Fischer (FUB) Satellite observations (WP 7)
- Martin Hagen (DLR) GOP weather radar data (WP 2)
- Thomas Hauf (UHan) Lightning networks (WP 6)
- Christian Koziar (DWD) Access to DWD observations (all WPs)
- Armin Mathes (Bonn) Coordination/QC rain gauges (WP 1)
- Mario Mech (MIM) GOP data management
- Gerhard Peters (UHH) Micro Rain Radar (WP 3)
- Matthias Wiegner (LMU) EARLINET Observations (WP 4)
- and many more

+ **DKRZ** (Claudia Wunram, Hannes Thiermann)

+ **COPS**

GOP Organization and Performance

The General Observation Period

— January to December 2007 —
encompasses **COPS** in time and space

- gather as many data about the atmospheric state as possible within an area covering Germany and its neighboring states.
- to provide information of all kinds of precipitation types
- to identify systematic model deficits
- to select case studies for specific problems
- to relate the COPS results to a broader perspective (longer time series and larger spatial domain)



GOP Ingredients: Precipitation



Rain gauge



Weather Radar









Drop Size Distribution

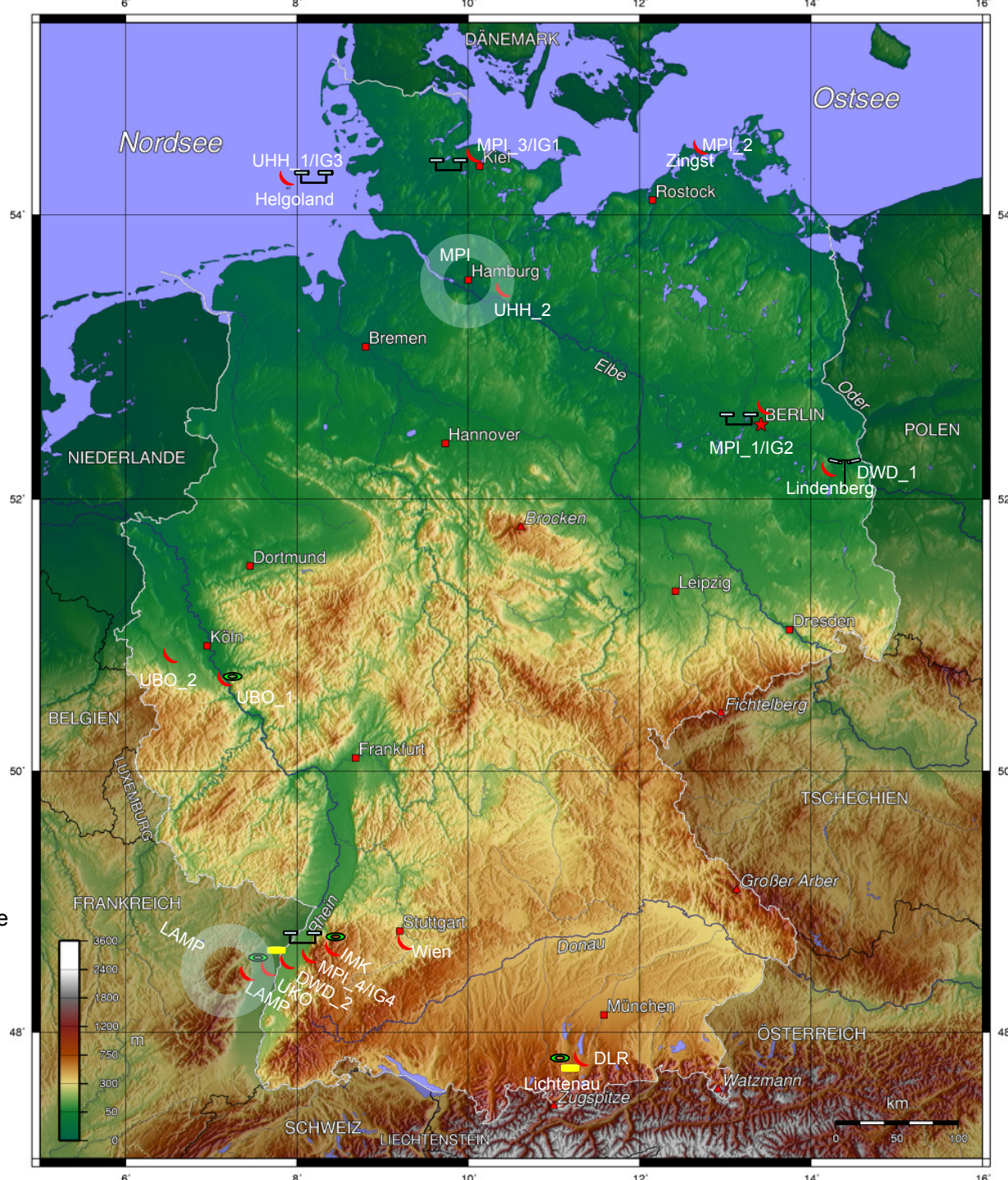
- **WP-GOP-1** Rain gauges
several hundred independent observations by water authorities, environmental agencies
- **WP-GOP-2** Weather Radar
DWD radar network and research radars, 3D volume scans
- **WP-GOP-3** Drop Size Distribution DSD
vertical structure at about 15 locations with Micro Rain Radar (MRR)

Continuous precipitation observation with high temporal resolution

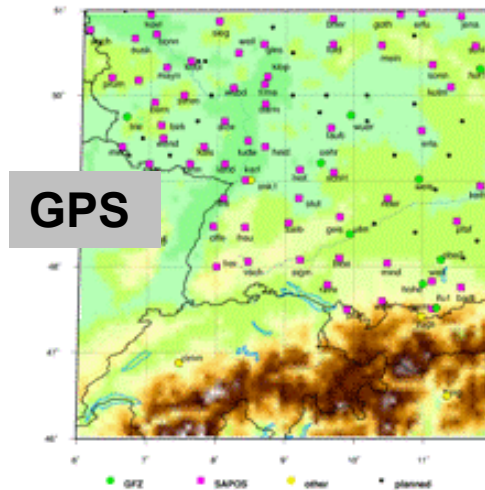
GOP-3

-  Micro Rain Radar MRR-2
-  Optical Distrometer ODM470_1
-  Optical Distrometer FD12P
-  Optical Distrometer PARSIVEL
-  Distrometer JOSS/WALDVOGEL
-  Scanning X-Band Radar (LAWR)

DLR	Inst. Phys. Atmos., Oberpfaffenhofen
DWD_1	R. Assmann Obs., Lindenberg
DWD_2	Met.. Obs. Hohenpeissenberg
IG_1-4	IfM Geomar, Kiel
IMK	Inst. Met. Klim., Karlsruhe
LAMP	Laboratoire de Météorologie Physique
MPI_1-4	MPI Hamburg
UBO_1-2	Uni Bonn
UHH_1-2	Uni Hamburg
UKÖ	Uni Köln
Wien	Uni Wien



GOP Ingredients: Auxillary Information



- **WP-GOP-4** Lidar (aerosol, cloud base, mixing layer height)
EARLINET stations, about 100 lidar ceilometer stations in Germany
- **WP-GOP-5** GPS water vapour column
>200 routine stations, additional stations in COPS area
- **WP-GOP-6** Lightning networks
European and national networks VLF and VHF
- **WP-GOP-7** Satellite observations (cloud properties, water vapor, aerosol)
MSG, MODIS, MERIS, AMSU, CLOUDSAT, CALIPSO
- **WP-GOP-8** Meteorological stations
ARM Mobile Facility (AMF), Lindenberg, diverse universities and research institutes

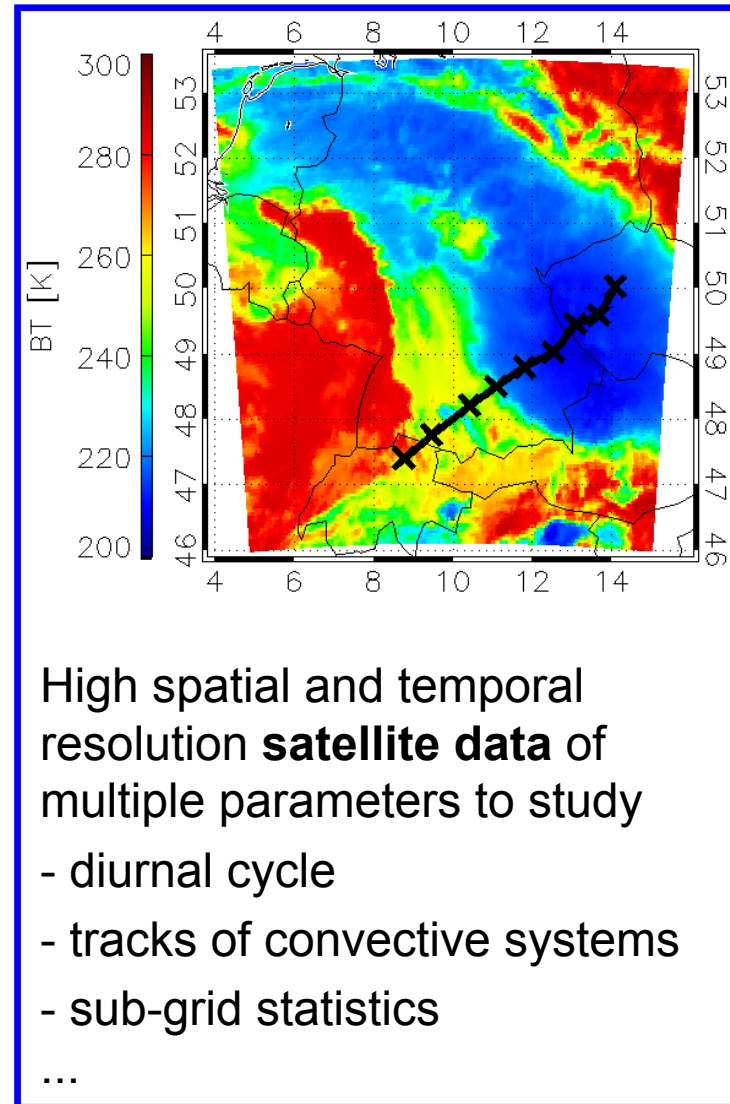
WP-GOP-9 GOP Management

- Optimized exploitation of existing instrumentation; (inter-)national contacts
- Provision of data suitable for statistical model evaluation/analysis
 - high quality
 - continuous observations or well defined temporal sampling
 - error characteristics (instrument limitations)
 - consideration of spatial and temporal scales

➡ **quality assessment and production of value-added products**

- Near-real time availability for close interaction with PQP projects

➡ **quicklooks and “online evaluation” of LM(K) forecasts**



Satellites

MSG:

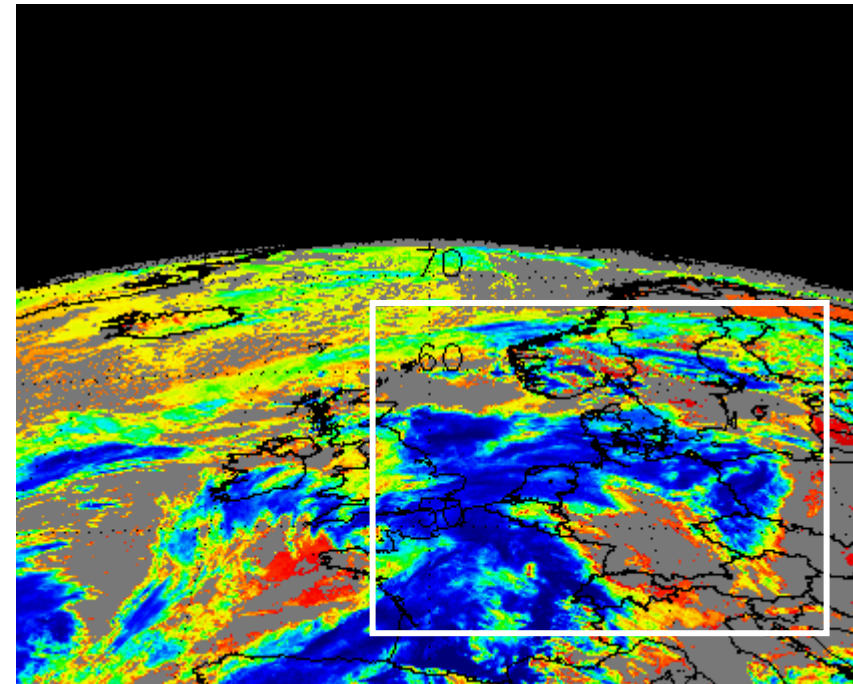
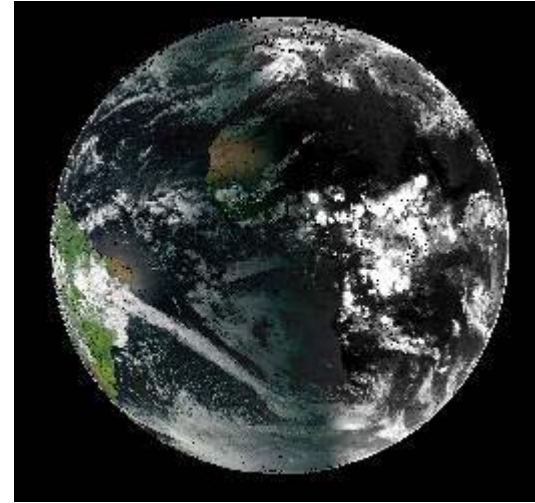
- cloud mask
- cloud top pressure (+temperature?),
- optical depth
- IR brightness temperature

MODIS:

- cloud mask
- cloud optical thickness τ
- liquid water path **LWP**
- effective radius r_{eff}
- geometric cloud thickness **H**
- IWV
- aerosol?

MERIS:

- cloud mask
- cloud optical thickness τ
- cloud top pressure (+temperature?)



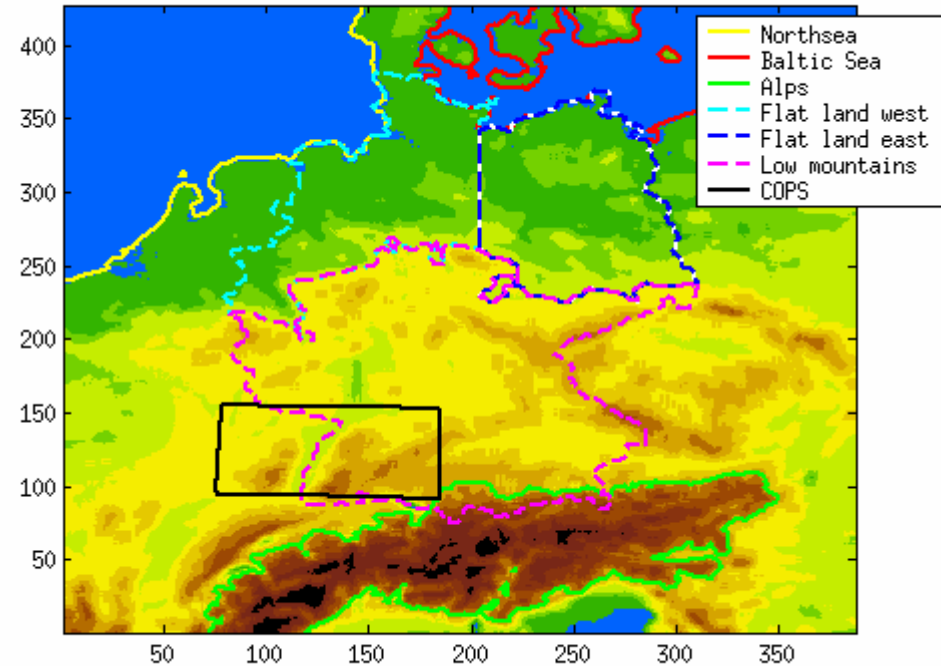
Preparation for model evaluation

Pre-operational phase

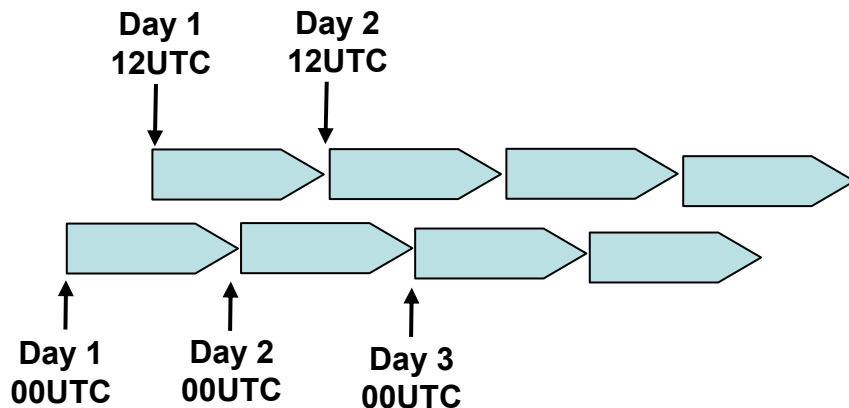
summer 2006 – spring 2007

Operational

expected spring 2007

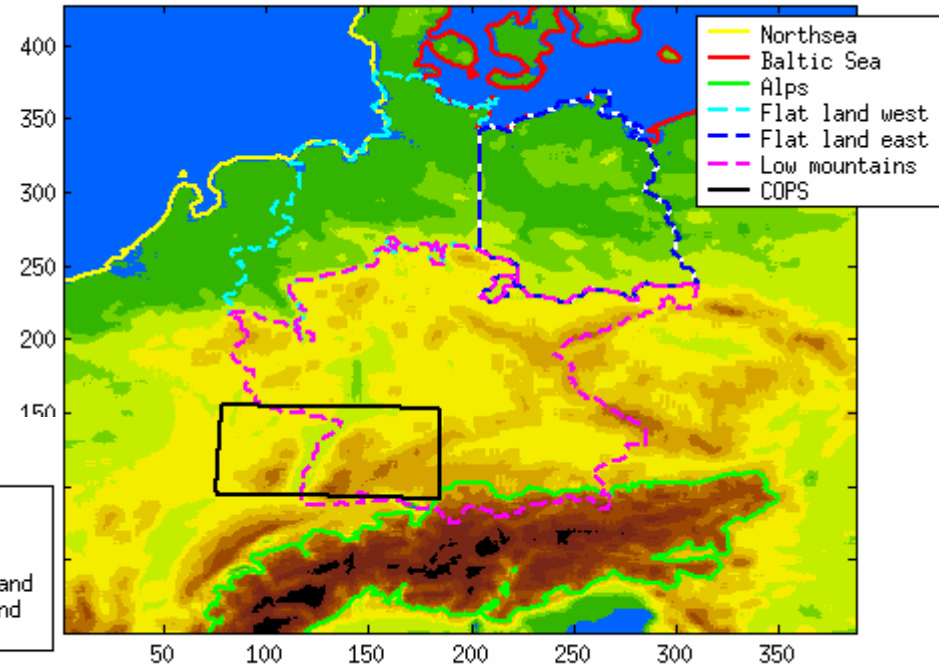
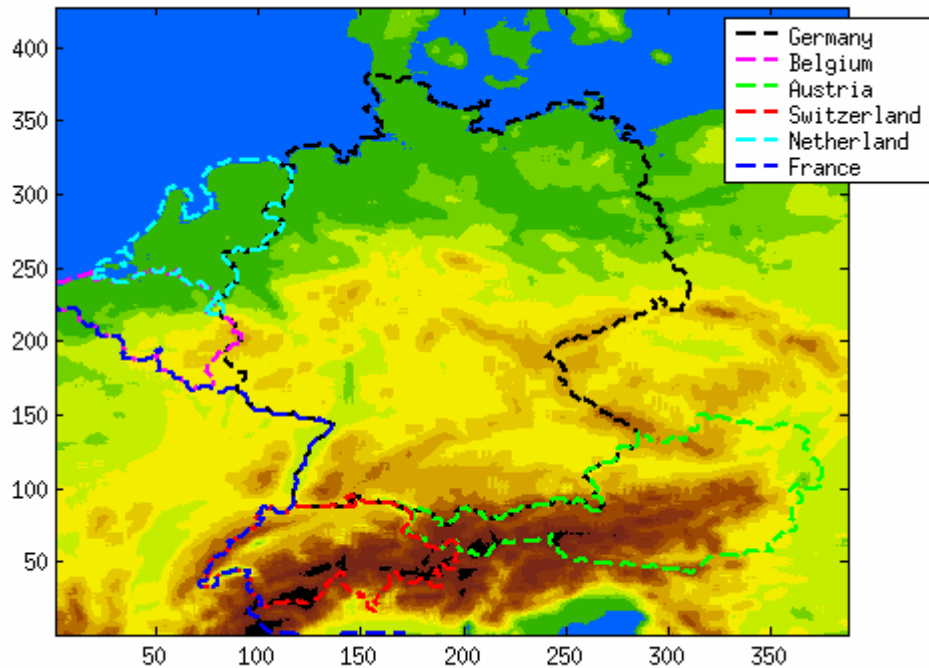


Lagged average forecast ensemb



Evaluation Areas

- Northsea
- Baltic Sea
- Alps
- North western German flat land
- North eastern German flat land
- Low mountains
- COPS



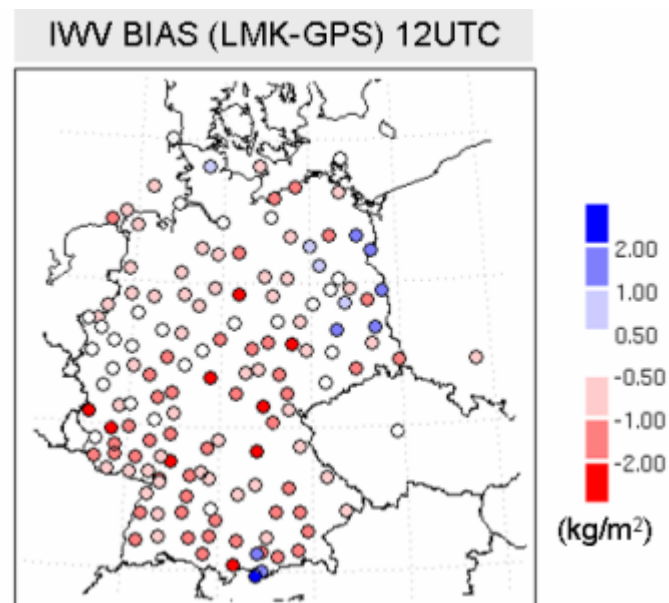
GOP - First order model evaluation

Diurnal comparisons / plots.

- Radiosoundings: Plots for each sounding in Germany and neighbouring countries
 - Stüve diagramm together with corresponding +12h LMK forecast
 - differences of temperature, specific humidity and wind speed forecasts (+3,+6,+9,+12,+15,+18 h) at each model level
- Ceilometer: Daily colour coded maps (see GPS example) of BIAS/RMS/correlation of cloud base height (LMK vs observation)

Monthly comparisons / plots.

- Radiosoundings: Bias and RMS profiles for temperature, humidity and wind for all stations
- Ceilometer: Monthly time series of Bias/RMS for each station or region (depending on number of stations within regions)
- Ceilometer: Monthly analysis of mean diurnal cycle and comparison to different model runs (lagged ensemble)



What to do?

What data to archive?

- radar data:
 - rain rate composite of DWD (DXQ)
 - 3D reflectivity data from DWD radar network
 - rain rate products from research radars Bonn, Hamburg, Karlsruhe, Hohenpeissenberg
- full LMK backup at DWD?
- satellite products
 - ➡ quicklooks available at <http://www.met.fu-berlin.de/nrt/>

Data Formats

- GAMIC format for radar volume data → HDF5 or Buffr
- GPS data in COST format (ask Dave Offiler for conversion of GPS COST format)
- volunteer for netcdf converter for "meteorological stations"