General Observation Period (GOP) 2007
Within Priority Program on Quantitative Precipitation Forecasting

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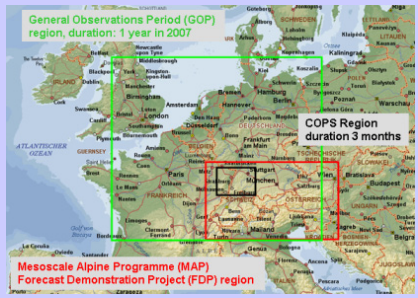
GOP Outline

The main goal of the General Observation Period (GOP) within the German Research Foundation's Priority Program on Quantitative Precipitation Forecasting (SPP-PQP) is to gather a comprehensive data set suitable for testing hypotheses and new modeling techniques developed within the SPP-PQP. The GOP encompasses the Convectively and Orographically induced Precipitation Study COPS performed in south-west Germany in summer 2007 both in time and space to provide information of all kinds of precipitation types and to relate the COPS results to a broader perspective (longer time series and larger spatial domain). The duration of one year will open up the possibility to statistically approach model problems and better pin down specific model weaknesses. The GOP will

- gather as many data about the atmospheric state as possible within an area covering Germany and it neighboring states. The Alpine states (e.g. Austria and Switzerland) are of special interest to include the complex orography and to connect with D-PHASE,
- optimize the exploitation of existing instrumentation by gathering routine measurements normally not available to the scientific community,
- focus on continuous/coordinated observations using existing instrumentations which are suitable for statistical evaluation.
- focus on measurements, which are available in near real-time to enable a timely use within the PQP
- perform a rigorous quality control, cross-checking, and error estimation of the data,
- tailor the observations to model output (e.g., COSMO-K, COSMO-E, D-PHASE forecasts),
- enable an easy access to data, quicklooks and first order analysis to the PQP.
- For efficient dissemination the data will be archived in a data base for use within the SPP
- An important topic for optimal exploitation of the GOP data is the creation of an optimal evaluation environment.

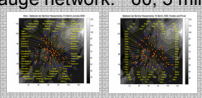
Therefore also techniques to bring together observations and model forecasts have been developed. For that purpose also forward operators which transfer the model output to observation space have been developed, e.g. the microwave radiative transfer model MWMOD and the polarimetric radar forward operator SynPolRad (by DLR).



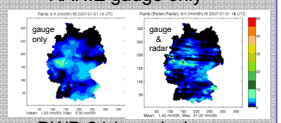
Ground-Based Data Sets

Rain Gauges (GOP-1)

- DWD rain gauge network:
  - daily sums: ~3000
  - 1 h resolution: ~700
  - 1 min resolution: ~60
- Berlin high density rain gauge network: ~60, 5 min



- German water authorities and environmental agencies ~200, 5 min
- DWD 6-h analyses:
  - RANIE gauge and radar
  - RANIE gauge only



- DWD 24-h analysis:
  - REGNIE

Weather Radar (GOP-2)

- DWD network: 16 C-Band
- Polarimetric research radars
  - POLDIRAD (DLR)
  - Hohenpeißenberg (DWD)
- X-Band radar (UBonn)
- C-Band radar (FZ Karlsruhe)
- RMI radar Wideumont
- DWD international composit
- DWD national composit
- DWD online calibrated radar precipitation (RADOLAN)

Met. Stations (GOP-8)

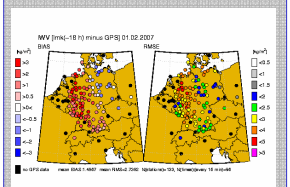
- Cloudnet stations (Lindenberg, Cabauw, Chilbolton, Sirta)
- ARM Mobile Facility Murgtal
- COPS supersites
- Other (Schneefernerhaus, Oberpfaffenhofen,Tuttlingen, Hartheim, Zimmerwald, Hohenheim, Bern, Payerne)

Lidar (GOP-4)

- Lidar (GOP-4)
  - Earlinet (Hamburg, Leipzig, Garmisch, München)
  - DWD ceilometer network (> 100 stations in Germany)
  - several ceilometer stations operated by universities / research institutes

GPS (GOP-5)

- GPS network for integrated water vapor

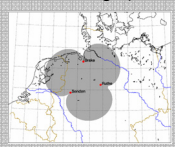


IWV of COSMO-K vs GPS

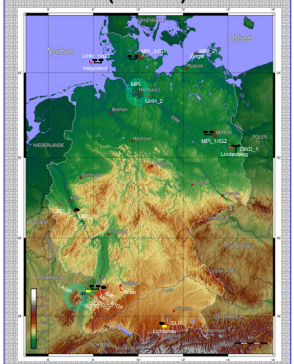
Lightning (GOP-6)

- Lightning for cloud-to-ground (GC) and in-cloud (IC) discharges:
  - LINET VLF Network (Bavaria, IC+GC)

  - SAFIR VHF network (Northern Germany, IC+GC + flash height)



Drop size distribution (GOP-3)



Micro Rain Radar MRR-2 — Optical Disdrometer ODM470_1
Optical Disdrometer FD12P — Optical Disdrometer PARSIVEL
Disdrometer 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
UKO	Uni Köln
Wien	Uni Wien

Satellite Observations (GOP-7)

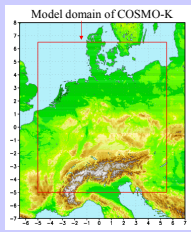
MSG:
- cloud mask
- cloud top pressure (+temperature?),
- optical depth
- IR brightness temperature

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

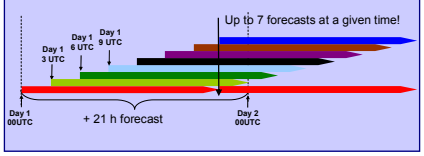
MERIS:
- cloud mask
- cloud optical thickness τ
- cloud top pressure (+temperature?)

Routine Model Data (GOP-9)

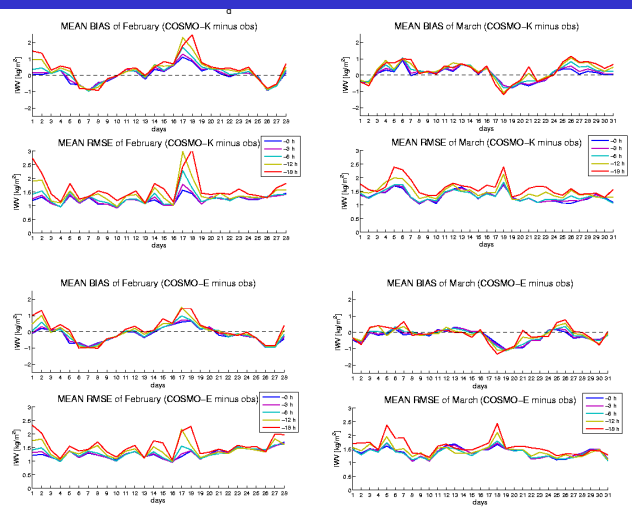
Emphasis on DWD's convection-resolving COSMO-K:
- Grid size: $\Delta x = 2.8$ km
- Timestep: 25 s
- 421 x 461 x 50 gridpoints
- Lowest level 10 m above surface
- Centre of model domain: 10 °E, 50 °N
- Forecast time: 21 h
- Started every 3 h
- Boundary conditions by COSMO-E ($\Delta x = 7$ km)



Lagged forecast ensemble



Integrated Water Vapor: GPS vs Model



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