# HErZ subproject 6:

# Ensemble methods – Representation of uncertainty in COSMO-DE-EPS

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# Subproject goals

→ Improved representation of uncertainty in COSMO-DE-EPS

    (1)   Investigation of KENDA IC perturbations

    (2)   Stochastic boundary layer perturbations

- <u>Done so far:</u>

Analysis of operational COSMO-DE-EPS, *Christian Kühnlein*

# Current situation

- KENDA system is running very slowly

  → Not many analysis / forecast ensemble fields to evaluate


- **9125:** 01.06. – 07.06.2011

  only analysis (no forecasts), issues with obs errors, **stopped**

- **9203:** 01.06. – 09.06.2011,

  only analysis (1 forecast for 2011060900), **stopped**

- **9259:** 01.06. – 04.06.2011

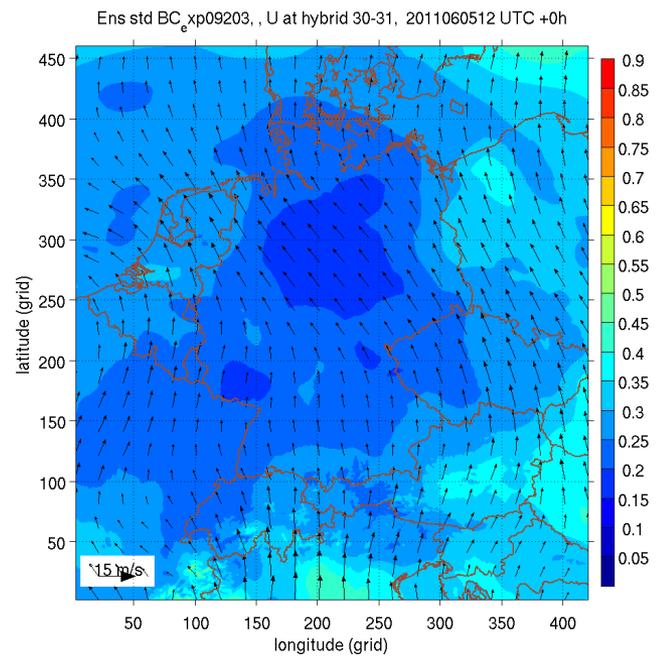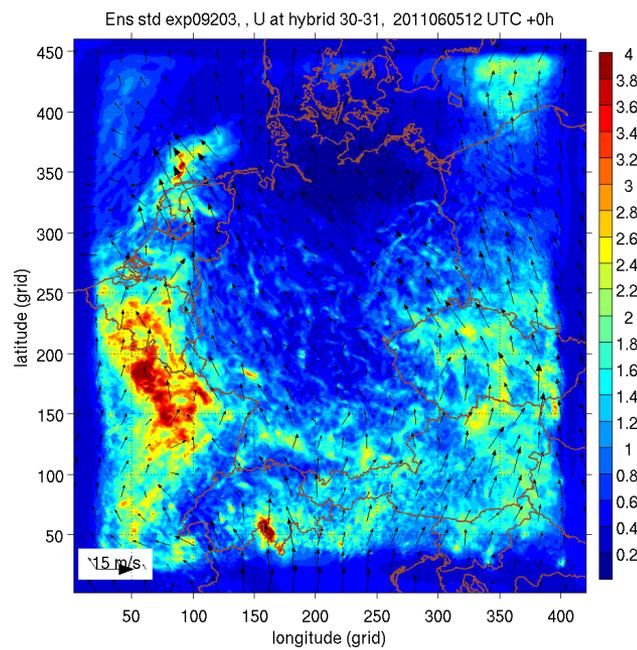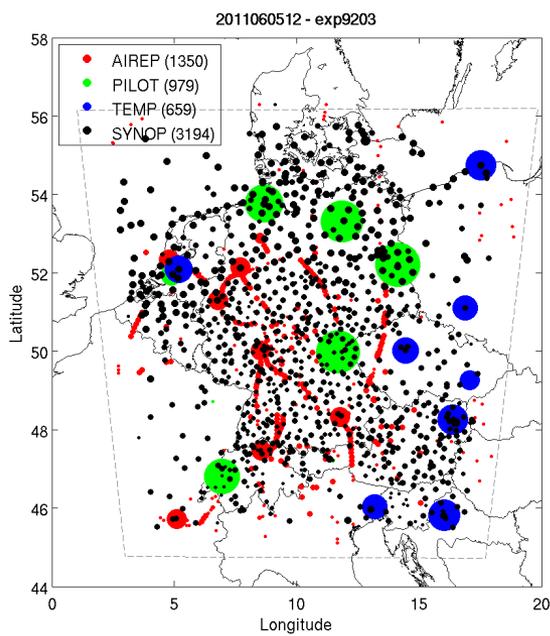  analysis / forecasts at 00 UTC, **still running**

# KENDA example 9203

## 20110605 12 UTC (hybrid level 30)

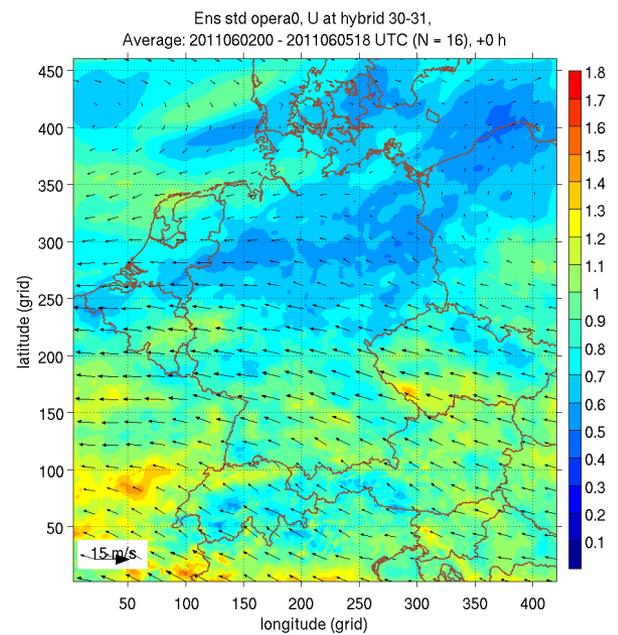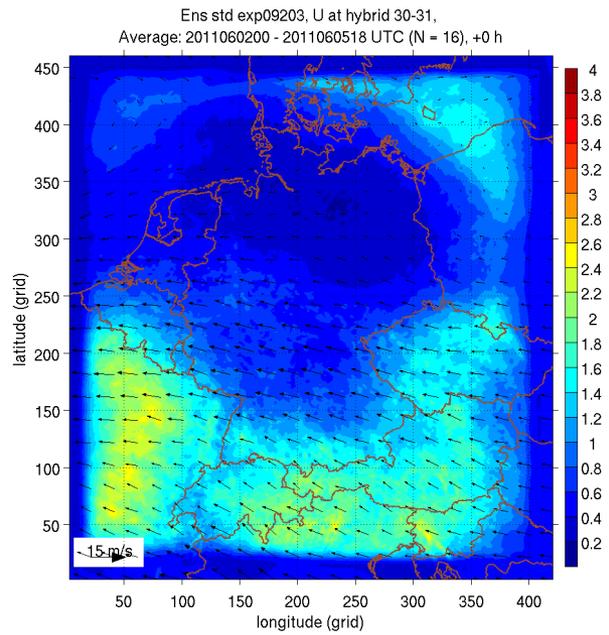Observation cov.          KENDA  spread U          BC spread U

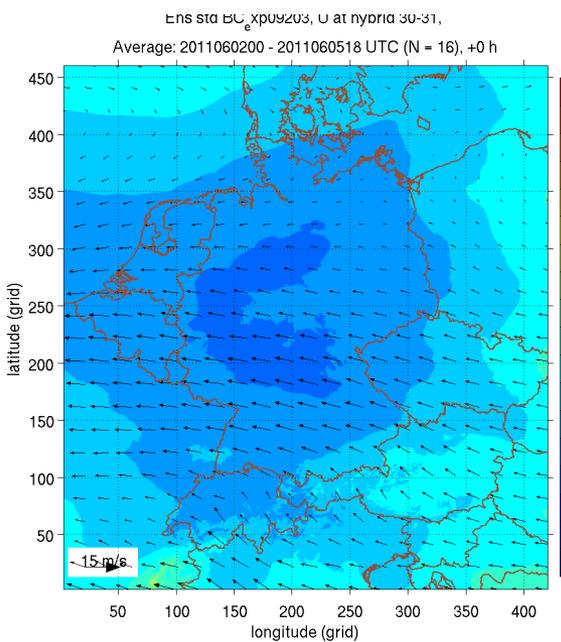# KENDA example 9203

- Average spread over 16 cycles for U at hybrid level 30:
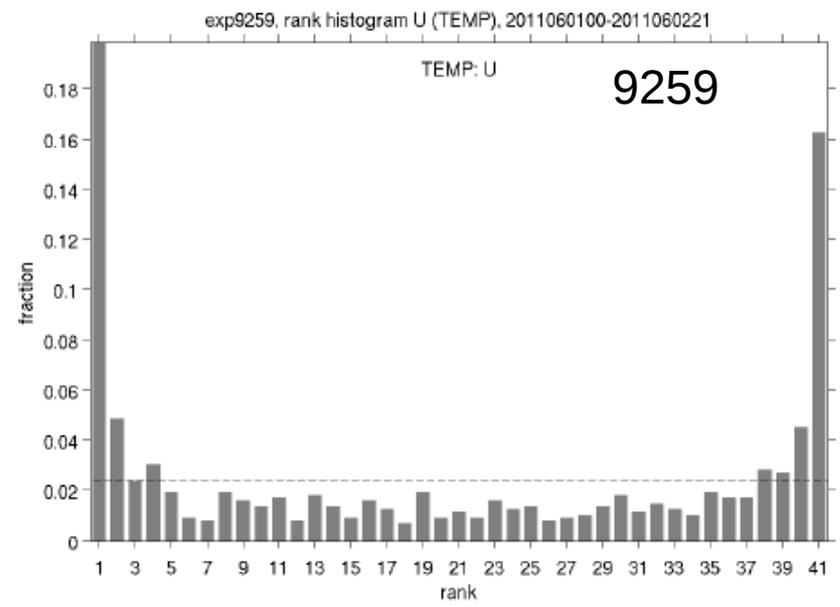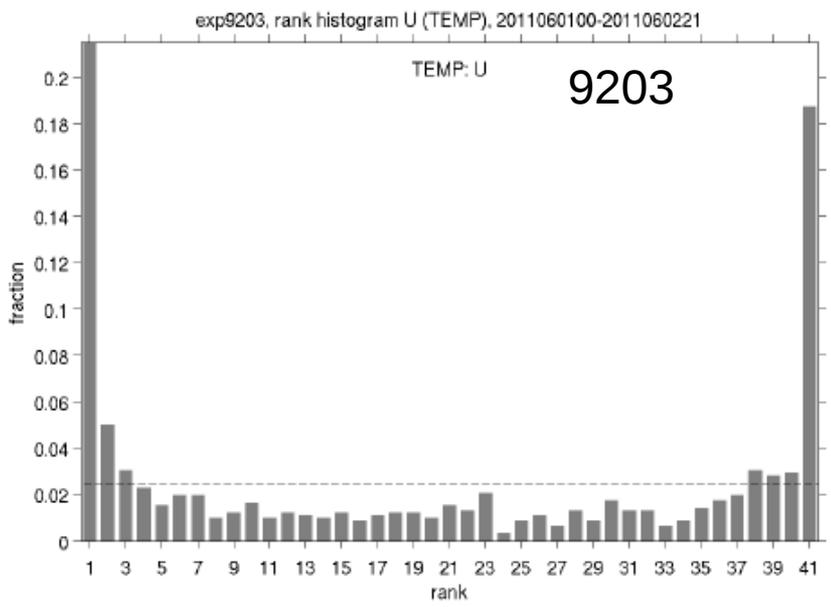
  LBC                              KENDA                          COSMO-DE-EPS

# Rank Histogram

- Ensemble analysis against TEMP U observations



slighty improved, but still far too under dispersive

# Plan B: new investigation period June 2012

- Own computation of KENDA experiments with different settings
  - → reference experiments
- Possible link to other subprojects:

    (1) Assimilation of VIS radiances

    (2) Observation impact computation
- LBC from ECMWF special project for 10.06. - 28.06.2012:
  - model level data, hourly archived up to +48 h
  - 20 members + 1 cntl
  - high (T1279 ~ 16 km) and operational (T639 ~32 km) resol.

# Outline of proposed experiments

- **KENDA**

  - only single cases studies possible

  - learn about effect of LBC

  - compare against operational COSMO-DE-EPS / EC EPS

  - baseline reference experiments

- **KENDA** + stochastic boundary layer scheme

  - clean evaluation of impact, known cases

- **KENDA** + VIS operator

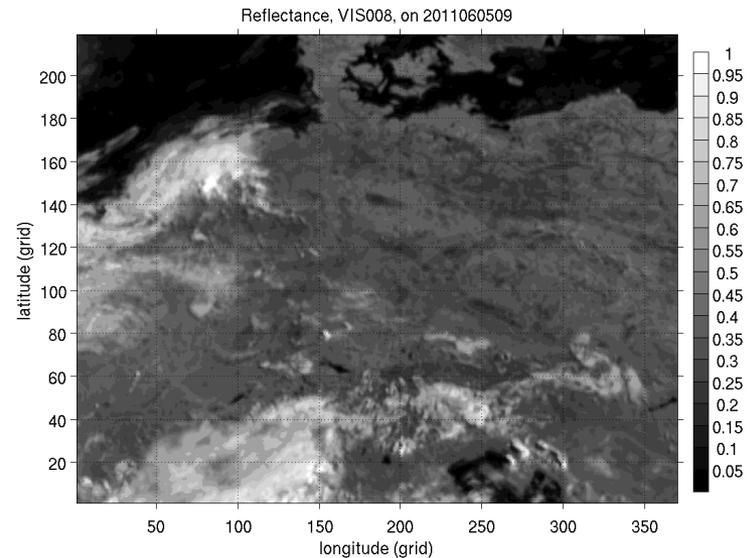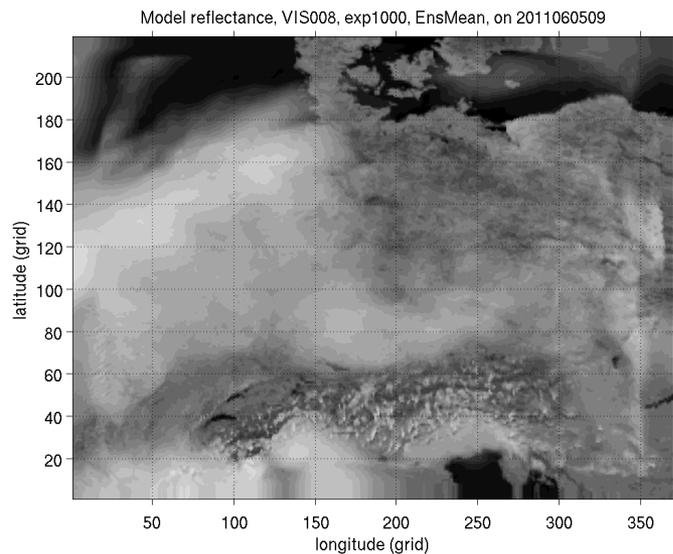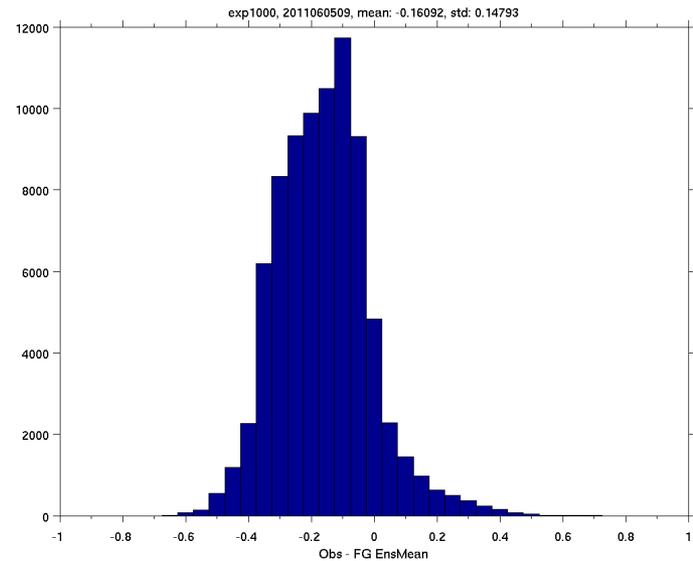  - clean evaluation of VIS observation impact
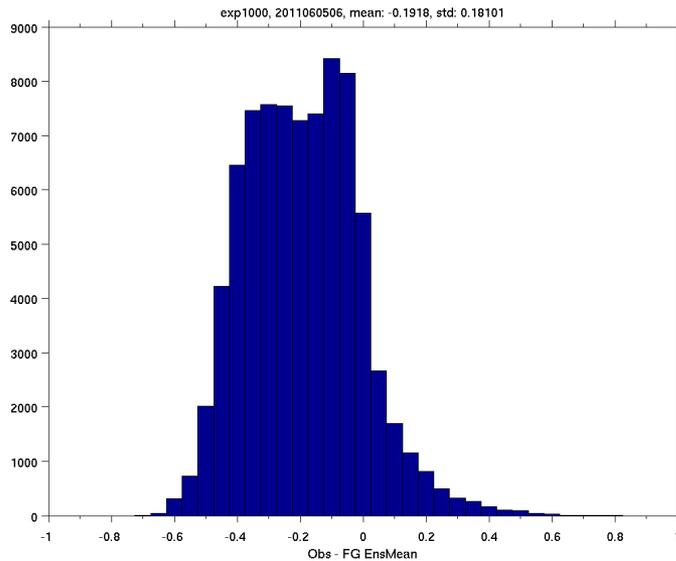
## Open points:

- Direct use of ECMWF BC, no intermediate step

- KENDA with 20 members, possible time-lagged 40 ?

- ECMWF LBC only every 12 hours

- Cycling frequency of KENDA analysis, 3-hourly / 6-hourly?

- Namelists / Settings?

# Assimilation of VIS radiances

- Test case 5 June 2011: passive use of VIS observation operator
- Simulated clouds do not „look like" model clouds



Model reflectance, VIS008, exp1000, EnsMean, on 2011060509



Reflectance, VIS008, on 2011060509

# Assimilation of VIS radiances



- More information need about observation statistics & biases to derive reasonable estimate of observation errors

- Idea: Apply the VIS operator to COSMO-DE forecasts over longer periods