Zentralanstalt für Meteorologie und Geodynamik

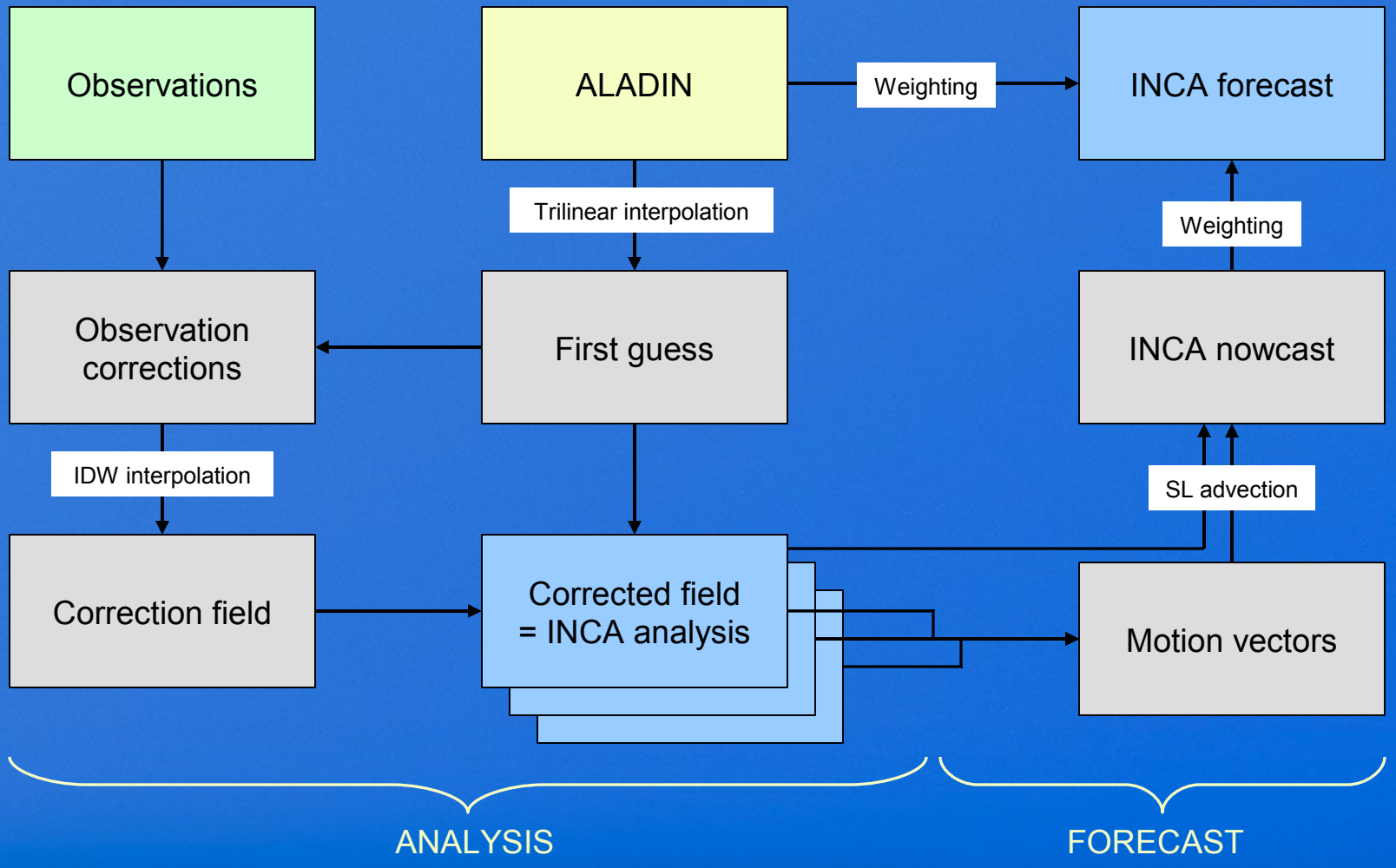
The analysis and nowcasting system INCA

T. Haiden, A. Kann, K. Stadlbacher, G. Pistotnik,
M. Steinheimer, F. Wimmer, C. Wittmann

Contents

- INCA system overview
- INCA performance
- Applications & cooperations
- Benefit to ALADIN / ALARO / AROME
- Next steps

INCA system overview



Geometry and variables

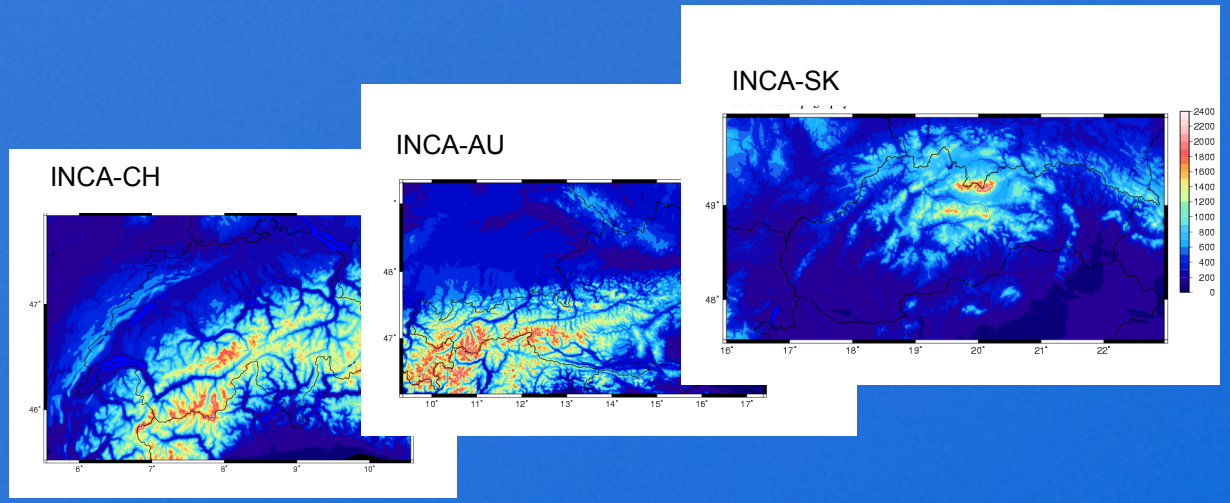
Horizontal
- Lambert projection
- 1x1 km
- 3 domains (AU, SK, CH)

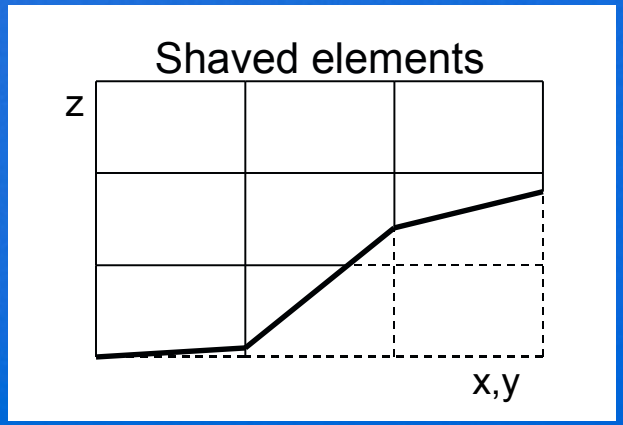
Vertical
- True z-coordinate
- Shaved elements
- dz = 100-200 m
- 30-40 layers

Variables
$\forall$ θ, q, u, v, w

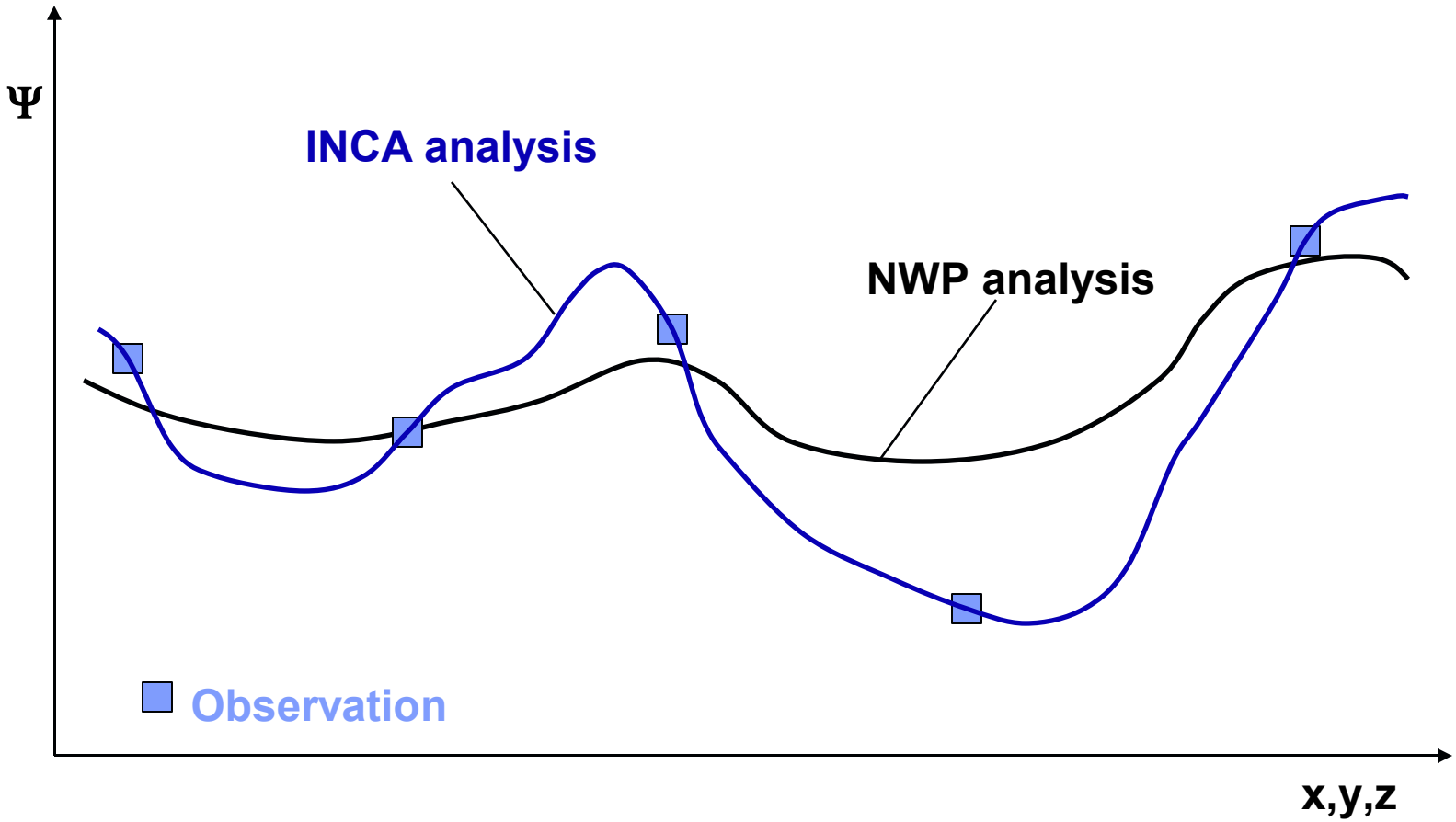
2-D analyses and forecasts
- Precipitation, cloudiness, global radiation

3-D analyses and forecasts
- Temperature, humidity, wind

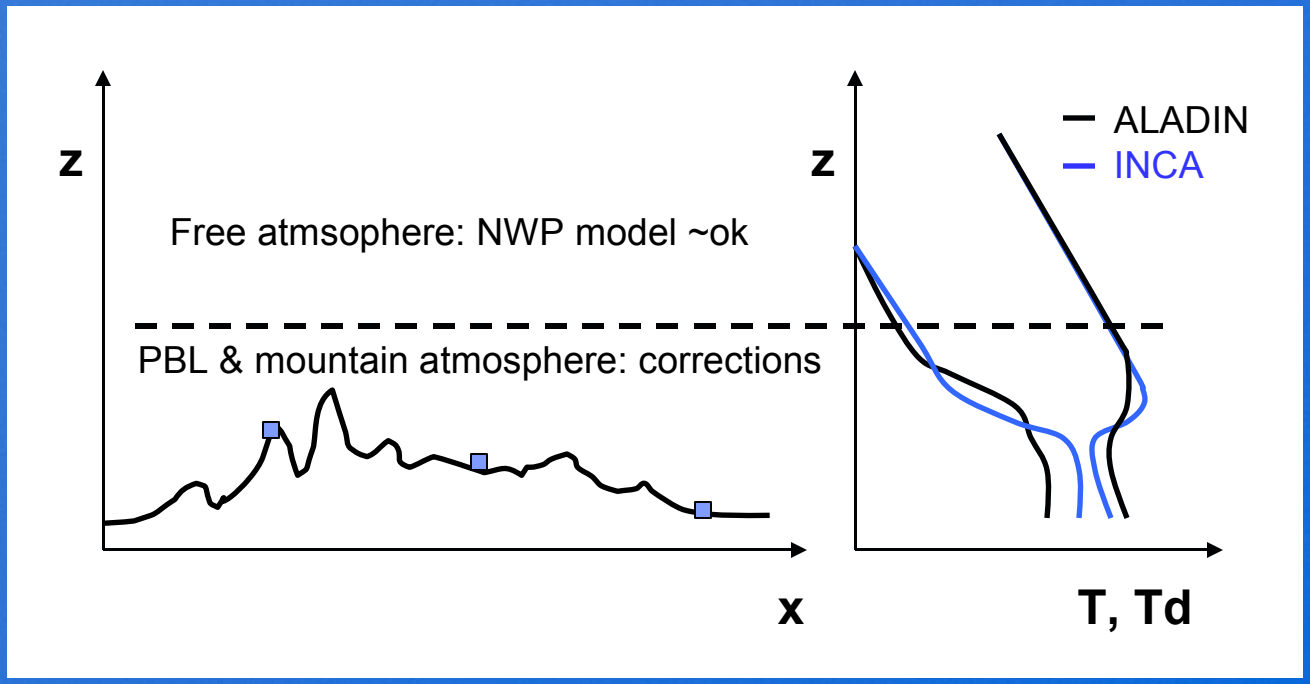




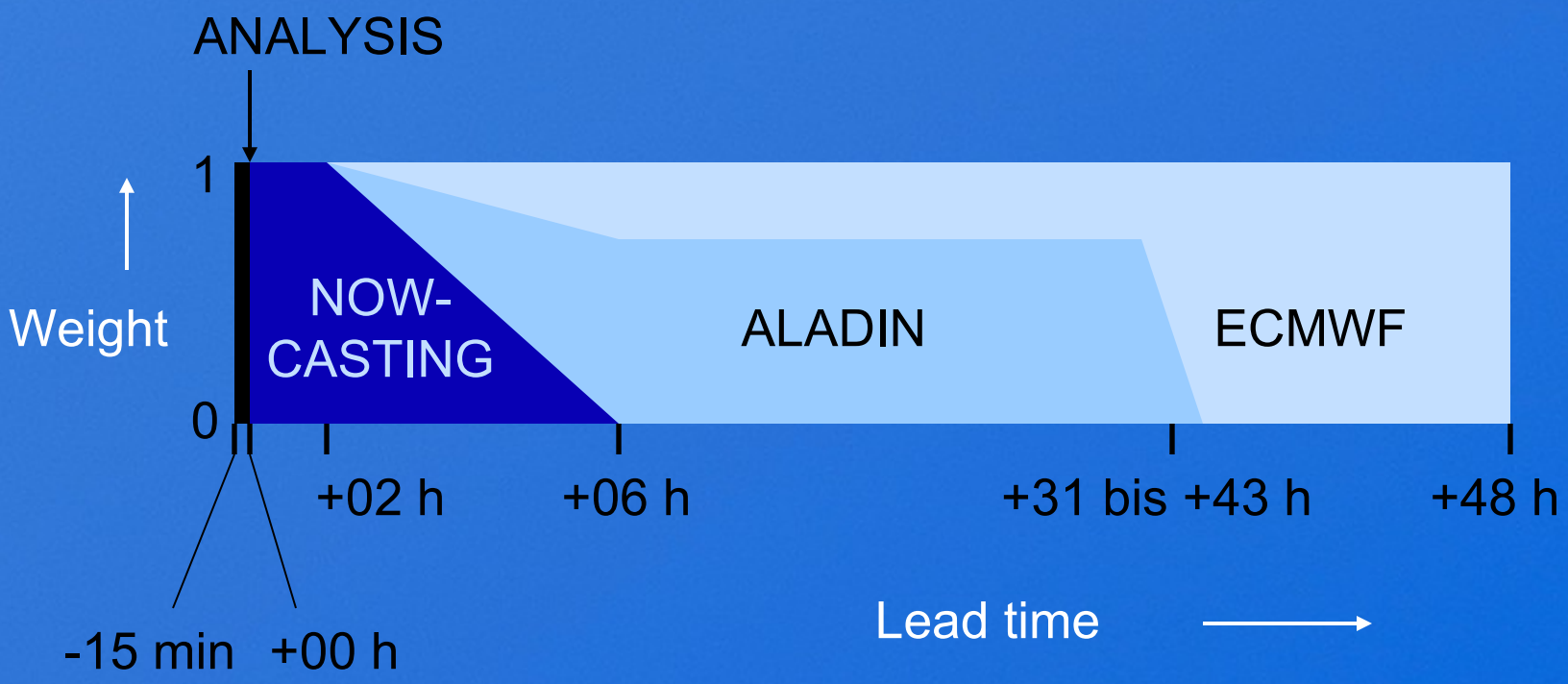
Analysis strategy



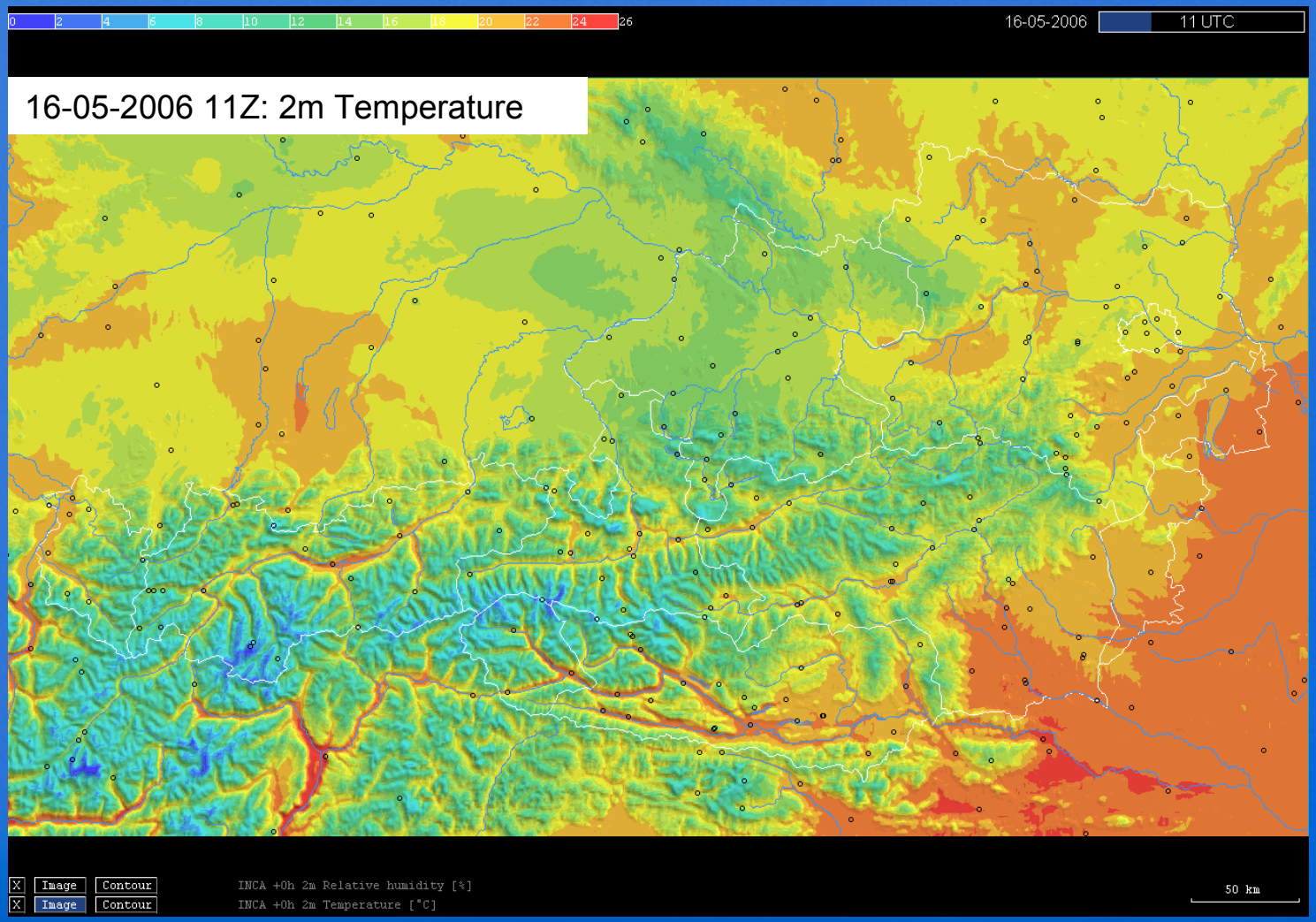
Analysis strategy



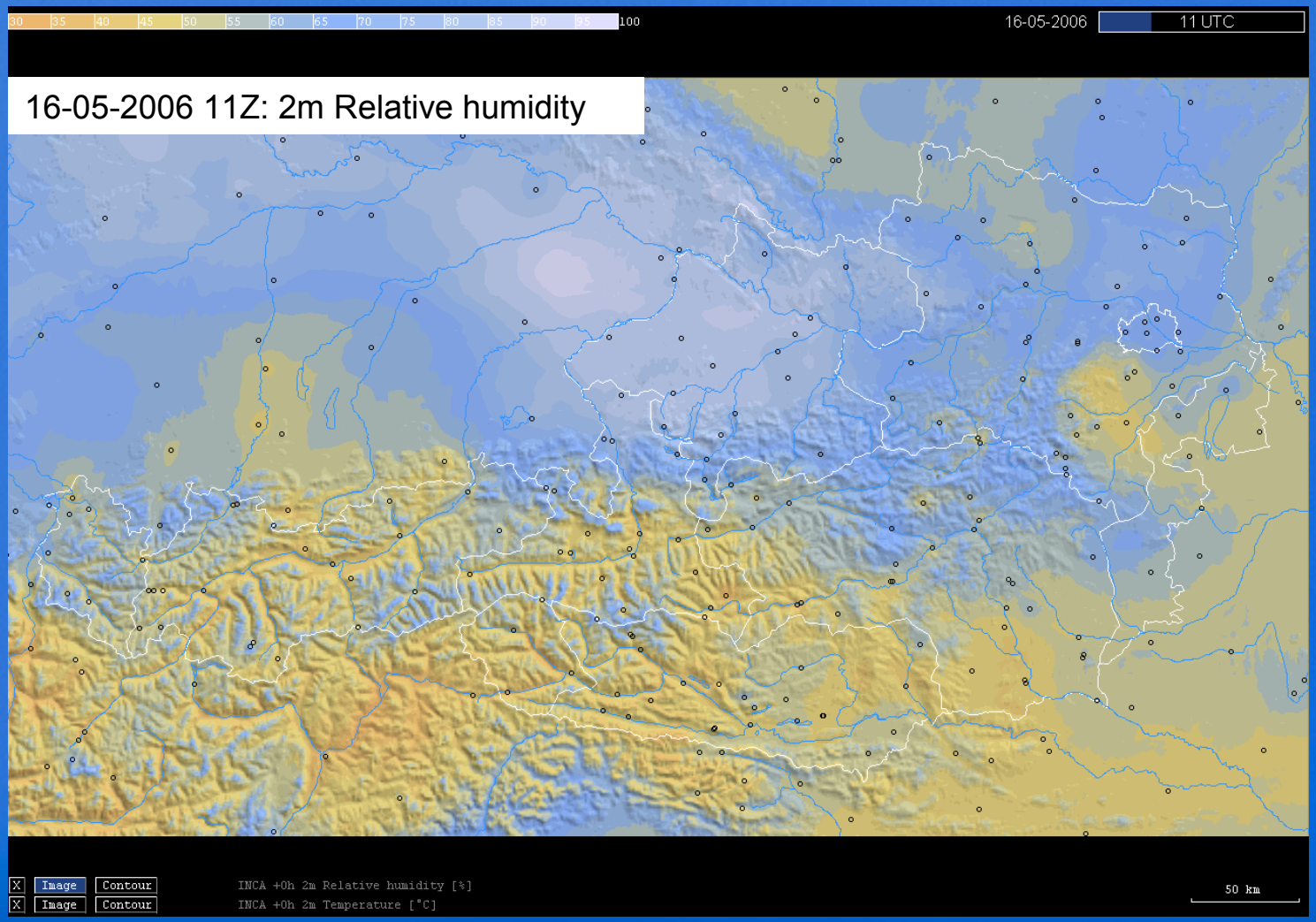
Forecast strategy



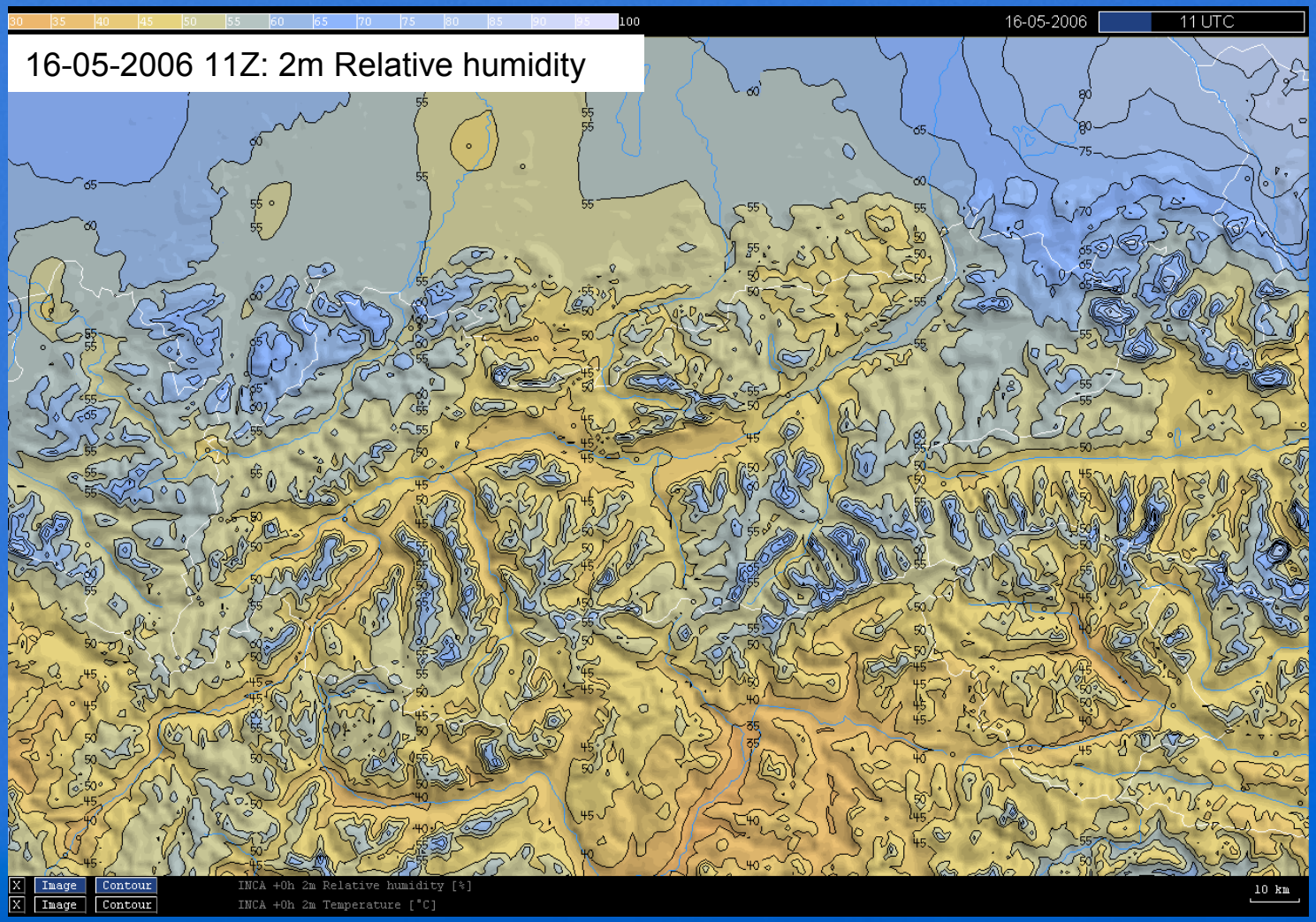
Analysis examples



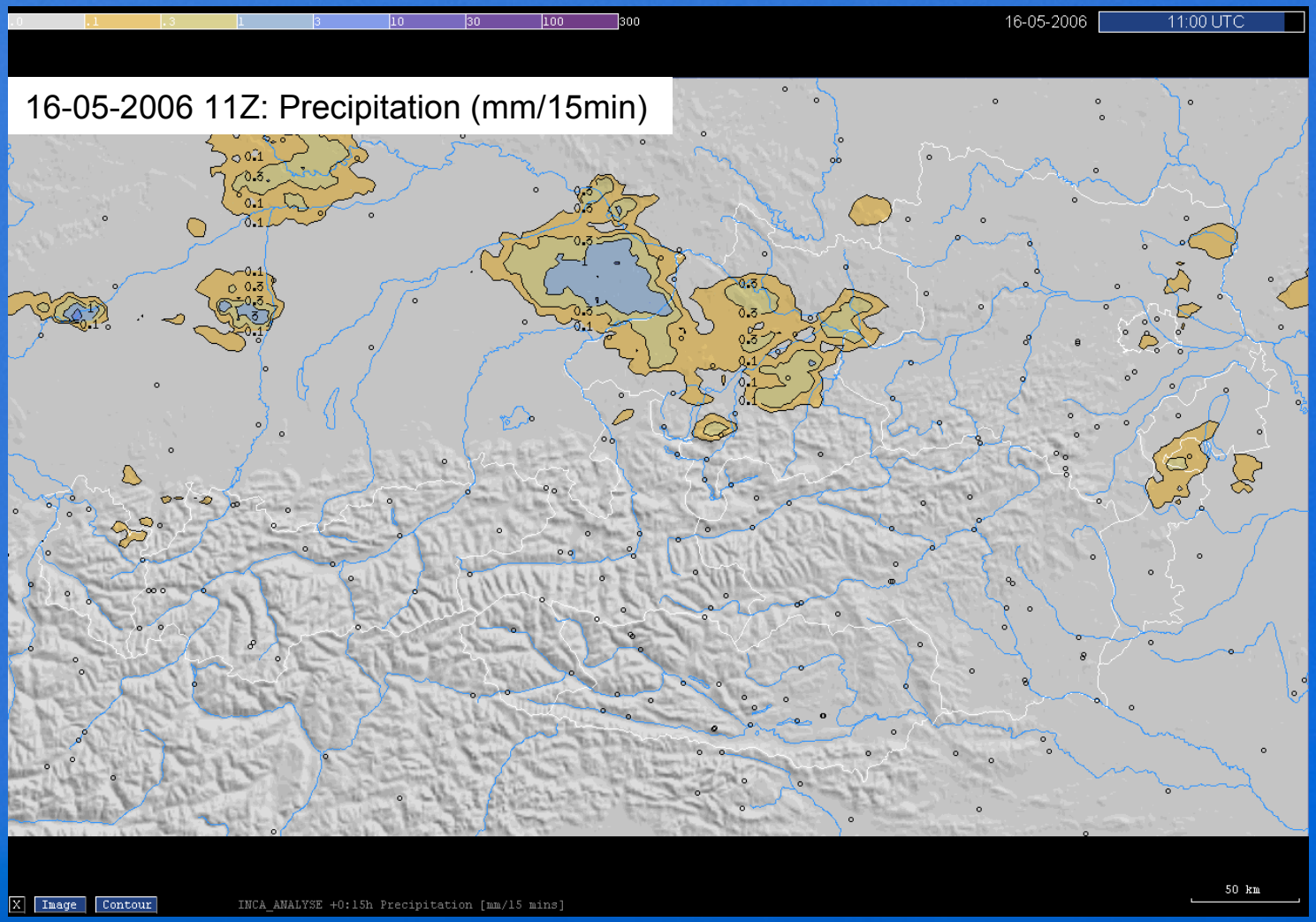
Analysis examples



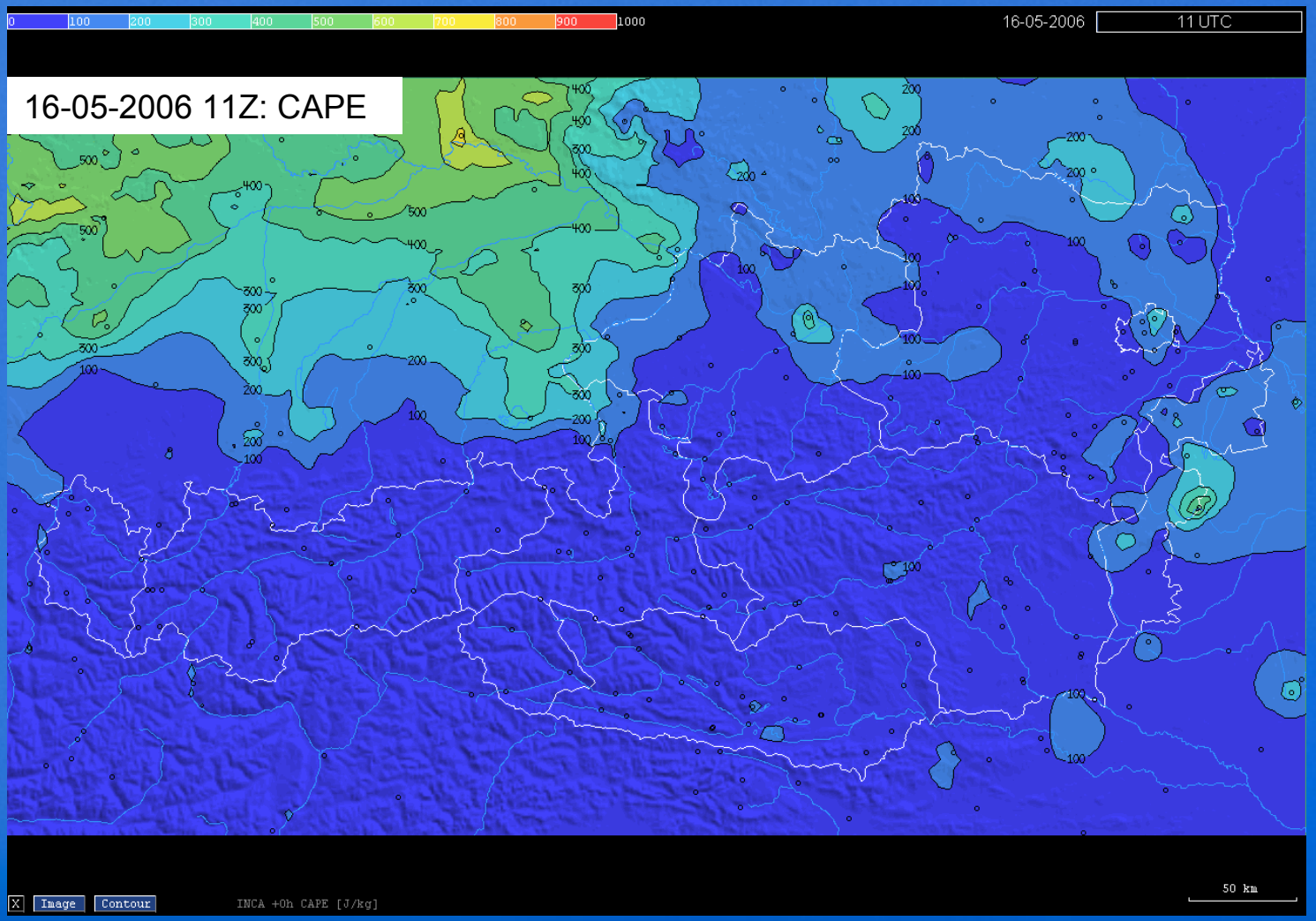
Analysis examples



Analysis examples



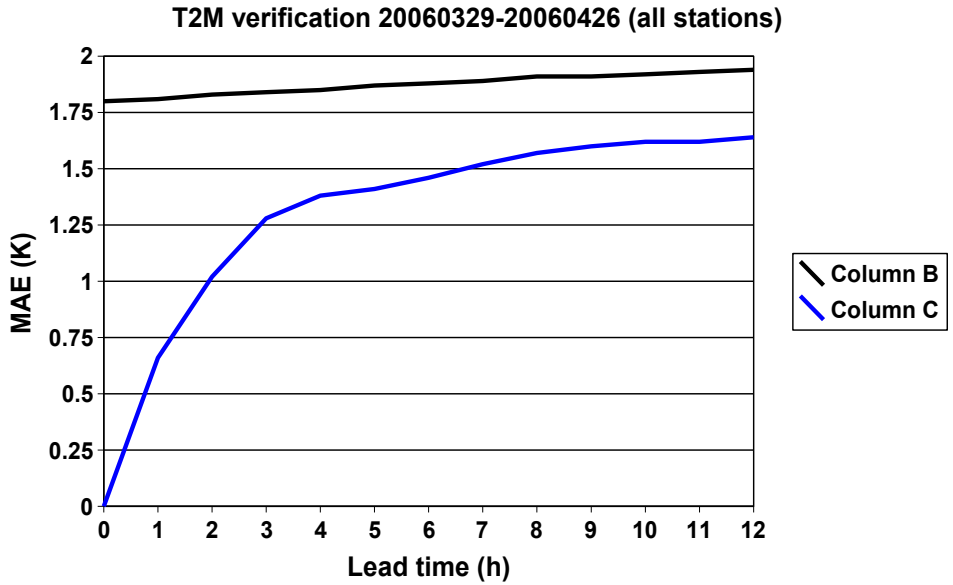
Analysis examples



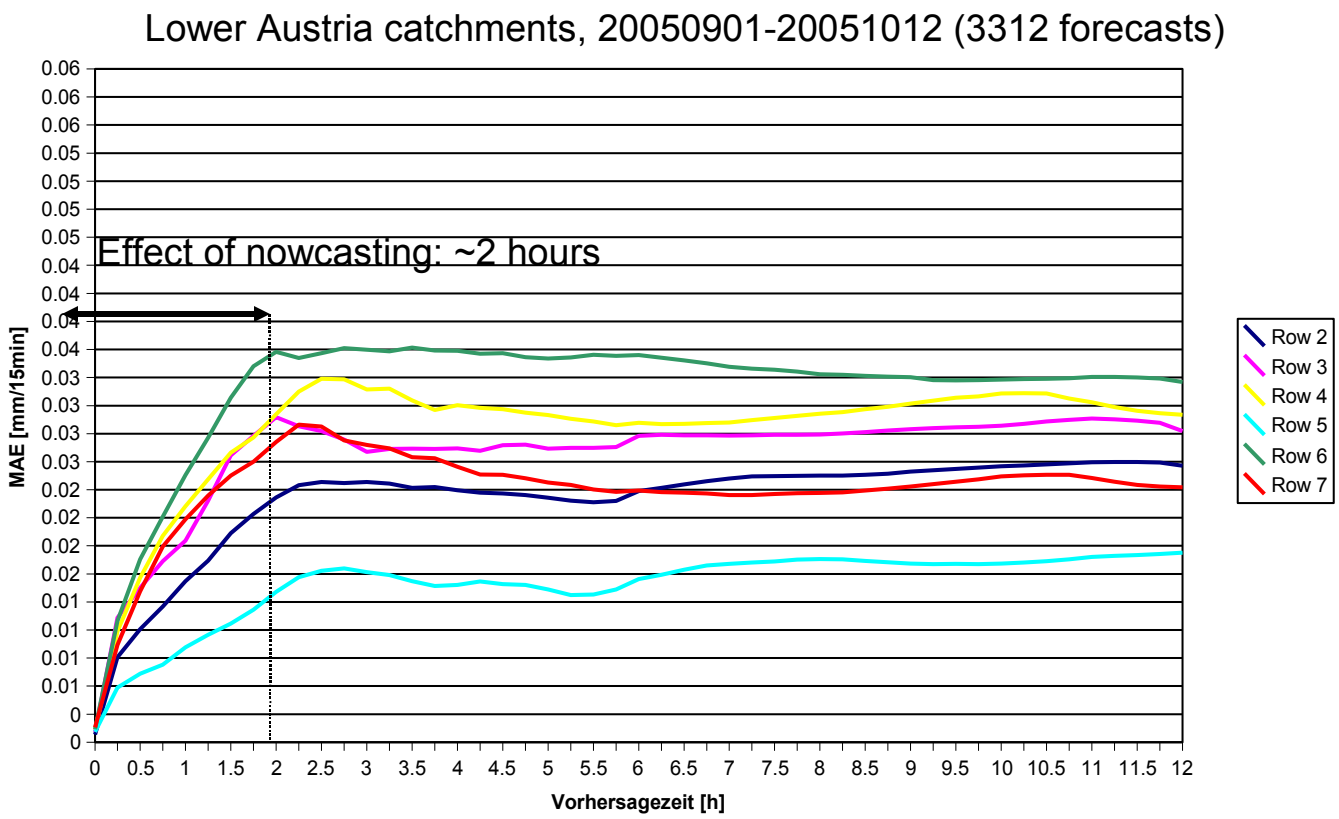
INCA Convective Analysis Fields:

LCL
CAPE
CIN
SHO
LI
MOCON
DT_TRIG
THETA_E

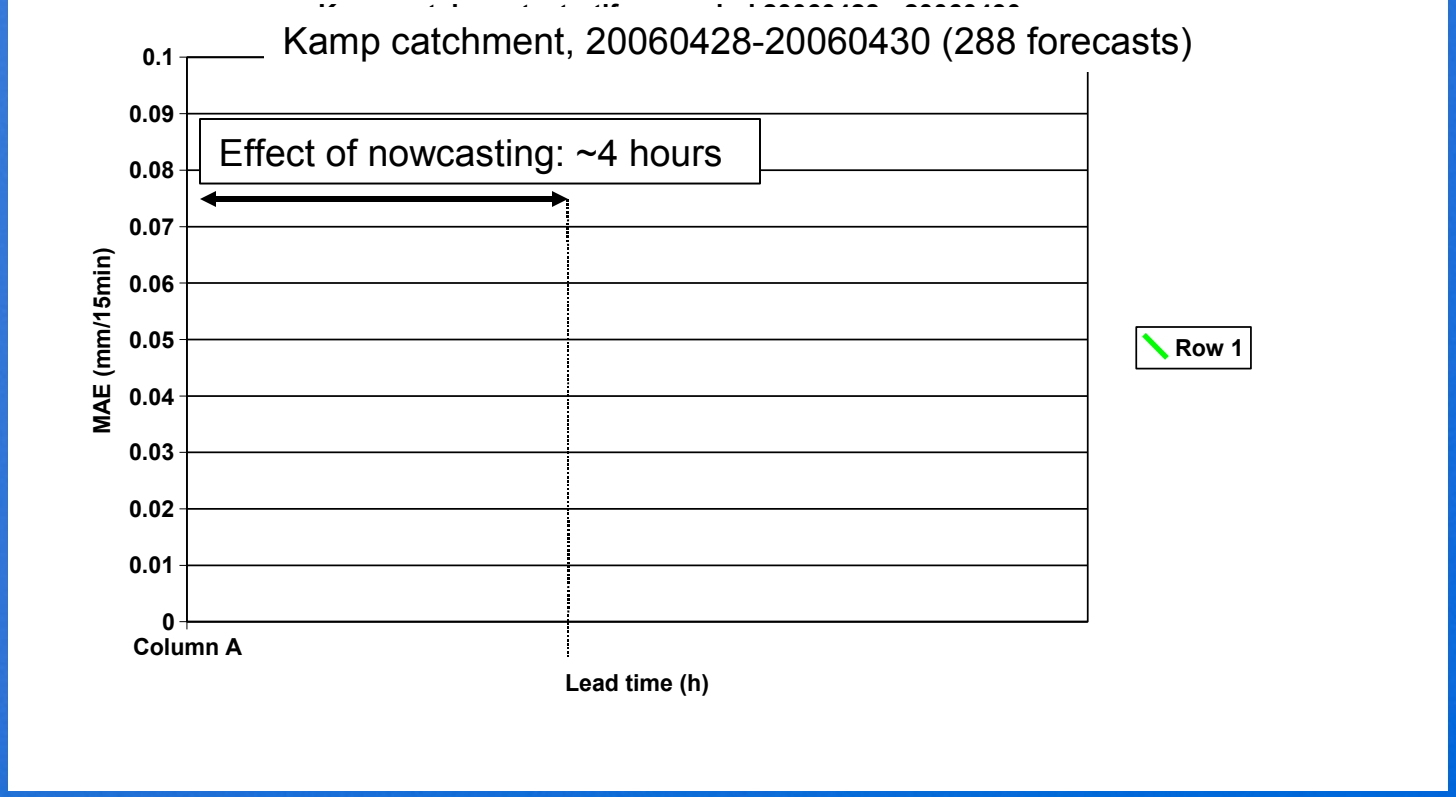
INCA performance: temperature



INCA performance: precipitation

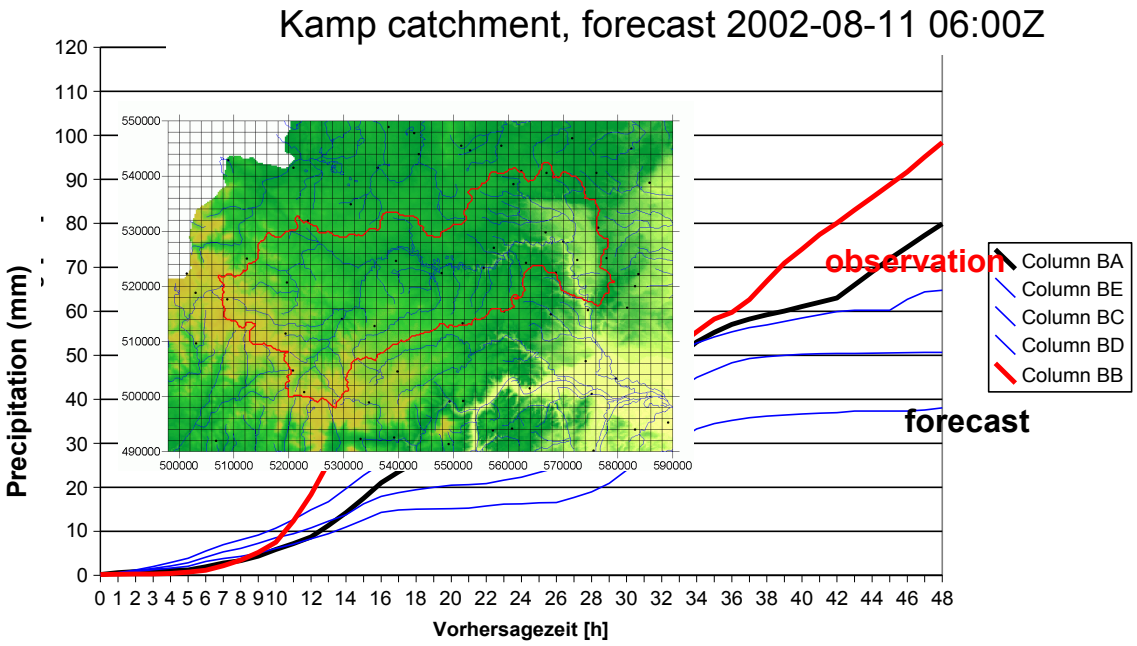


INCA performance: precipitation



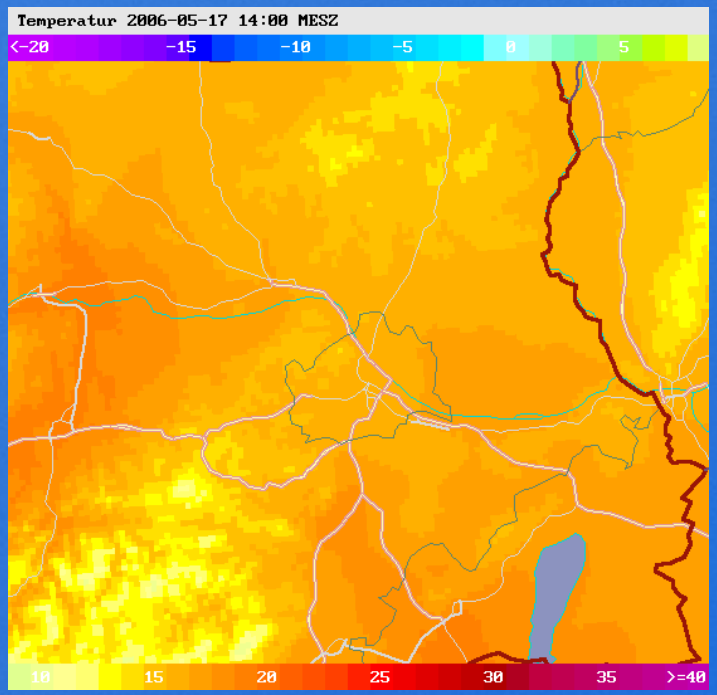
Applications

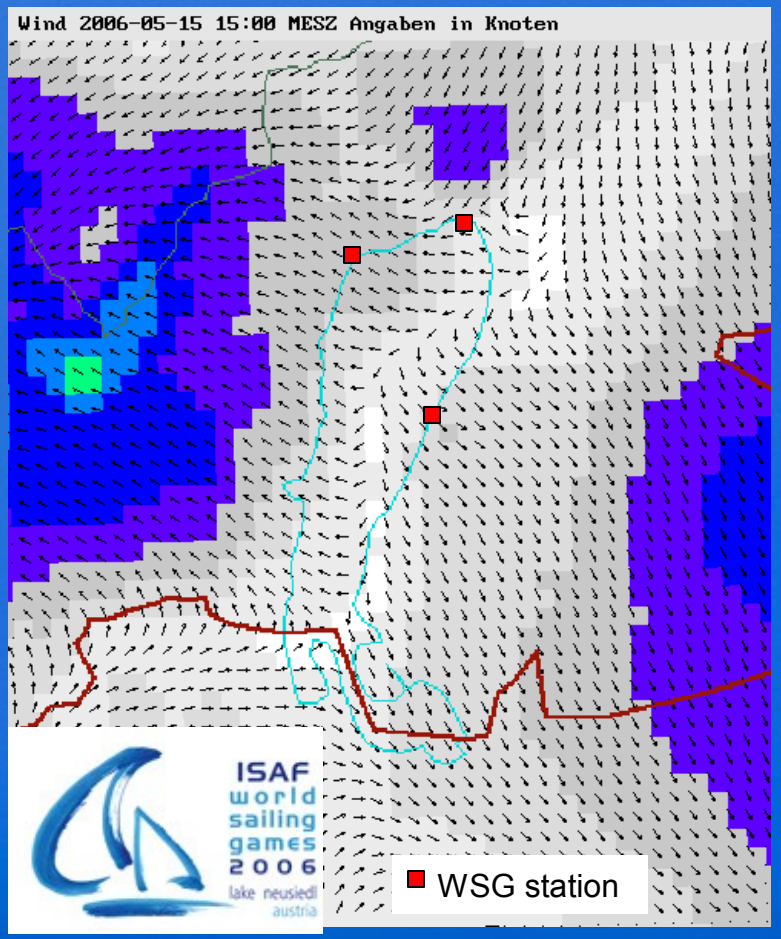
Operational flood forecasting and warning: Kamp, Danube+tributaries



Applications

Web applications: transportation, energy, sports, tourism





Cooperations

- Flood forecasting, precipitation analysis
  - University of Technology, Vienna
  - University of Agriculture, Vienna
  - Institute for Meteorology und Geophysics, University of Vienna
  - Austrian Hydrological Services

- Nowcasting, data exchange
  - DWD
  - SHMU
  - MeteoSwiss
  - CHMI (planned)

Benefit to ALADIN / ALARO / AROME (AAA)

1) Use of INCA analyses for verification and model intercomparison

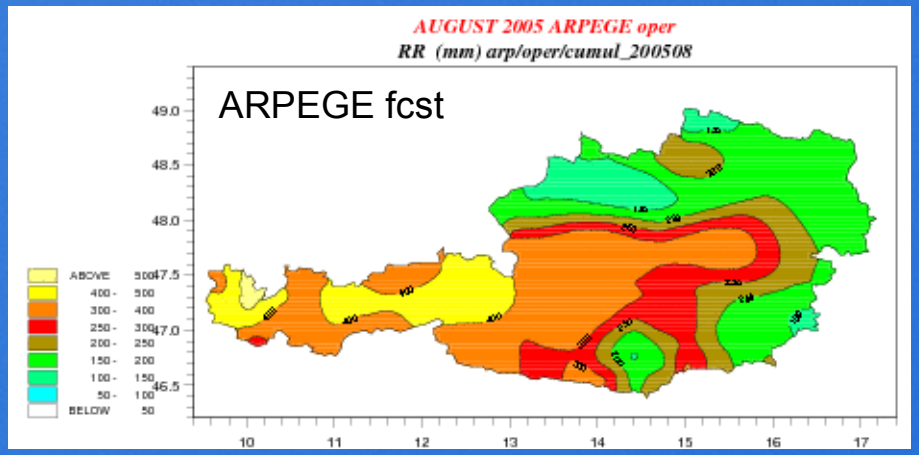
2) Use of INCA forecast as benchmark for AAA

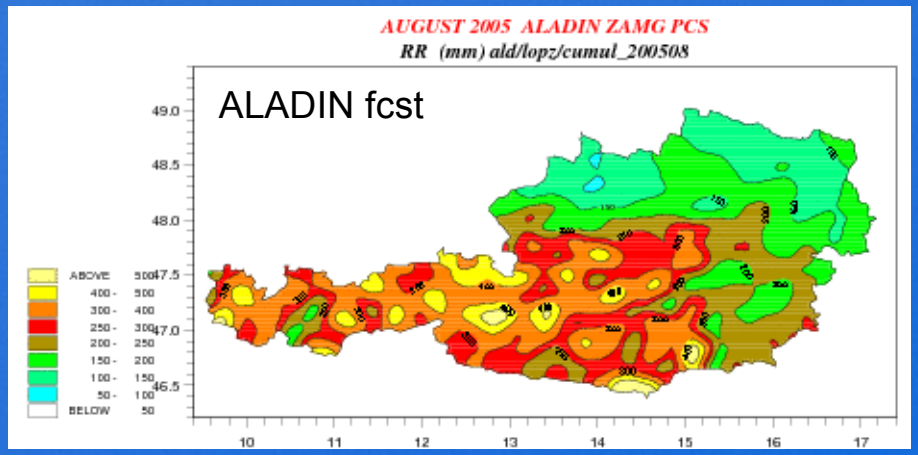
3) Convection nowcasting → feedback for AAA developments

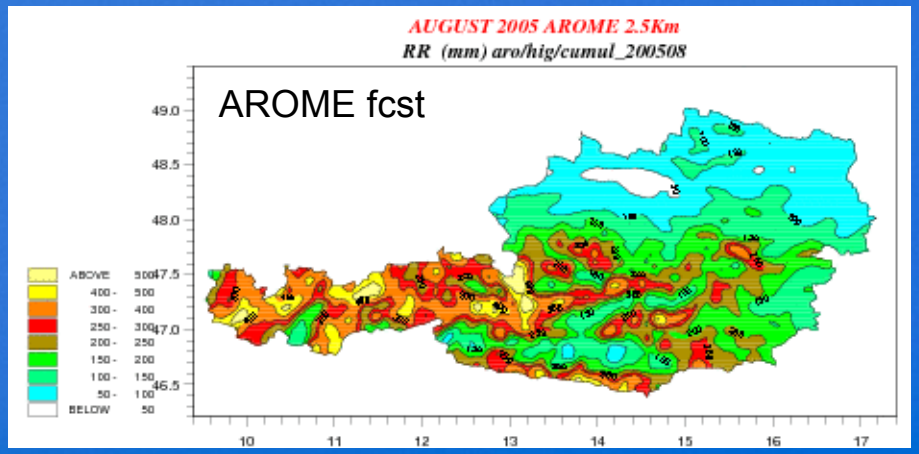
4) Gathering experience with use of non-standard obs from various sources

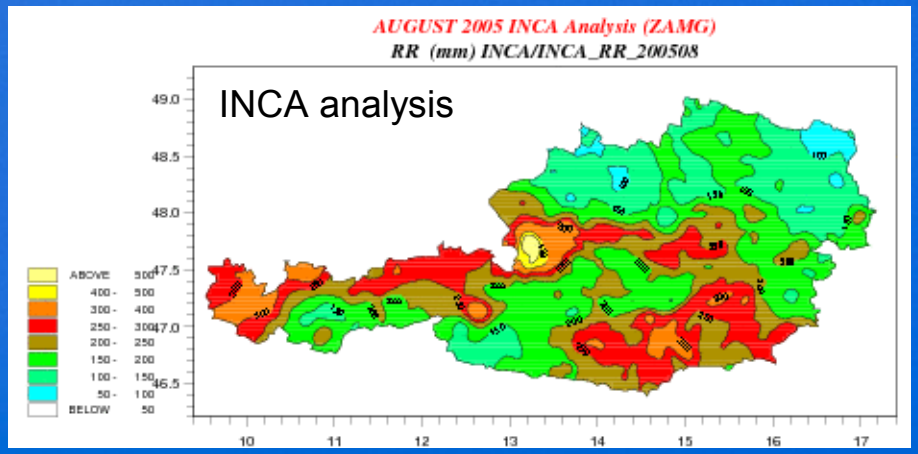
5) Nowcasting tool ready for operational use with any NWP model

1) Verification and model intercomparison



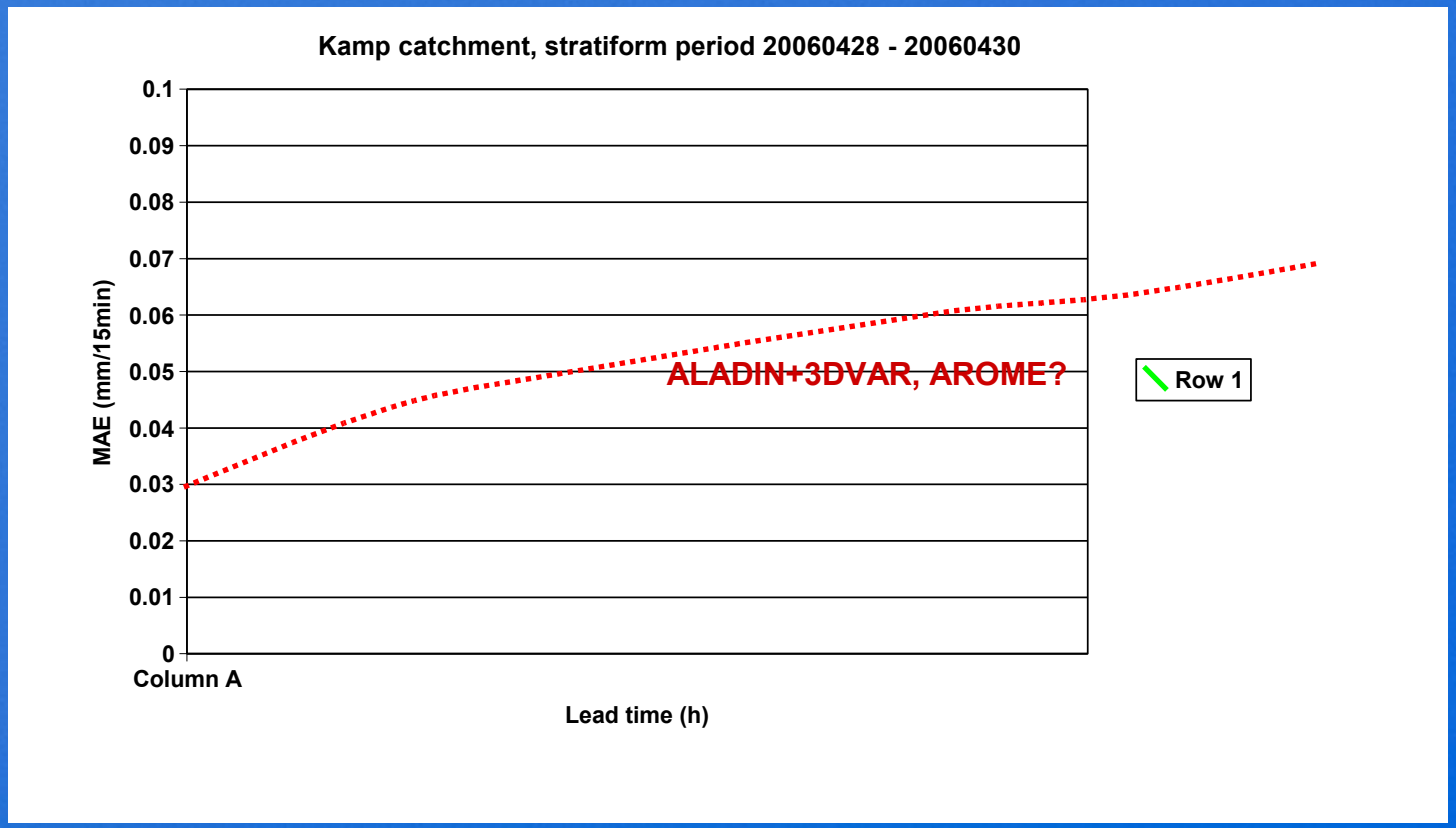




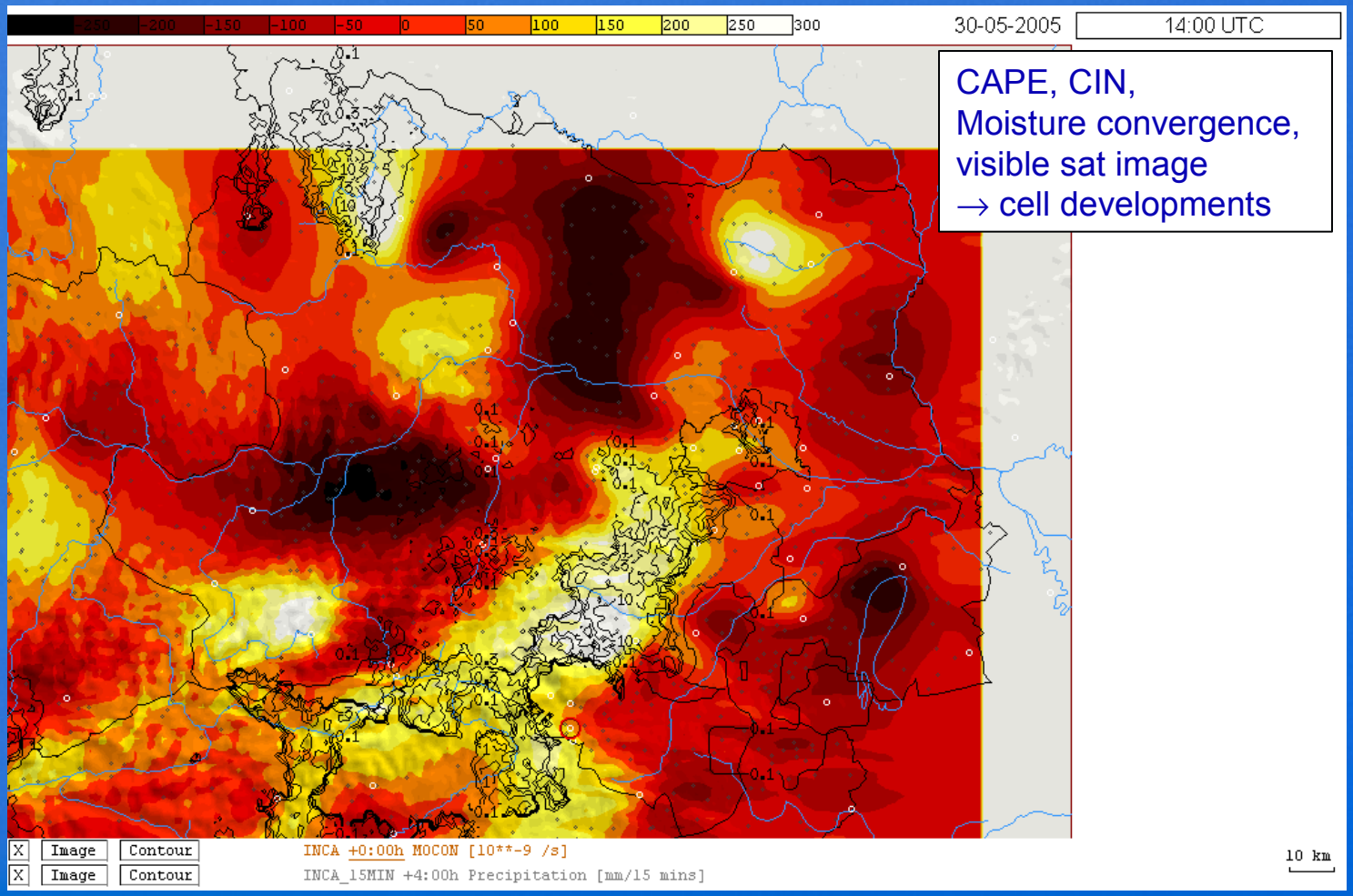


E. Bazile, EGU2006, Vienna

2) INCA forecast as benchmark for AAA



3) Convection nowcasting: feedback for AAA



4) Experience with diverse non-standard obs

Currently in the INCA system:

- SYNOP+TAWES sfc obs
- HYDRO sfc obs
- RADAR data
- SAT data (hires vis, cloud types)

Planned or in progress:

- D, CH, SK, CZ sfc obs + RADAR
- Radiosonde data

5) Tool ready for operations with any NWP model

Currently:

ALADIN, ECMWF

In progress:

ALMO

Planned:

LM (LMK?), ALARO, AROME?

Next steps (2006/2007)

- Operationalize INCA-SK, INCA-CH
- Move towards multivariate analysis (use θ_L,q_T)
- Move towards unified nowcast method (error motion vectors)
- Improve interpolation (anisotropy, correlations)
- Include more model physics (sfc energy budget, PBL processes)