Regional Cooperation for
Limited Area Modeling in Central Europe

LACE
nwp central europe

LACE in the last year

Yong Wang and many LACE colleagues

Organisational news: no change

Programme Manager: Yong Wang

- **Area Leaders:**

  Dynamics & Coupling: Petra Smolikova

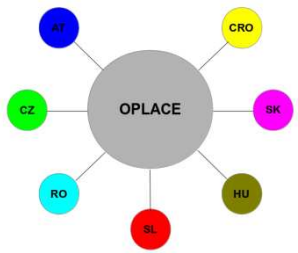
  Physics: Neva Pristov

  Data Assimilation: Mate Mile

  Predictability: Theresa Gorgas

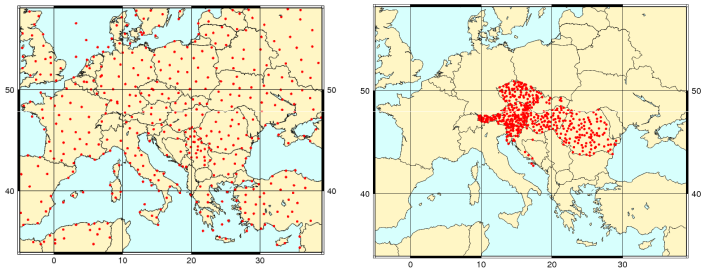
- **Data Manager:** Alena Trojakova
- **System Coordinator:** Oldrich Spaniel
- **Climate Project manager:** Gabriella Szepszo
- **Administration and Finance:** Andrea Sigl

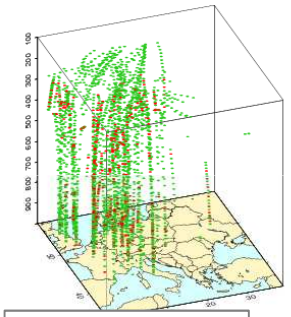
Common operations



- OPLACE: The common Observation Pre-processing for LACE DA and Verification: SYNOP, TEMP, AMDAR, AMV, Wind profilers and radiances (SEVIRI, AMSU-A/B, MHS, HIRS, IASI)

Exchanging the whole National near surface observation in real time

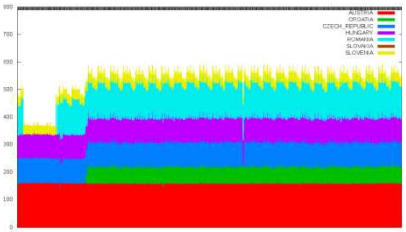




AMDAR reports

Agreement has been signed by all 7 LACE directors in 2013.

Preparation of exchange of national radar data in real time.



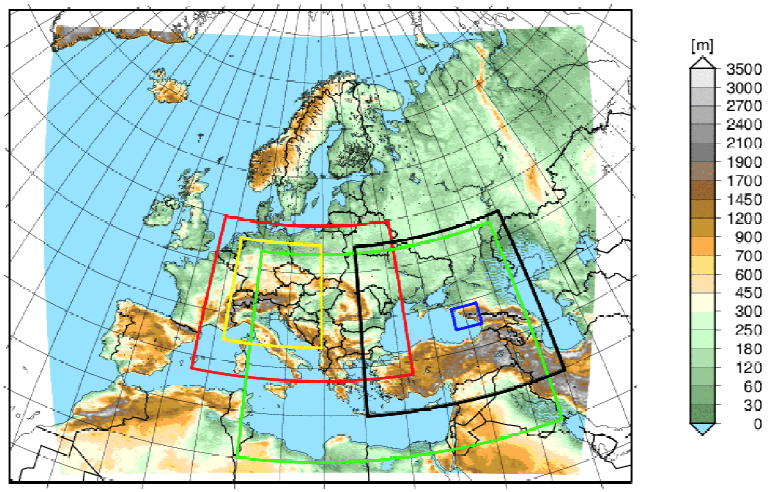
Data monitoring hourly

Deatils at Mate‘s talk

Common operations

- ALADIN-LAEF from IBM to CRAY

Ensemble size	16+1
Horizontal resolution	11km
Vertical resolution	45
Runs/day	2
Forecast range	72h
Coupling	ECMWF EPS time lagged



Initial perturbation	Blending
Model perturbation	multi-physics
Initial surface perturbation	ensemble DA

Details at Theresa's talk

LACE DA status

AROME(2.5) *Austria*
3DVAR+OI_main

0 3 6 9 12 15 18 21 →

ALARO(8) *Croatia*
3DVAR+CANARI

0 6 12 18 →

ALARO(4.8) *Austria*
IFSDSC+CANARI

0 6 12 18 →

ALARO *Czech Rep.*
Blending → 3DVAR(exp)

0 6 12 18 →

AROME(2.5) *Hungary*
3DVAR+ALDDSC

0 3 6 9 12 15 18 21 →

ALARO(6.5) *Romania*
3DVAR+CANARI

0 6 12 18 →

ALARO(8) *Hungary*
3DVAR+CANARI

0 6 12 18 →

ALARO *Slovakia*
Blending+CANARI

0 6 12 18 →

ALARO(4.4) *Slovenia*
3DVAR+CANARI

0 3 6 9 12 15 18 21 →

Details at Mate's talk

R&D highlights in DA

Radar, GPS, IASI and SEVIRI radiances DA experiments with AROME

Radar, Mode-S and IASI and SEVIRI radiances DA experiments with ALARO

Studies on representation of background error statistics

- Collection of raw RADAR data samples from LACE countries to examine common pre-processing and data assimilation.
- Test of INCA2 Quality Control and CONRAD tool for MF BUFR file conversion.
- Investigation of data quality of every LACE RADAR measurement and provision of reliable inputs for DA

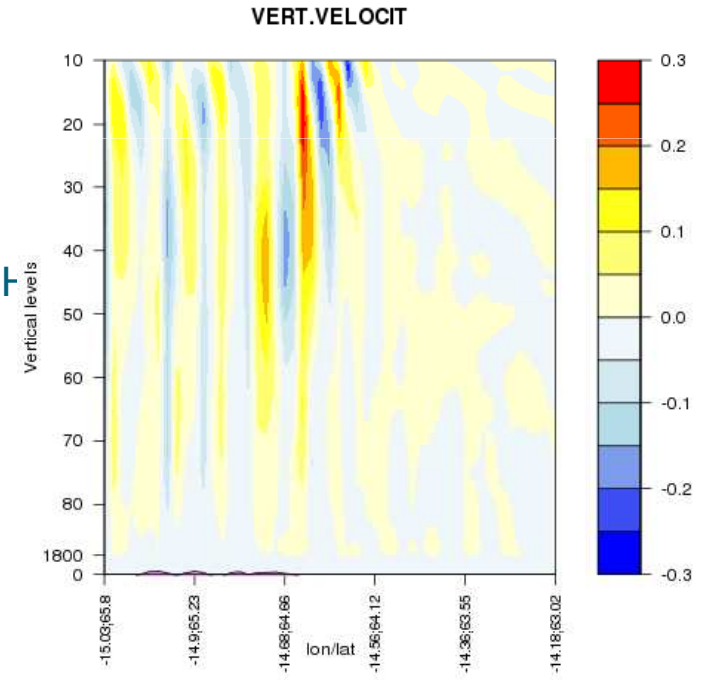
RADAR stations for summer period 2012

Deatils at Mate‘s talk

R&D highlights in DYN

- Design of VFE scheme for NH model
  - Better understanding the VFE scheme and performance: why does it work? Does it work well in very high resolution? Which are the crucial parameters?
    - Testing of vertical Laplacian term
    - Testing of vertical integral operator
    - Testing of accuracy

- Physics-dynamics interface
  - Turbulent tendency of vertical velocity in NH impact of the vertical turbulent on w.



Difference – without and with turbulent flux

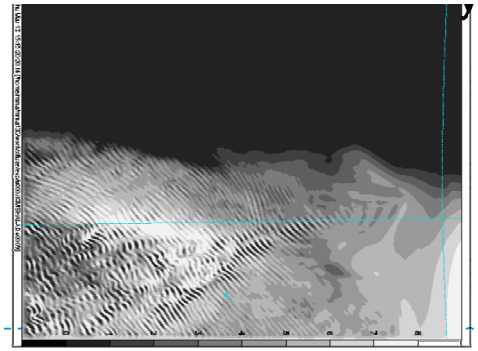
Details at Petra‘s talk

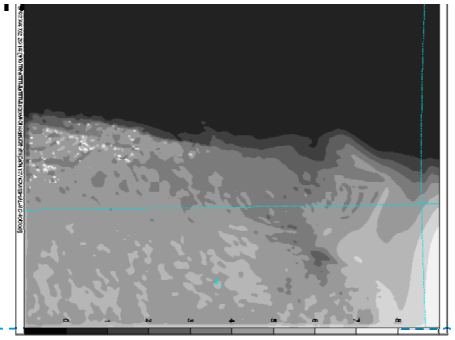
R&D highlights in DYN

- ENO (Essentially Non-Oscillatory) technique for SL interpolation
  - High order semi-Lagrangian interpolations (cubic Lagrange polynomial) are not monotonic and produce spurious overshoots in the vicinity of sharp gradients
  - Their quasi monotonic version exists, but reduces accuracy dramatically
  - ENO interpolation chooses one of interpolated values on consecutive stencils and may reduce spurious oscillations/overshoots while keeping high order accuracy uniformly
  - Study in 1D linear advection toy model and 2D vertical slice version of ALADIN
- Tunning SLHD (semi-Lagrangian horizontal diffusion) in ALARO

High level cloudiness: reference

Tuned vert.profile of spectral diffusion





Details at Petra‘s talk

R&D highlights in PHY

- ALARO-1 status (10km – 1km): The first ALARO-I has been ready, the pre-operational validation/verification is ongoing.

TOUCANS, improved radiation ACRANEB2 and unsaturated downdraft scheme have been integrated in ALARO-I; modifications in microphysics; improvement on vertical geometry of cloudiness and falling rainfall; adjustments on parameterization of rain drop size distribution….

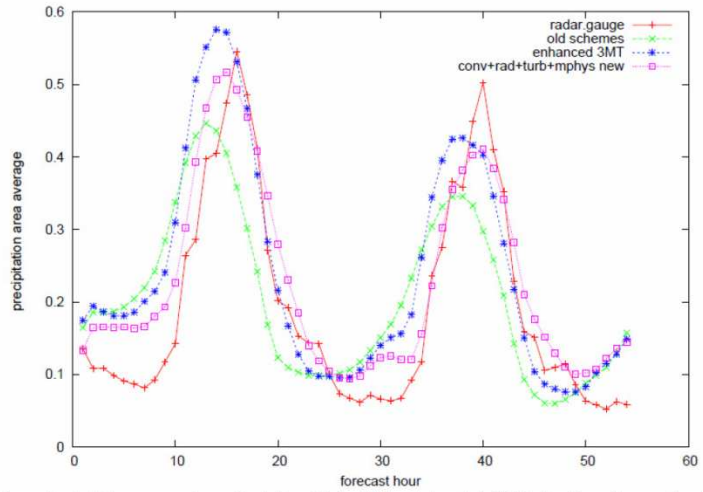


Figure: Precipitation averaged over Czech Republic for 11 days in June/July 2009, situation with exceptional quasi-tropical diurnal convective conditions over Central Europe, red - measured precipitation by radar and rain-gauges, green - ALARO-0, blue- ALARO-0 baseline, magenta - ALARO-1. To early diurnal cycle of convection is improved in the newest version.

Impact on diurnal cycle

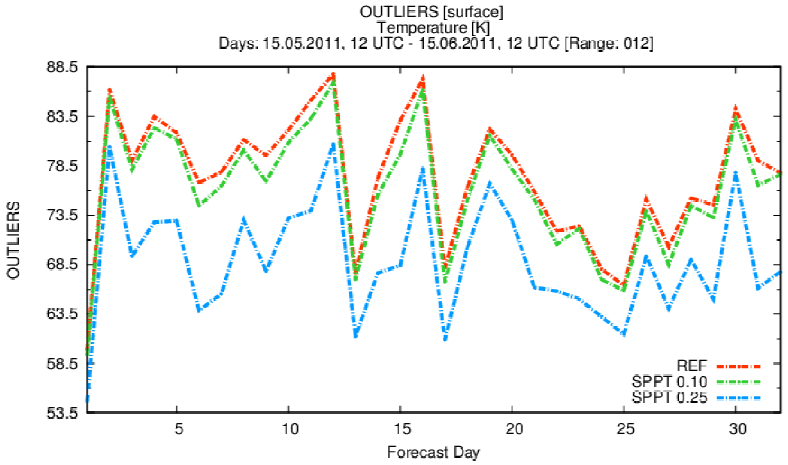
average of mean hourly precipitation over the area (11 realizations, 4.7 km)

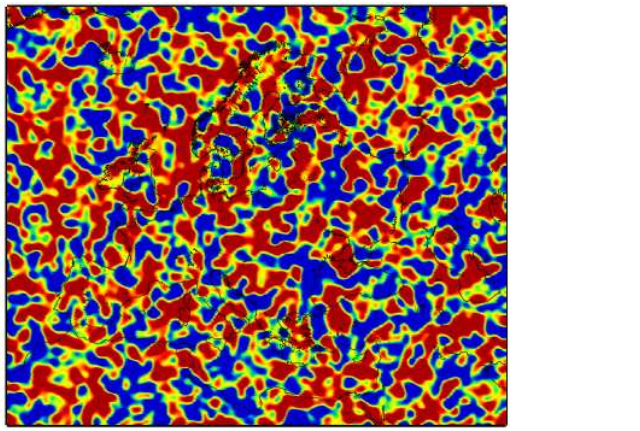
Details at Neva's talk

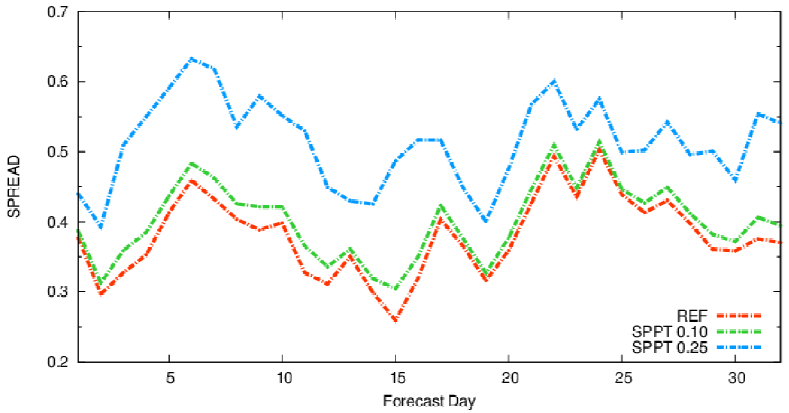
R&D highlights in EPS

ALADIN-LAEF

- Stochastic surface physics perturbation



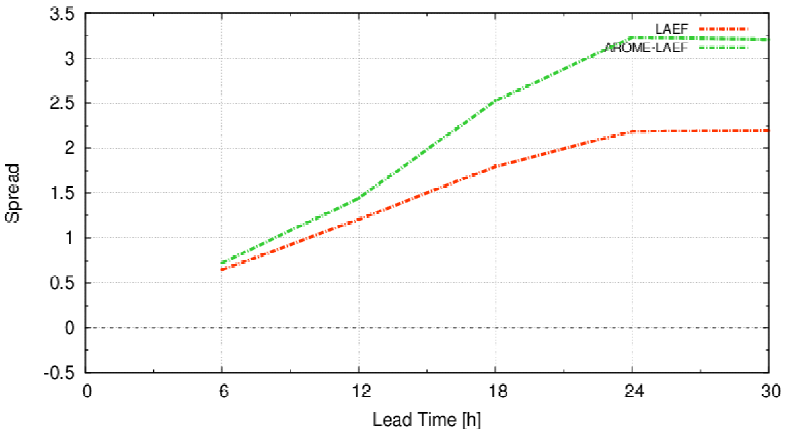


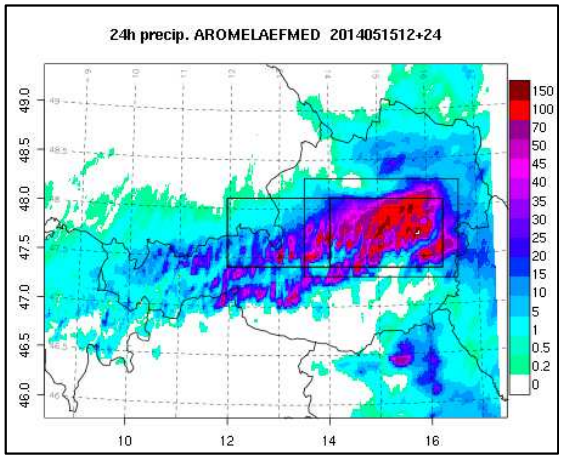


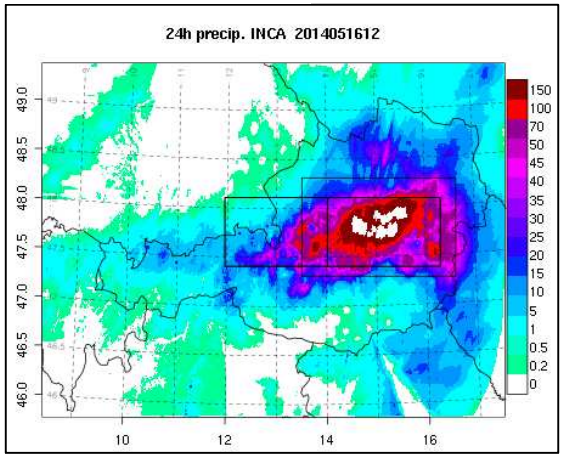
Details at Theresa's talk

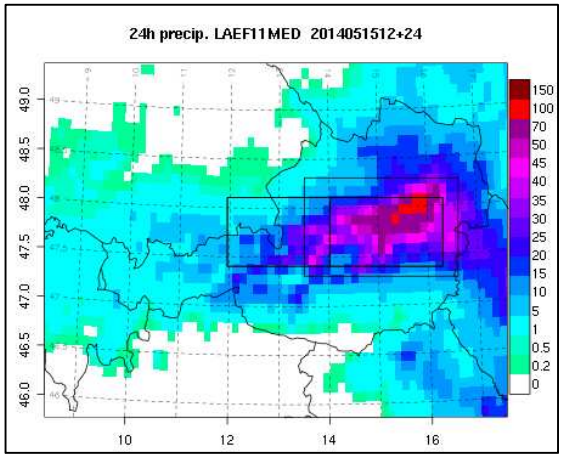
R&D highlights in EPS

ALADIN-LAEF vs. AROME-LAEF





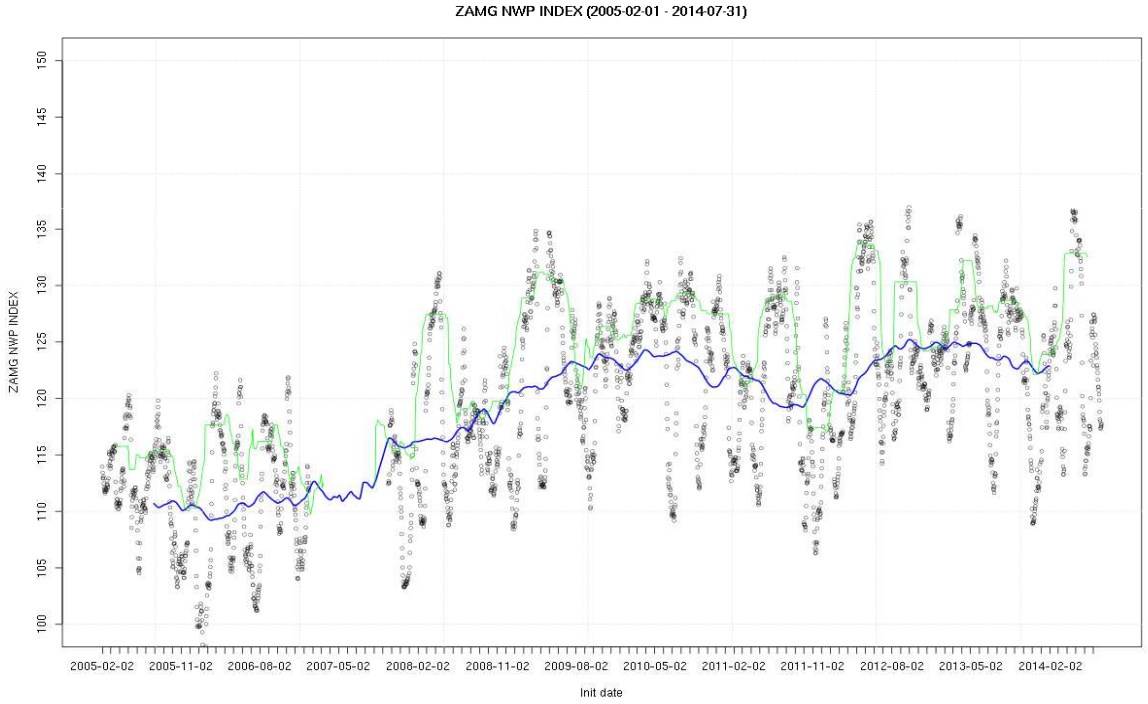




Verification

Work towards to long term verification in each LACE country

Austria



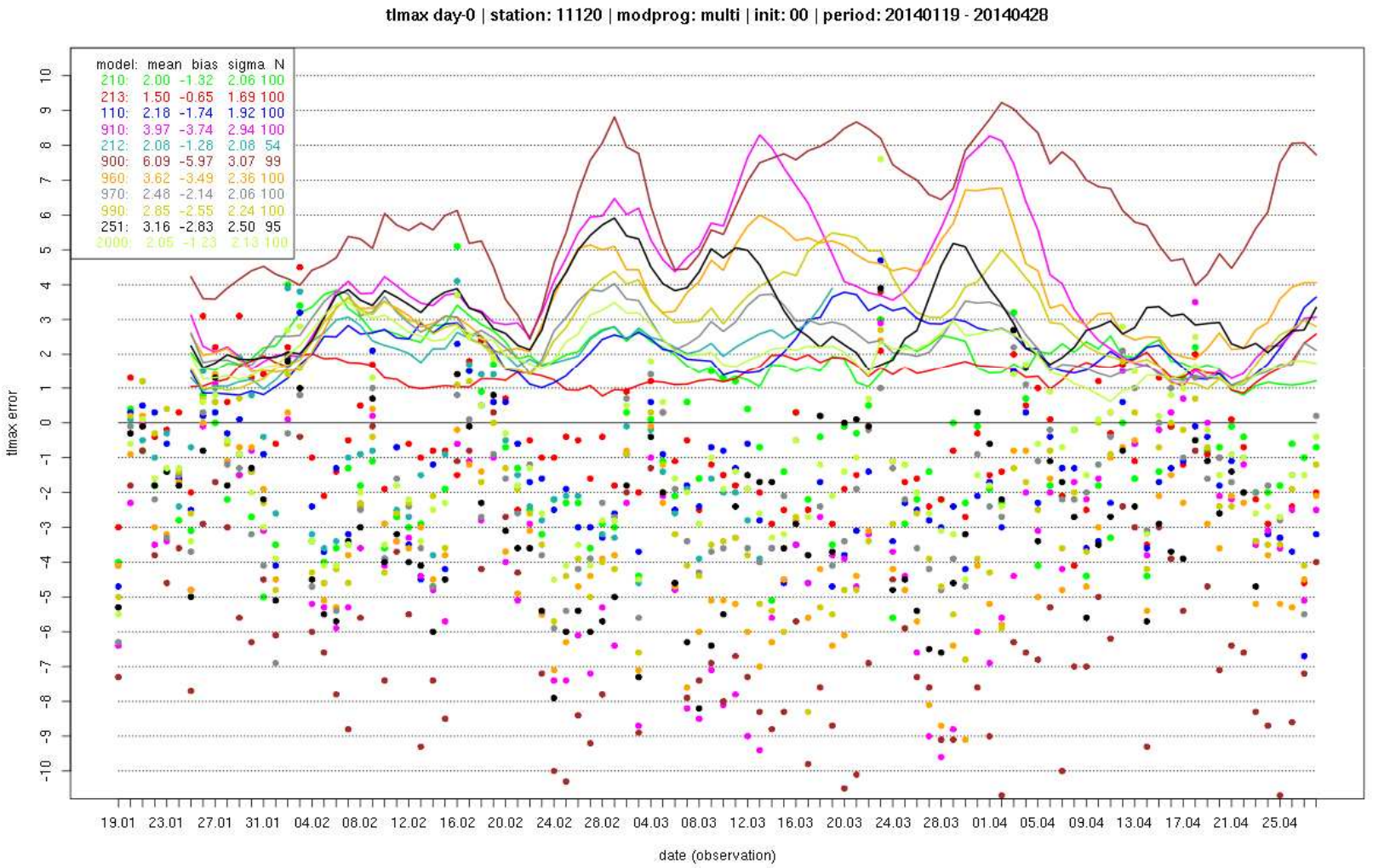
NWP Index

2005-2014

Verification

Austria

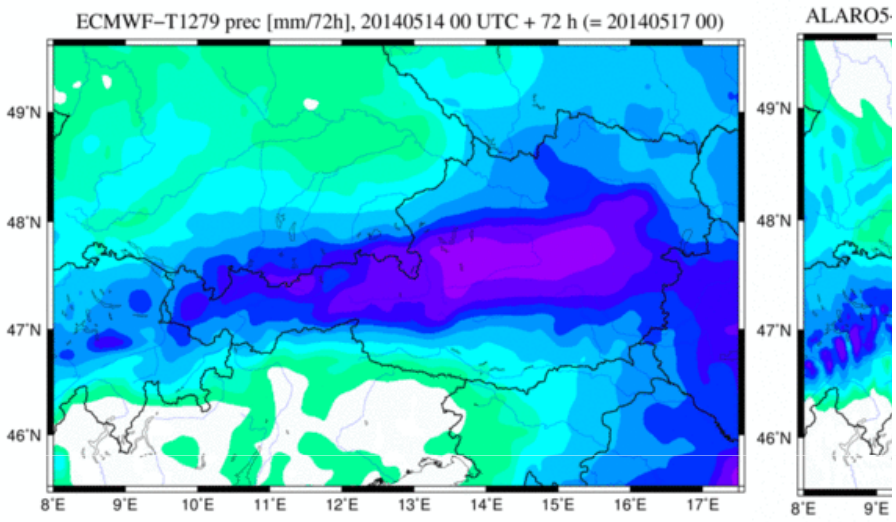
AROME Tmax

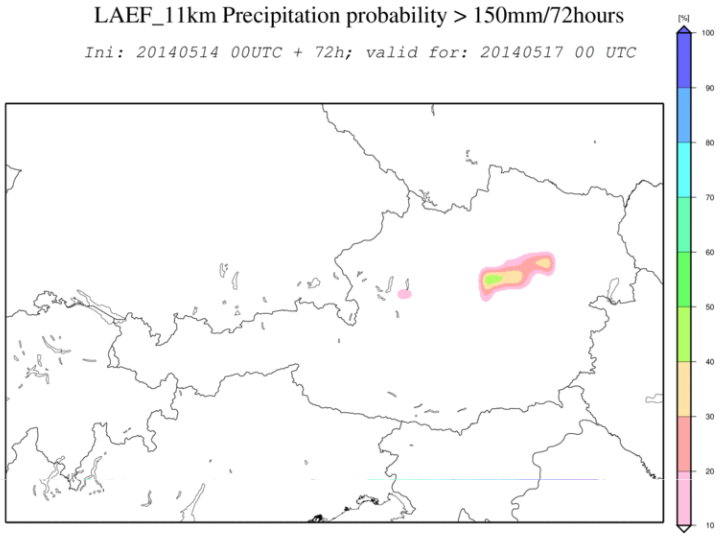


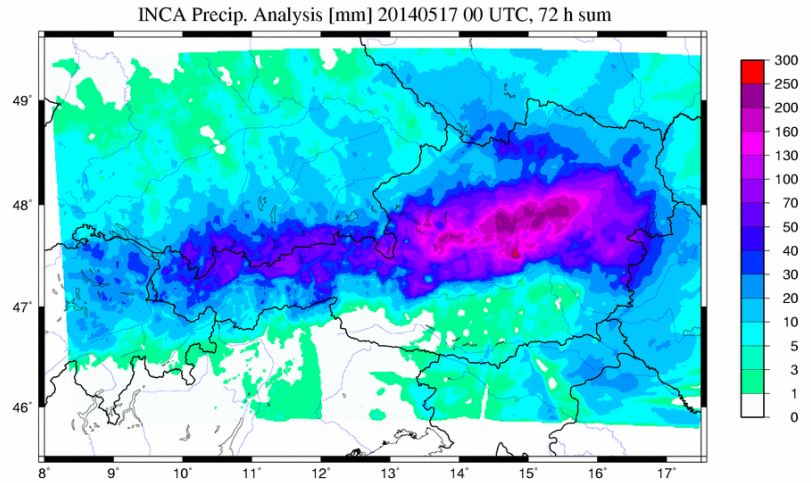
Verification

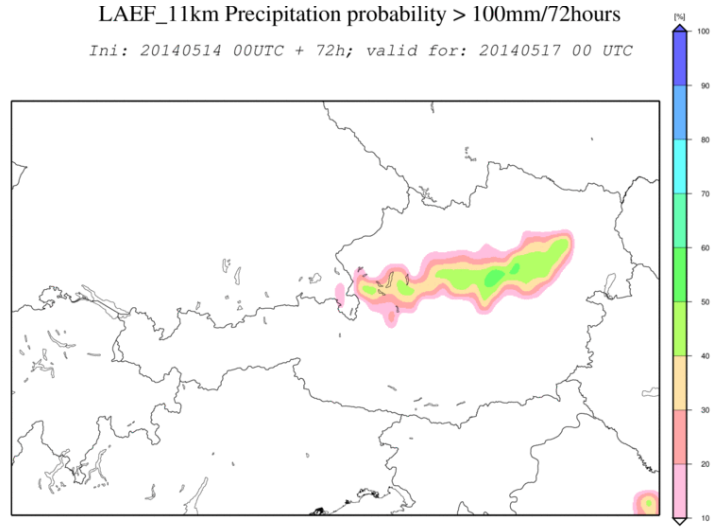
Austria

ALADIN-LAEF









For the next future

- focusing on AROME/ALARO at 1 -- 2.5km scale
- designing LACE future model systems, VFE, ALARO
- further developing DA, 1h RUC, radar QC, DA
- upgrading LAEF, 5km, EN-DA, multi/stochastic PHY
- preparing LACE climate modelling
- exchanging national radar observations in real time

Thanks!

Visiting our homepage.