

*Regional Cooperation for  
Limited Area Modeling in Central Europe*



## LACE in the last year

Yong Wang and many LACE colleagues



# Organisational news: no change

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**Programme Manager:** Yong Wang

– **Area Leaders:**

Dynamics & Coupling: Petra Smolikova

Physics: Neva Pristov

Data Assimilation: Mate Mile

Predictability: Theresa Gorgas

– **Data Manager:** Alena Trojakova

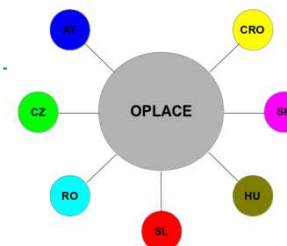
– **System Coordinator:** Oldrich Spaniel

– **Climate Project manager:** Gabriella Szepszo

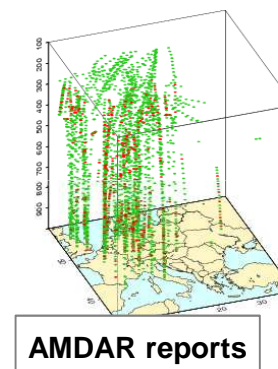
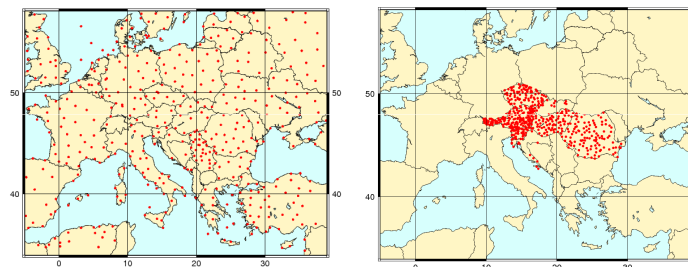
– **Administration and Finance:** Andrea Sigl

# 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)

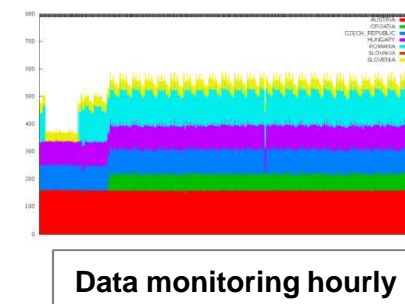


Exchanging the whole  
National near surface  
observation in real time



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

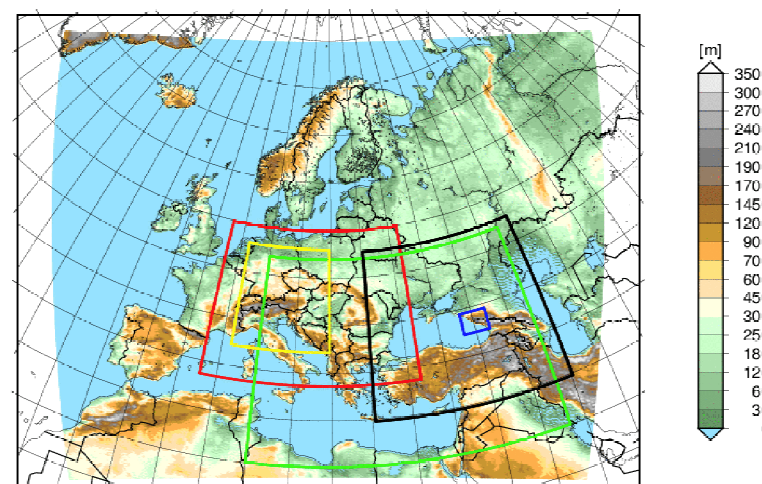
Preparation of exchange of national radar data in real time.



# 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

# LACE DA status

AROME(2.5) *Austria*  
3DVAR+OI\_main

0 — 3 — 6 — 9 — 12 — 15 — 18 — 21 →

ALARO(4.8) *Austria*  
IFSDSC+CANARI

0 — 6 — 12 — 18 →

AROME(2.5) *Hungary*  
3DVAR+ALDDSC

0 — 3 — 6 — 9 — 12 — 15 — 18 — 21 →

ALARO(8) *Hungary*  
3DVAR+CANARI

0 — 6 — 12 — 18 →

ALARO(4.4) *Slovenia*  
3DVAR+CANARI

0 — 3 — 6 — 9 — 12 — 15 — 18 — 21 →

ALARO(8) *Croatia*  
3DVAR+CANARI

0 — 6 — 12 — 18 →

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

0 — 6 — 12 — 18 →

ALARO(6.5) *Romania*  
3DVAR+CANARI

0 — 6 — 12 — 18 →

ALARO *Slovakia*  
Blending+CANARI

0 — 6 — 12 — 18 →

# 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

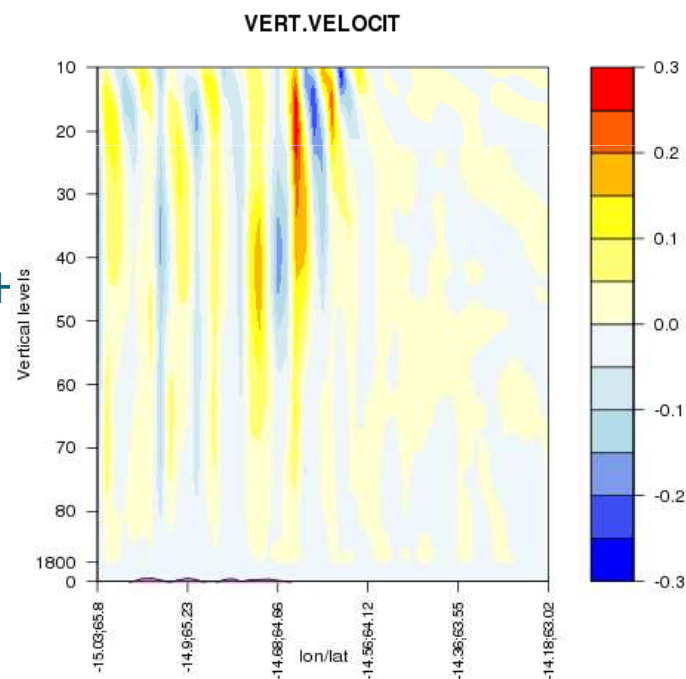
RADAR stations for summer period 2012



# R&D highlights in DYN

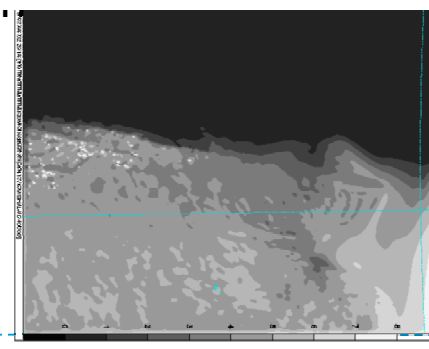
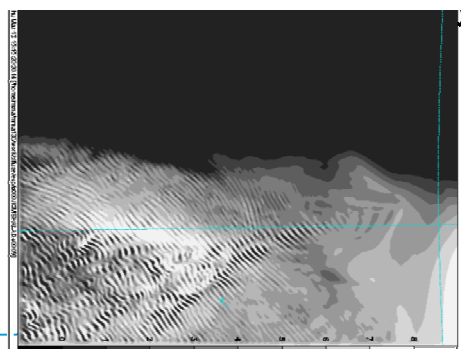
- Design of VFE scheme for NH model
  - ▶ Better understanding the VFE scheme and performance: why does it work? Does it work well in very high resolution? Which are the crucial parameters?
    - ▶ Testing of vertical Laplacian term
    - ▶ Testing of vertical integral operator
    - ▶ Testing of accuracy
  
- Physics-dynamics interface
  - ▶ Turbulent tendency of vertical velocity in NH
  - ▶ impact of the vertical turbulent on w.

Difference – without and with  
turbulent flux



# 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
- Tuning SL HD (semi-Lagrangian horizontal diffusion) in ALADIN
  - High level cloudiness: reference
  - Tuned vert.profile of spectral diffusion





# 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 ACRANE2 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....

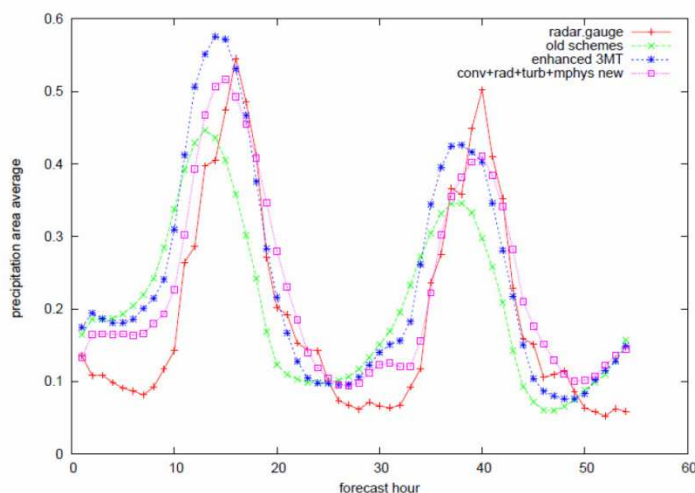


Figure: Precipitation averaged over Czech Republic for 11 days in June/July 2009, situation with exceptional quasi-tropical diurnal convective conditions over Central Europe, red - measured precipitation by radar and rain-gauges, green - ALARO-0, blue - ALARO-0 baseline, magenta - ALARO-1. To early diurnal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

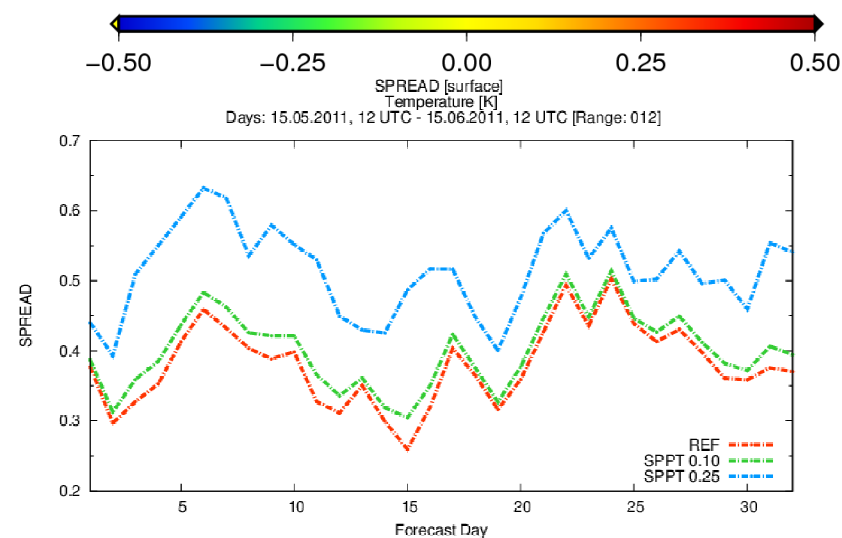
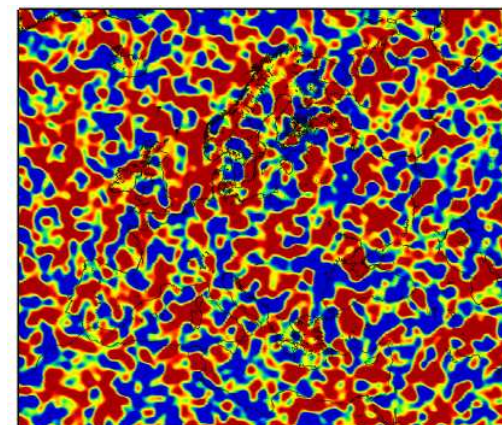
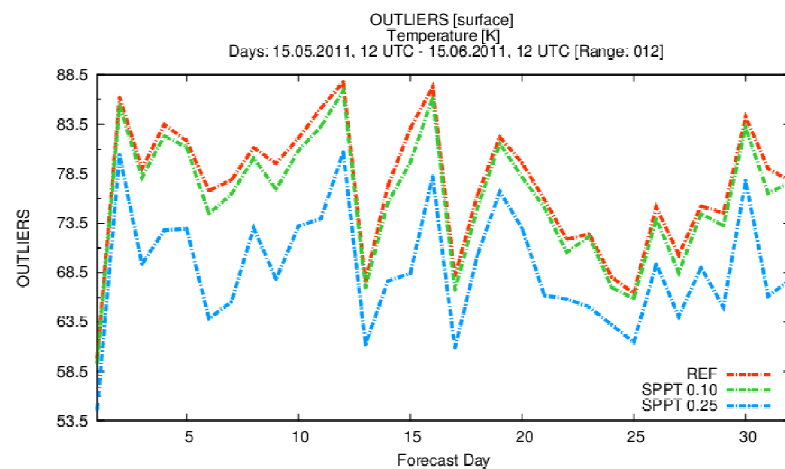
## Impact on diurnal cycle

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

# R&D highlights in EPS

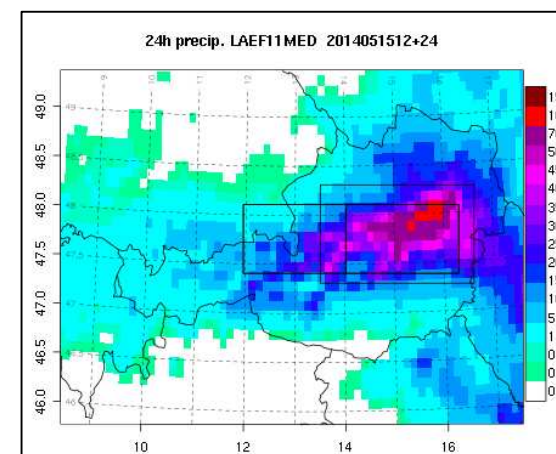
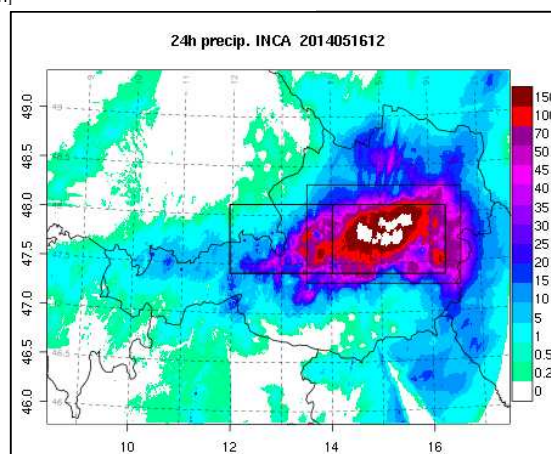
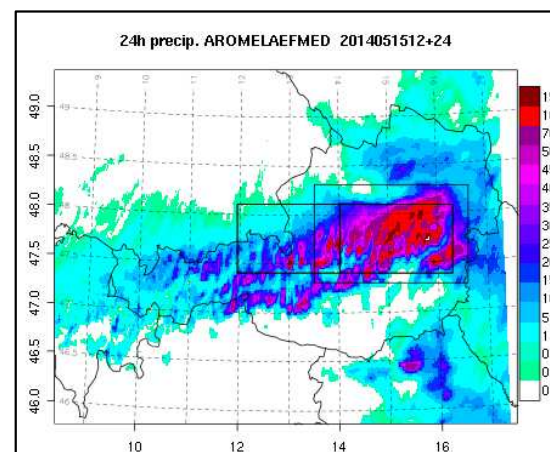
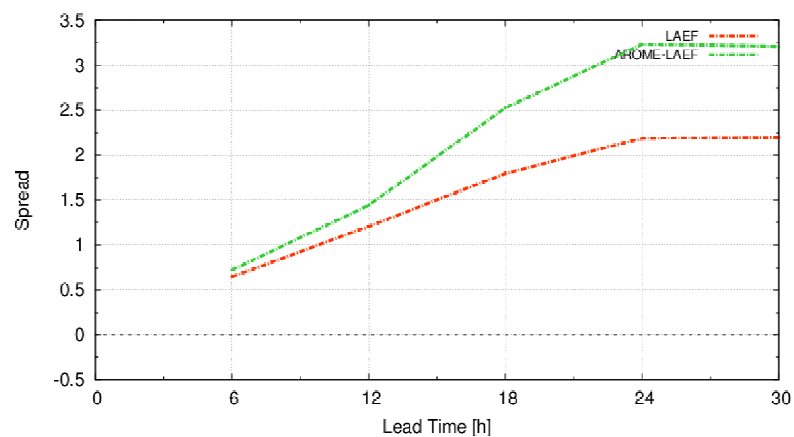
## ALADIN-LAEF

- Stochastic surface physics perturbation



# R&D highlights in EPS

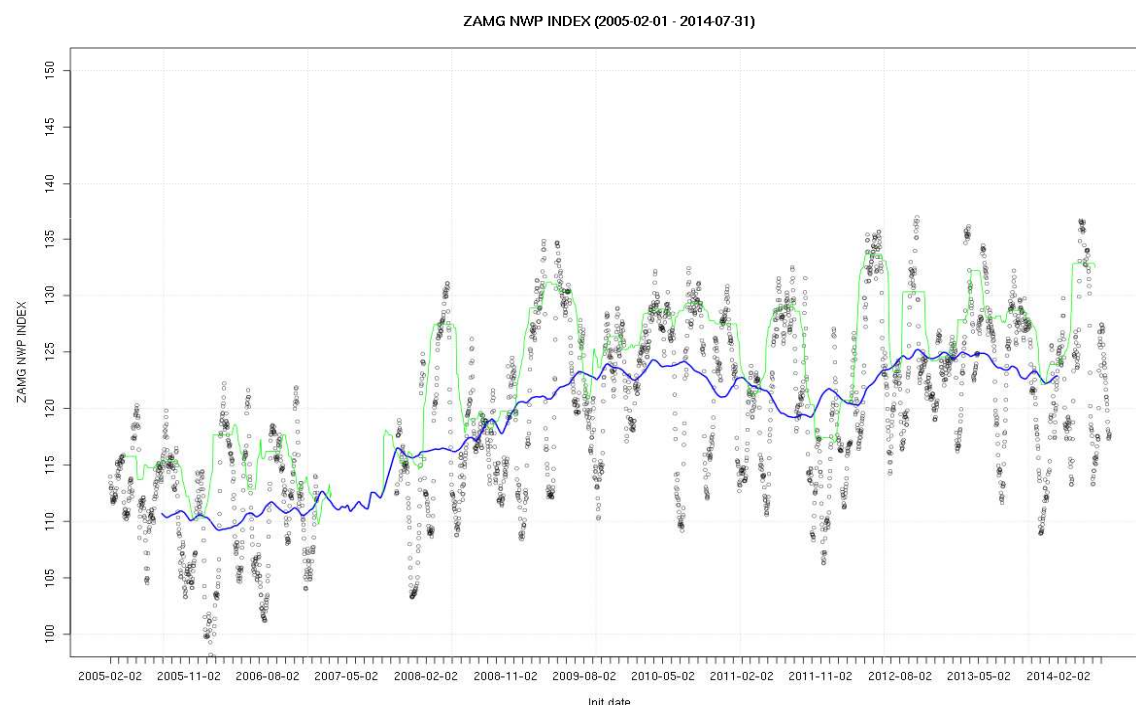
## ALADIN-LAEF vs. AROME-LAEF



# Verification

Work towards to long term  
verification in each LACE  
country

Austria



NWP Index  
2005-2014

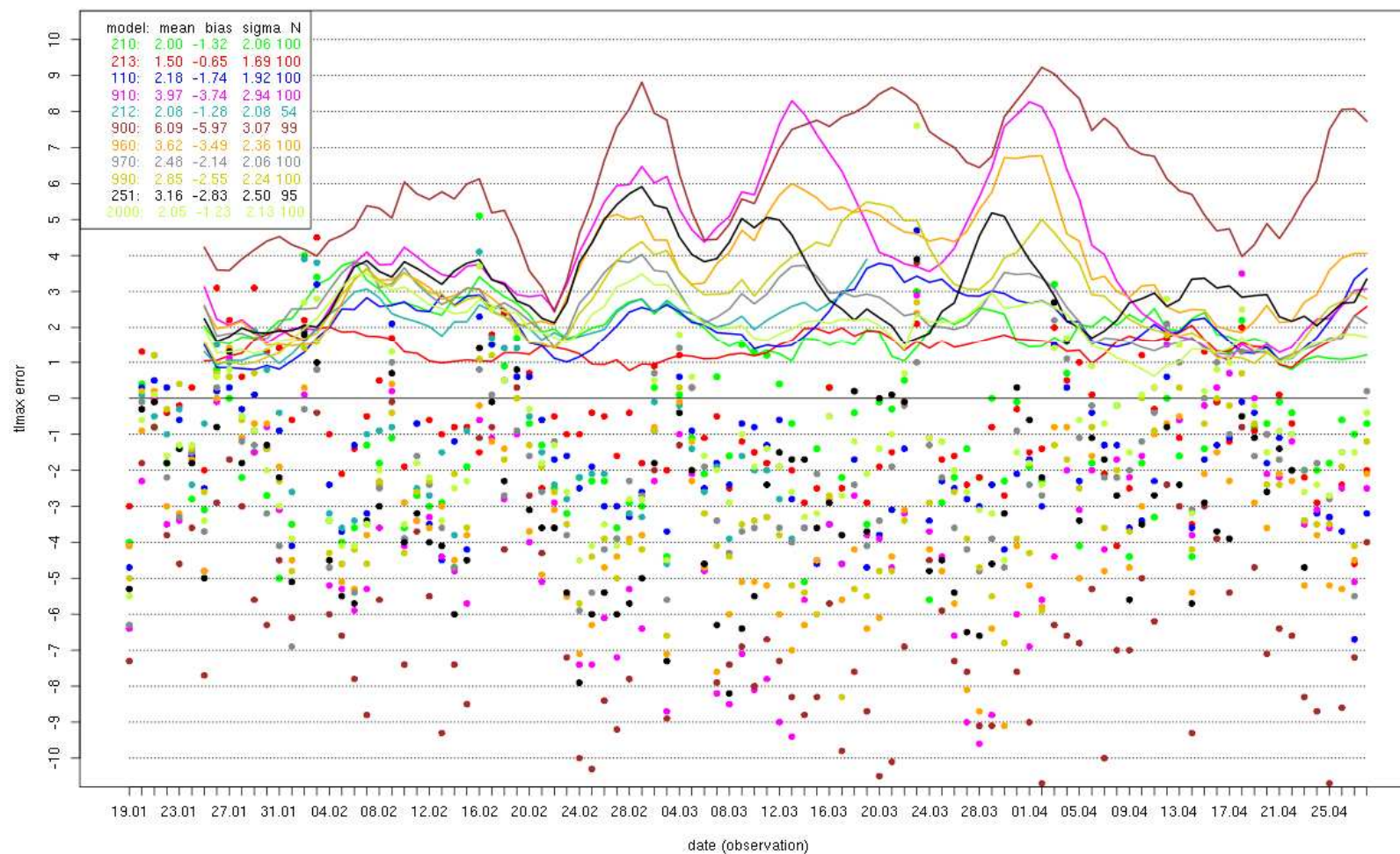


# Verification

Austria

AROME Tmax

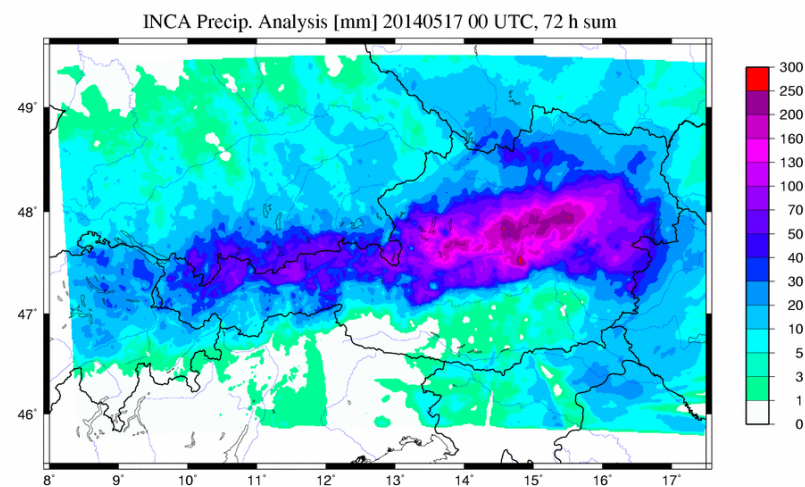
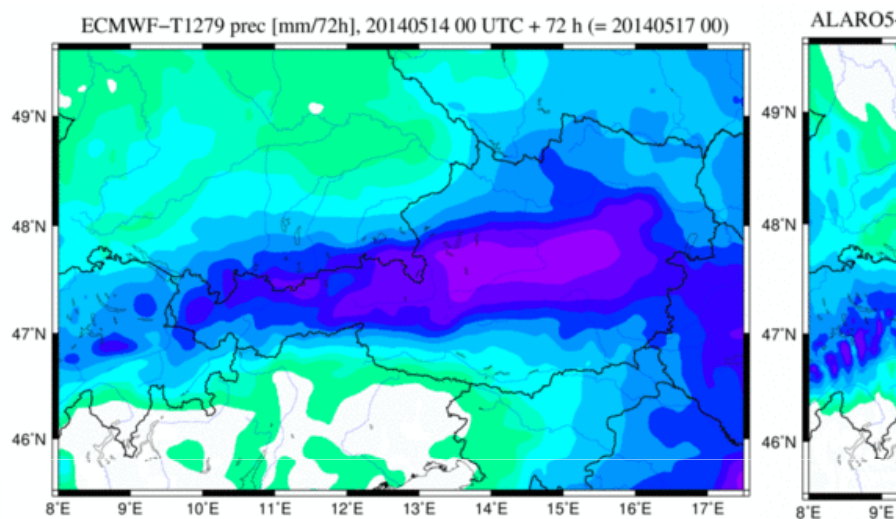
t1max day-0 | station: 11120 | modprog: multi | init: 00 | period: 20140119 - 20140428



# Verification

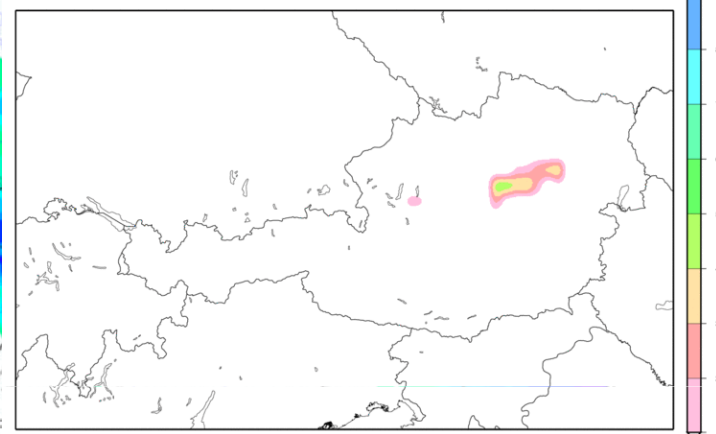
Austria

ALADIN-LAEF



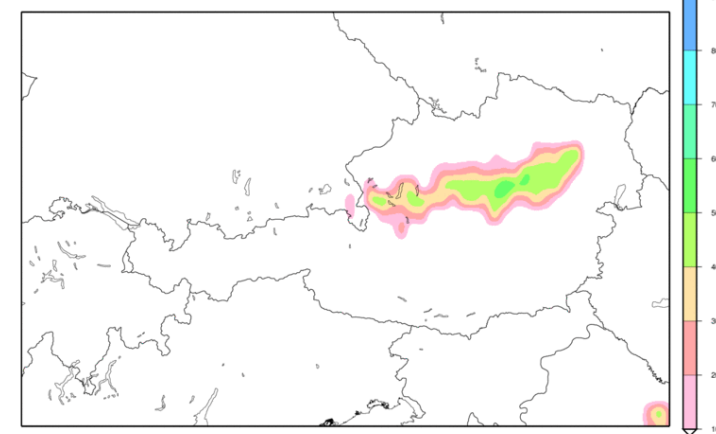
LAEF\_11km Precipitation probability > 150mm/72hours

Ini: 20140514 00UTC + 72h; valid for: 20140517 00 UTC



LAEF\_11km Precipitation probability > 100mm/72hours

Ini: 20140514 00UTC + 72h; valid for: 20140517 00 UTC



# For the next future

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- 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.



The screenshot shows the RC LACE website homepage. At the top, there is a header with the LACE logo (nwpcentraleurope) and a search bar. Below the header is a navigation menu with links: Organization, Operational activities, RC LACE Projects, Actions, Documents, Data base of cases, Events, Forum, and Private zone. The main content area features a welcome message, the RC LACE logo, and a description: (Regional Cooperation for Limited Area modeling in Central Europe). Below this is a grid of eight icons representing different areas: Data assimilation, Physics, Dynamics, Predictability, Operational, Publications, Forum, and Contact. On the right side, there is an 'Events' section listing upcoming events: 16-21 August 2014 in Montreal, Canada; 02-03 October 2014 in Vienna, Austria; and 06-10 October 2014 in Prague, Czech Republic. A 'more events' link is provided. At the bottom, there is a 'Partners' section with logos of various organizations and a 'Newsletters' section with a 'Subscribe' button. The footer contains copyright information and a 'powered by WEBNETIX' logo.

**LACE**  
nwpcentraleurope

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Welcome to RC LACE website

**RC LACE**  
(Regional Cooperation for Limited Area modeling in Central Europe)

Data assimilation | Physics | Dynamics | Predictability | Operational | Publications | Forum | Contact

**Events**

- ❖ **16-21 August 2014**  
Montreal, Canada:  
[World Weather Open Science Conference, Environmental prediction systems: mid-latitude regional aspects](#)
- 🕒 **02-03 October 2014**  
Vienna, Austria:  
[MesoVICT Kick-off meeting,](#)
- 🕒 **06-10 October 2014**  
Prague, Czech Republic:  
[The EMS Annual Meeting and the European Conference on Applied Climatology](#)

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