*Regional Cooperation for*
*Limited Area Modeling in Central Europe*

LACE
nwp central europe

# LACE highlights in 2013

LACE Management

# LACE in 2013

LACE R&D highlights in 2013

Common operations

Performance of LACE forecast

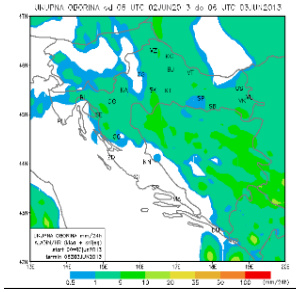
# R&D highlights in DA

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

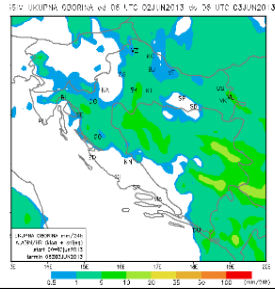
Radar, Mode-S and IASI and SEVIRI radiances DA experiments with ALARO

Studies on representation of background error statistics

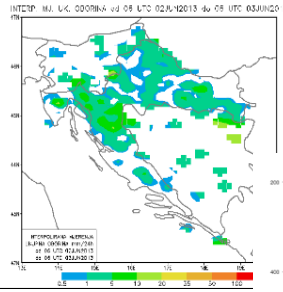
Oper



Radar assim

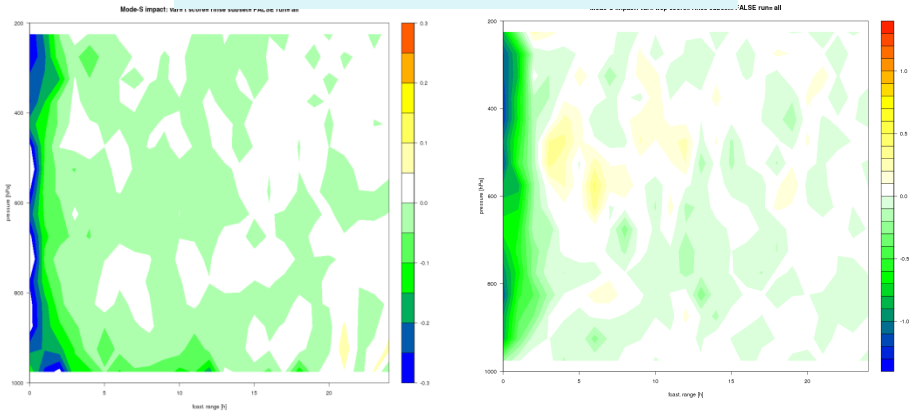


Rain gauges



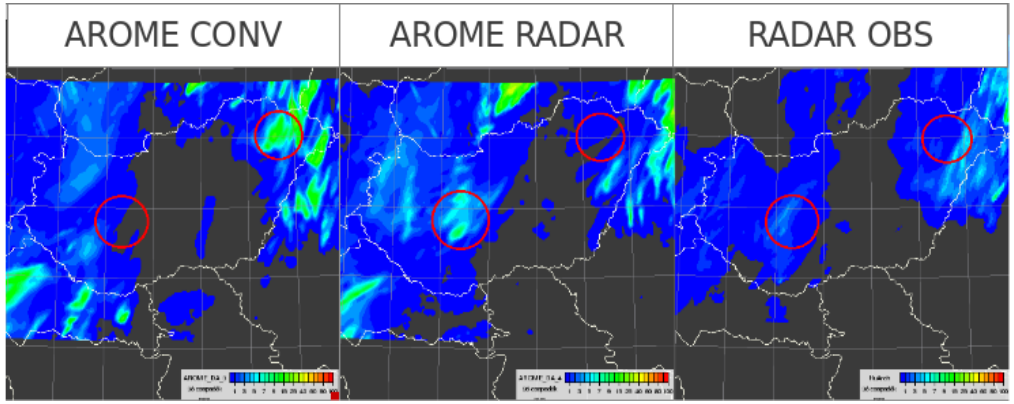
ALARO-CRO + Radar

ALARO-SLO + Mode-S

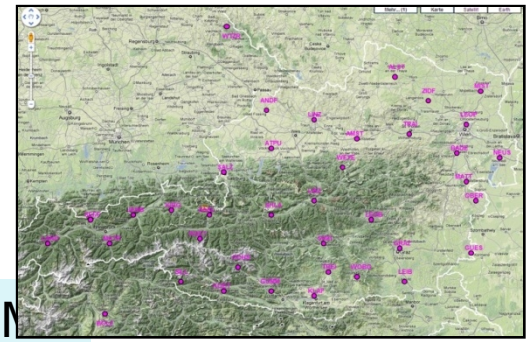


# R&D highlights in DA

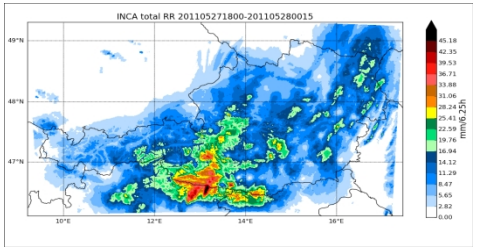
## Radar assimilation with AROME



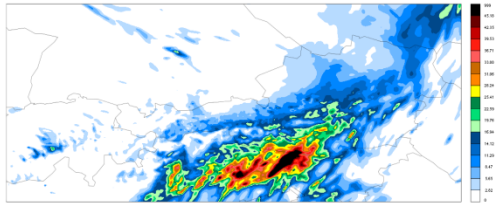

AROME-HU + Radar



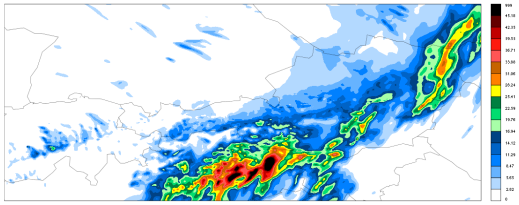
## Local GPS assimilation with AROM




Observation



AROME-AU + GPS



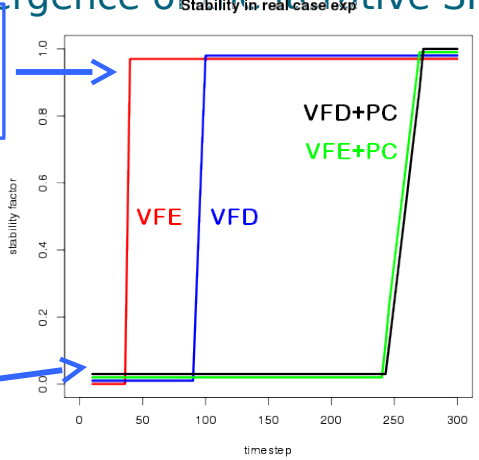
AROME-AU control

# R&D highlights in DYN

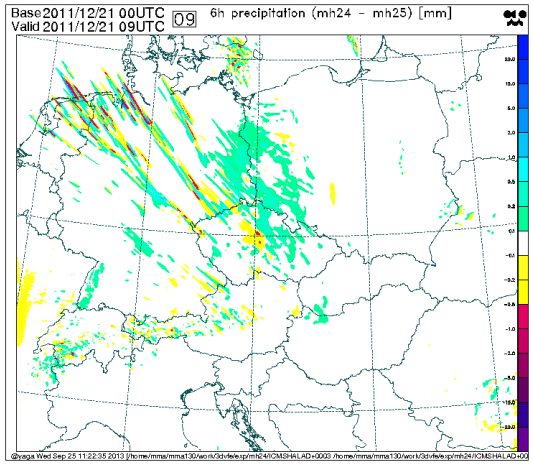
1. Works on FE (finite element) in vertical discretization of ALADIN-NH

- Design and implementation with general B-splines
- Testing of stability: 2D model tests (potential flow, non-linear flow over steep orography, density current), 3D academic adiabatic experiments over steep orography, 3D real cases in 2.2 km resolution ALARO – the stability is in all the experiments comparable to FD method
- Testing of accuracy: theoretical accuracy of vertical operators improved, the enhanced accuracy in experiments not proven
- Testing of convergence of the iterative SI

crash in less then 24 hours




stable




Difference in cumulated precipitation for 6hours, Δt=180s, VFD – VFE (both with PC time scheme)

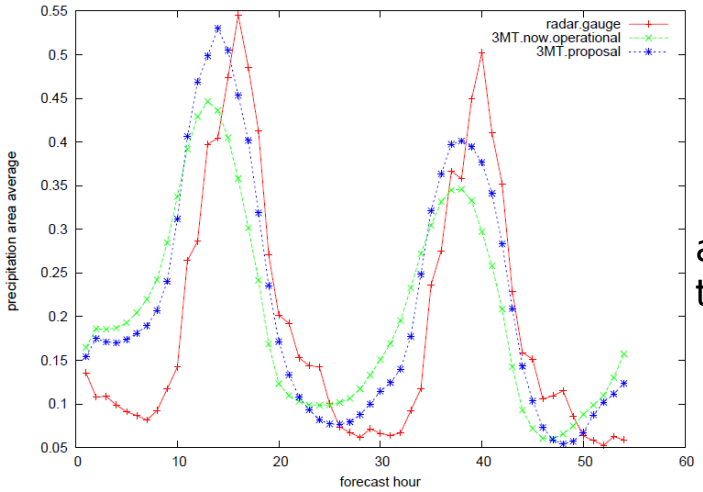
# R&D highlights in DYN

## 2. Physics-dynamics interface

- Second-order accurate time scheme based on SETTLS technique
  - Stability analysis – encouraging, stability properties limited but encouraging properties to test in the model code
  - Implemented
  - Tested in real case simulations in 4.7km resolution – when applied on moisture, significant time oscillations appear in the field of temperature mostly near the ground
  - If applied only on temperature and wind components, the stability recovered but the expected enhanced accuracy not detected
- Impact of SLHD (semi-Lagrangian horizontal diffusion) in AROME with 3DVAR
  - Comparison of SLHD on falling hydrometeors, not on wind and temperature VS. the opposite. Results achieved by applying new setting show:
    - positive impact on mean 10 m wind, wind gusts and precipitation
    - neutral impact on 2 m temperature and humidity
- Consistency with the time step choice
  - model results is sensitive to small change in Δt

# R&D highlights in PHY

- ALARO-0
  - In use in operational applications in all LACE countries at resolutions (4-10 km), in LAEF
- ALARO-0 baseline version (December 2012)
  - introduction of latest improvements in the convection scheme 3MT;
  - 3MT behaves very consistently across the resolutions (test on 16km, 8km, 4km, 2km and 1km without and with parameterised moist deep convection.)




Impact on diurnal cycle

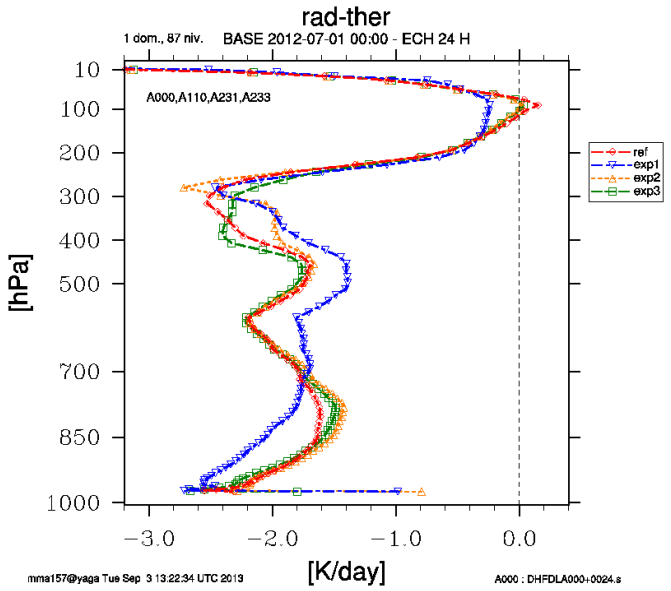
average of mean hourly precipitation over the area (11 realizations, 4.7 km)

# R&D highlights in PHY

## ALARO-1 development (10km – 1km)

- Works on turbulence TOUCANS scheme
  - Extensive testing and tuning of various options
  - Searching for an optimal set-up for operational use
  - Developing new prognostic features e.g., turbulent total energy (TTE), mixing length, shallow convection cloudiness (SCC)
- Works on radiation scheme
  - Improvement, upgrade and reformulati
    gaseous transmissions statistical mode
    simulation model etc.
  - validation in 3D model

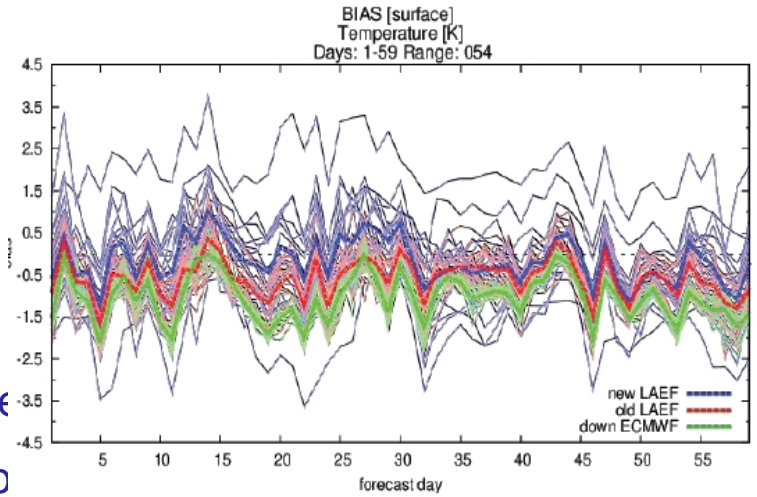
TOUCANS, improved radiation and unsaturated
Downdraft scheme will be integrated in ALARO



# R&D highlights in EPS

## ALADIN-LAEF

- Higher horizontal/vertical resolution
- Ensemble surface assimilation
- Optimising multi-physics scheme
- Verification against deterministic fore
- Study on uncertainty due to initial co




## AROME-EPS

- EDA
- stochastic physics SPPT
- Coupling strategies

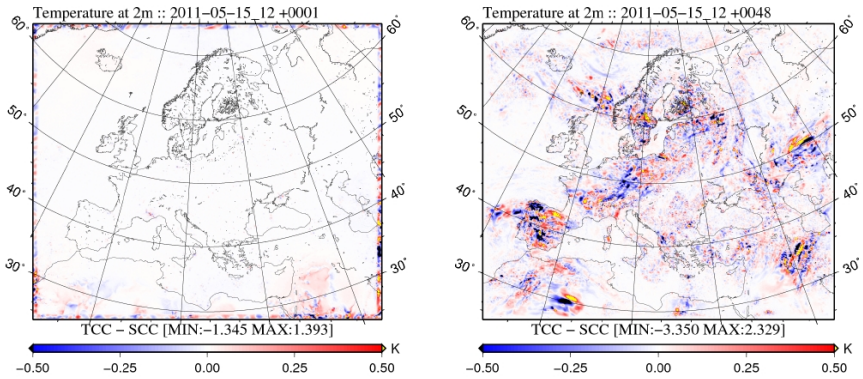



***Fig 2:*** *The difference between TCC and SCC experiments for Temperature at 2m after 1st hour of integration (left) and after 48 hours, i.e. valid for 17th of May 2011, 12 UTC (right).*

# LACE in 2013

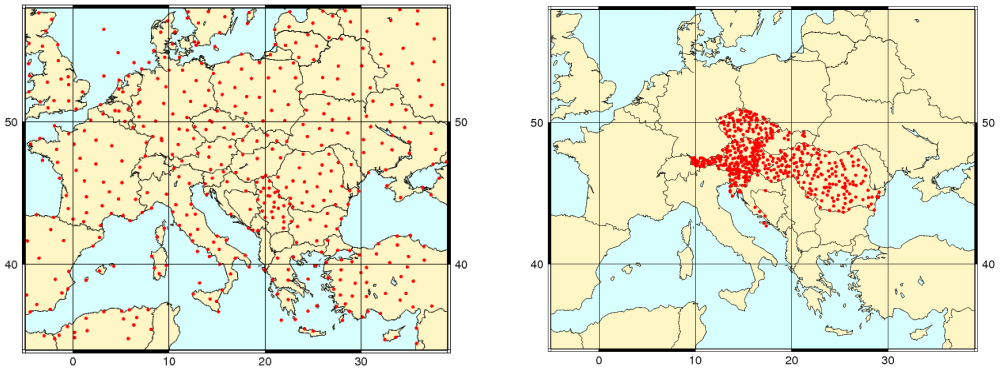
LACE common operations

# 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)

**New in the last year:**

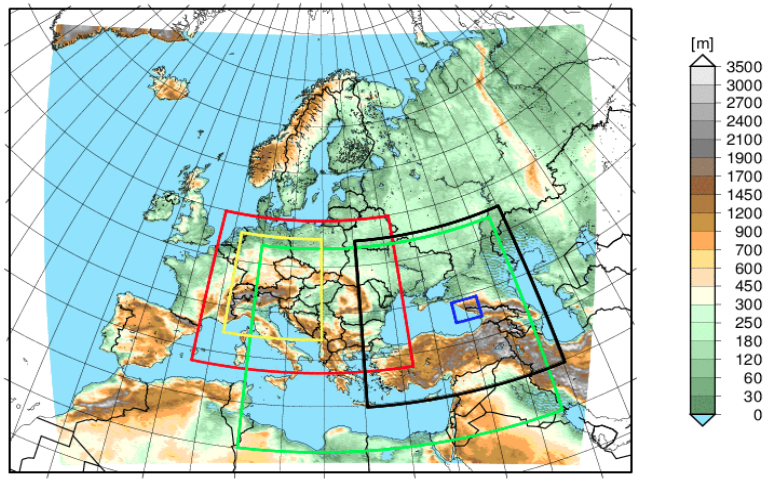



More national SYNOPs; IASI, extensive observation monitoring, switch to Meteosat-10 products, extension of windprofilers; investigation and preparation: BUFR SYNOP, national SYNOP data, LANDSAF and ASCAT products. Preparation of exchange of national radar data.

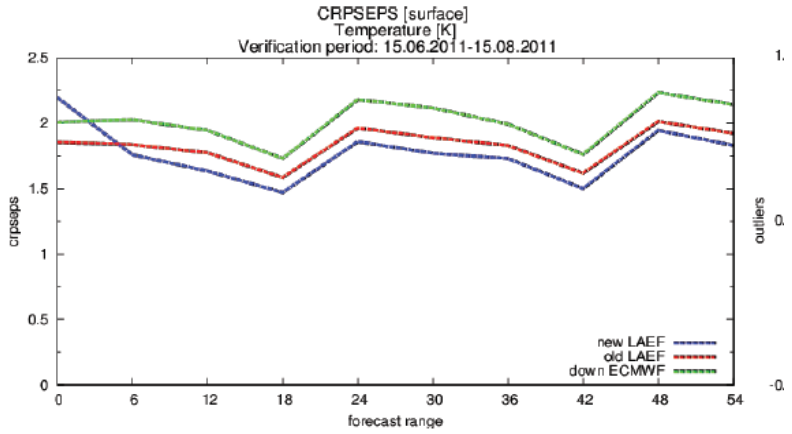
# Common operations

- Upgrade of ALADIN-LAEF

| | |
|---|---|
| Ensemble size | 16+1 |
| Horizontal resolution | 18km → 11km |
| Vertical resolution | 37 → 45 |
| Runs/day | 2 |
| Forecasts available | 09:00 → 04:00 |
| Coupling | direct → time lagged |




Comparison: new—old—ECMWF



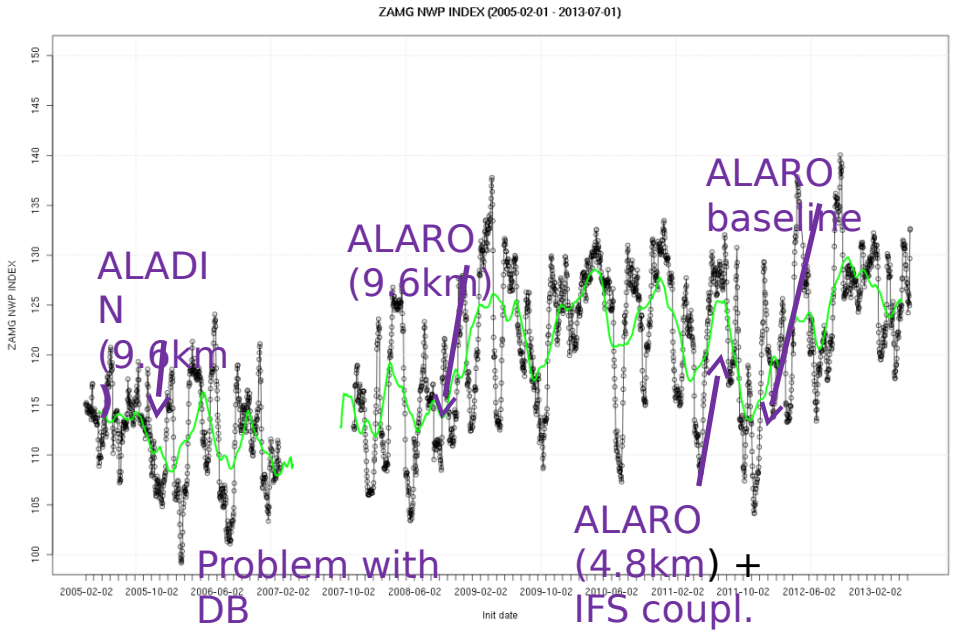
# LACE in 2013

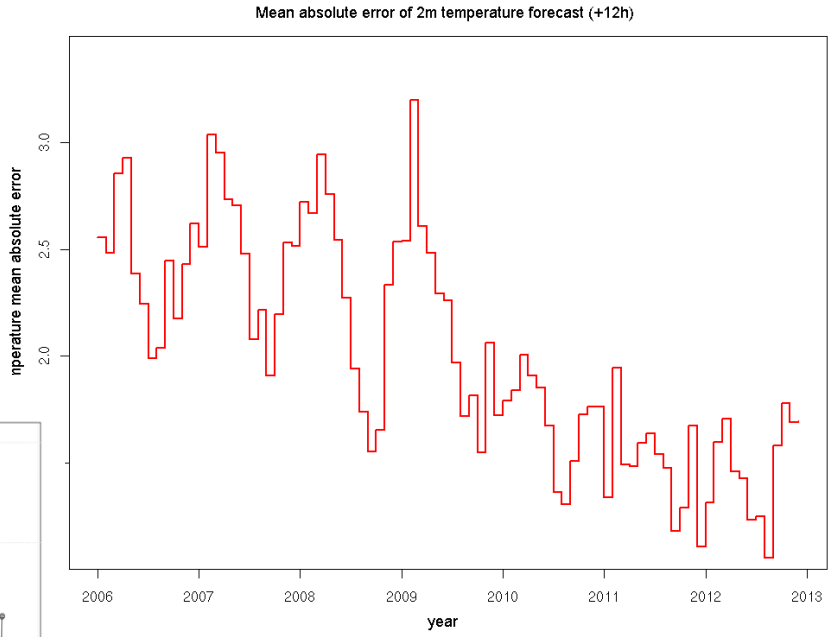
Performance of LACE forecast

# Verification

Work towards to long term verification in each LACE country

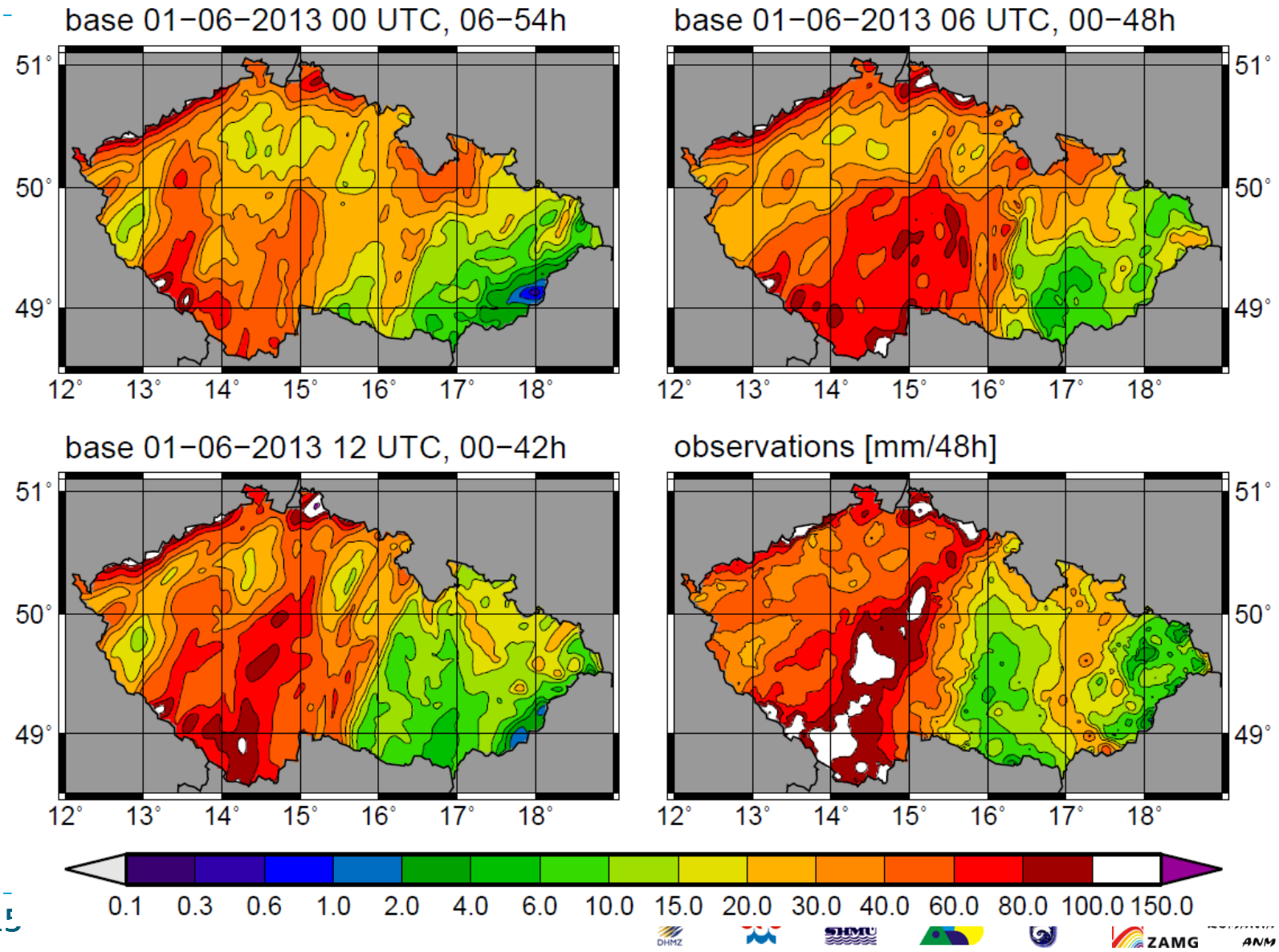
## Austria



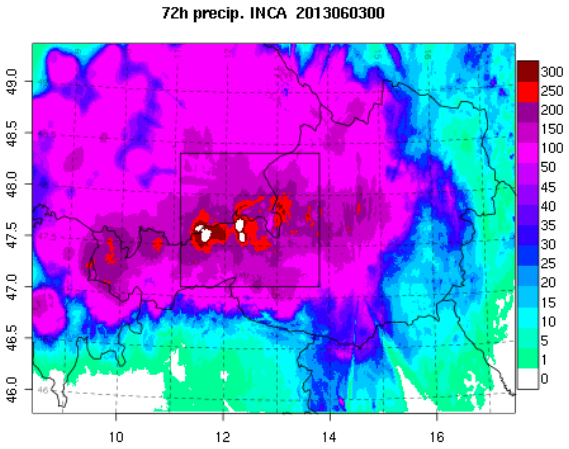

## Slovenia

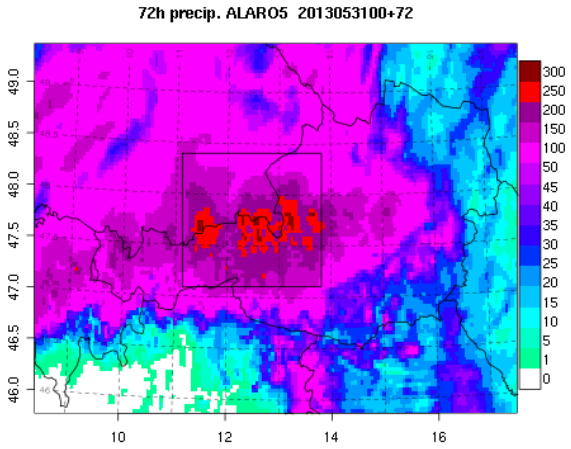
# Flooding 2013



# Flooding 2013

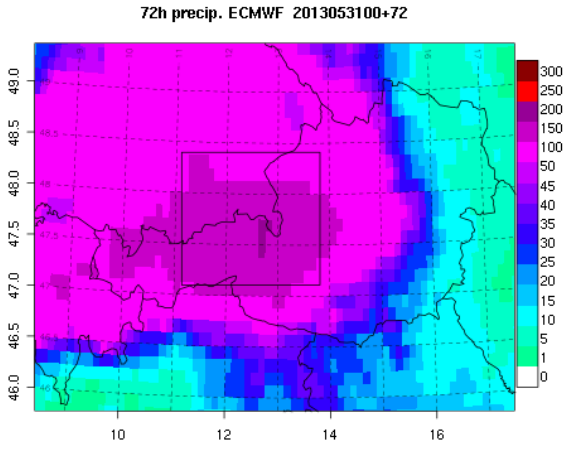
INCA

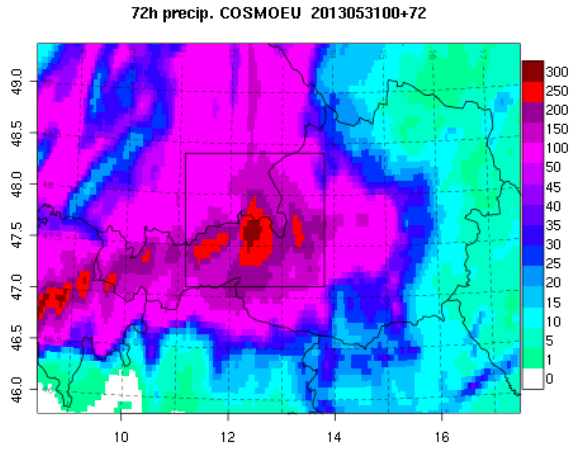



ALARO

ECMWF

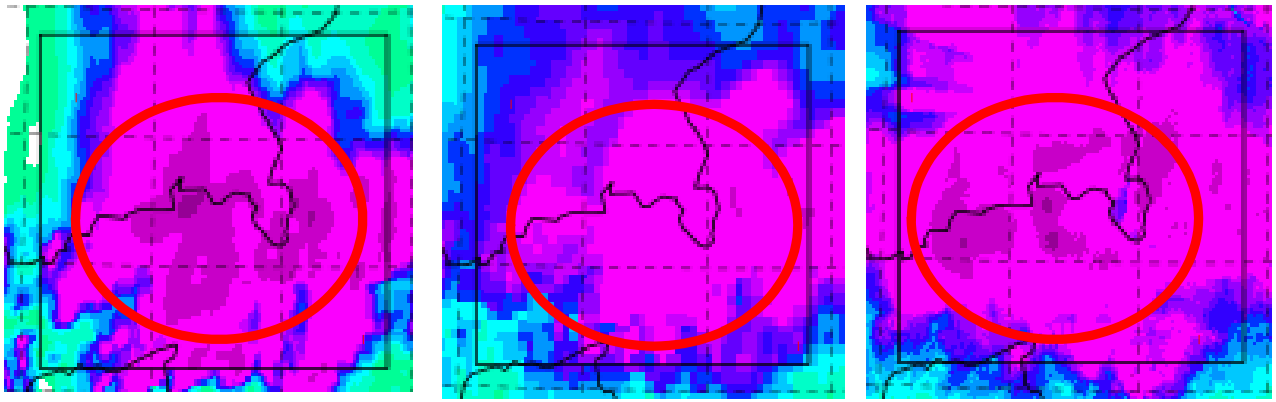



COSMO

# Flooding 2013

| Model | 24h acc. Rainfall fcst in mm | | |
|---|---|---|---|
| | 31.5. 00UTC – 1.6. 00UTC | 1.6. 00UTC – 2.6. 00UTC | 2.6. 00UTC – 3.6. 00UTC |
| INCA Analyse | 33.7 | 44.5 | 68.6 |
| AROME | 30.5 | 42.1 | 63.9 |
| ALARO | 23.9 | 36.8 | 50.9 |
| SAL (AROME) | 0.02/-0.10/0.06 | 0.17/-0.06/0.01 | -0.11/-0.07/0.02 |
| SAL (ALARO) | 0.24/-0.34/0.07 | 0.32/-0.19/0.01 | 0.25/-0.30/0.03 |



**AROME** **ALARO** **INCA**

24h acc. Rainfall fcst 02-03.06.2013 00 UTC

# Current LACE management

**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

**Working with PM:**

**Climate issues:** Gabriella Szepszo

**Administration and Finance:** Andrea Sigl

- Promoting the ALADIN climate modelling in LACE
  - To set up ALADIN climate network
  - To search funding possibilities for all LACE NWP teams


THANK YOU
merci
spasiba
kam ouen
gratzias
manana
mahalo
kitos
tak
grazie
hvala
cheers
toda
gracias
grassie
thank you
danki
welalin
mahalo
danki
gracias
merci
dankon
thanks
na gode
mesi
modupe
talofa
miigwetch
thanks
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dziekuje