***R**egional **C**ooperation for*
***L**imited **A**rea Modeling in **C**entral **E**urope*

LACE
nwp central europe

LACE in the last year

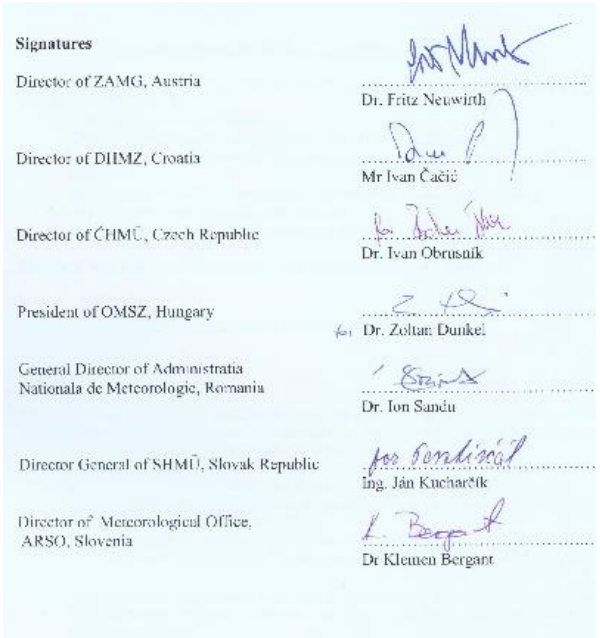
Yong Wang and many other LACE colleagues

DHMZ SHMU OMSZ ZAMG ROMANIA ANM

Organisational news

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


Signatures

Director of ZAMG, Austria — Dr. Fritz Neuwirth

Director of DHMZ, Croatia — Mr Ivan Čačić

Director of ČHMÚ, Czech Republic — Dr. Ivan Obrusník

President of OMSZ, Hungary — for Dr. Zoltan Dunkel

General Director of Administratia Nationala de Meteorologie, Romania — Dr. Ion Sandu

Director General of SHMÚ, Slovak Republic — Ing. Ján Kucharčík

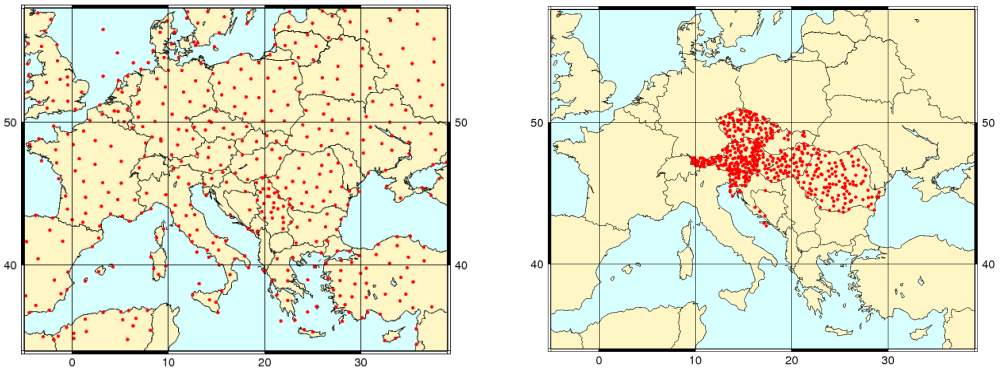
Director of Meteorological Office, ARSO, Slovenia — Dr Klemen Bergant

LACE new MoU 2013---2016

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:



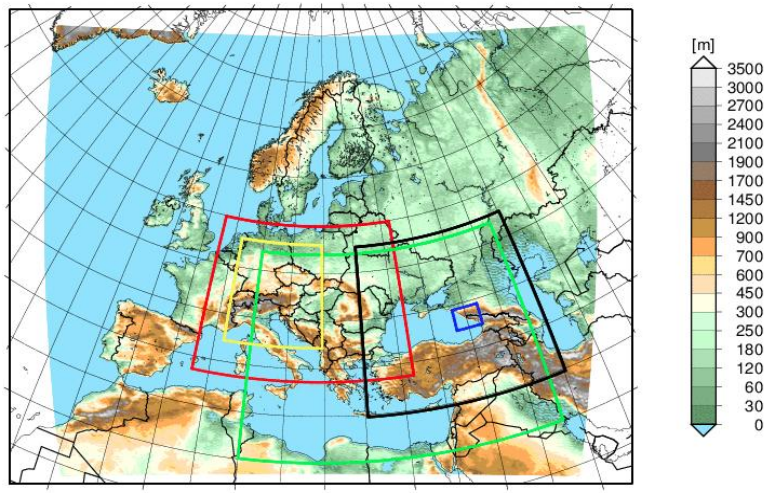
More national SYNOPs; IASI, extensive observation monitoring, switch to Meteosat-10 products, extension of windprofilers; investigation and preparation: BUFR SYNOP, national SYNOP data, LANDSAF and ASCAT products. Preparation of exchange of national radar data.

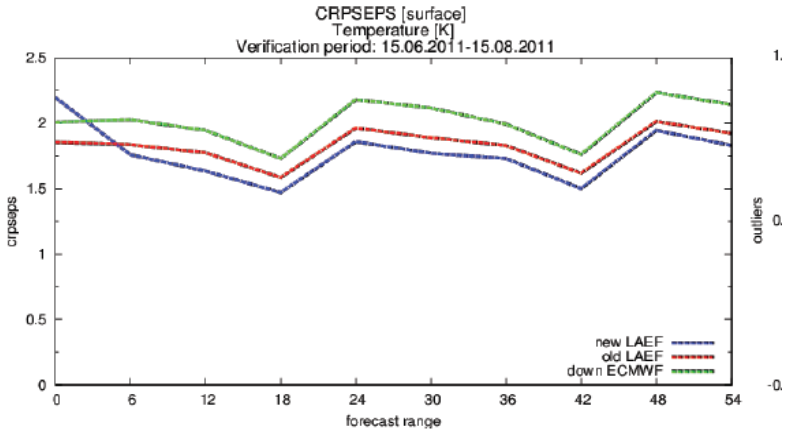
Deatils at Mate's talk

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

Details at Theresa's talk

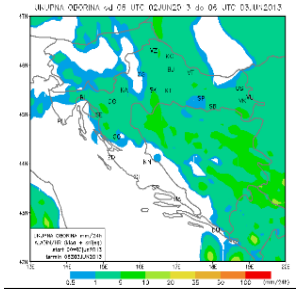
R&D highlights in DA

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

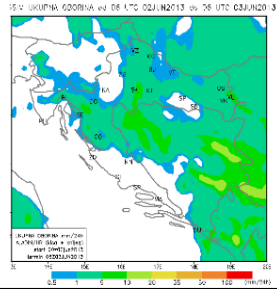
Radar, Mode-S and IASI and SEVIRI radiances DA experiments with ALARO

Studies on representation of background error statistics

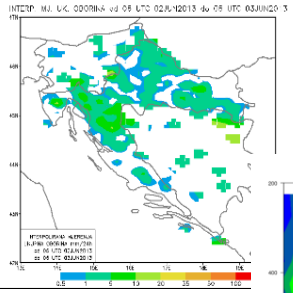
Oper



Radar assim

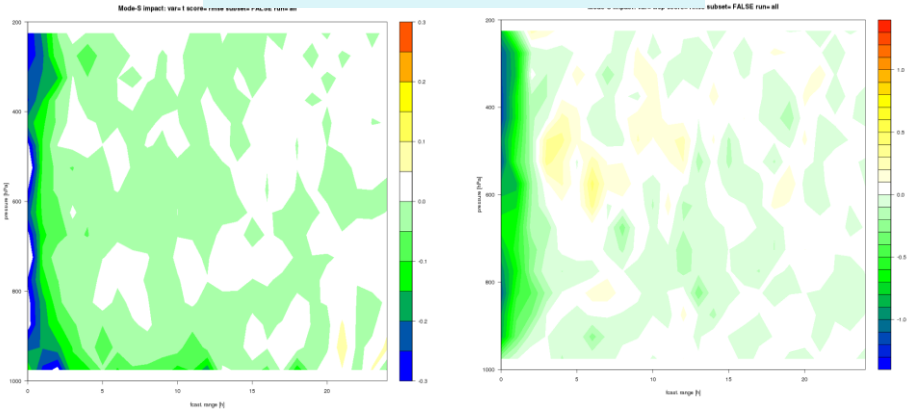


Rain gauges



ALARO-CRO + Radar

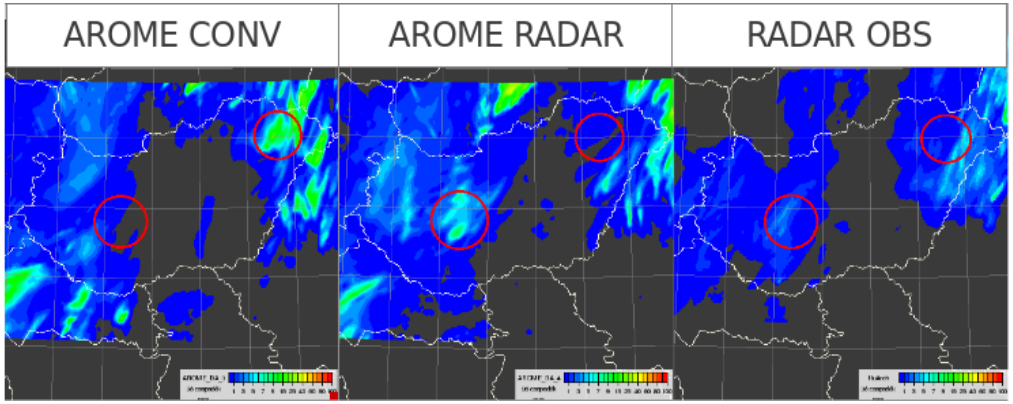
ALARO-SLO + Mode-S



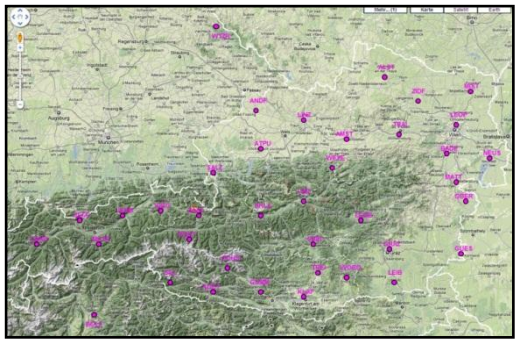
Deatils at Mate's talk

R&D highlights in DA

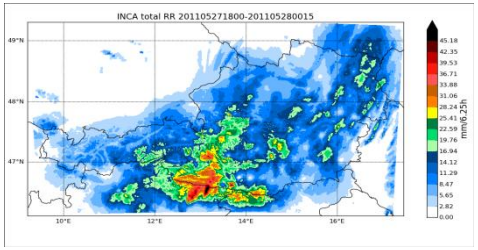
Radar assimilation with AROME



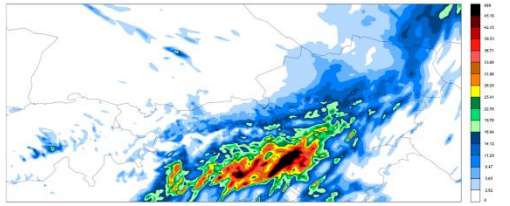
AROME-HU + Radar



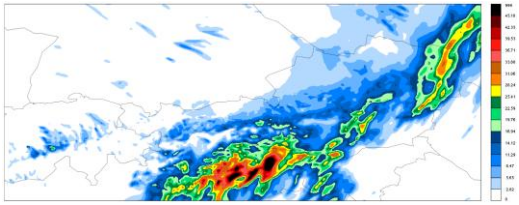
Local GPS assimilation with AROME



Observation



AROME-AU + GPS



AROME-AU control

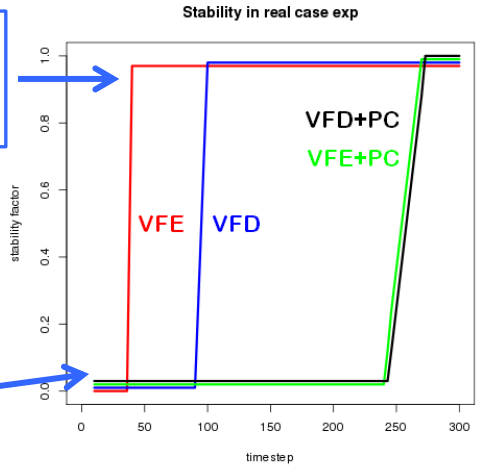
Details at Mate's talk

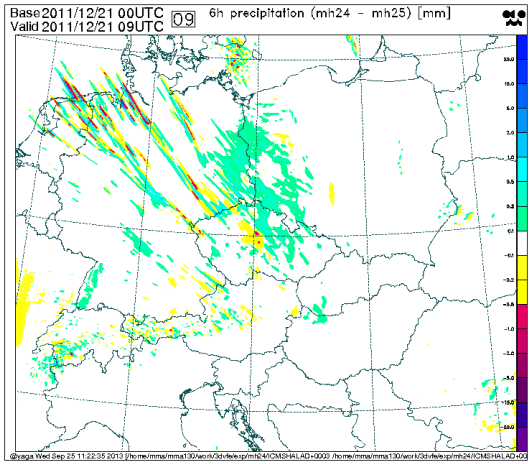
R&D highlights in DYN

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 solver

crash in less then 24 hours

stable





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

Details at Petra's talk

R&D highlights in DYN

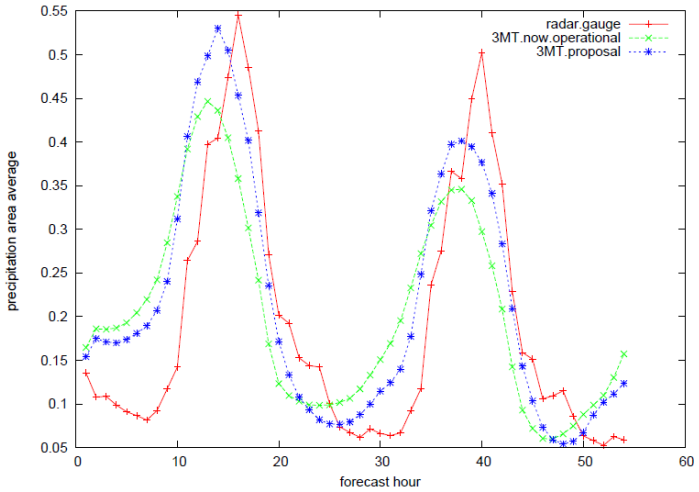
2. Physics-dynamics interface

- 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
  - Comparsion of SLHD on falling hydrometeors, not on wind and temperature VS. the oppsite. 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

Details at Petra's talk

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)

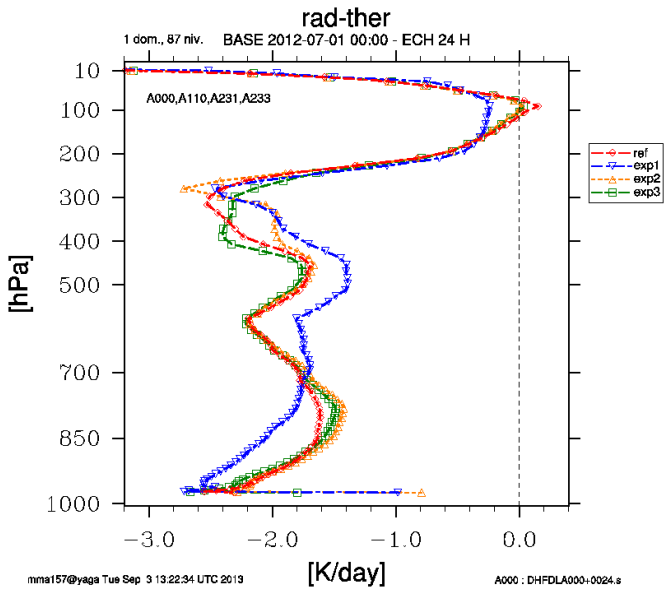
Details at Neva's talk

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 reformulation of gaseous transmissions statistical model, cloud simulation model etc.
  - validation in 3D model

TOUCANS, improved radiation and unsaturated Downdraft scheme will be integrated in ALARO-1

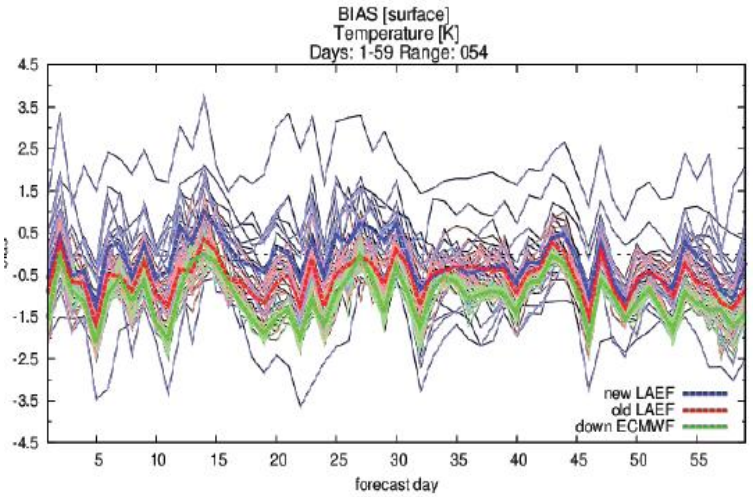


Details at Neva's talk

R&D highlights in EPS

ALADIN-LAEF

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



AROME-EPS

- EDA
- stochastic physics SPPT
- Coupling strategies

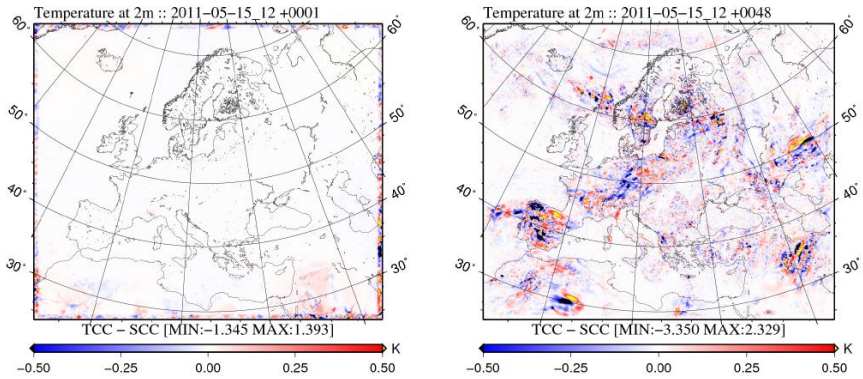
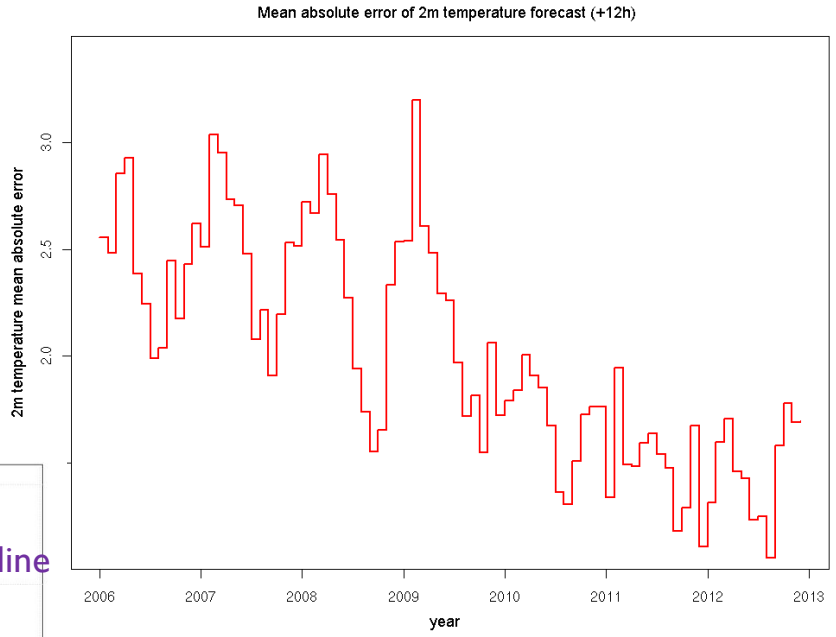


Fig 2: *The difference between TCC and SCC experiments for Temperature at 2m after 1st hour of integration (left) and after 48 hours, i.e. valid for 17th of May 2011, 12 UTC (right).*

Details at Theresa's talk

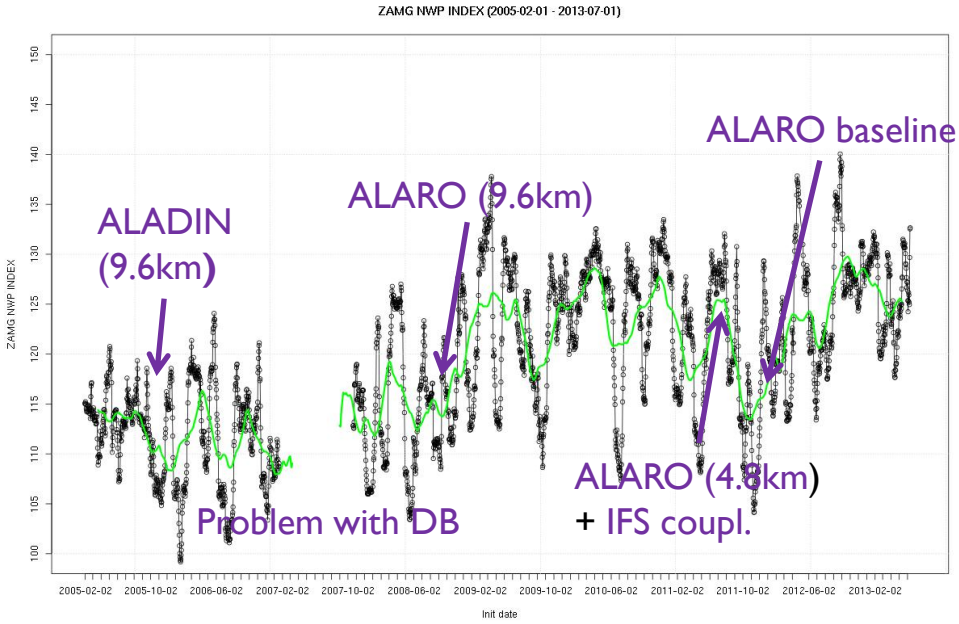
Verification

Work towards to long term verification in each LACE country



Slovenia

Austria



For the next future

- focusing on AROME/ALARO at 1 -- 2.5km scale
- designing LACE future model systems
- further developing LACE DA and LAEF
- introducing LACE verification
- preparing LACE climate modelling
- exchanging national observations in real time

Thanks!