National Posters
EWGLAM/SRNWP Meeting 2019

Poster: NWP related activities in AUSTRIA

- Operationalization of the AROME based nowcasting system **AROME-RUC**: 1.2km, 90L, 24 runs/day, +12h, coupled with AROME, assimilation of local radar, Mode-S and GNSS ZTD data

- Operationalization of the AROME based ensemble system **C-LAEF**: 2.5km, 90L, 4 runs/day, +48h (+6h), coupled with ECMWF-ENS uncertainty representation: EDA, sEDA, Ensemble-JK, stochastic physics

- Assimilation of GNSS tropospheric parameters: ZTD (Zenit Total Delay) observations and STD (Slant Total Delay) observations

ZAMG
Zentralanstalt für Meteorologie und Geodynamik

Bulgaria

- Operational suite in NIMH: ALADIN-BG and AROME-BG based on cy41t1 – scores
- Cy43t2 was ported and runs on a parallel suite – scores cy43t2 vs cy41t1
- Works on the improvement of lightning probabiblity forecast

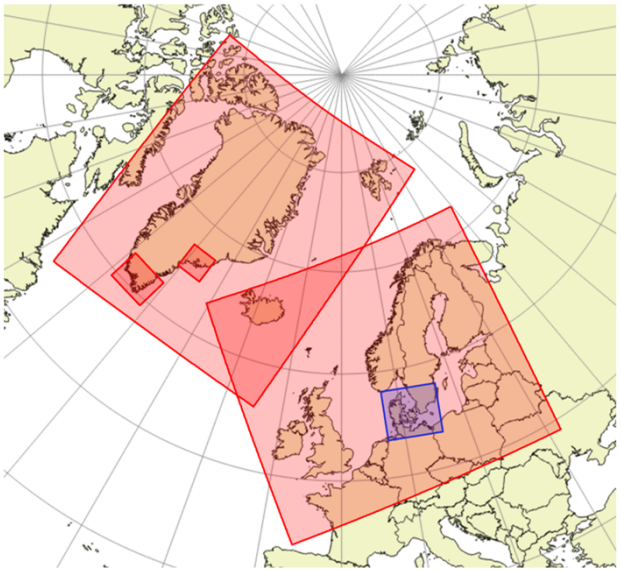
Croatia

- Operational suite consists of 4 configurations: ALADIN-HR8 (8km, 37 levs, ALARO phy., 3DVar, 72h fcs.), ALADIN-HR4 (4km, 73 levs., ALARO phy., 3DVar, 72h fcs.), ALADIN-HR2 (2km, 37 levs.,SSDFI, 48h fcs. hours) and ALADIN-HRDA (2 km dynamical adaptation of wind)
- The new setup for ALADIN-HRDA was developed based on ALADIN-HR4 operational model (currently ALADIN-HR8 model is used). First validation results were obtained and verification over larger time span and individual cases is ongoing.
- The new algorithms are developed and tested to expand the number of locations and the forecast variables for analog-based post-processing method. The new setup includes wind speed, wind gusts and temperature predictions for approximately 50 stations. The analog-based predictions are currently being implemented in the test operational mode.

- A new method to combine large-scale initial perturbations from a global ensemble prediction system (EPS) with small-scale initial perturbations from a limited area EPS is developed. Perturbations are combined within limited area ensemble data assimilation system. New large-scale perturbations results in a more skillful and reliable EPS with a positive impact on precipitation forecasts. In addition, initial condition and lateral boundary perturbations are more consistent.

Danmarks Meteorologiske Institut

Operational NWP @DMI, 2019



- Operational **CO**ntinuous **M**esoscale **EPS** (**COMEPS**) in its third year with V3.0: larger domain!
- First **hectometric scale models** in the NWP world. High resolution essential sometimes, but not everywhere!
  - TAS, 400x400x65. 750 m grid
  - SGL, 600x480x65. 750 m grid
- Work on 750-m RUC setup and COMEPS strategy with lagged cycling and overlapped window; assimilation of crowd source data: **Ensemble sub-km nowcasting** in development

Finland

- Work on data-assimilation of new types of observations (NWCSAF-satellite, MSG-cloud products and AMV's) for the MetCoOp HARMONIE-Nowcasting (MNWC) system with frequently (1h) updated short-range forecast up to 9h lead time and with a spatial resolution of 2.5 has been a major part of the developments

- Operational results of using Freshwater lake (FLake) parametrizations in HIRLAM NWP model since 2012 have been studied by comparing them with the observations from Finnish Environment Institute

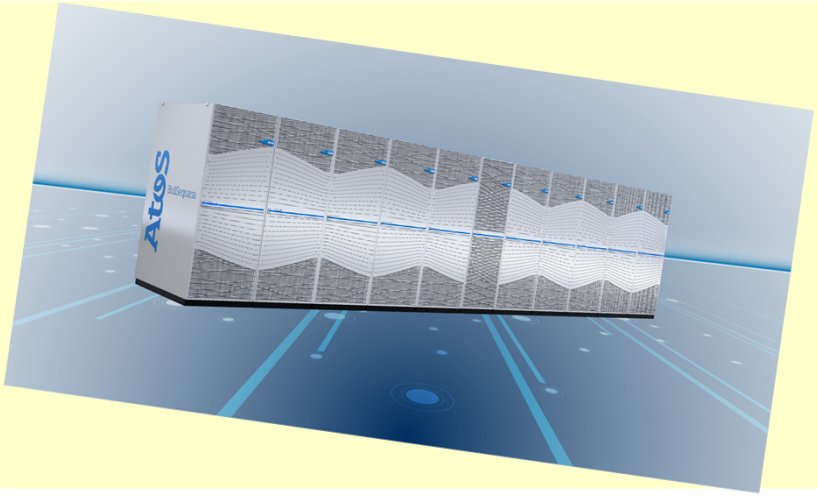
- The arrival of Harlequin ladybirds (*Harmonia axyridis*) from continental Europe to the UK in 2004-2005 after the first record in 2003 has been studied using atmospheric models (NWP + ADM)

The NWP systems at Météo-France

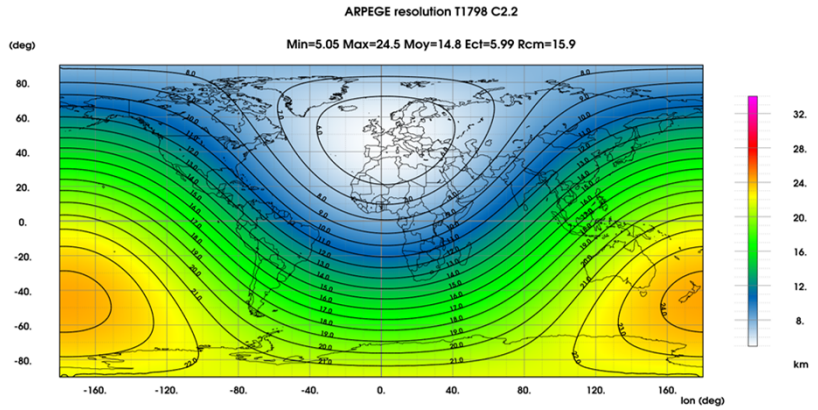
New HPC at Meteo-France in 2020

2 twin HPC, 2 implementations

ATOS BULL Sequana XH2000
«Belenos» and «Taranis»



New version of the ARPEGE/IFS code : CY43T2, operational since 2 July 2019



Simultaneous switch of all systems

ARPEGE : increase of horizontal resolution

New model output diagnostics

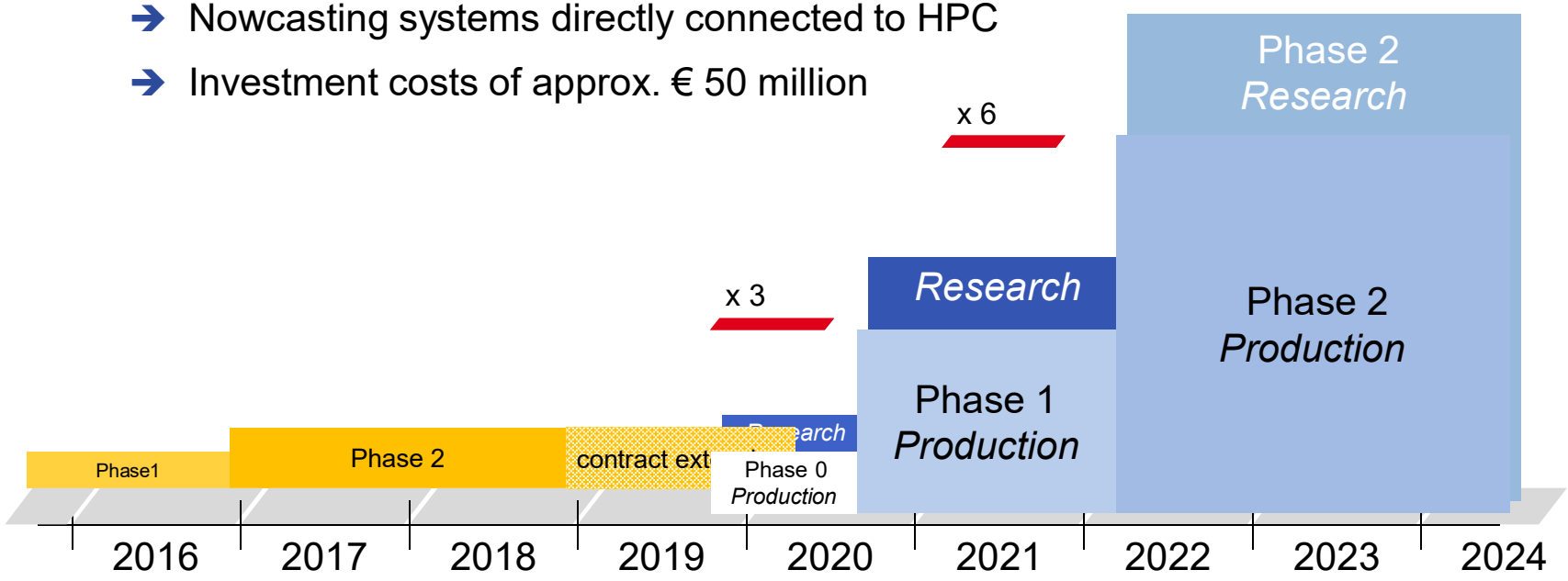
AROME : new version of microphysics scheme, surface analysis, ...

Projekt HPC19: Procurement of a new HPC at DWD

Vetterdienst
a aus einer Hand

DWD

- Invitation to tender out in November 2018
- Negotiation phase from March to May 2019
- Contract with NEC (Japan) signed in June 2019
- Remote datacenter in Ludwigshafen for research machine
- Nowcasting systems directly connected to HPC
- Investment costs of approx. € 50 million



Migration from the COSMO-model to ICON-LAM (limited area mode of the ICON Modelling Framework) until 2022

- Mass conservation, mass consistent tracer advection
- Stable dycore for steep terrain
- Up-to-date physics packages, e.g. RRTM, tile approach
- One-way and two nesting options available
- Hybrid MPI / OpenMP parallelization, highly scalable and efficient
- ICON-model is between 30 to 50% faster than COSMO-model
- Consistent initial and lateral boundary data based on global ICON-model
- Further development and support by DWD, MPI-M, KIT and DKRZ

http://cosmo-model.org/content/tasks/priorityProjects/c2i/default.htm

ICON in the Cloud

Since many NHMS in developing countries cannot operate HPCs, DWD will provide in the “Cloud” (e.g. Amazon Web Services, Microsoft Azure, Google Cloud, IBM Cloud, …) four important components of the NWP process starting Q2 2020:

- **ICON-LAM**, the limited area mode of our comprehensive modelling framework ICON (https://code.mpimet.mpg.de/projects/iconpublic),
- **fieldextra**, a comprehensive and robust postprocessing package developed by MeteoSwiss (https://github.com/COSMO-ORG/fieldextra-wiki/wiki),
- **NinJo**, a flexible forecaster’s workbench and production system (http://www.ninjo-workstation.com/home.0.html),
- **Initial and lateral boundary data** for ICON-LAM runs, based on ICON global model runs with a grid spacing of 13 km, 70 layers at 3-hourly intervals. Up to four runs per day, from 00, 12 UTC up to 174 h and from 06, 18 UTC up to 120 h. With bzip2 packing: **120 GByte global data set** or 5 – 10 GByte tailored to the NMHS’s region of interest.
- The access to “ICON in the Cloud” will be free of charge for NHMS of developing countries; these NHMS only have to pay for the cloud services.

THE SHORT-RANGE WEATHER FORECASTING SYSTEM COSMO-RU, HYDROMETCENTRE OF RUSSIA, MOSCOW

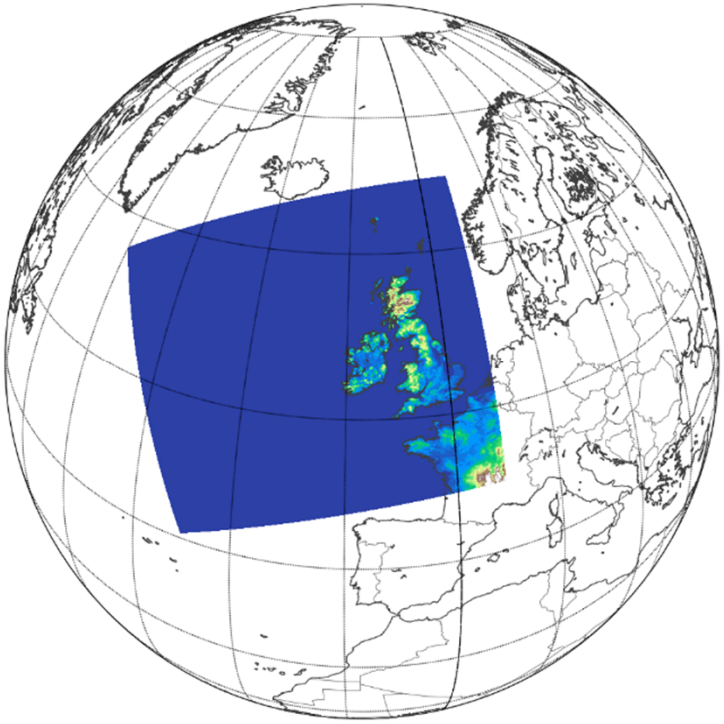
1. **Operational short-range forecast system COSMO-Ru:**

   - 4 times per day for 11 areas (NEW – 5 areas):
     6 (ICE-X , 14 Tflops) & 5 (CRAY XC40-LC (1.3 Pflops)
   - 4 times per day 8000 maps, 1200 meteograms
   - 4 times per day COSMO-ART7
   - NEW: COSMO ⟹ ICON

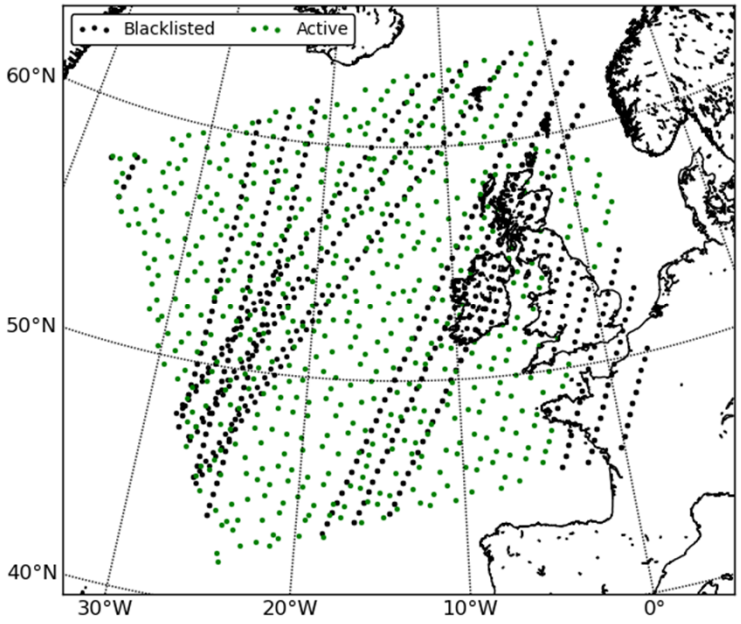
2. **NEW: Moscow megapolis (2019 - 1.0 km; 2020 – 0.5 km, maybe)**

3. **NEW: ICE-POP2018, South Korea (grid spacing 0.55 km)**

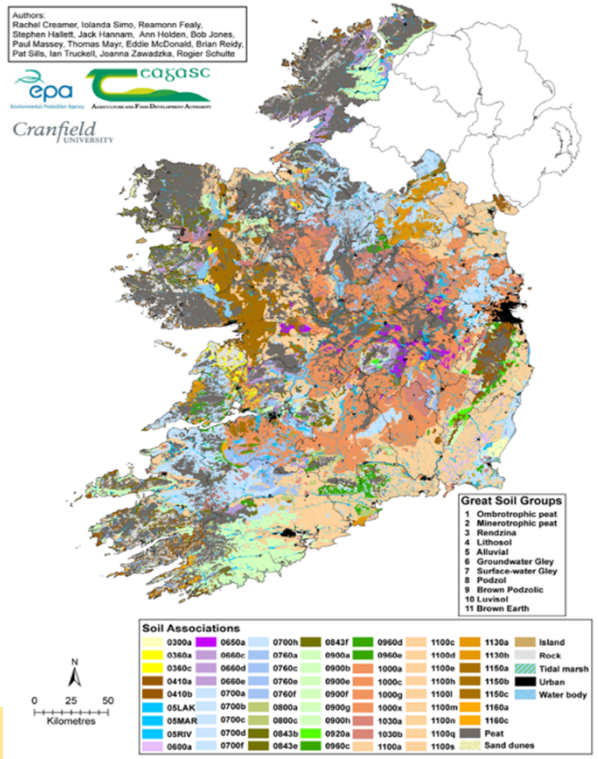
Operational NWP at Met Éireann



10+1 member ensemble (IREPS) twice daily



Improved our DA – now include ASCAT winds and radiances from AMSU-A, MHS and IASI



Physiography improvements

A few other developments

UWC West

- Wave/ocean coupling
- Nowcasting system
- Member of UCW-west
  - Will run half of IREPS at KNMI from next year

NWP at the Hungarian Meteorological Service

- AROME data assimilation at every 3 hours → hourly rapid update cycle experiments
- AROME forecasts with 60 model levels → EDA experiments to calculate new B-matrix for 90-level AROME forecasts
- ALADIN LAMEPS et al. → convection-permitting AROME ensemble

Italy

- The ITAF operational NWP system
- COSMO-IT EPS: the pre-operational convection permitting ensemble prediction system of ITAF
- A case study: convective precipitation over southern Italy (27 August 2019)

Poland – COSMO

- Operational status of deterministic and probabilistic COSMO PL and status of semi operational ICON PL .
- Comparison of verification results for COSMO PL and ICON PL: a case study.
- Further development and testing of compressible COSMO-EULAG.

Portugal

- The Portuguese NWP system versions
- Regional Cooperation
- Data Assimilation Activities

Romania – ALADIN

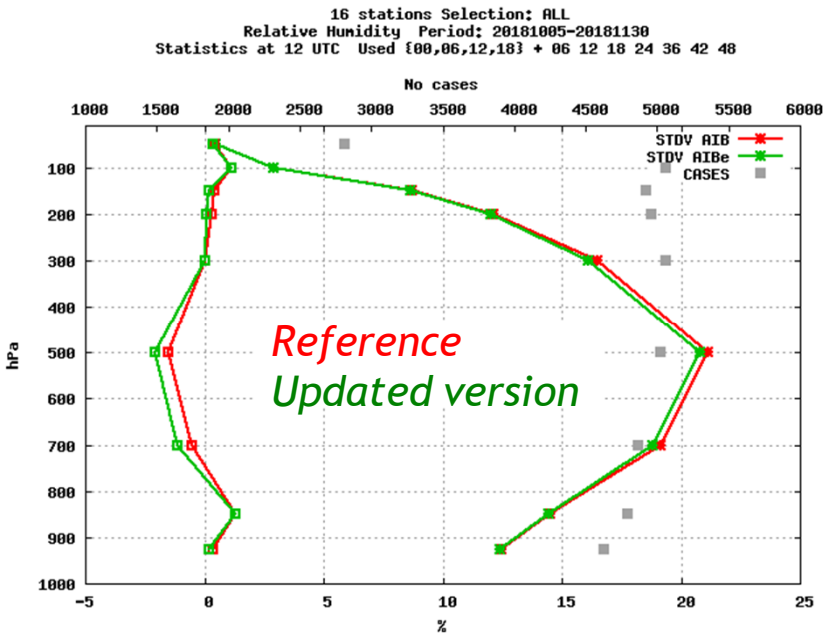
- Operational suite
- Bias correction for wind speed forecast
- Comparison of ALARO-0 and ALARO-1vb during the 2018 convective season.

AEMET Highlights

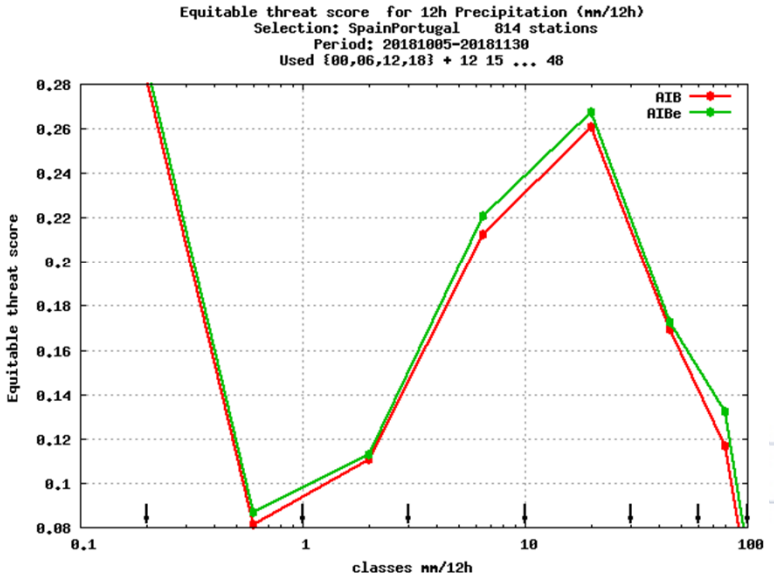
- Updates in operational runs:
  - Radar reflectivity assimilation using OPERA data. Improvement in humidity profiles and in precipitation mainly due to a decrease of False Alarms.
  - Blending of ECMWF humidity in the First Guess included. Improvement in most paramenters.

- γSREPS ensemble system. Multi-model Multi-boundary system in pre-operational phase shows good results (operational forecasters subjective evaluation) specially in high impact weather events

STDV & Bias RH at 12 UTC



ETS Precipitation



NWP related activities @ SHMU

- ALADIN systems
  - operational **ALARO-1vB** using CY40t1bf07_export: 4.5 km/L63
  - experimental ALARO & AROME 2 km/L73
- R&D within RC LACE
  - A-LAEF operational suite implementation in ecFlow under TC user
  - Testing of visibility parameterization in ALARO
- High resolution data assimilation
  - Assimilation of Mode-S data
  - Assimilation of GNSS ZTD data
  - Setup of SODA-EKF based surface assimilation suite

Slovenia

- first study of OPERA reflectivity assimilation was conducted, solutions for wind dealiasing are searched for
- diagnostics of visibility and detailed precipitation type was adopted for ALARO
- ongoing feasibility study of using attenuation in mobile network data links to retrieve rain rate

Switzerland

- New ensemble-only forecasting system at MeteoSwiss on a new GPU-based machine
- High-resolution data assimilation for the Alpine region
- High-resolution ensemble: advantages and tests of kernel density estimation

United Kingdom

- UKV and MOGREPS-UK operational changes at PS42 (March '19), featuring new hourly time-lagged ensemble and assimilation of Mode-S winds.

- Global Model plans for PS43 (November '19) - En-4DEnVar replaces ETKF.

- UKV and MOGREPS-UK plans for PS43 (November '19), featuring new physics and soil moisture assimilation