LAM ACTIVITIES IN ROMANIA

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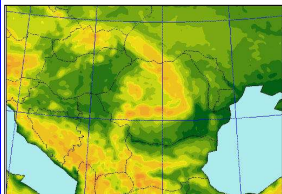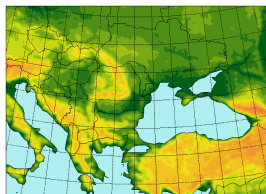
Meteo Romania

The actual Romanian national numerical prediction system is based on the following models: Aladin, COSMO, HRM

A. ALADIN applications
D. BANCIU, M. CAIAN, S. TASCU

Operational suite –no important changes since last year

ALADIN-RO

ALADIN-RO, 144 x 144 points
Δx=10 km, 41 levels

NEW Coupling Domain 180 x 144 points
Δx=16 km, 60 levels

ALADIN-SELAM : mainly for Black Sea Applications)
same area as for the coupling files but with Δx=24 km (120x90) 46 levels
Δx=24 km, 46 vertical levels

> **Computing platform:**
- SUN E4500 workstation (8-CPU 400GHz, 8*1 GB RAM) for direct integrations and in line post processing
- ALPHA DEC 500 workstation (1CPU, 704 MB RAM) for different processing of model output

> **Model: cycle 28t3,** with quit poor physics set-up (no prognostic variable for condensed water, old ARPEGE/ALADIN radiation scheme, diagnostic convection, simple microphysics)

> **Characteristics :**
- Arpege LBC; 6 hours coupling frequency
- Dynamical adaptation mode, DFI initialization, 2TLSLscheme (Δt= 450s for 10km and 900s for 24 km)
- 4 runs per day : 00-78h, 12- 66h, 06-48h, 18-48h ALADIN_RO
- 2 runs per day : 00-78h, 12- 66h for ALADIN_SELAM
- Post-processing: in line FPOS on geographical regular grid (routed towards visualization systems in Bucharest and to Regional Centers) , off line FPOS on model grid, every hour

> **Specific graphical products:** on the intranet ALADIN web page
> **Input for Downstream applications:** wave and sea circulation, pollutant diffusion and transport and hydrological models
> **Statistical adaptation** (Otilia Diaconu)
> **Verification :** local new version (Otilia Diaconu, Cristina Cretu) and common verification proiect
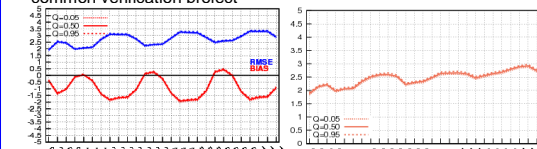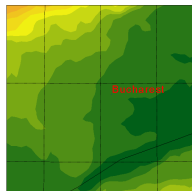

ALADIN 2m temperature MAE,RMSE (left); Standard deviation (right) for March 2008

ALADIN-BUCHAREST – Pre-operational suite
…… it will be replaced in the future by AROME

> **Computing platform**: 2CPU SGI ALTIX
> **Model version**: cy32t1, non hydrostatic version

Domain: 50 x 50 points, Δx=3.5km
41 vertical levels. Δt=60s
Wind dynamical adaptation at Δx=1.5km

Atmospheric input for urban scale air quality system

Research-development

Mainly in the frame of the ALADIN, LACE and LIFE projects

- **Implementation of ALADIN/ALARO cy33t1**
  first local tests with ALARO ⇒ **the next operational model for Romania**
- **Set up of 3 AROME domains** (for Romania area Δx=2.5 km, for Bucharest area Δx=3.5 km and Δx=1.5km) **and first simulations at Δx=2.5 and 1.5 km**
- **Contribution to further development of the prognostic convection within 3MT frame** (prognostic entrainment rate)
- **Contribution to the development of the combined ARPEGE-LAEF EPS**
- **Case studies** (severe weather events) by using operational ALADIN (coupled with ARPEGE and ECMWF), ALARO at 10 and 5 km, ECMWF and LAEF EPS, the mono (Aladin) and multi model (Aladin and Cosmo) "pour man" EPS {prepared to be implemented in operations}
- **Validation of PBL parameters forecasted by ALADIN Bucharest (3.5km) at local scale (peri-urban area) against measurements (sodar and lidar data)**

B. COSMO&HRM-RO applications
I.V. PESCARU, R. DUMITRACHE, L. VELEA, C. BARBU
A. LUPASCU, I. IBANESCU

COSMO-RO Integration characteristics
> **LAM, based on the non-hydrostatic, full compressible equations in advection form.**
> **Δx= 14km ; 35 levels; Δt=80s**
> **IC & LBC: GME 00, 12 every 3h**
> **Runge-Kutta**
> **Data Assimilation: No**
> **Forecast range: 78h**
> **Operational suite for 2 runs/day (00, 12 UTC)**

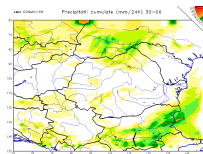**COSMO-4.0**
> Δx= 7km ; 40 levels; Δt=40s
> IC & LBC: GME 00, every 3h
> Data Assimilation: No
> Forecast range: 54h
> Operational suite for 1 run/day (00 UTC)

Physical parameterizations:
- Clouds and precipitation
  - Grid-scale pp: 2-ice category scheme, prognostic
  - Convection scheme: Tiedtke
  - Grid-scale and convective clouds, total cloud cover
- Radiation
- Turbulent fluxes
- Soil processes

Operational domain and products

> T_{2m}; MSLP
> 10 m wind speed, direction
> total, convective and grid scale precipitation
> geopotential 850, 700, 500 hPa
> Cloudiness, etc

COSMO model operational domain

Research – development activities
- Testing different convection schemes, soil humidity initial conditions , microphysical parameterizations and numerical schemes for COSMO-RO over a domain with 301x301 grid points and 7 km resolution
- Preoperational run of COSMO-RO for a domain with 301x231 grid points and 2.8 km resolution
- Implementation of the "VERSUS" verification package and use this for COSMO-RO evaluations
- Data assimilation for synop and AMDAR data.

**Future activities**

Local developments

- The new operational domain will have 301x301 grid points and 40 vertical levels (7 km resolution)
- The new COSMO-2.8 km domain will cover Romanian territory.
- Improvement of the data visualization.
- Operational verification versus observational data.

Developments in the frame of COSMO consortium

- Participation on priority project "**Towards Unified Turbulence-Shallow Convection**" **Scheme** "
- Participation on priority projects **"VERSUS 2"**
- Participation on priority projects SPRT **"Support Activities"**
- Participation on the priority project **"Assimilation of satellite data with clouds and over land"**
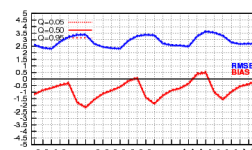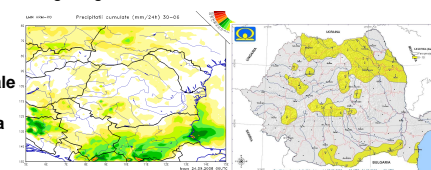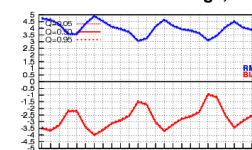

MAE,RMSE
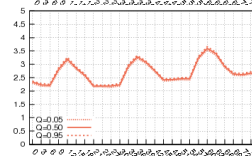
Standard deviation

COSMO 2m temperature verification
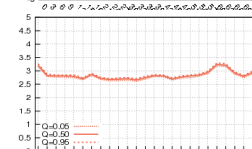
HRM-RO

HRM operational domain: 24h cumulated precipitation forecast (left) and 24h observed precipitation (right)

- Workstation version updated (updated accordingly with DWD version)
- Full operational implementation
- Initial and boundary conditions from GME-DWD
- Rotated geographical grid 0.125 deg., 40 vertical levels
- 78 hours forecast range, one run/day

MAE,RMSE

Standard deviation

HRM 2m temperature verification

C. REGIONAL CLIMATE applications
M. CAIAN, A. ENCULESCU, M. NICULAE

Mean range forecast - REGCM3 (Giorgi, 1993) model coupled with the ECMWF global model.

Spectrum of 10 days predictability (t2m– left and precipitation – right) for RegCM3+ECMWF–computed over 1 year simulations.

Simulations (dx=10km) with anticipations: 1, 2 , 5 and 7 days: confirm predictability results for this extreme case (observation above).

Ensemble simulation (10 members) supplies accuracy in the range of 7 days predictability scale even at coarser resolution (50km).