29th EWGLAM&14th SRNWP Meetings
DHMZ, Dubrovnik, 8th to 11th October, 2007

LAM ACTIVITIES IN ROMANIA

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The actual Romanian national numerical prediction system is based on the following models: Aladin, HRM, LM, MM5.

A. ALADIN model

D. BANCIU, M. CAIAN, R. RADU, C. SOCI, S. STEFANESCU, S. TASCU

Operational suite –no important changes since last year

➢ **Domains (quadratic grid , Lambert projection)**

- **ALADIN-Romania, 144x144 grid points, Δx=10 km, 41 levels**
- **ALDIN-Selam (Romania + Bulgaria area): 120x90 grid points Δx=24 km, 46 vertical levels**

➢ **Characteristics :**

- **Arpege LBC; 6 hours coupling frequency**
- **Dynamical adaptation mode, DFI initialization, 2TL semi-lagrangean scheme (Δt= 450s for 10km and 900s for 24 km)**
- **4 runs per day : 00-78h, 12- 66h, 06-48h, 18-48h**
- **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 3 hours**

➢ **Graphical products available on the intranet ALADIN web page**

➢ ***Statistical adaptation***

➢ ***Verification* : local and common verification project**

➢ ***Input for Downstream applications*: wave and sea circulation, pollutant diffusion and transport and hydrological models**

Research-development

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

- **Data assimilation: J_b formulation**
- **Physical parameterization (prognostic convection)**
- **Scale analysis and tuning of spectral coupling for fine scale process representation**
- **Case studies (severe weather events)**
- **Study of the urban boundary layer using an extended database; application for Bucharest region**

ALADIN and hot summer in Romania

S.STEFANESCU, S.TASCU

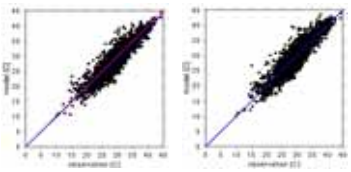


Fig. 1 *ALADIN maximum temperature, scatter plot: first (left) and second forecast day (right) of 00 UTC run for June-July 2007 including data for 49 observation stations*

Fig. 2 *ALADIN maximum temperature, bias and RMS (left) and second forecast day right for June-July 2007 including data for 49 observation stations*

July 2007, maximum temperature in Romania: 44.3°C (15482)
absolute record: 44.5°C, August 10, 1951

ALADIN model for 15482: 00 run – 44.4/44.0, 12 run: 43.6
GOOD BEHAVIOUR !

NWP models verification *O. DIACONU*

- **The operational verification procedure was reorganized, including descriptive diagrams (scatter plots, histograms and box plots), confidence intervals for all computed scores** (figures 3, 4 and 5)
- **Currently the procedure is applied to the ECMWF products but in the future it will be used for all operational LAM in Romania**

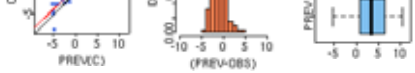


Fig. 3 *ECMWF temperature, scatter plot, histogram and box plot for 15080 station (W Romania) for 12-30 h forecast, January 2007*

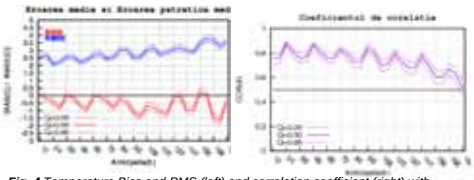


Fig. 4 *Temperature Bias and RMS (left) and correlation coefficient (right) with confidence intervals for ECMWF 10 days forecast, SW Romania region for January 2007*

B. COSMO-RO Model

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, every 3h**
- **Data Assimilation: No**
- **Forecast range: 78h**
- **Operational suite for 4 runs/day (00, 06,12 and 18 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

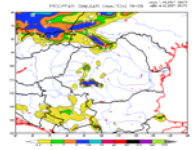


Fig. 6 *COSMO model operational domain*

- **T_{2m}; MSLP**
- **10 m wind speed, direction**
- **total, convective and grid scale precipitation**
- **geopotential 850, 700, 500 hPa**
- **cloudiness**

Research – development activities

- **Installing of the COSMO_3.19 and the new COSMO_4.0 code on the PC Cluster**
- **Testing different convection schemes, soil humidity initial conditions , microphysical parameterizations and numerical schemes**
  ⇨ **for both COSMO versions over a domain with 301x301 grid points and 7 km resolution** (figure 7)

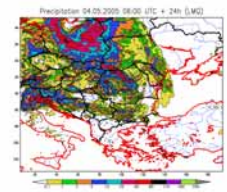


Fig. 7 *ACOSMO future operational domain*

- **Testing the COSMO code for a domain with 81x81 grid points and 2.8 km resolution.**
- **Implementation of the "CVS - Common Verification Suite" on the Linux system, and COSMO model evaluation.**
- **Development of the graphic package for scores visualization in GRACE.**

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.**
- **Data assimilation for synop and AMDAR data.**
- **Improvement of the data visualization.**
- **Operational verification versus observational data.**

Developments in the frame of COSMO consortium

- Further participation on priority projects: "***Advanced Interpretation of COSMO model output***", "***Towards Unified Turbulence-Shallow Convection Scheme*** ", "***1dVar retrievals of satellite radiances for nudging***"
- Participation on priority projects CV ***"Conditional Verification, Extended Common Verification Suite"*** and on SPRT ***"Support Activities"***
- Participation to other priority projects, if it is required

Fig. 5 *ECMWF wind direction (observed –left, forecast-center, box plot=right) for the 15247 station (W Romania) for January 2007*

C. High resolution Regional Model

I.V.PESCARU, R.DUMITRACHE, L.VELEA,C.BARBU A.LUPASCU, I.IBANESCU

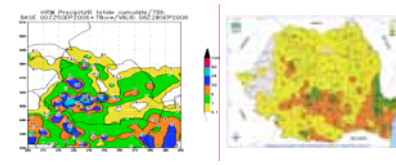


Fig 8. ***HRM operational domain: 78h cumulated precipitation forecast (left) and 78h observed precipitation (right)***

- **Workstation version updated (updated accordingly with DWD version)**
- **Full operational implementation**
- **Initial and boundary conditions from GME-DWD**
- **Rotated geographical grid 0.25 deg., 20 vertical levels**
- **78 hours forecast range, twice per day**

D. MM5 model

I. IBANESCU

Operational suite in Romania – no changes since last year

***Characteristics*:**

➢ **non-hydrostatic mm5v3.4 version**

➢ **model domain: 80 x 167 points (Δx = 15 km, stereographic projection), 25 vertical σ levels, Δt=45s**

➢ **initial and boundary condition from GFS (1.25º resolution) and the SST from NCEP)**

➢ **4 runs per day, up to 24 hours**

➢ **Output in grib format routed towards the visualization systems**

E. Regional climate modeling – *M. CAIAN*

REGCM3 (Giorgi, 1993)
★coupled with the ECMWF
- for10 days: Δx=10km, 23 σ - levels
- for 1 month: Δx=50 km , 18 σ levels,10 members ensemble

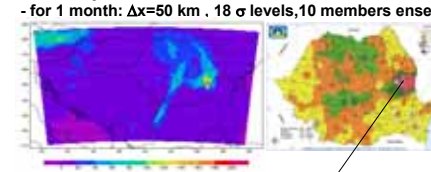
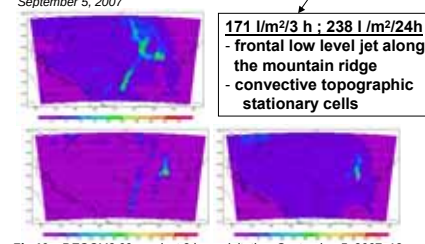


Fig 9. *REGCM3 (left) and observed (right) 24 h precipitation for September 5, 2007*



171 l/m²/3 h ; 238 l /m²/24h
- frontal low level jet along the mountain ridge
- convective topographic stationary cells

Fig 10. *REGCM3 00 run: last 3 h precipitation: September 5, 2007, 12 UTC (left up), 15 UTC (left down) and 18UTC (right down)*

Downscaling ability of ALADIN-Climate using spectral nudging

Radu R., Déqué M., Somot S., 2007: ***Spectral nudging in a spectral regional climate model***, (submitted to Tellus)

-25 years simulations using ARPEGE and ALADIN models at the same resolution (50km), by employing spectral nudging method to nest the large-scales from the driving model (ARPEGE) into LAM (ALADIN).
- ALADIN is able to predict the large scales present in the driving global fields and the small scales as well. For summer season: an important reduction of differences in between the driving global and regional model when using spectral nudging (Fig. 11).

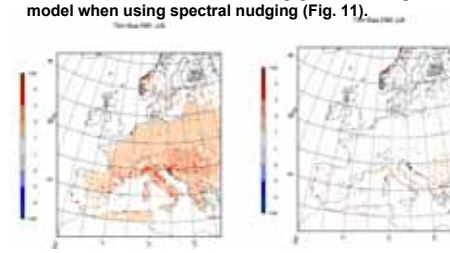


Fig. 11 *Differences in 2m temperature between ARPEGE and ALADIN for summer. Seasonal means over 25 years: a) without spectral nudging (left) , b) with spectral nudging (right).*