

Operational ALADIN models at Météo-France

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A. PRESENT CONFIGURATION (*october 2002*)

ALADIN-France ("ALADIN-Métropole")

Running in dynamical adaptation mode :

- digital filter initialization + short-range forecast
- 4 runs a day, up to 48h, 42h, 36h, 30h at 00, 06, 12, 18 UTC respectively
- initial and boundary conditions from ARPEGE (- Métropole)
tilted and stretched grid, average mesh-size over France : 20 km
- synchronous 3h-coupling
- post-processing every 3h
- providing coupling files for ALADIN - Belgium, every 3h

Geometry :

- mesh-size : 9.5 km
- spectral resolution : E149 × 149 (linear)
- gridpoints : 288 × 288 (including the extension zone, 11 gridpoints wide)
- vertical levels : 41
- corners : SE → [33.14°N; 11.84°W], NE → [56.96°N; 25.07°E]
(using 1 or 2 processors on Fujitsu VPP5000, CPU time /day : 6.2 h)

Pre-operational applications :

- parallel suites : 1 run per day (from 00 UTC, up to 48h)
- hourly diagnostic analyses for nowcasting (only every 3h in winter)
- "*soon*" : *blending suite, with a 6h cycling*

ALADIN-Réunion (new !)

Running in dynamical adaptation mode :

- digital filter initialization + forecast
- 1 run per day : from 00 UTC, up to 72h
- initial and boundary conditions from ARPEGE - Tropiques
regular grid, mesh-size : 67 km
- synchronous 6h-coupling
- post-processing every 6h

Geometry :

- mesh-size : 33.4 km
- spectral resolution : E63 × 124 (linear)
- gridpoints : 128 × 150 (including the extension zone, 11 gridpoints wide)
- vertical levels : 41
- corners : SE → [1.12°S; 29.18°E], NE → [36.00°N; 100.41°E]
(using 1 processor on Fujitsu VPP5000, CPU time /day : 0.4 h)

B. MAIN CHANGES ALONG THE LAST YEAR

(mainly improvements in physics, increase in vertical and spectral resolutions, ... and debugging)

➤ **11 September 2001 : "New cycles"** (new libraries, changes in physics)

Cycles 24T1 (ARPEGE), 15 (ALADIN), etc

Avoiding snowfall on warm surfaces :

The distribution of convective/subgrid precipitations between rain and snow is now height-dependent, so as to avoid snowfall when the atmosphere is very warm and the soil simply between 0 °C and +3 °C.

+ *changes in data assimilation for ARPEGE (4d-var + O.I.- surface)*

➤ **12 November 2001 : "CYCORA-ter"** (changes in physics and post-processing)

Explicit dependency of deep convection on resolution while still taking into account large-scale precipitations (intermediate between the previous schemes)

No shallow convection allowed without potential moist instability

Improved description of mixing lengths and critical Richardson number

Correction of some inconsistencies in the vertical diffusion and "a few" other bugs in the physics

New post-processing :

-recomputation of diagnostic PBL fields on the target grid

-management of roughness lengths considering the land-sea mask

+ *improved SST analysis in ARPEGE*

☹ : **bugs introduction !** (in vertical diffusion)

➤ **6 December 2001 : "Bug correction in ARPEGE"** (correction of a bug introduced on 11/09/2001 in 4d-var)

➤ **17 January 2002 : "Increase of resolutions"** (new design of operational suites)

Improved stability and reproducibility of the physics

Retunings

imposed by the changes of resolution

Increase of vertical resolution :

-from 31 to 41 vertical levels

-(highest : from 5 hPa to 1 hPa, lowest : from 20 m to 17 m)

Increase of spectral resolution :

-the grid does not change

-the orography does not change

-the spectral resolution is increased by 50% for prognostic variables ("linear" truncation, also called "linear" grid)

+ *similar changes in ARPEGE and new 4d-var configuration*

☹ : **bugs introduction !** (in convection)

➤ **28 March 2002 : "Bug corrections"** (correction of the bugs introduced on 12/11/2001)

Corrections in the vertical diffusion and anti-fibrillation schemes

Retunings

➤ **14 May 2002 : "Safer physics"** (a few improvements in physics)

Stronger safety thresholds in the convection scheme

Improved anti-fibrillation scheme :

The vertical variations of the coefficient controlling the anti-fibrillation scheme are limited, with a maximum equal to the value at the lowest level, in order to avoid the previous (sometimes very strong) oscillations

➤ **Tested in ALADIN along summer 2002 : "Convection"** (improvements and bug corrections)

Correction of a bug introduced on 17/01/02

Better management of situations with dry air in the lowest levels

Time-smoothing of the shallow-convection scheme

Introduction of a "shear-linked" convection

Retunings

➤ **17 September 2002 : "Hourly outputs"** (up to 12h, for diagnostic analyses)

➤ **Under test : "New observations"** (use of new observations in ARPEGE and changes in post-processing)