The operational ALADIN models

1. Introduction

Changes were numerous along the last year, with the end of the common LACE operations, deep changes in Morocco and Tunisia, and a general upgrade of computers and libraries. The tables hereafter try to describe the situation at the end of September 2003, according to the informations provided to the Toulouse support team.

MODEL CHARACTERISTICS

Partner / Model	Mesh (km)	Gridpoints (C+I / C+I+E)	Grid type	SW corner (lat , lon)	NE corner (lat , lon)	Vertical levels	Coupling model
AUSTRIA-LACE	12.2	229×205 / 240×216	quadratic	33.99*N* 2.17*E*	55.62*N* 39.07*E*	37	ARPEGE
AUSTRIA-Vienna	9.6	133×117 / 144×128	quadratic	41.36*N* 5.88*E*	51.81*N* 21.84*E*	37	ALADIN-LACE Au
BELGIUM	7.0	229×229 / 240×240	linear	43.17*N* 5.84*W*	57.25*N* 17.08*E*	41	ALADIN- FRANCE
BULGARIA	12.0	79×63 / 90×72	quadratic	39.79*N* 20.01*E*	46.41*N* 31.64*E*	31	ARPEGE
CROATIA-LACE	12.2	229×205 / 240×216	quadratic	33.99*N* 2.18*E*	55.62*N* 39.08*E*	37	ARPEGE
CROATIA-HRn8	8.0	169×149 / 180×160	quadratic	39.00*N* 5.25*E*	49.57*N* 22.30*E*	37	ALADIN-LACE Hr
CROATIA-Dyn Adap	*2.0*	*72×72 / 80×80 (×5)*	*Senj, Karlovac, Maslenica,Split, Dubrovnik*			*15*	*ALADIN-HRn8*
CZECH REP.	12.2	229×205 / 240×216	quadratic	33.99*N* 2.18*E*	55.62*N* 39.08*E*	37	ARPEGE
FRANCE	9.5	277×277 / 288×288	linear	33.14*N* 11.84*W*	56.96*N* 25.07*E*	41	ARPEGE
HUNGARY	6.5	421×373 / 432×384	quadratic	34.15*N* 2.35*E*	55.3*N* 38.7*E*	37	ARPEGE
HUNGARY-Dyn Adap	*2.4*	*239×169 / 250×180*				*15*	*ALADIN-HU*
MOROCCO-NORAF	31	189×289 / 200×300	quadratic	1.93S 35.35*W*	44.86*N* 57.22*E*	37	ARPEGE
MOROCCO-Morocco	9	309×349 / 320×360	quadratic	17.24*N* 24.84*W*	42.46*N* 9.40*E*	37	ALADIN-NORAF
POLAND	13.5	169×169 / 180×180	quadratic	41.42*N* 5.56*E*	61.16*N* 40.19*E*	31	ARPEGE
PORTUGAL	12.7	79×89 / 90×100	quadratic	34.94*N* 12.42*W*	44.97*N* 0.71*W*	31	ARPEGE
ROMANIA	10.0	89×89 / 100×100	quadratic	41.91*N* 20.68*E*	49.80*N* 32.12*E*	31	ARPEGE
SLOVAKIA	7.2	109×79 / 120×90	quadratic	46.05*N* 14.69*E*	51.07*N* 25.26*E*	31	ALADIN-LACE Au
SLOVENIA	9.5	258×244 / 270×256	quadratic	34.00*N* 2.18*E*	54.82*N* 33.37*E*	37	ARPEGE
SLOVENIA-Dyn Adap	*2.5*	*148×108 / 160×120*	*44.57 N, 12.18 E - 46.98N 16.92E*			*17*	*ALADIN-SI*
TUNISIA	12.5	117×151 / 120×162	quadratic	27.42*N* 2.09*E*	44.16*N* 18.37*E*	41	ARPEGE

PRACTICAL IMPLEMENTATION

Partner / *Model*	Computer	Library / *Physics*	Operational applications	
AUSTRIA / *LACE*	SGI Origin 3400 20 processors	AL15 → *CYCORA-ter+...*	• 48h forecast twice a day • synchronous 3h-coupling	• post-processing every 1h
AUSTRIA/ *Vienna*	SGI Origin 3400 20 processors	AL15 → *CYCORA-ter+...*	• 48h forecast twice a day • synchronous 6h-coupling	• post-processing every 1h • hourly diagnostic analyses
BELGIUM/ *Belgique*	SGI Origin 3400 24 processors	AL15_02 → *CYCORA-ter++*	• 60h forecast twice a day • synchronous 3h-coupling	• post-processing every 1h
BULGARIA/ *BG*	SUN Ultra Sparc 60	AL12 → *CYCORA-bis*	• 48h forecast twice a day • synchronous 6h-coupling	• post-processing every 3h
CROATIA/ *LACE*	SGI Origin 3400 16 processors	AL25T1_op2	• 48h forecast twice a day • synchronous 3h-coupling	• post-processing every 3h
CROATIA/ *HRn8*	SGI Origin 3400 16 processors	AL25T1_op2	• 48h forecast twice a day • synchronous 3h-coupling	• post-processing every 3h • dynamical adaptation of wind (every 3h , 5 domains)
CZECH REP./ *CE*	NEC SX6B 4 processors	AL25T1_op4 → *COCONUT+++*	• 48h forecast twice a day • synchronous 3h-coupling	• post-processing every 1h • hourly diagnostic analyses • blending cycle (6h)
FRANCE/ France	FUJITSU VPP 5000 2 processors (/64)	AL26T1 → *COCONUT*	• 4 forecasts a day, up to 54h, 48h, 42h, 36h • synchronous 3h-coupling	• post-processing every 1h • coupling files every 3 hours • hourly diagnostic analyses
HUNGARY/ *HU*	IBM Regatta 32 processors	AL15_03	• 48h forecast once a day • synchronous 3h-coupling	• post-processing every 1h • hourly diagnostic analyses • dynamical adaptation of wind (every 6h , 1 domain)
MOROCCO/ *NORAF*	IBM RS6000 SP	AL25T1 AL13 for assim.	• 72h forecast twice a day • lagged 6h-coupling	• post-processing every 3h • data assimilation based on O.I.
MOROCCO/ *Maroc*	IBM RS6000 SP	AL25T1	• 72h forecast twice a day • synchronous 3h-coupling	• post-processing every 3h
POLAND/ *Poland*	SGI Origin 2000 8 processors (/128)	AL09 (soon AL15)	• 48h forecast twice a day • synchronous 6h-coupling	• post-processing every 3h
PORTUGAL/ *Portugal*	DEC Alpha XP1000	AL12 _bf02 → *CYCORA-bis*	• 48h forecast twice a day • synchronous 6h-coupling	• post-processing every 1h
ROMANIA/ *Romania*	SUN Ent. 4500	AL15 _04 → *CYCORA-bis*	• 48h forecast twice a day • synchronous 6h-coupling	• post-processsing every 3h
SLOVAKIA/ *Slovakia*	DEC Alpha XP1000	AL12_op6 → *CYCORA-bis*	• 48h forecast twice a day • synchronous 6h-coupling	• post-processing every 1h
SLOVENIA/ *SI*	Cluster with 14 nodes, 22 among 26 processors used	AL25T1	• 48h forecast twice a day • synchronous 3h-coupling	• post-processing every 1h • dynamical adaptation of wind and precipitations (every 3 or 6 h)
TUNISIA/ *Tunisie*	IBM Regatta 690	AL25T1 → *COCONUT*	• 48h forecast once a day • synchronous 6h-coupling	• post-processing every 3h

2. Changes in the operational version of ARPEGE along the first half of 2003

(more details bruno.lacroix@meteo.fr)

<u>"DICORA"</u>, *20/02/2003*

See the last Newsletter for a description of the modifications.

<u>"Longer forecast ranges"</u>, *31/03/2003*

The forecast ranges were increased, up to :

- 102 h for the 00 UTC run,
- 48 h for the 06 UTC run,
- 72 h for the 12 UTC run,
- 36 h for the 18 UTC run,

i.e. at least to 06 UTC the second day to have more diagnostics available.

<u>"COCONUT"</u>, *15/04/2003*

See the last Newsletter for a description of the modifications.

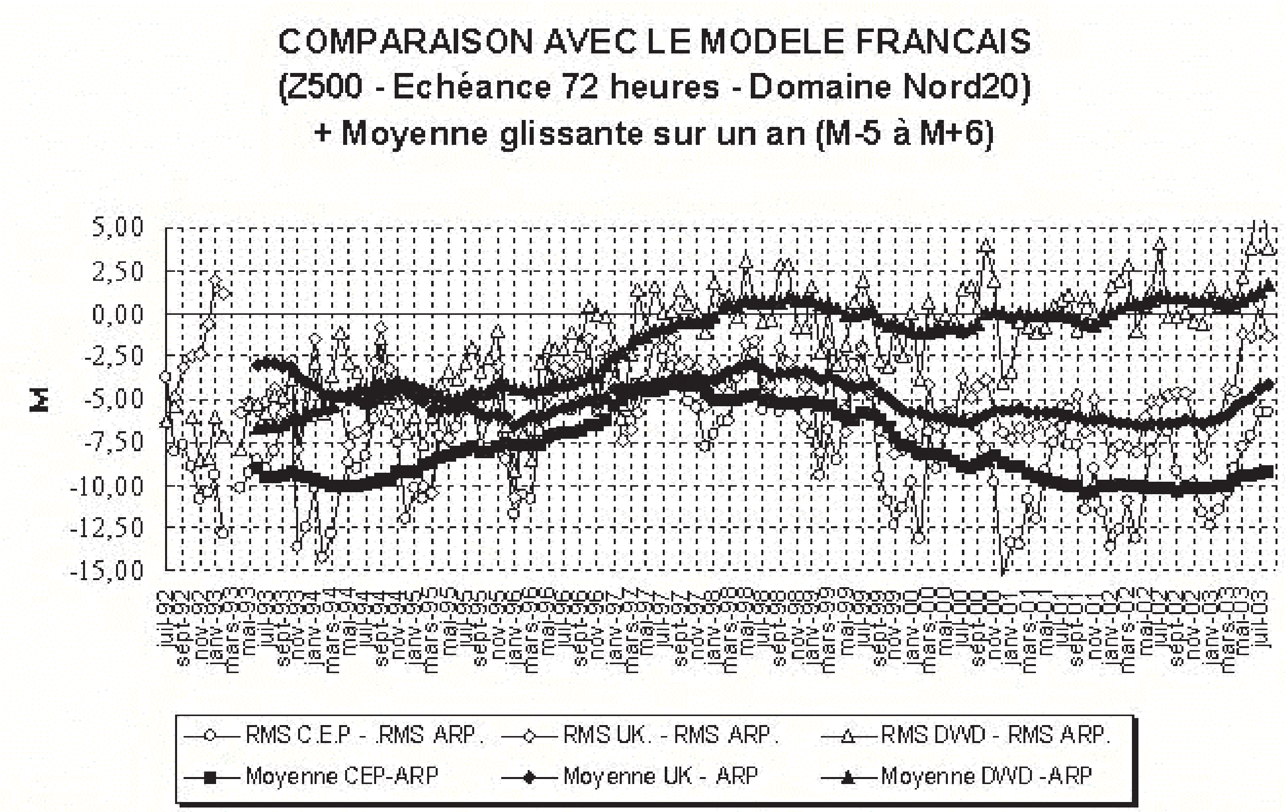
<u>"New geometry"</u>, *02/06/2003*

The stretching factor was reduced from 3.5 to 2.4, to attenuate the problems noticed in data assimilation. The new model resolution is T_L358 c2.4 for the forecast model, i.e. a mesh-size ranging from 23 km to 133 km, instead of 19 km - 235 km. The resolution of the outer loop of 4d-var decreased from T_L161 to T_L149 in the meantime.

<u>"New computer"</u>, *30/06/2003*

At first the move looked quite easy to perform (very similar computers), a parallel suite had been carefully controlled for 10 days, ... but the new machine scratched once operational !

Globally, the skill of ARPEGE was improved, even when compared to other models on large-scale scores :



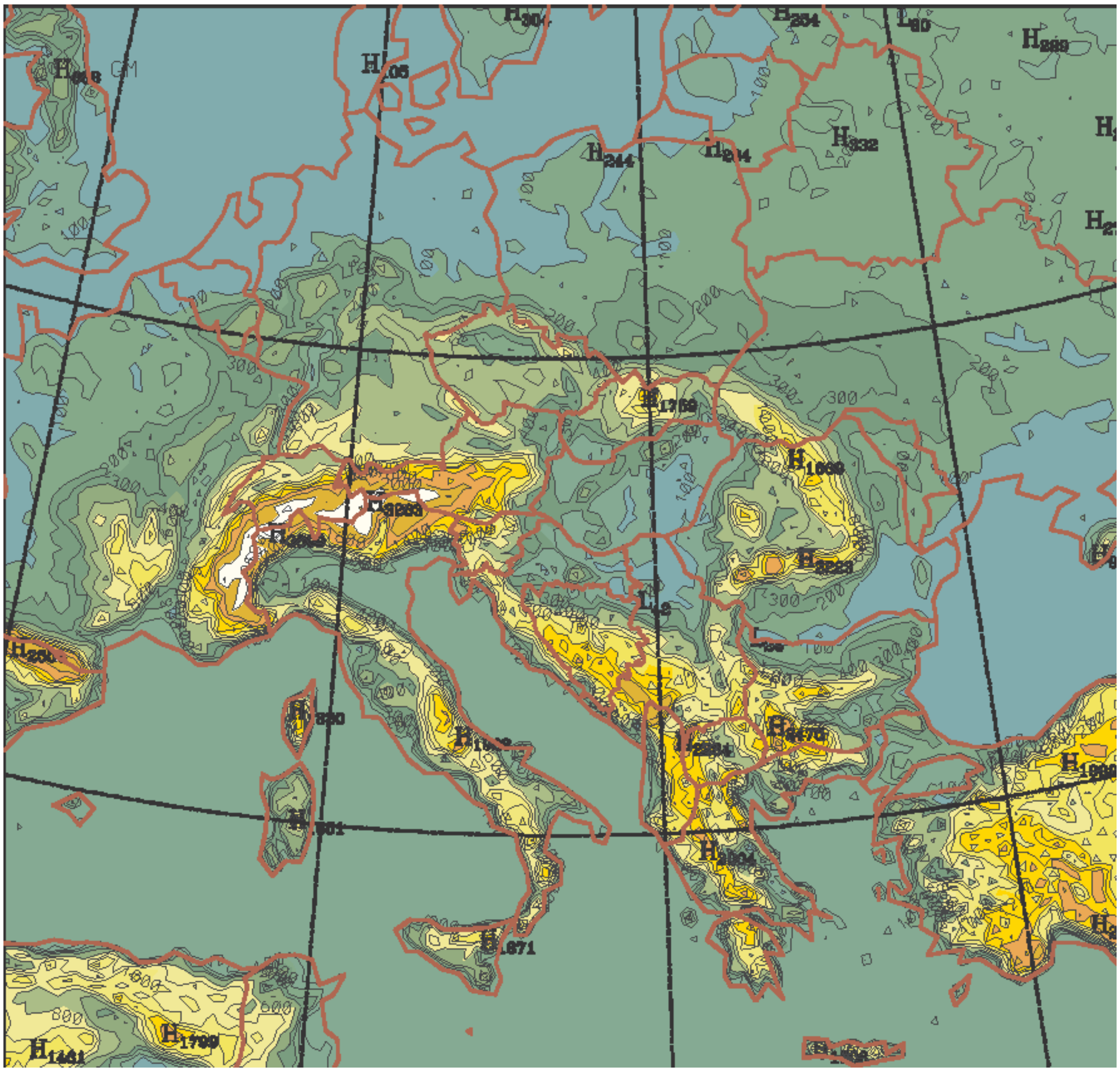
3. Operational versions in Austria

(more details thomas.haiden@zamg.ac.at)

Since January 2003, ZAMG is running the ALADIN model operationally on two domains, with the specifications given below. The model version currently used is AL15 (export version 03 + bugfixes).

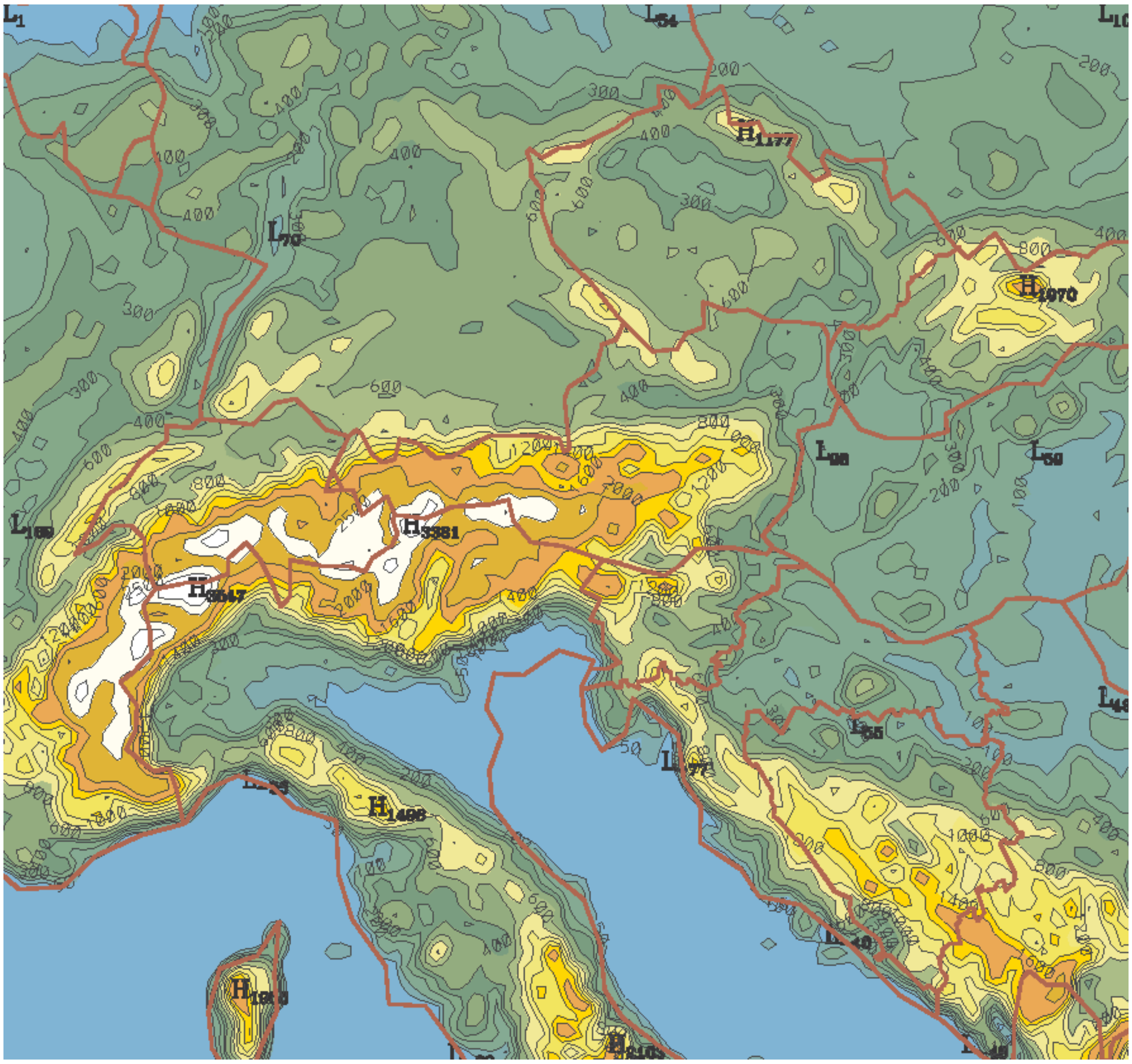
<u>ALADIN-LACE</u> :

- Horizontal resolution : 12.2 km
- 37 vertical levels
- Number of gridpoints : 240 x 216 (including the extension zone)
- Time-step : 514 sec
- Coupling frequency : 3 hours (LBCs provided by ARPEGE)
- Integration time : 1/2 hour
- Availability of products : 04:00 UTC, 16:00 UTC



ALADIN-VIENNA :

- Horizontal resolution : 9.6 km
- 37 vertical levels
- Number of gridpoints: 144 x 128 (including extension zone)
- Time step : 415 sec
- Coupling frequency : 6 hours (LBCs provided by ALADIN-LACE)
- Integration time : 10 mn
- Availability of products : 04:15 UTC, 16:15 UTC



Plans for the future :

- Increasing the horizontal resolution of ALADIN-VIENNA (6-7 km)
- Data assimilation cycle for ALADIN-VIENNA using 3d-var
- See also the paper of Alexander Kann.

4. Operational version in Belgium

(more details olivier.latinne@oma.be)

Recently, many changes have been brought to the Belgian operational forecasts. Firstly, we have extended the forecast range up to 60 hours instead of 48. To do that, we are still using the hybrid coupling method : for the midnight run, ALADIN-Belgium is coupled to ALADIN-France for the first 54 hours, and beyond to ARPEGE, until 60 hours, while for the midday run the coupling to ALADIN-France goes up to 48 hours.

In a few weeks, the surface of the Belgian domain will also be multiplied by a factor of about five, while preserving the actual mesh-size of 7 km (see Part 1 for more details). In August, we made a request to DWD, with an aim of taking part in the project for a Multi-Model Ensemble Prediction System in Europe.

5. Operational version in Bulgaria

(more details andrey.bogatchev@meteo.bg)

Nothing new along the last months.

6. Operational versions in Croatia

(more details ivateks@cirus.dhz.hr, tudor@cirus.dhz.hr)

ALADIN is running operationally twice a day, for 00 and 12 UTC. Model resolutions are 12.2 km for LACE domain, 8 km for HRn8 and 2 km for dynamical adaptation domains.

Initialization of ALADIN on LACE domain is provided by Digital Filter Initialization (DFI). When the 48 hours forecast on LACE domain finishes, 48 hours forecast on HRn8 starts, without initialization, with coupling files from LACE. Coupling frequency and frequency of output files for LACE and HRn8 domains are the same, 3 hours.

In operational suite 5 domains (Karlovac, Senj, Maslenica, Split and Dubrovnik) are used for high-resolution dynamical adaptation of the wind field to orography in the lower troposphere. Four of them cover the coastal part of Croatia. Dynamical adaptation is run sequentially for each output file, every 3 hours till 48 hours.

<u>Changes in the first half of 2003</u> :

From the beginning of April, the Croatian domain was enlarged from 144x120 (127x109) points to 180x160 (169x149). The domain was enlarged mostly southward and westward to cover the whole Adriatic Sea and Genoa Bay. The horizontal resolution remained the same, 8 km.

Latitudes and longitudes of new HRn8 domain:

- SE corner : 39.00°N, 5.25°E
- NE corner : 49.57°N, 22.30°E
- central point : 44.60°N, 13.00°E

Main memory on SGI was upgraded to 12288 Mbytes, because of more memory consumption by the new ALADIN version, AL25.

Speed of Internet line increased to 2 Mbytes/sec from 13th of June 2003.

RETIM2000 was installed on 16th of June, from that day comparison between transfer speeds and reliability via RETIM2000 and via Internet were performed.

From 30th of July 2003 12 UTC, operational version of ALADIN is AL25T1_op2.