
# Number 17

## October - December 1999

*This Newsletter presents you the principal events concerning ALADIN during the quarter of year mentioned above. The news about work or events outside Toulouse are related with informations that you sent (for disponibility constraints, the "deported" work deals with the previous quarter).*

*So, reading this Newsletter, you will know everything about ALADIN activities (more precisely everything I was told about) between October and December 1999 (except for the work realized outside Toulouse : between July and September 1999).*

*Please do bring to my notice anything that you would like to be mentioned in the next Newsletter (number 18) before the 15th of April 2000.*

*Any contribution concerning announcements, publications, news from the ALADIN versions on workstations or on big computers, verifications results, ... will be welcome. This deadline is particularly important for the report of the deported work each representative should sent every quarter.*

*If needed, please contact :*

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(from France, replace 33 by 0)

# http://www.cnrm.meteo.fr/aladin/

## Main events



## Conferences/Workshops/Announcements



## Contacts & Informations



## Money Funding asked for some cooperations based on the ALADIN project



## The (pre-) operational ALADIN models

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2. Ilian GOSPODINOV : "Conservation Properties of 2 Time Level semi-Lagrangian"
3. Filip VANA : "The dynamical and physical control of kinetic energy spectra in a NWP spectral semi-Lagrangian model"
4. Mark ZAGAR : "Forecasting of the high resolution wind and precipitations with dynamic adaptation"

## Forecasting of the High Resolution Wind and Precipitations with Dynamic Adaptation

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14. Deported work by Météo-France people

## ALADIN developments in Prague during the forth quarter of 1999

## ALADIN developments in Toulouse during the forth quarter of 1999

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4. Mixed Toulouse-Deported studies
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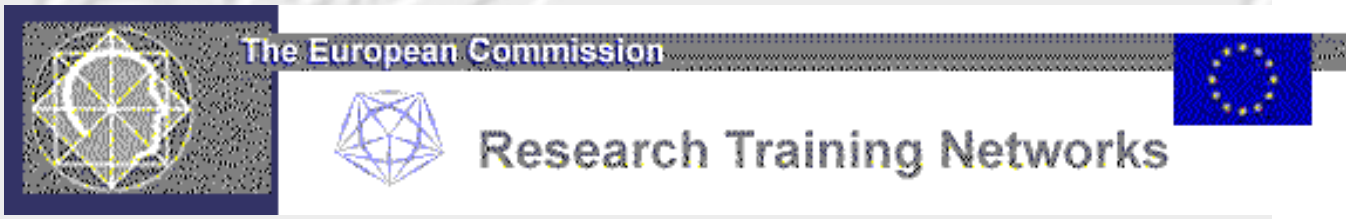
# Main events

1. ***ALATNET***

   Only one main event but it is really a main main main ... event from its future impact on ALADIN in case of definite acceptation (with the new boost ALATNET could give to ALADIN) and ... its current impact on the work of the teams involved in the preparation of the contract with the European Union.




   - **ALATNET** is an acronym for **ALA**din **T**raining **NET** work. Since the 4th of June 1999, it was only a promising application for one of the horizontal programmes of the European Community.
   - Last October, it has been favorably evaluated by the Commission services.
   - Then, paperworks have going on, with exchanges between Brussels and Toulouse.
   - At the beginning of January 2000, we received the final contract prepared by the E.U.
   - This contract was signed by Météo-France's "Contrôleur Financier" on the 1st of February, 2000 and sent back to the E.U. for ultimate signature.
   - After this signature, ALATNET shall enter into force for 48 months from the first day of the month after the last signature of the contracting parties (Météo-France and the E.U.), probably 1st of March 2000.
   - But the payment of the initial advance may be suspended, after the allotted time, until the date of receipt by the E.U. of the Membership Agreement duly signed and dated by all ALATNET Participants (CHMI, IRMB, HIMS, HMS).
   - A Membership Agreement was sent to the ALATNET participants on February 7th, 2000.
   - Once receiving the four membership agreements signed, they will be sent to the E.U.: it will be the last step ...

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2. ***A new ALADIN doctor***

   Mark Zagar is the 6th ALADIN doctor (see "PhD Studies").

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3. ***ALATNET Training Course on High Resolution Modelling***

   ALADIN organizes a training course on High Resolution Modelling from the 15th to the 26th of May 2000 in Radostovice (Czech Republic).

   This seminar was proposed during the last Assembly of ALADIN Partners; the decision of its organization was suspended to both commitments of the ALADIN NMSs about their participation to the Seminar and the signature of ALATNET contract. Both conditions are realized (or will be realized undoubtedly very soon).

As an ALATNET Seminar, it has to be open to countries not members to ALADIN. The European SRNWP-Programme Coordinator announced the ALATNET Seminar to the members of SRNWP Network.

The programme will cover the dynamical as well as the physical aspects of modelling and also their relevance to data assimilation. Participants should be somehow knowledgeable in NWP, but not necessarily in the ALADIN model.

Informations (very few from the time being) are available on our ALADIN Web server ("meetings" or directly : http://www.cnrm.meteo.fr/aladin/meetings/rado.html ).

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**4.** ***Are you a good ALADIN Newsletter reader ?... the solution***

Extract from a guessing game in the Newsletter 16 : "*My first name is a famous cyclone; I share my name with a famous method and its inventor; who am I ? ... (indication : I am an ALADINer).*"

Well, good ALADIN Newsletter readers are not so many ... or the guessing game was not so good. Anyway, solution is : David DVORAK.

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# Conferences / Workshops / Announcements

## *1. 7th ALADIN Workshop : Recent and planned operational exploitation of ALADIN model, hold in Ljubljana on November 17-19, 1999*

During this workshop, it was generally recognized that the use of ALADIN NWP products has increased very much since more and more users have access to the enhanced data (special parameters & products, colorful visualization, etc.) and find better ways to use it in their decision-making process.

Therefore the efforts started to shift from the conventional use of standard forecast charts also towards the final part in the forecastproduction chain.

With the present and foreseen quality of ALADIN we can expect that it will be so even more in the future. An exchange of information and maybe even common undertaking also in these fields within ALADIN community was recognized to be very valuable since it reduces the duplication of efforts (and avoids the employment of NWP human resources in the development of more technical applications).

Many topics were discussed (Visualization, Nowcasting, Verification, Applications, Automatic forecast generation) and concreteactions were decided :

- In order to start the draft inventory of ALADIN NWP applications a questionnaire will be prepared in Slovenia by Dec. 6th.. The questionnaire will be put into circulation in Jan. 2000.
- The way of centralized maintenance ofthe inventory should still be discussed.
- Special session for Automatic forecast generation should have place at the next Workshop, in Brussels.

It was also proposed that besides the usual forecasting themes the above listed topics of discussion should be announced for the next "users'" workshop in order to increase the interest towards the end-users of ALADIN products.

The complete Minutes of the discussions have been sent to each participants and are available on ALADIN Web : http://www.cnrm.meteo.fr/aladin/meetings/meetings.html.

## 2. *Assembly of ALADIN Partners hold in Lisbonn on December 6th, 1999*

The Agenda was presented in the Newsletter 16. Some points have already been completed such as:

- **Approval of the revised 2nd Medium-Term (1999-2001) research plan for ALADIN :**

* Three main topics were focussed: maintenance and improvement of the operational versions, high resolution modelling and data assimilation. For each of these 3 generic targets, the relative importance of themes was established and these were distributed, by priorities, in very/high, medium and long term.

* At the same time, it was stressed what work was completed on those themes during 1999 and the expected work to be done during the year 2000 on: Physics, Dynamics (including coupling) and Data Assimilation.

* The approved medium-term reasearch plan is available on our public ftp.

- **the commitments for the** maintenance :

Stricter rules for participation to the maintenance effort inside the ALADIN partnership were accepted :

* The participation of each ALADIN team to phasing must be at least 1 person once a year. It can be more for the largest teams (more than 4 full-time equivalent persons for instance). The minimum size of a phasing team is 8 persons for a full cycle, less for intermediate cycles if any.

* Only one unexperienced person per phasing team is accepted. This newcomer must of course have some basic knowledge of ALADIN.

* An ordered list of all ALADIN scientists will be elaborated. Persons will be invited following this list in "rotation mode", so that everyone will contribute but not very often.

* Each team will send its own part of the list, mentioning constraints if any, to the Toulouse support team. Otherwise the list of quarterly contributions will be used.

* Phasing is centralized in Toulouse since a very close cooperation between ALADIN and ARPEGE scientists is required for this crucial exercise. The stays are usually 6 weeks long, costs may be supported by Météo-France. Deported validation of cycles are accepted as contributions to phasing exercises exceptionally, for technical options that cannot be validated in Toulouse.

It was also admitted to dedicate 10% of the ALADIN effort on the maintenance. Maintenance includes not only phasing, but also code optimization and cleaning, code documentation and the preparation of databases for the use of all partners.

- **the commitments for** the ALADIN school on high resolution modelling :

In accordance with the decision taken during the Assembly, the Directors of ALADIN NMS were asked to commit on the participation of members of their National Meteorological Service to the ALATNET Seminar on "High Resolution" Modelling : full commitments on the number of students, on the previous knowledge of NWP and ALADIN these will have previously acquired and on their future involvement in the project have been received and the decision to organize the Seminar was taken;

- **the** verification's project : Presently the verification issue is handled in Europe at several levels:

* EWGLAM (with co-ordination of Germany);

* SRNWP (with a focal point by the Netherlands);

* ALADIN,

with no real effect yet. A well running example is the one by WMO on thescores for global modelling, with a decentralized way of functioning. The Assembly decided to endorse the following actions:

(1) the need for each NMS to nominate a contact point dedicated to verification : the e-mail list (verifala @meteo.fr) contains the addresses of the nominated contact points;

(2) start a WMO like, i.e. decentralized, exchange of scores (but using the same definitions and same parameters as in the EWGLAM project);

(3) computation by everyone of scores for its geographical domain using the stations recommended by EWGLAM (with special attention of Morocco, not included in EWGLAM);

(4) scores sent back to all other contact points.

If this first attempt is successful, it will open the way to a broader cooperation, at the European level for the exchange of scores, and towards a better coordination of subjective verification and the collection of typical situations inside the ALADIN partnership.

The Minutes of the Assembly have been sent to all ALADIN Partnersby Mario Almeida andare available on the ALADIN Web : http://www.cnrm.meteo.fr/aladin/meetings/minutesass4.html .

*For additional information please contact: mario.almeida++at++meteo.pt*

## 3. *ALADIN events in 2000*

- An ALADIN school on high resolution modelling will be organized in Radostovice (Czech Republic), 15-26 March 2000. Informations on http://www.cnrm.meteo.fr/aladin/meetings/rado.html
- The 8th ALADIN workshop (ALADIN - Toward High-Resolution Modeling) will be held in Cracow (Poland) on 19-20 June, 2000. The first announcement was made on February 9th and current information about the workshop can be found at: http://www.cyf-kr.edu.pl/IMGW/workshop2000 .
- Belgium will organize then the 9th ALADIN workshop (forecaster meeting) in Brussels on 6-8 November 2000.
- 5th Assembly of ALADIN partners shall take place in Vienna probably on November 24th, 2000 with the crucial question of the MoU renewal on the table.

## 4. *Other events in 2000*

- SRNWP Workshop on Mesoscale Variational Assimilation", UKMO/Bracknell, Monday 8th - Wednesday 10th May 2000
- EWGLAM/SRNWP joined meetings, Météo-France/Toulouse, 9-13th October, 2000 (first informations on http://www.cnrm.meteo.fr/aladin/meetings/ewglam2000/index.html ).
- SRNWP workshop on statistical adaptation, ZAMG/Vienna, 4-6th December 2000.
- A.M.A., Météo-France/Toulouse, November or December 2000.

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ontacts & Informations 


## 1. ALADIN on

These informations

## 2. Public ftp

Some documents (please see the list of the documents in annex)are also available on a public ftp : cnrm-ftp.meteo.fr , under the directory ***/pub-aladin***. Please connect on user anonymous and useyou e-mail address as your password.

You can access to the postcript files on this public ftp also through this web server with : http://www.cnrm.meteo.fr/aladin/contact/ftp.html

## 3. Mailing lists

**The public lists :**

- a general list has been recently updated : aladin++at++meteo.fr. It can be used for exchange of general interest about ALADIN project. It contains address of ALADINers at home.
- the stagmap++at++meteo.fr list contains the list of the ALADIN international Toulouse team : this very variable list (updated at the arrival or the departure of every visitors) permits to contact all visitors in GMAP,
- Sthe AWOC list : awoc++at++meteo.fr , list for Aladin WOrkstation Coordination,
- the list for questions and/or problems encounteredwith ALADIN software : alabobo++at++meteo.fr ,

**More "private lists" :**

- a list with correspondents for operational questions : operala++at++meteo.fr ,
- a list with correspondents for verification questions : verifala++at++meteo.fr , following the 1999 Assembly of ALADIN Partners' recommendations, each country has entrusted one person as the correspondent for the verification project.

## 4. Remote access to Météo-France machines :

At the beginning of March, DINO (i.e. the VPP700 machine) will disappear and will be replace by KAMI (i.e. the VPP5000 machine).

If you have a user on DINO, a user with the same name and password has been created on KAMI. It is up to you to transfer the files from your user on DINO to your user on KAMI. Your "old" DINO scripts or binary files should work on KAMI but ... a few cleaning and recompilation is not forbidden.

In case of problems, do not hesitate to contact Eric Escalière (eric.escaliere++at++meteo.fr ).

### *5. Dino is dead, long live Kami !*

At the beginning of March, DINO (i.e. the VPP700 machine) will disappear and will be replace by KAMI (i.e. the VPP5000 machine).

If you have a user on DINO, a user with the same name and password has been created on KAMI. It is up to you to transfer the files from your user on DINO to your user on KAMI. Your "old" DINO scripts or binary files should work on KAMI but ... a few cleaning and recompilation is not forbidden.

In case of problems, do not hesitate to contact Eric Escalière (eric.escaliere++at++meteo.fr ).

### *6. ALADIN visitors in Toulouse : e-mail addresses*

A change in e-mail addresses for visitors in Toulouse has been introduced; please use :

*firstname.surname++at++cnrm.meteo.fr*

Addresses of Météo-Francepeople remains : firstname.surname++at++meteo.fr.

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# Money Funding asked for some cooperations based on the ALADIN project

### *1. French "Ministère des Affaires Etrangères" support (MAE)*

Money for 1999 support is now available and all of the stays have been planned : first ones have already begun, last ones will end in June.

The requests for 2000 support have been sent to the Ministery.

More details can be asked to Arlette Rigaud (arlette.rigaud++at++meteo.fr ).

### *2. Bilateral supporting grants*

Balaton, Barrande, Proteus are bilateral programs who can support short visits in both sides. The countries involved in these programs can easily be guessed considering the programs names. The French fundings are used to pay the per-diem (in France) of the visitors and to pay the travel of French people to your NMS, and vice-versa.

The reports of 1999 actions and the 2000 renewal demands have already been sent for these programmes (depending of the deadline for each of them). The request for new demands (2001) should be prepared in spring.

The Balaton and Barrande demands have been accepted and the exchanges realized on these supports partly planned.

More details can be asked to Dominique Giard (dominique.giard++at++meteofr ).

### *3. Météo-France support for maintenance*

The amount of Météo-France support for 2000 will be similar to the 1999 one. It will be dedicated to phasing and cleaning : one phasing will take place from mid-March to end of April, mainly for OBD; another phasing will be organized this automn after EWGLAM meeting.

### *4. ALATNET funding ?*

See "Main events".

# The (pre-) operational ALADIN models

**It is always very difficult to obtain contributions about the operational versions. The above tables below try to summarise the status of all these versions. Please do protest in case of mistakes et do send me ... a report or, at least, just the changes introduced since this status was prepared...**

1. **Status report of the operational ALADIN versions**

   See updated informations on this web server at : http://www.cnrm.meteo.fr/aladin/oper/oper.html .

2. **AWOC :** More workstation friendly ALADIN\2 code

*more details* jure.jerrman++at++rzs-hm.si *)*

   Last news in Newsletter16.

3. **Workstation version at Austrian Meteorological Service**
   *(more details yong.wang++at++zamg.ac.at)*

   Last news in Newsletter16..

4. **The operational implementation of ALADIN-Belgium**
   *(more details luc.gerard++at++oma.be)*

   Last news in Newsletter16.

5. **Workstation version at Bulgarian Meteorological Service**
   *(more details valery.spiridonov++at++meteo.bg or andrey.bogatchev++at++meteo.bg)*

   Last news in Newsletter16.

## 6. Operational ALADIN-FRANCE in Météo-France

*(more details samuel.westrelin++at++meteo.fr)*

See article "A review of the main changes in ALADIN along 1999 and their impact on forecasts" in this Newsletter.

## 7. Workstation version at French Meteorological Service

*(more details jean-marc.audoin++at++meteo.fr)*

The intermediate cycle AL11T2 and a new version of the GRIBEX package were installed and validated on the SUN workstation.

## 8. Workstation version at Hungarian Meteorological Service

*(more details horanyi++at++met.hu)*

- The main event during the last quarter of 1999 was the installation and the operational implementation of the AL11t1 version of the ALADIN code. The operational switch took place at the beginning of November. At the same time the operational application of the CANARI diag.pack scheme was also upgraded using the last tuned version of it with 1 hour execution frequency. Recently the setting of the diag.pack scheme is as follows (starting at 12 minutes after every hour):
- Preparation of special ASCII files for Mandalay from the SYNOP observations;
- Execution of Mandalay, which creates the binary input file for the CANARI scheme;
- Execution of the CANARI diag.pack scheme;
- FULL-POS for post-processing;
- Creation of netcdf files, needed for the nowcasting applications based on the CANARI scheme.

As it can be seen basically the diag.pack scheme is used for nowcasting purposes having the analyses near to the observations. The outputs of diag.pack are especially used for the early recognition of convective phenomena with the tracing of such derived quantities as convective available potential energy or moisture convergence. The first experiences of the upgraded scheme are very positive, also some case studies were carried out showing the potential of the scheme.

At the very end of the year an upgrade of the SGI Origin2000 machine was performed, now there are 12 processors available in the machine making the exploitation of the ALADIN/HU model even quicker (the execution time is around 1 hour for 48 hours forecasts).

## 9. Operational ALADIN-LACE in CHMI

*(more details can be asked to Project Leader or Prague Team Leader)*

# 1. Evolution of the ALADIN/LACE application.

The ALADIN/LACE application followed the evolution of ARPEGE application and switched to the CYCORA set of modifications on:

**30/11/1999 for 12 UTC network time (CYCORA fix on the cycle AL11/CY21T1.op1/XR19)**

CYCORA modifications were before tested in parallel suites, the first one using ARPEGE/CYCORA double suite for providing the lateral boundary conditions (LBC), the second one using ARPEGE operational LBC. A positive impact was observed when ALADIN/CYCORA was coupled with ARPEGE/CYCORA (we saw there a beneficial impact when the coupling model got improved). The switching on CYCORA in ALADIN/LACE had a neutral impact on the scores. Since the test was done in winter season and the domain of LACE is rather continental (little chance for Atlantic storm cyclogenesis), we may see the impact of CYCORA still in summer season, like a

work on some isolated case studies (Flood'97 case, July'98 storm case) already suggests.

### 2. Parallel Suites

- The Prague Team launched the following parallel tests to assess the impact of different modifications:
- Pre-operational test of CYCORA (names aan, aao, aap, aaq), as explained above.
- EUCOS (name aap) suite, testing the impact of coarser radio-sounding observations on ALADIN/LACE via the coupling with ARPEGE/EUCOS double suite. The impact of reduction of observations on the scores is clearly negative in the most of characteristics.
- HUCOE/HUTIL suite, modifying the parameterization of clouds. Theimpact has not been evaluated yet.
- 41 Levels suite, testing the impact of higher vertical resolution (anticipation of ARPEGE 41L configuration). The suite has started just before Christmas and it still continues.

The scores may be consulted on www.chmi.cz/meteo/ov/lace/aladn/partests pages.

Research & Development

## 10. Operational ALADIN-MAROC in MAROC-Météo

*(more details mehdi.elabed++at++meteo.ma)*

Last news in Newsletter16.

## 11. Workstation version at Polish Meteorological Service

*(more details zijerczy++at++cyf-kr.edu.pl )*

Last news in Newsletter16.

## 12. Workstation version at the Portuguese Meteorological Service

*(more details* mario.almeida++at++meteo.pt *)*

Last news in Newsletter16.

## 13. Workstation version at the Romanian Meteorological Service)

*(more details cordoneanu++at++meteo.inmh.ro)*

Last news in Newsletter16.

## 14.Workstation version at Slovak Meteorological Service

*(more details olda.spaniel++at++mail.shmu.sk )*

Last news in Newsletter16.

## 15.Workstation version at Slovenian Meteorological Service

*(more details jure.jerman++at++rzs-hm.si )*

Last news in Newsletter16 .

# "Réseau Formation Recherche": PhD Studies

The former RFR support no longer exists but PhD studies go on in Toulouse or at home ...

- **Doina BANCIU : "Specific small scale diabatic forcing in ALADIN at the limit of the hydrostatic assumption" :**

Report in Newsletter 16.

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- **Ilian GOSPODINOV : "Conservation Properties of 2 Time Level semi-Lagrangian" :**

Research activities with the 3D model: The uniformly accelerating motion scheme for the 3D model is under development. The application on the horizontal is automatic. The challenge is on the vertical. The vertical motion in a hydrostatic model is restricted by the hydrostatic assumption. We try to use this limitation in order to construct an explicit estimate of the vertical acceleration in the environment of a hydrostatic model with a hybrid vertical coordinate.

Research activities with the 1D model: The study of the second order accuracy of the SL schemes for the treatment of the non-linear residual has been finalized. The conclusion is that this part of the 2TLSL method is more flexible but also less important for the quality of the entire SL scheme. The predictor-corrector method has been compared with the other 2TLSL techniques. The conclusion is that the method, in its trajectory part, is equivalent to the uniformly accelerating motion scheme and is only slightly better in terms of overall performance.

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- **Filip VANA : "The dynamical and physical control of kinetic energy spectra in a NWP spectral semi-Lagrangian model"**

Report in Newsletter 16.

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- **Mark ZAGAR : "Forecasting of the high resolution wind and precipitations with dynamic adaptation "**

Mark is no longer a PhD student since he defended with succes his "cotutelle" PhD on January 25th, 2000, in Lujbljana (SLO). Thus Mark is now a French Doctor (from Université Paul Sabatier in Toulouse) and a Sloven Doctor (from University of Ljubljana).

30 people, including the 9 members of the jury attended to this successful defense : the speech (15 minutes in French and 35 minutes in Sloven) was followed by one hour of questions; the mention was "très honorable avec félicitations" for the French University (even without any knowledge of French, that's sound very good ... and, in fact, it is).

A glimpse of his PhD work.

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**Mark ZAGAR defended his thesis**

## Forecasting of the High Resolution Wind and Precipitationswith Dynamic Adaptation

**in Ljubljana on 25th of January 2000**

*mark.zagar++at++rzs-hm.si*

# Abstract

The method of dynamic adaptation for forecasting the wind and precipitations is described. The results of its application in an interesting weather situation are presented. It is particularly usable when intense precipitations are the consequence of the orographically forced ascent. Vertical motion at high resolution is obtained by a short integration of the model (ALADIN), after an interpolation of the fields of a lower resolution model onto a finer mesh, with better description of the relief. As precipitations are directly dependent to the vertical velocities, a knowledge of these makes possible the diagnosis of the intensities which is made in this work in 3 different ways: statistically, by adiabatic adjustment and 1D model.

# Method

The method of adaptation dynamic for forecasts of the wind and precipitations is a particular approach, where a numerical method is adapted to describe some small scale phenomena, disregarding the general description of the problem. It is conceptually rather close to the dynamic initialization of the digital model. The method consists initially of an interpolation of the solution of a driving model, sometimes global one, on the mesh of the adaptational model. The number of the vertical levels is reduced. A maximum of 30 minutes integration (see &#14;agar and Rakovec, 1999 for all the details about the estimation of the temporal scale of dynamic adaptation) is then applied, during which the fields adapt to the new representation of orography. The diabatic part of physics in the model for the adaptation can be omitted to accelerate calculation. The fundamental and essential assumption for a dynamic adaptation of the wind is that the wind at the surface is dependent on synoptic forcing. In the Fig. 1 the result of dynamic adaptation of the wind at the resolution 2.5 km is presented.

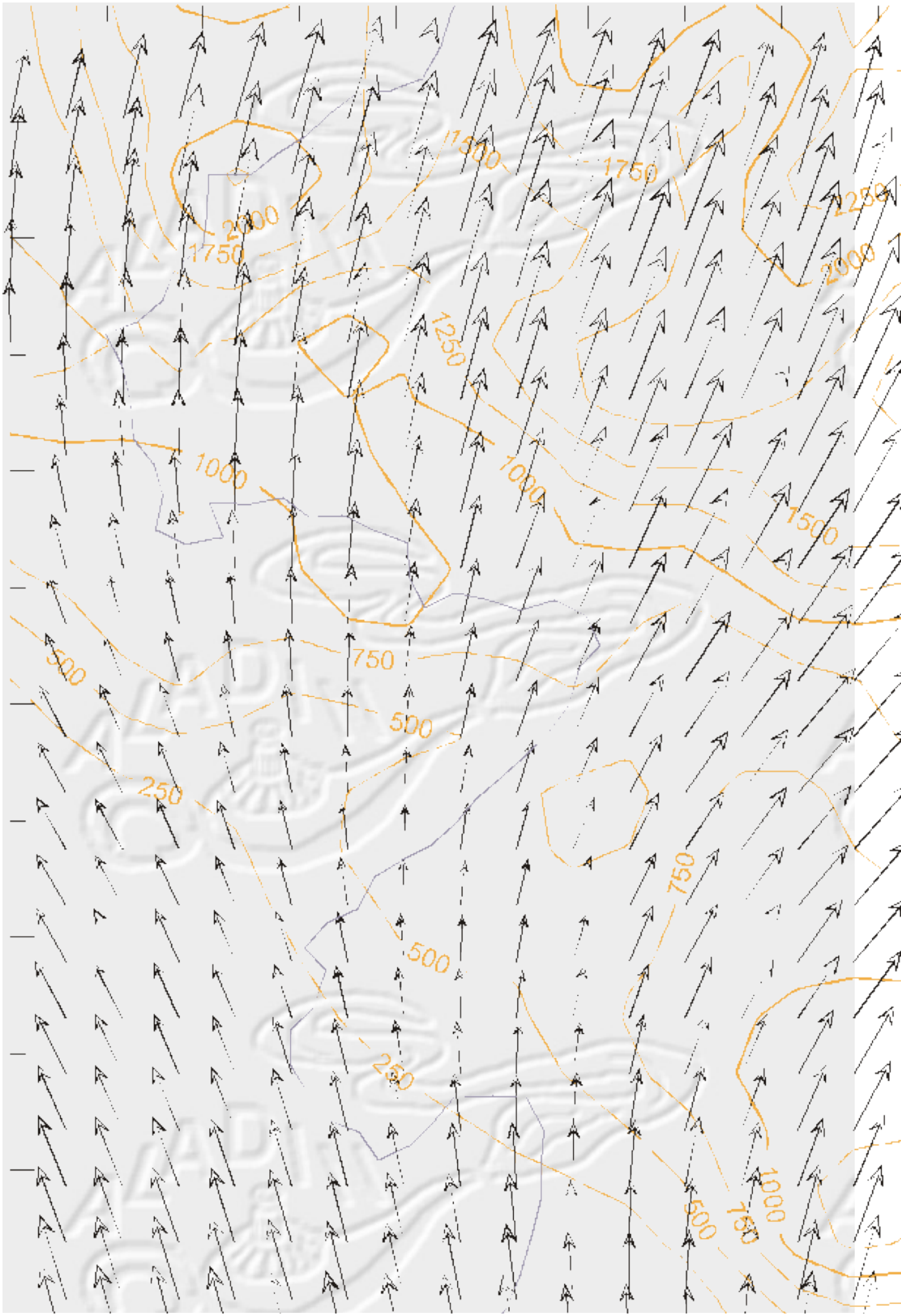
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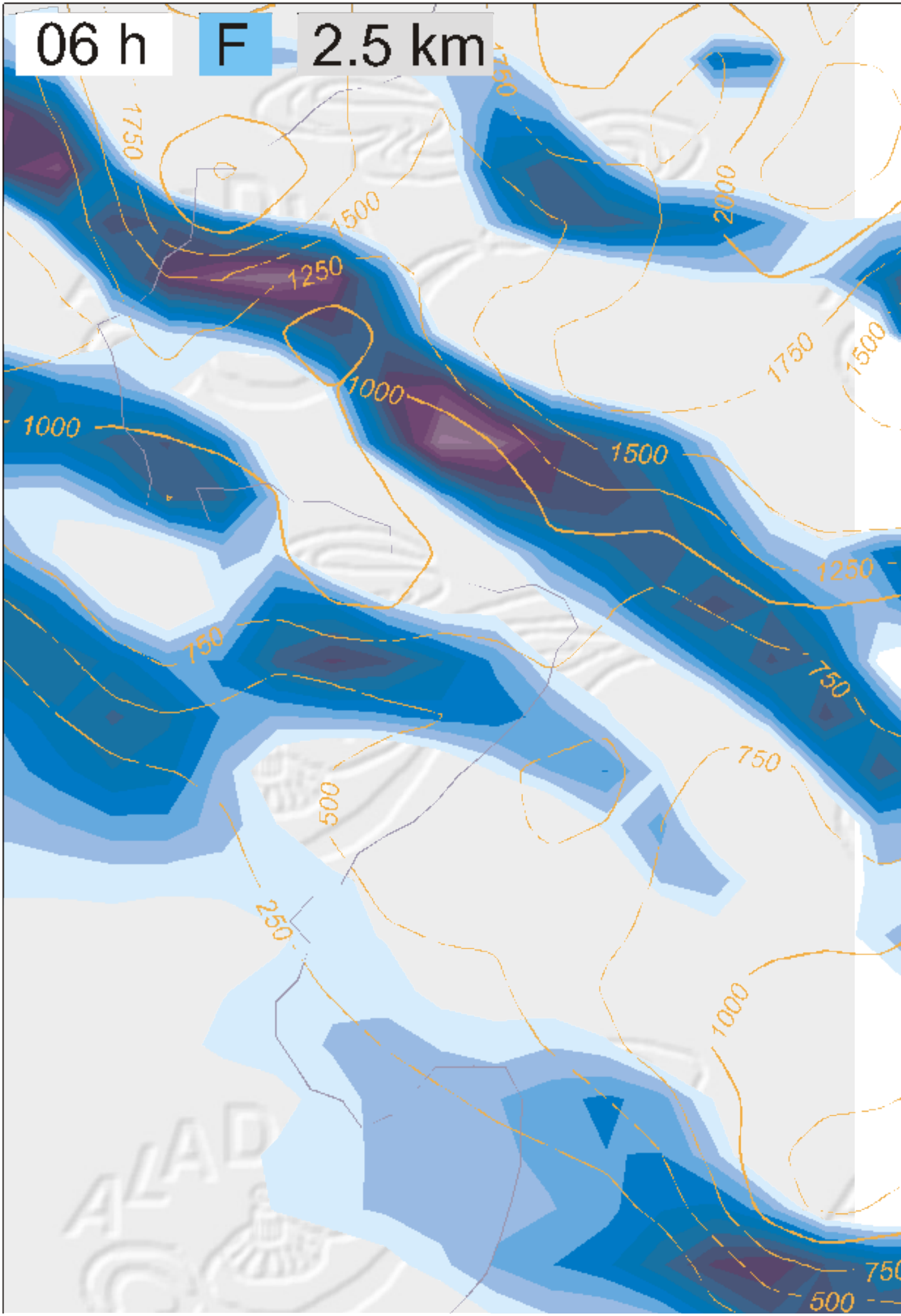
Figure 1: November 7, 1997, 6 UTC, 10 m wind in the mountainous area over western Slovenia, forecast by operational model ALADIN/SI (resolution 11.2 km), interpolated in a grid of 2.5 km (left) and the forecast obtained by dynamic adaptation (right). Note the maximum wind arrow. The relief is also traced.

In a hydrostatic model, vertical velocity is a diagnostic consequence of the modeling of the horizontal wind. The vertical velocity is employed like one of the two key variables for the forecast of precipitations, which result from orographically forced ascent. The second variable is the absolute humidity, provided by the driving model (low resolution). On the fig. 2 one can see how vertical velocity adapts to a detailed description of the relief.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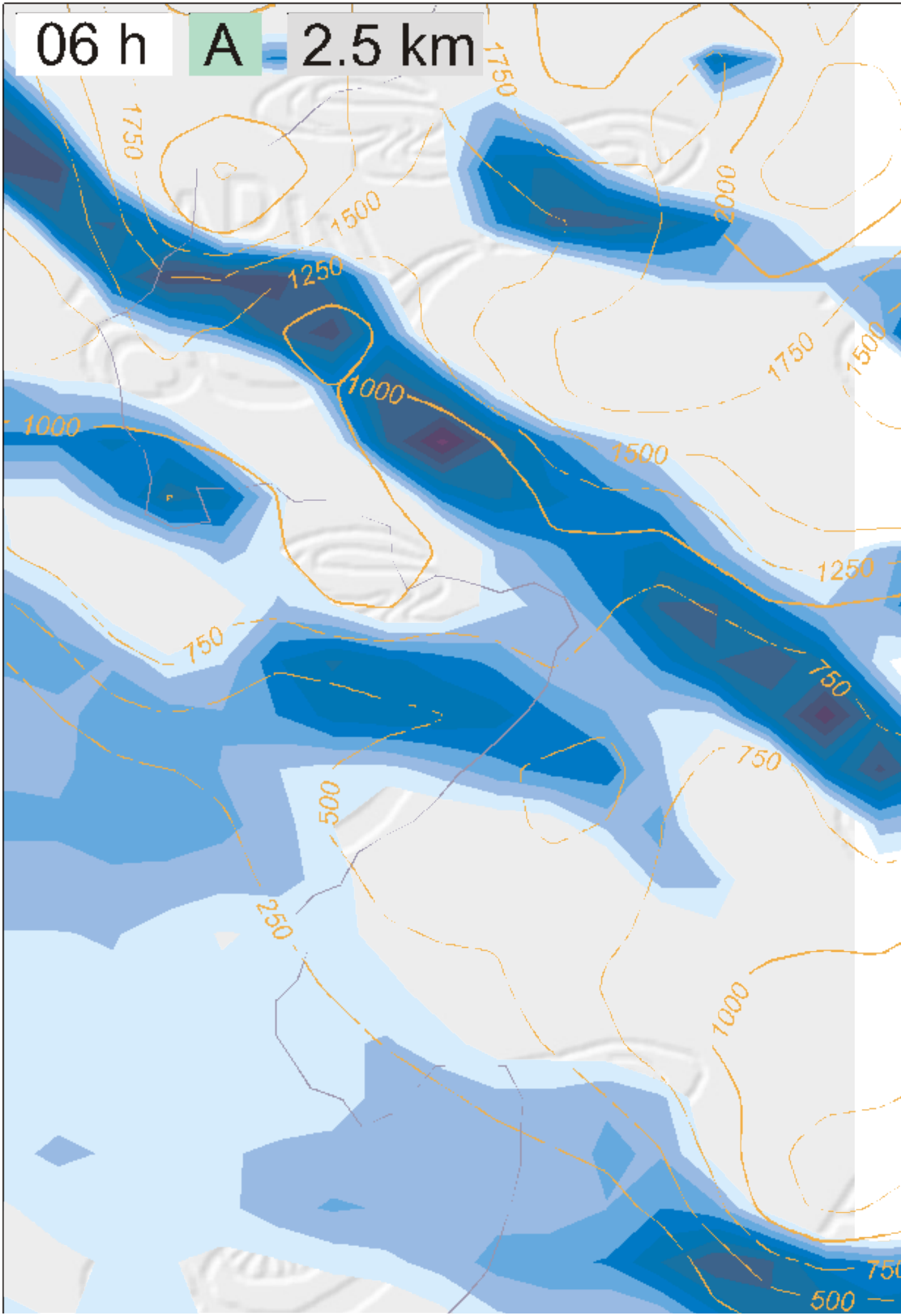
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750
500

Figure 2: November 7, 1997, 6 UTC, vertical velocity at the 20th level (approximately 1400 m above the ground), forecast by a 6h integration of the complete model at resolution 2.5 km (left), and obtained by 30 minutes of dynamic adaptation from the initial state, in which the atmospheric fields arethose of the left-hand-side of fig. 1 (right). The relief is also traced.

We employ three approaches of the diagnosis of precipitations from the field of adapted vertical velocities:

- **Statistically** (an idea of R. Bénoît, 1998, personal communication) bysupposing the uniform relation between the vertical velocity and the intensity of precipitations (on a limited domain). In the formula $RR_{LS} = a \cdot \Phi_{mLS}$, which connects the intensity of precipitations to the vertical velocities, coefficient *a* is obtained by the linear regression, as it is obvious in fig. 3. Index " LS " specifies that this relation is obtained on the large scale (in the driving model) and the mass flux is an integral value through the layer of formation of precipitations. Once *a* is determined, it is used to diagnose the intensity of the precipitations, caused by adapted vertical velocities: $RR_{HR} = a \cdot \Phi_{mHR}$, where "HR" means "high-resolution".

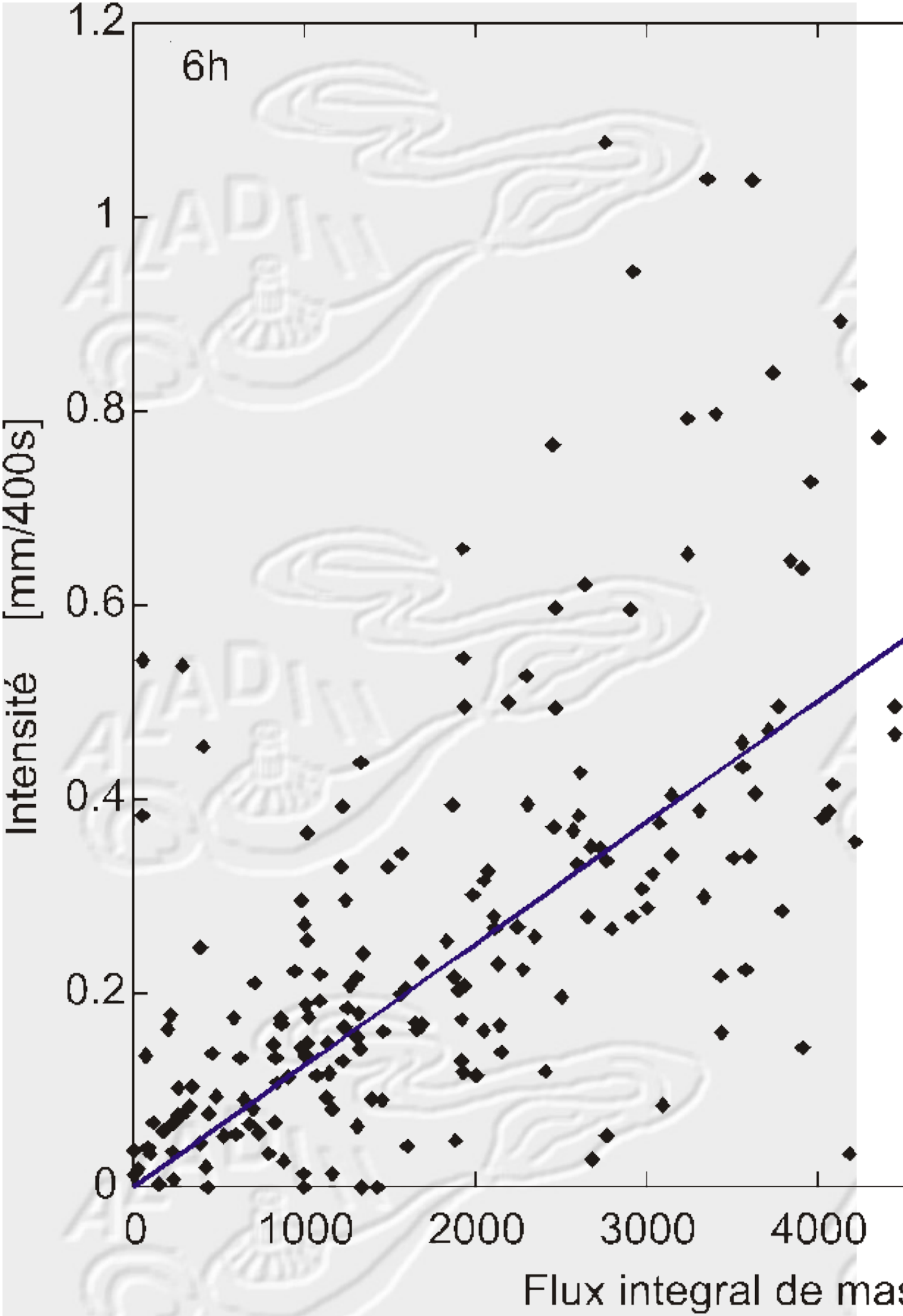

6h
1.2
1
0.8
0.6
0.4
0.2
0
Intensité [mm/400s]
0
1000
2000
3000
4000
Flux integral de mas

Figure 3: The relation between the intensity of precipitations and the vertical ascent in the driving model.

- **Adiabatic adjustement** of moisture and temperature profile. Precipitations are calculated directly from the thermodynamic parameters of the air mass and dynamically adapted vertical velocities: $RR = -\frac{c_p}{L_{av}} \int_{z_b}^{z_t} w(z)\rho(z)(\gamma_a - \gamma_s)dz$. Here $z_b$ and $z_t$ represent the base and the top of the cloud, $\gamma_a$ is the dry adiabatic vertical gradient of the temperature and $\gamma_s$ is the vertical course of the temperature in the ascending, saturated air.
- **One-dimensional model**, forced by the dynamically adapted fields. It is good to find a way, faster and easier than to turn 720 times the one-dimensional model (to cover a field of 24x30 points, that is to say 60x75 km). It is possible, in the three-dimensional model, to exclude the influence from the advection and the numerical diffusion, for thus insulating the best possible each point. That returns almost to placing a one-dimensional model, almost independent, at each point of the model grid. The time necessary of the integration of the one-dimensional model must be found as well. In the case of the dynamic adaptation, this time was chosen to allow the balance of the dynamic fields. Now, it is the intensity of precipitations which interests us and the complete model must be run from the dynamically adapted state by the adiabatic model, until the moment when the flow of precipitations is stabilized. It was found that the consequences of the initial dissension between the dynamic and thermodynamic fields disappear after only three minutes. Such a short integration is thus sufficient so that the field of intensity of precipitations can be regarded as a stable result of dynamically adapted vertical velocities.

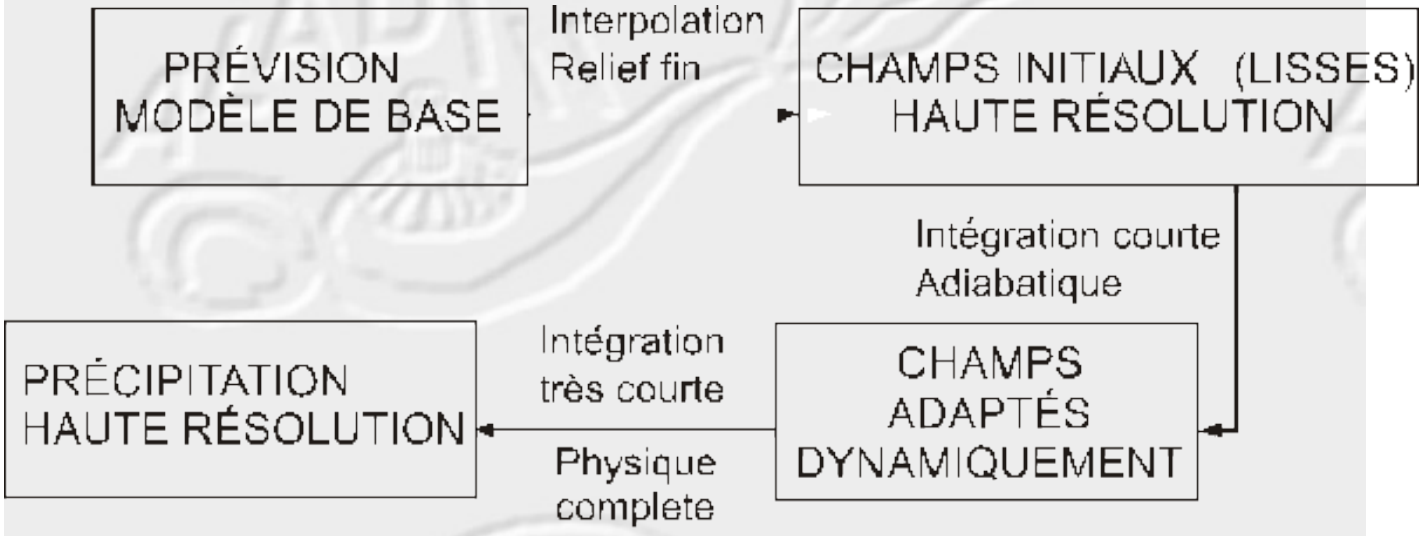
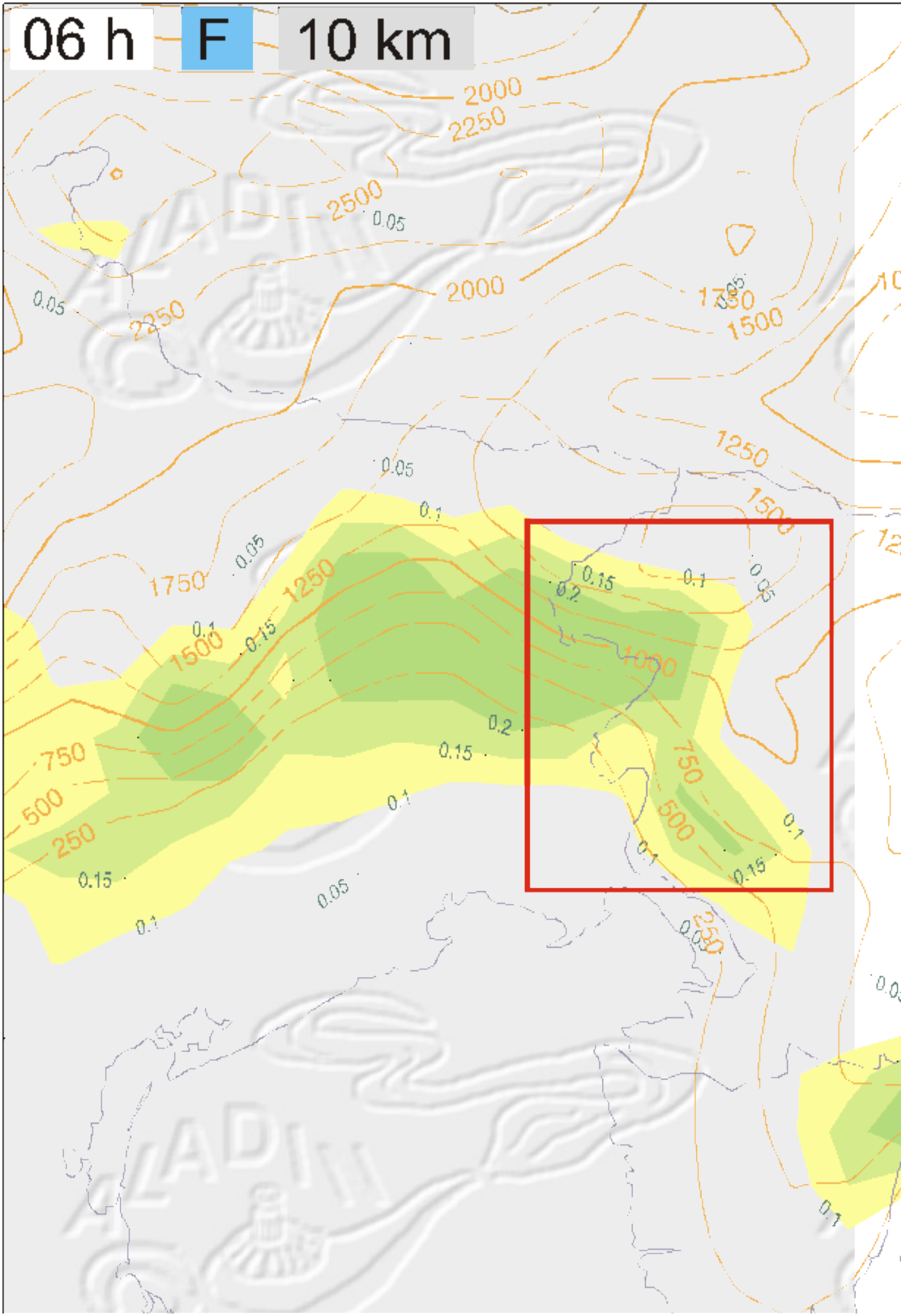



Figure 4: Individual phases of the dynamic adaptation of the wind and vertical speed in order to feed the one-dimensional model.

# Results

For verifications, observations on a mesh much denser than the current one are necessary. Apart of the

means like the radar and the satellite, observations of precipitations at the resolution 2.5 km will not be available before a long time. Thus, and to answer to the aim of this research, which is to approach a as much as possible to the high resolution model by simple means and of moderate cost, the only suitable evaluations of all the methods are those compared to the model of reference, and those of the methods between them. Let us recall that the model of reference is turned in operational mode with complete physics and at high resolution. On figures 5 and 6 one can compare the results of the described methods of the diagnosis of the intensity of precipitations with the model at low resolution and with the model of reference.


06 h
F
10 km
2000
2250
2500
0.05
1750
1500
1250
0.1
0.15
0.2
1000
750
500
250

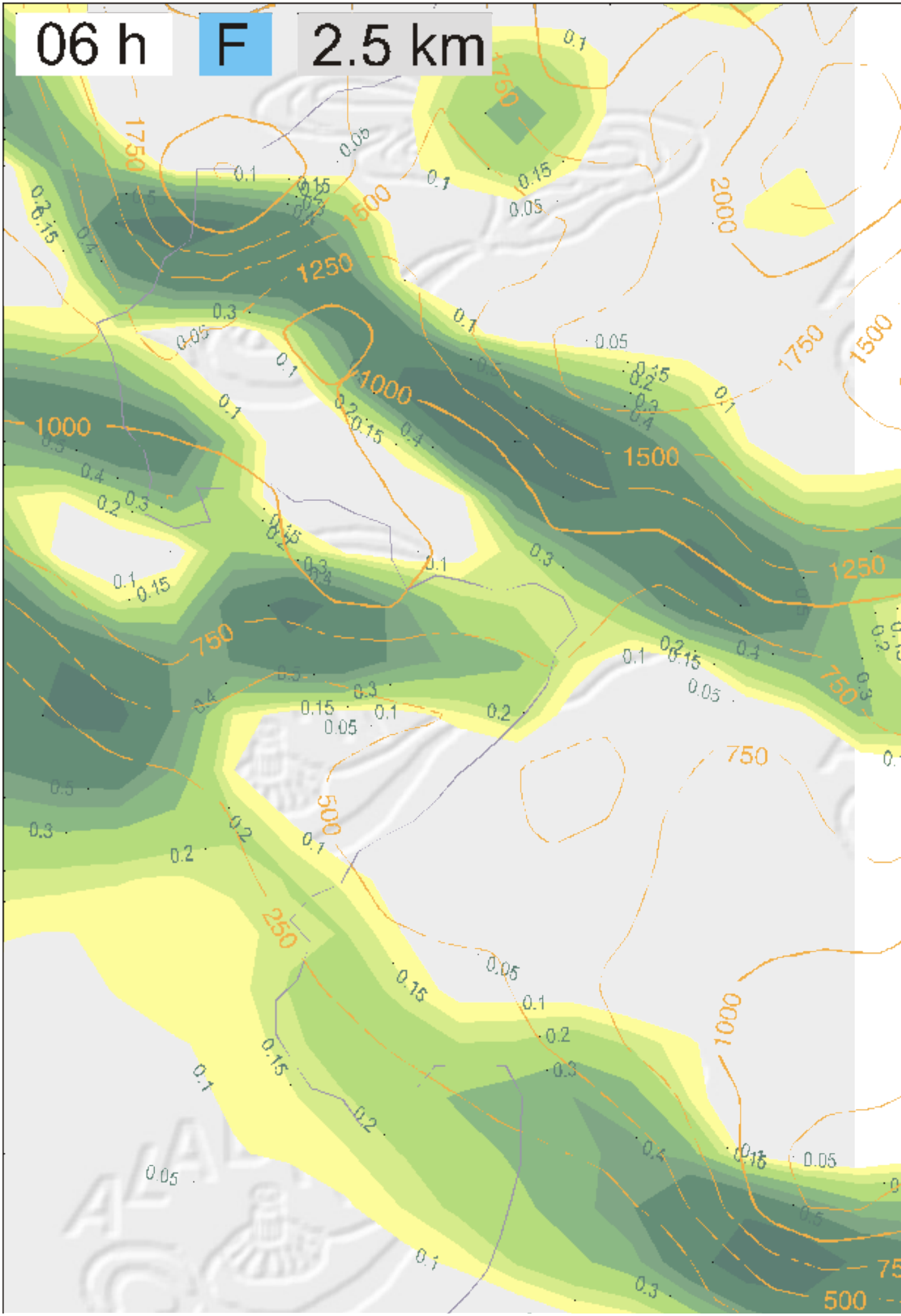
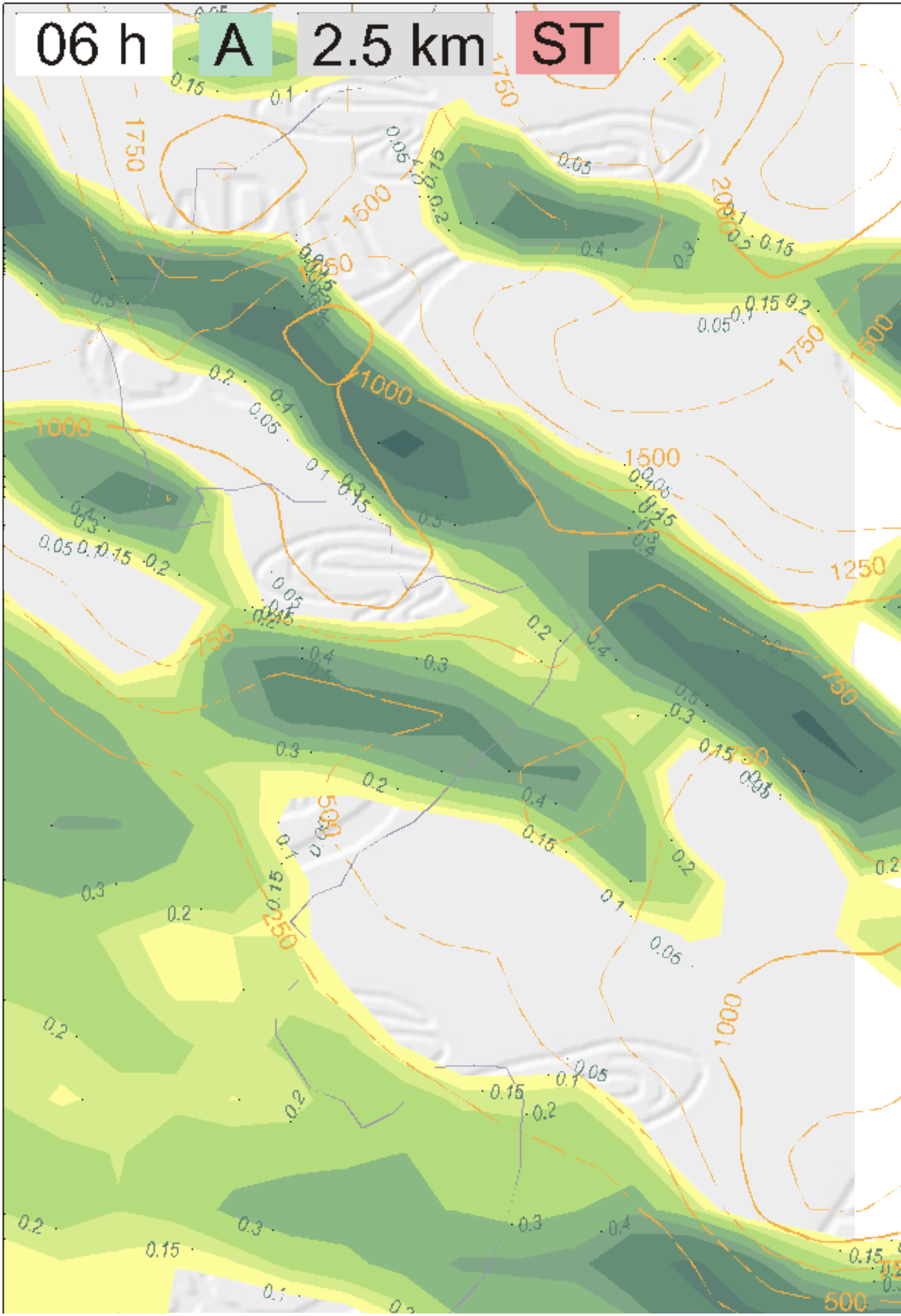

06 h
F
2.5 km

Figure 5: November 7, 1997, 6 UTC, intensity of precipitations, forecast by driving model (operational ALADIN/SI at resolution 11.2 km) (left), and by a 6h integration of the complete model (of reference) at resolution 2.5 km (right). The relief is also traced.


06 h
A
2.5 km
ST

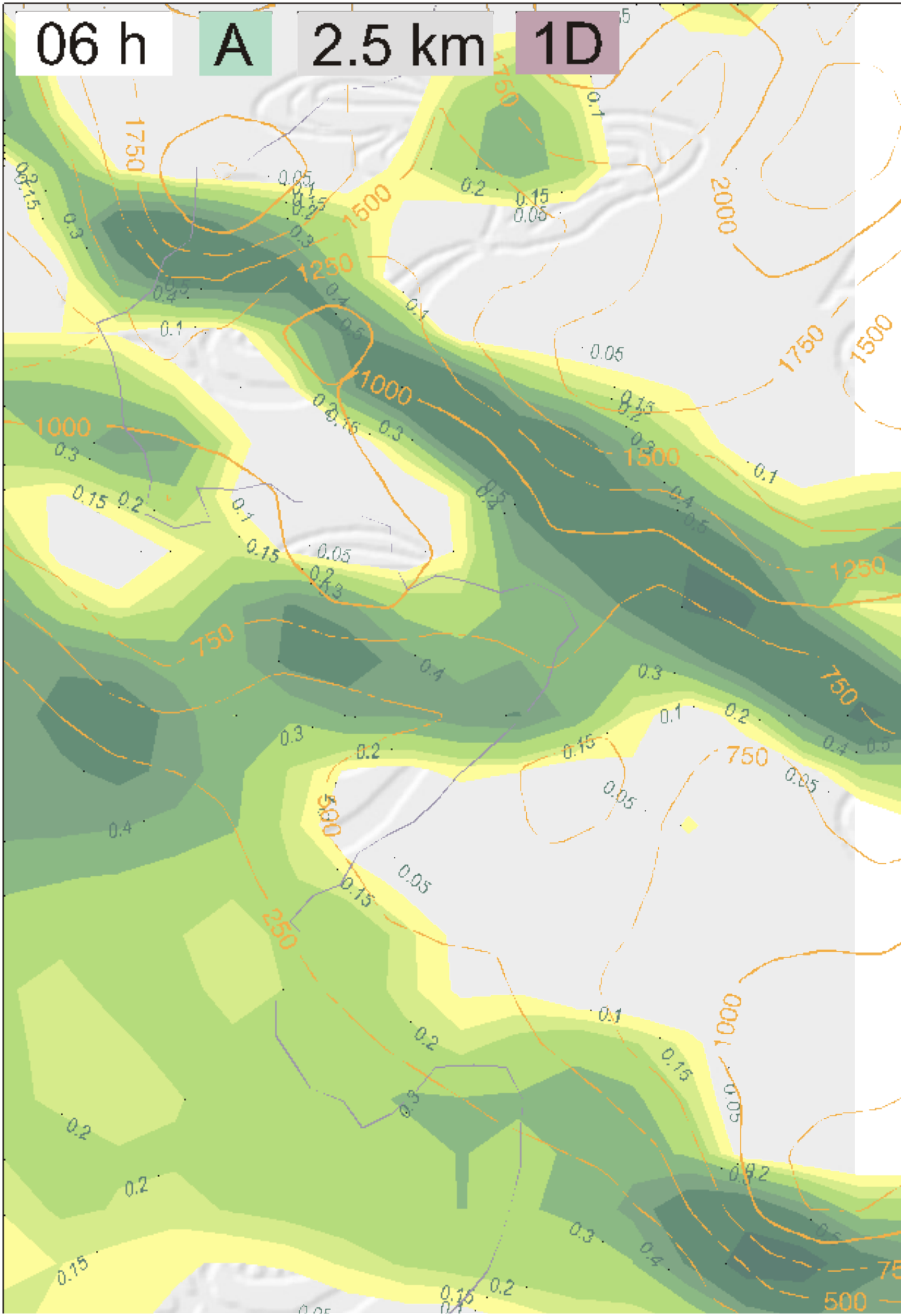

06 h
A
2.5 km
1D

Figure 6: November 7, 1997, 6 UTC, intensity of precipitations, forecast by statistical method (left), and with the quasi-onedimensional model (right). The relief is also traced.

The method by adiabatic adjustment gives also comparable results.

# Acknowledgments

A considerable part of the work for this research was carried out at Météo France, CNRM/GMAP.

# References

Zagar, M. et J. Rakovec, 1999: Small-Scale Surface Wind Prediction using Dynamic Adaptation. *Tellus*, **51A** , 489--504.

# CAST BY HRID and ALADIN/LACE

*(more details:* glasnovic++at++cirus.dhz.hr, picek++at++cirus.dhz.hr*)*

## *1. Introduction*

MAP SOP (Mesoscale Alpine Programme - Special Observing Period) from 7 September to 15 November 1999 was divided on numbers IOP-s (Intensive Observation Periods). For the eastern part of Alps one the most interesting period is IOP5 (2 October, 06 UTC - 5 October, 06 UTC), particularly 4 October when intensive precipitation was observed. The synoptic situation was characterized by a deep trough through the whole troposphere. Its axis was tilted in SW-NE direction and strong SW winds prevailed over the middle and eastern part of the Alps. In the night from 3 - 4 October the cold front reached the MAP target area. Orographic enhanced convection was observed in relation with warm and moist air at low levels from the Adriatic Sea ahead of a relatively slow moving cold front. The process was also connected with cyclogenetical processes over the northern Italy and Adriatic Sea. On 5 October a new upper vorticity advection, crossing the alpine area, reactivated the cyclone over the Adriatic, and established northerly flow over the MAP area. Over Slovenia and Croatia the southerly moist and warm flow, connected with complex orography, enhanced the convective processes. The strongest processes took place during the 4 October morning hours. The mesoscale precipitation system from its early stage of intense and very narrow convective line developed to its later stage of widespread stratiform precipitation.

The 24-hours precipitation measured at 06 UTC on 5 October in some regions exceeded 100 mm. The largest amount of precipitation was 241 mm, measured at the station Soca in Slovenia. The second maxima

can be found over western Croatia with maximum of precipitation in Slunj region (122 mm). It is noteworthy to mention that the extremes of rain amounts happened in the morning hours on 4 October (between 06 UTC and 12 UTC). At many stations the total amount of precipitation measured during that case was larger than the average monthly amount.

## *2. ALADIN/LACE forecasts, postprocessing and verification by HRID*

ALADIN/LACE correctly forecast this intense precipitation event. The 6-hourly precipitation produced by the model for 12 UTC, shown in Fig. 1, gives the evidence of the model good performance. Previous model run from 3 October, 00 UTC shows the similar precipitation distribution, but less in amounts. The region of maximal precipitation is well forecasted and also agrees very well with the observation.

During the whole IOP5 enhanced 6-hourly (Zagreb 3-hourly) radiosonde network was establish. Fig. 2 shows a time-height cross-sections of relative humidity, temperature, equipotential temperature, specific humidity, horizontal wind, Montgomery potential and static energy from the model for Zagreb and analysis of vertical structure of the atmosphere in the same time period based on the radiosounding measurements. The model has captured the whole process of time and space variations very well. The front is well indicated by the isopleths of equipotential temperature that steeply lift up and also in the wind field. In the late afternoon on 4 October humidity content in the middle troposphere has rapidly decreased following the passage of a cold front. This process is a little late in the model forecast.

The enhancement of the frequency of radiosonde ascents in Zagreb during IOP5 and the availability of the 3-hourly radiosonde measurements gave us an exceptional opportunity to get more information on the capability of the ALADIN/LACE model to predict quite locally the vertical atmospheric structure and its time changes. The verification against observation was done here by intercomparison of the HRID vertical time cross-sections produced on the basis of both the ALADIN/LACE pseudoTEMPs and TEMP messages at every 3-hour.

An obvious similarity between analyses and prognostic time cross-sections can be recognized by their comparison in Fig.2. From the forecasters point of view the intensity, local development and lifetime of considered atmospheric system was successfully predicted. There are some differences in the wind structure and a certain delay in establishing the moist processes in the upper and middle troposphere, but they didn't have any special meaning in creating local forecast for Zagreb. In conclusion, when evaluating considered ALADIN/LACE forecast we must keep in mind that it was the forecast of an extraordinary event.

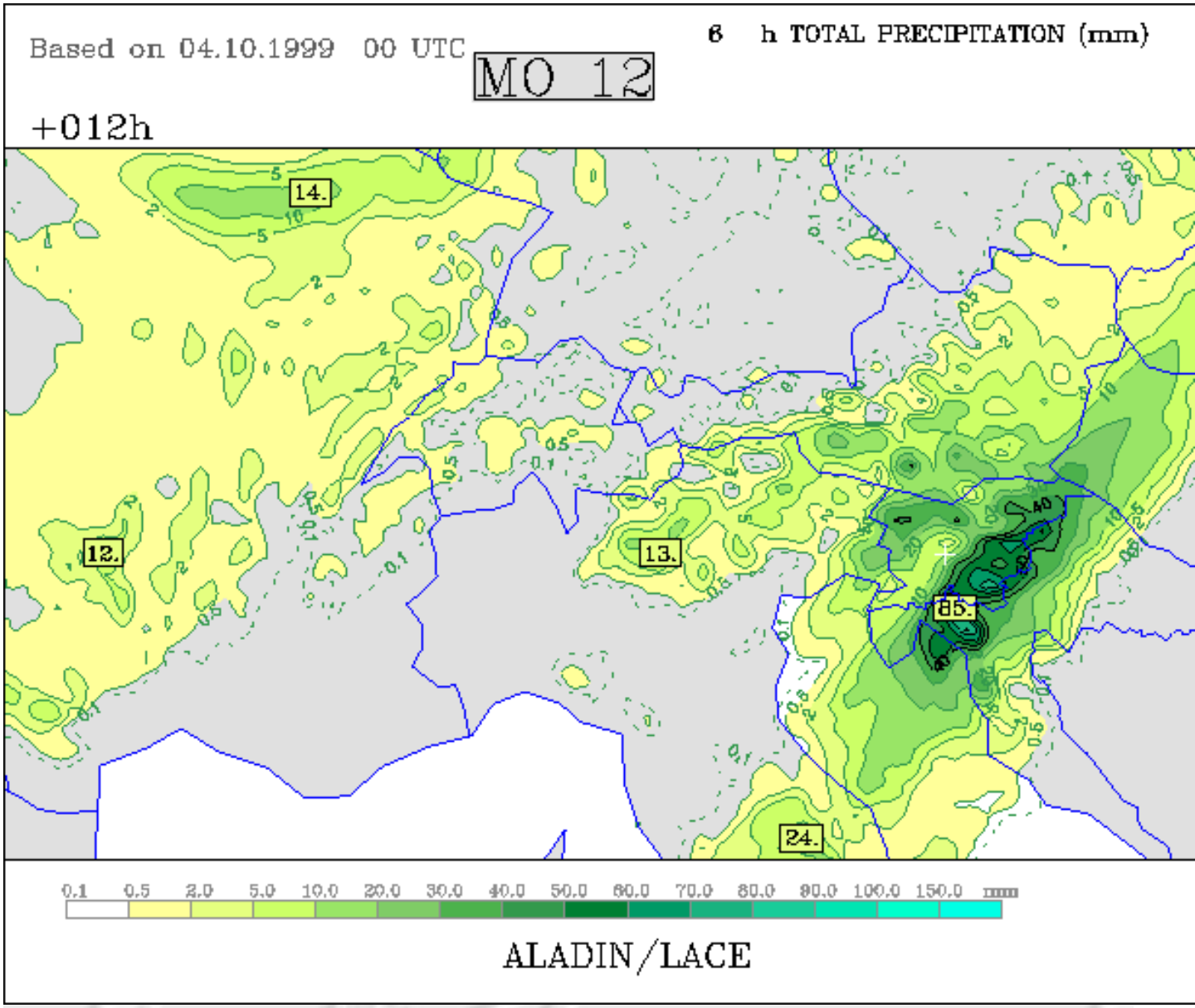



***Fig. 1*:** ALADIN/LACE accumulated precipitation, 4 October 1999 00 UTC +12 hours.

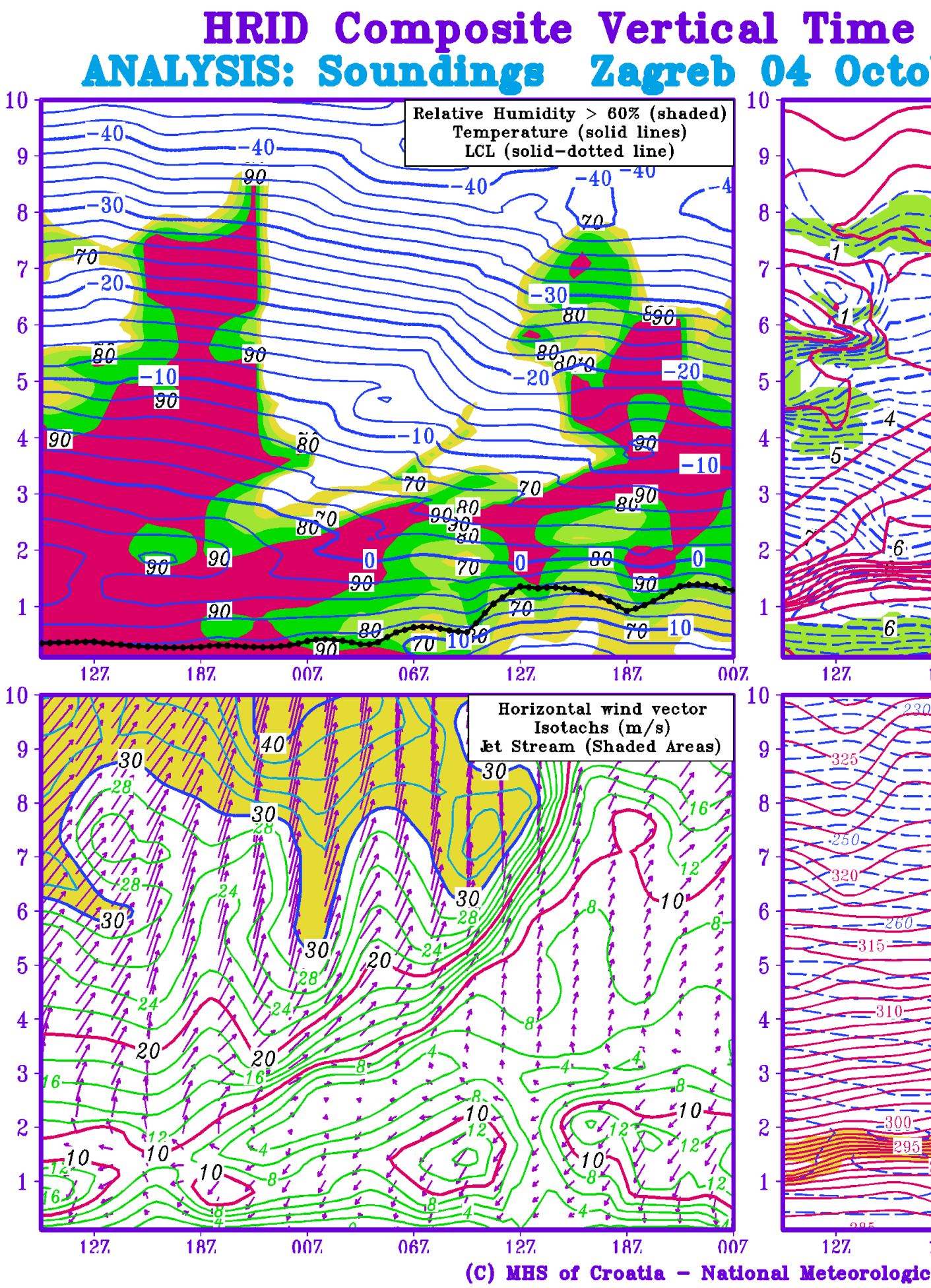
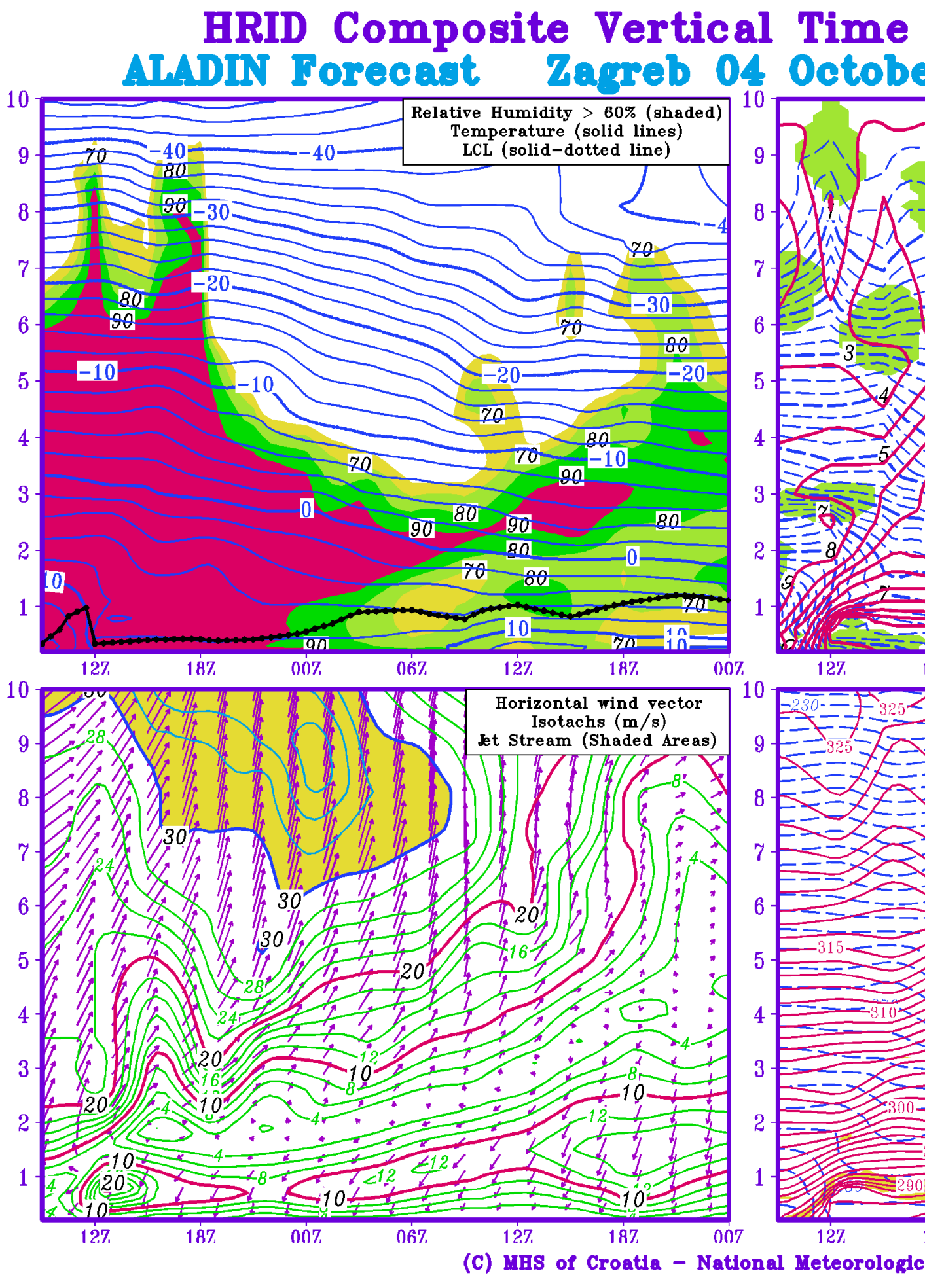



***Fig. 2:*** *Composite vertical cross-sections for Zagreb 4 October 1999, 09 UTC + 39; analysis (above)* and *ALADIN/LACE*

*forecast (below)*



# A review of the main changes in ALADIN along 1999 and their impact on forecasts.

*(more details : samuel.westrelin @ meteo.fr)*

## *1. Soil water freezing parameterization in ISBA*

(Interaction between Soil,Biosphere and Atmosphere)

The land surface scheme ISBA has been modified by Giard and Bazile and implemented in ARPEGE and ALADIN on March 1998. A one layer soil water freezing had been implemented to solve the cold bias over frozen areas and to parameterize the impact of the freeze-thaw cycles on the thermal and hydrological characteristics of the soil. It successfully solved these problems but two deficiencies appeared : it is time step dependent and it prevents the increase of the surface temperature during the thawing period (figure 1, dotted line compared to full line).

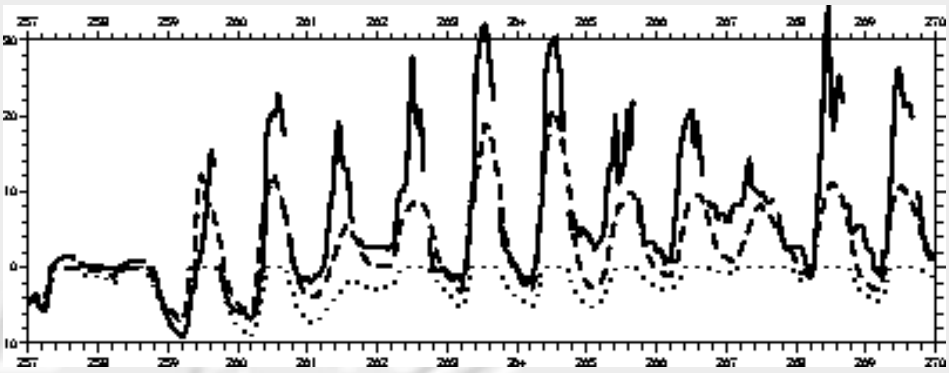


*Figure 1 : Col de Porte (1D model). Surface temperature during the thawing period (1999/04/13 to 1996/04/26). Full line: measured infrared temperature ; dotted line : ISBA with one layer freezing ; dashed line : ISBA with two layers.*

As a solution a characteristic time and a superficial reservoir for frozen water (figure 1) have been introduced. The objective scores are presented on figure 2 over North America, where freezing is still effective on May, date at which the parameterization became operational. This modification was introduced quite late to allow the reservoirs to be in equilibrium for the next winter over Europe. New background error statistics for variational analysis and some modifications in soil moisture assimilation were introduced at the same time.

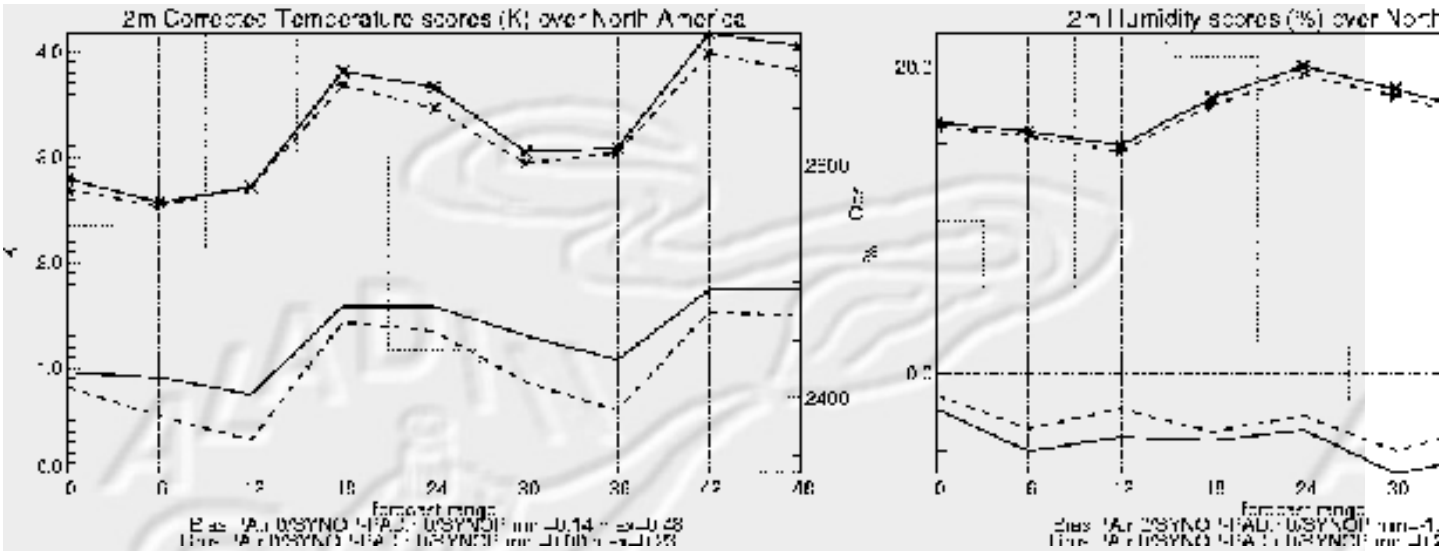



*Figure 2 : Bias and root mean square error of corrected 2m temperature (°K, left panel) and 2m humidity (%, right panel) of ARPEGE with one frozen layer (PA, full line) and ARPEGE with two layers and new guess errors statistics - changes which had no impact on temperature in altitude - (PAD, dashed line) against SYNOP over North America from 2nd to 26th of may 1999 as a function of forecast range in hours. The number of observations is on the right axis.*

The bias in temperature has been successfully reduced as well as the bias in humidity.

Reference :

*Bazile, E. (1999). The Soil Water Freezing in ISBA. In HIRLAM Newsletter, Number 33, pp. 92-95. HIRLAM 4 Project, c/o Met Eireann, Glasnevin Hill, Dublin 9, Ireland.*

## *2. Soil water content analysis*

After one year of operational use, some problems have been identified in ISBA. The soil water content was oscillating too much especially during summer 1998. Moreover it showed an unexpected drying in winter because the surface analysis tried to correct the cold bias of the model by drying the soil.

To correct these oscillations, some changes in ARPEGE soil moisture assimilation have been undertaken by Eric Bazile and François Bouyssel.

A first modset, on may 1999, consisted in the following points :

- soil moisture analysis is switched off in case of frozen soil;

- the constraint on evaporation is stricter;

- the interaction between analysis conditions and smoothing of the diurnal cycle is modified to further limit soil moisture corrections.

This first set of modifications only slightly corrected the oscillations (figure 3, dashed line compared to full line).

Some stronger changes have then been implemented on October 1999 :

- the analysis conditions were replaced by a continuous weighting of soil moisture increments, p(ten-meter wind, evaporation rate, precipitation, snow cover, ...) in the range [0,1] and equal to 1 when all conditions are satisfied;

- the threshold for precipitations was reduced from .6mm/6h to .3mm/6h;

- a damping by the mean low-level cloudiness along the previous 6h forecast was added;

- the basic analysis coefficients a1, a2 relating corrections of the mean soil moisture to analysis increments of 2 meters temperature and relative humidity :

$$DWp = ( a1..DT2\,m + a2.DH2m ).\ p(..., cloudiness)$$

were divided by 3 (a1, a2 depend on soil and vegetation characteristics and on the local solar time);

- the computation of the mean bias on T2m changed to reflect longer time-scales and the interaction with smoothing was again modified.

These changes brought a significant smoothing of the evolution of the mean soil moisture (figure 3).

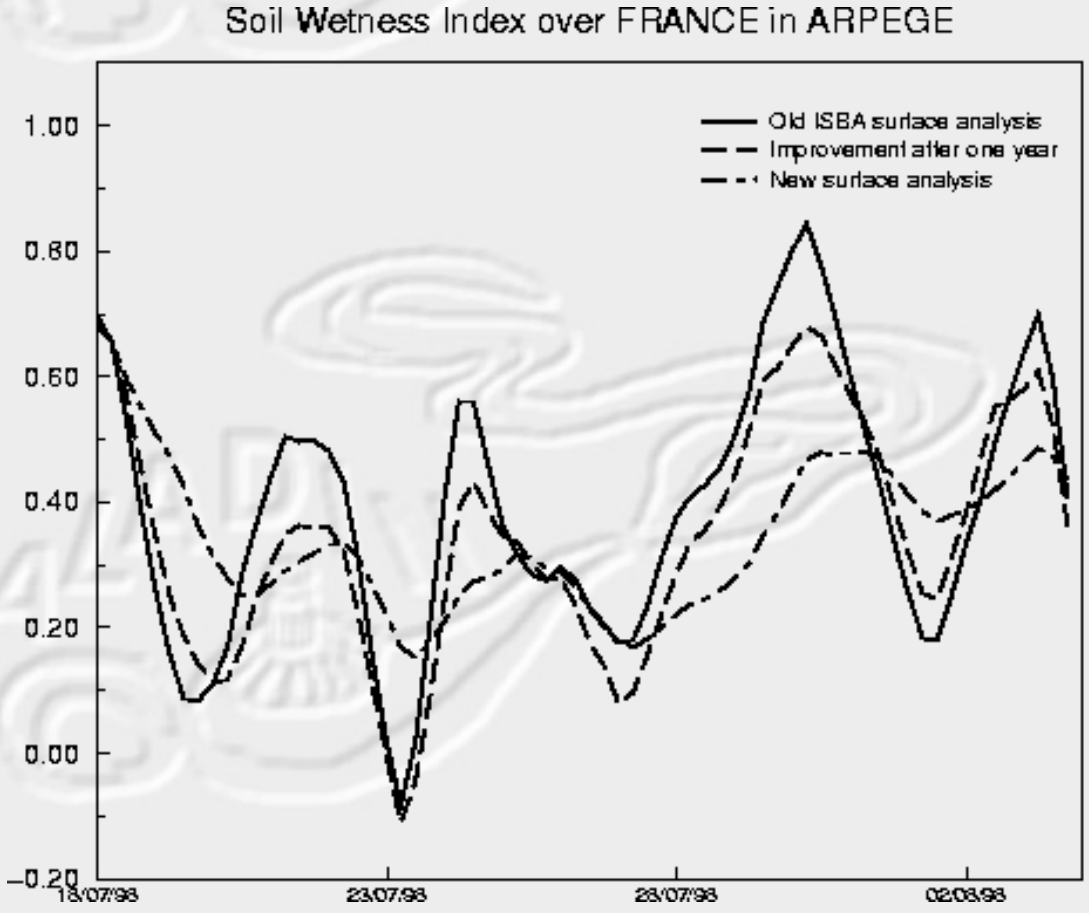



*Figure 3 : Evolution of soil wetness index over France from ARPEGE analysis during the summer 1998 for the old ISBA surface analysis (operational on march 1998, full line), the operational analysis on june 1999 (dashed line) and the operational one on october 1999 (dot-dashed line).*

As regards to objective scores (figure 4), on one hand the model appears warmer and clearly reduces the previous cold bias. On the other hand the humidity deficit has been increased by a few percents. This modset moved to operations together with the CYCORA package.

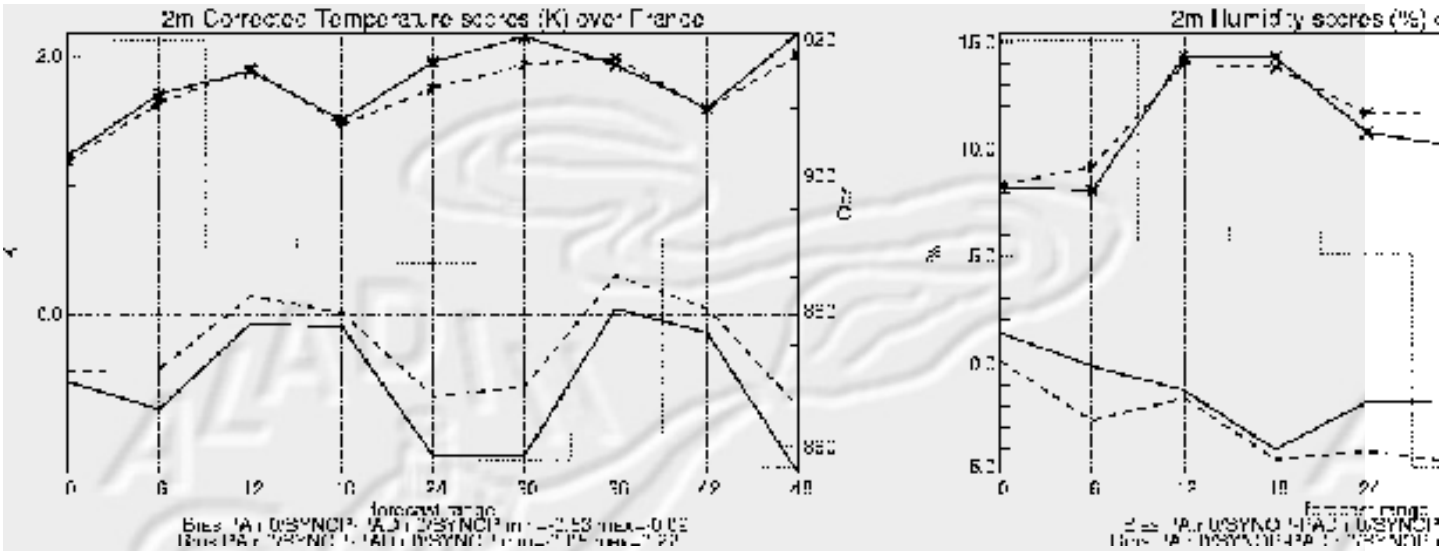



*Figure 4 : Bias and root mean square error of corrected 2m temperature (left panel) and humidity (right panel) of ARPEGE against SYNOP over France from september 1999 the 9th till october 1999 the 10th as a function of forecast range in hours. ARPEGE operational on june 1999 (PA, full line), ARPEGE operational on october 1999 (PAD, dashed line). The number of observations is on the right axis.*

## *3. A few scores with parameterization changes in cyclogenesis, convection and radiation*

The operational suite at METEO-FRANCE includes some changes in the parameterization of precipitating phenomena to correct the lack of stratiform clouds at the top of the tropical convection, to give more realism to the mesoscale convection and to avoid the dependency of the part of stratiform precipitations in the total precipitations on the model resolution. Some other changes have been implemented following the cyclogenesis failure on December 1998 the 20th over Britany. They also contain different clouds optical properties and a parameterization of clouds at the top of the boundary layer. They became operational on October 1999. See Newsletter 16 page 36 for more details.

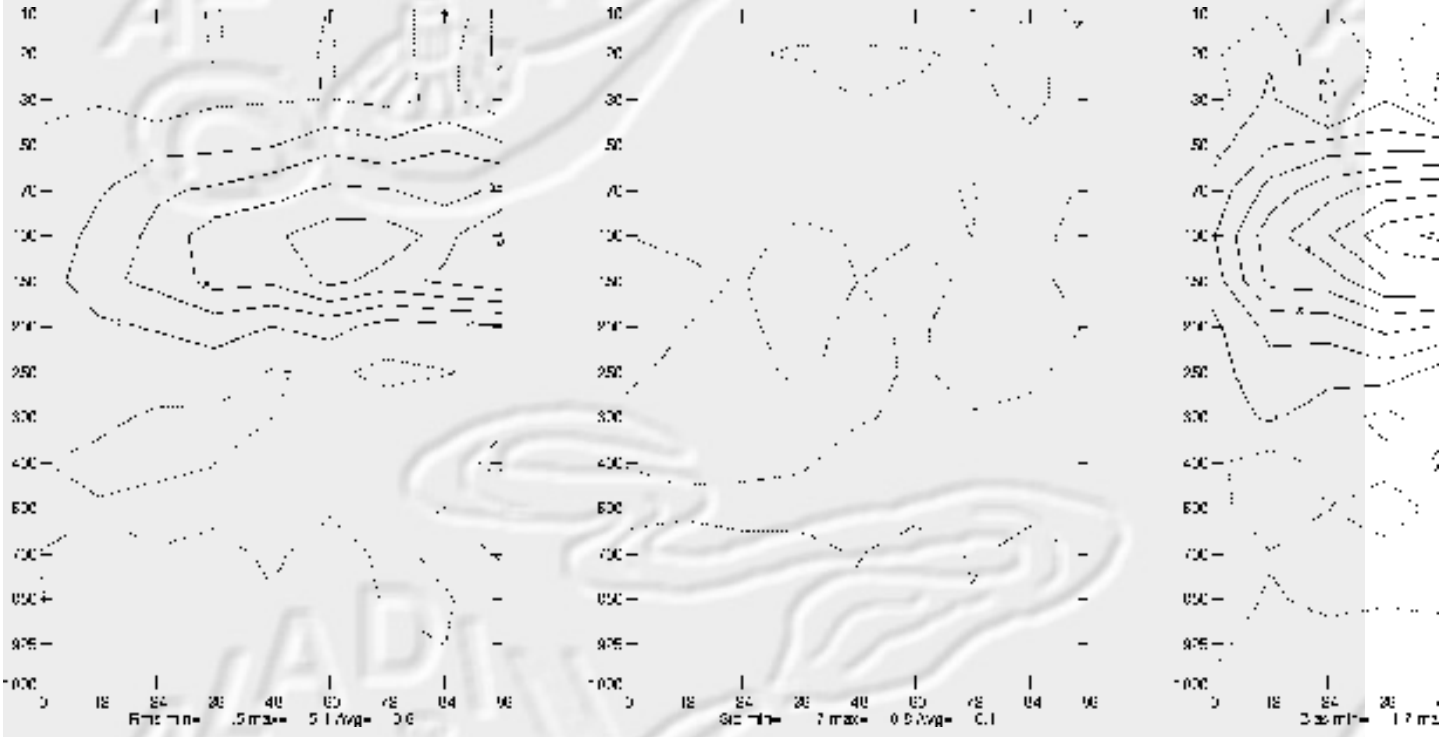


*Figure 5 : Differences of scores of geopotential (m) (root mean square error, standard deviation and bias from left to right) between ARPEGE before (PA) and after (PAD) the parameterization changes against radiosondes over the tropics (20°S-20°N) for different pressure levels (y axis) from september 1999 the 9th till october 1999 the 10th as a function of forecast range in hours. Improvements are in full line,*

*deteriorations in dot-dashed line, neutrality in dotted line.*

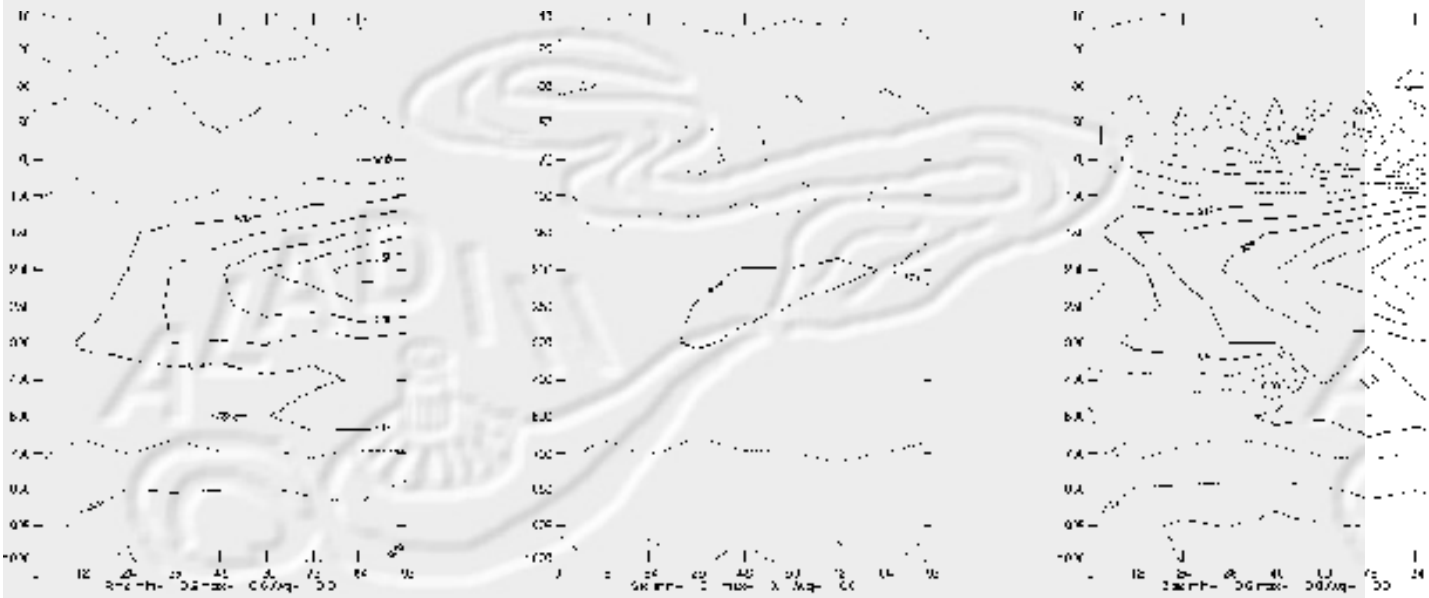


*Figure 6 : Differences of scores of temperature (K) (root mean square error, standard deviation and bias from left to right) between ARPEGE before (PA) and after (PAD) the parameterization changes against radiosondes over the tropics (20°S-20°N) for different pressure levels (y axis) from september 1999 the 9th till october 1999 the 10th as a function of forecast range in hours. Improvements are in full line, deteriorations in dot-dashed line, neutrality in dotted line.*

The main improvements are located over the tropics for geopotential and temperature, especially by reducing the bias above 200 hPa (figures 5 and 6). Over other regions scores are neutral except some slight positive signals, not shown here, above 20°N and below 20°S in geopotential.

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# Participations in the ALADIN project

The statistics about the participations in the ALADIN project and the ensuing compilation of the ALADIN developments are drawn up from the contributions sent by the representative of each country. Please find in annex the graphics illustrating the last summary of the participation in the ALADIN project.

Prague (RC-LACE) and Toulouse actions are registered immediately (i.e. at the end of December 1999 for the current statistics) while a tree months' lag is applied to the deported contributions (i.e. at the end of September 1999 for the current statistics).

In this Newsletter, you can find a more complete sample of the statistics that are produced; others can be drawn up on request.

In the next three parts ("Deported developments during the third of 1999", "ALADIN developments in Prague/LACE during the forth quarter of 1999" and " ALADIN developments in Toulouse during the forth quarter of 1999"), you will find the list of the ALADIN developments (in Prague, in Toulouse and outside) except those detailed in the previous pages : PhD studies, developments for workstation versions or operational suites, ... during the quarters concerned by this Newsletter. The following informations concerning the deported developments are obtained from informations you sent.

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# Deported developments during the second quarter of 1999

The Deported ALADIN effort (in person.month or considering the number of people involved in ALADIN) remained equivalent to the one of the previous quarters.

However, a change occurred in one of the ALADIN NMSs : the Croatian NWP modeling group has been reorganized with a new head of group Mrs. Alica Bajic. Mrs. Bajic is also the contact person of MHSC for the ALADIN community. Welcome to Alica and her new team !...

## 1. *In Austria*

- Objective verification of ALADIN/Vienna (K. Stadlbacher),
- Statistical structure of observation and background error in ALADIN (Y. Wang).
- Statistics of ALADIN and research on thermal front parameter with using ALADIN forecasts (S. Greilberg)
- Studies on convection indices (H. Seidl)

## 2. *In Belgium*

- Objective validation of ALADIN-Belgium(B. Schenk),
- ALADIN validation during exceptional meteorological situations (J. Neméghaire, J. Vanderborght),
- Reliability and improvements of the operational ALADIN suite (O. Latinne),
- Performance analysis (F. Chomé),
- Various adaptations of the convective scheme, Preparation of a detailed documentation in English under LaTex for Aladin's Physics, Enhancements of local post-processing tools, Arpege Files and archives and Operational work (L. Gerard).

## 3. *In Bulgaria*

- Control of operational runs (A. Bogatchev).

## 4. *In Croatia*

- RC-LACE related administration tasks and coordination (D. Klaric),
- Visualization for MAP related application (V. Malovic).

## 5. *In Czech Republic*

- Development of post-processing tools for ALADIN and operational monitoring of ALADIN/LACE (D. Dvorak),
- Development of Kalman filtering of ALADIN forecasts (Z. Huthova),
- Verification of ALADIN/LACE (R. Mladek),

- Study of diffusion properties of semi-Lagrangian scheme, source code management for ALADIN/LACE (F. Vana).


## 6. *In Hungary*

- AL11, ALADIN benchmark on SGI, administrative tasks (A. Horanyi),
- AL11, code maintenance, diag.pack (CANARI) (G. Radnoti),
- Automatic forecast generation based on ALADIN preparation of AL11 (T. Szabo).

## 7. *In Moldavia*

- nothing reported this quarter.

## 8. *In Morocco*

- Automatization of the statistical control of ALADIN/Maroc (W. Sadiki),
- Operational work, 2000 tests (R. Ajjaji),
- Characterization of meteorological situations from analyzed fields (M. El Abed),
- Porting of OUTLAN-BATOR on workstation Sun Ultra 5 (H. Haddouch),
- Cyclogenesis study (J. Boutahar).

## 9. *In Poland*

- Administration and organization, (M. Jerczynski),
- Administration and development of NWP operational system (M. Jerczynski, M. Szczech, W. Owcarz),
- Development of post-processing-on-demand system (W. Owcarz),
- Development of verification software (A. Dziedzic, M. Szczech),
- Development of verification system (M. Szczech, J. Woyciechowska).

## 10. *Portugal*

- ALADIN/Portugal (C. Madeira, F. Prates),
- Administration (M. Almeida).

## 11. *In Romania*

- Code maintenance (C. Soci),
- Convection parametrization (D. Banciu),
- Physical parametrizations (M. Ciobanu, M. Caian),

## 12. *In Slovakia*

- Verification of ALADIN outputs (J. Vivoda, M. Bellus),

- Visualization of ALADIN/LACE products (M. Konakovska),
- The end user presentation (WWW): M. Bellus,
- Workstation version ALADIN/Slovakia, operational maintenance (O. Spaniel).

### *13. In Slovenia*

- Transfer and testing of operational configuration at the cluster, double suite (N. Pristov),
- Research work on cluster installation (J. Jerman).

### *14. Deported work by Météo-France people*

- In Prague : Further CYCORA tuning work (J.-F. Geleyn),
- In Prague : Porting of error covariances computation package on NEC (C. Fischer)
- In Prague : Use of high resolution ALADIN for quantitative forecast of precipitation and surface wind (E. Gerard).

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# ALADIN developments in Prague during the forth quarter of 1999

All the LACE partners were represented in Prague during this quarter (14 people from 6 countries) and worked on various subjects.

### *1. Data assimilation related developments.*

- Blending of surface fields.

Blending of surface prognostic variable fields completes the one of spectral variables. The following strategy has been adopted, starting from these principles:

1. We need to use the information from observations. This we may do only via ARPEGE analysis in case of blending.

2. We want to use the information in the ALADIN guess.

3. We do not have much information on structures of the surface fields (they have different evolution equations than the atmospheric part and different nature). Their structure is mostly dictated by the physiography of the model surface boundary (orography, land/sea mask, vegetation). Therefore it is the LANCELOT procedure that is selected as the base of blending filter, since this procedure takes into account the bottom boundary features in a most complex way.

We may summarize the base of the surface blending algorithm:

Step 1: take ARPEGE analysis and project it by LANCELOT to ALADIN grid (AR2AL).

Step 2: take ARPEGE guess and project it by LANCELOT to ALADIN grid (AR2AL).

Step 3: obtain ARPEGE analysis increment : ARPE_anal_ar2al minus ARPE_guess_ar2al. The increments are available on ALADIN grid and they arefiltered by LANCELOT (AR2AL).

Step 4: add the increments to ALADIN guess.

Blended surface variables = ARPE_anal_ar2al minus ARPE_guess_ar2al plus ALAD_guess.

**BUT:**

We have to still care for the following problems:

1. We have to re-check the physical limits and consistency of the computed blended state. For example, we cannot have snow and surface soil temperature above zero at the same time and place. We cannot exceed the saturation limits of soil reservoirs, and so on.

2. We have to be careful that ARPEGE and ALADIN cycles do not diverge. Therefore we apply a sort of weak relaxation to ARPEGE analysis.

The equation then becomes:

**Blended surface variables** = Check_limits ( (ARPE_anal_ar2al minus ARPE_guess_ar2al plus ALAD_guess) * 0,95 + ARPE_anal_ar2al *0,05)

**The other surface fields (not variables) should be taken from ALADIN guess.**

It should be further noted, that the "analysis" of surface variables in ARPEGE rely mostly on the analysis of temperature at 2 meters. The question here is, whether an analysis of T_2m and consequently of the surface variables should not be done directly in ALADIN. This hypothesis may be verified in parallel with the tests of surface fields blending.

The relevant software for surface blending has been developed and tested on two forecast cases in order to find out possible bugs or remaining problems.

- Tuning of spectral blending.

The aim of this tuning has been to find out the spectral resolution ratio between the resolution of the operational model and the resolution related to ARPEGE long waves. Further, the parameters of internal DFIs should be refined as well (see two previous Newsletters for more detailed description). Concerning the spectral resolution ratio, a table of experiments has been done, for the values 3.3 (initially tested), 2.9, 2.5, 2.1 and 1.7. The ratio of 2.5 has been selected, i.e. NSMAX=28, NMSMAX=31 for the lower resolution (NSMAX=71, NMSMAX=79 are the operational values of ALADIN/LACE). Tuning of internal DFI (the one of blending increments) still continues. Regarding the external DFI, it was figured out that: the initialization is not needed in the short runs producing the guess; however some initialization is still needed in the production runs but probably a weaker one than it is currently.

More details can be asked to: Dijana Klaric, Stjepan Ivatek-Sahdan, Martin Janousek, Gabor Radnoti, Radmila Bubnova and Jean-François Geleyn.

- ALADIN/LACE background error statistics to be used in Jb.

A set of "standard" NMC statistics was computed using the raw ALADIN/LACE forecasts. As it has been expected, the single observation experiment has shown the same syndrome like in case of ALADIN/FRANCE domain: the contribution of the observation goes through the extension zone and appears on the opposite side of the integration domain C+I. This effect is due to bi-periodic nature of spectral ALADIN fields (the minimization of the penalty function J is done in the spectral space because of the reduced dimension of the problem) and due to the typical correlation lengths of several hundreds of km,

exceeding the usual length of ALADIN extension zone (since the purpose of ALADIN is to run on a very fine mesh, hence with a small Delta x, the physical length of the E-zone is typically about 150 km or shorter). It should be noted here that a sufficient increase of the E-zone length is impossible: either it would mean to increase substantially the number of grid-points in the E-zone in which case we would have more points in the E-zone than in the meteorological domain itself, or to increase Delta x in which case there is no point to run ALADIN. Together with the fact that ALADIN domains are relatively small (the domains LACE and FRANCE are only about 2500 km wide to allow using the fine mesh at still reasonable computing cost) and thus the sampling for doing well the analysis of long waves is rather doubtful, it leads to the idea of a decremental approach: ALADIN has to rely on ARPEGE for doing the analysis of long waves while the ALADIN fine mesh should be used to analyze smaller scales as a complement to ARPEGE. In the spirit of this strategy some other types of background errors were examined still using the NMC method, the diagnostics being now tuned on eliminating the large scale component present in the error covariances. For details, there is a first draft of a special ALADIN Note on this issue.

More details can be asked to: Maria Siroka, Claude Fischer, Radmila Bubnova.

## *2. Developments in the physics.*

There has been no development in the physics within the last quarter of 1999. Regarding the convection issues, a newcomer to the ALADIN team has started the training.

## *3. Developments in the dynamics.*

A progress has been made in the NH model, using the vertical plane version to simulate the non-linear non-hydrostatic idealized mountain flow. A diagnostic tool to compute and visualize the momentum flux and surface drag was finalized, enabling to measure the precision of model simulations. Further, the experiments has shown that:

- new formulation of the bottom boundary condition is unstable using Eulerian advection scheme;
- semi-Lagrangian three-time-level NH model is stable for long time-steps (contrary to what was observed in some 3D real-case framework experiments); though the quality of the simulations must be assessed by an experimental work done more neatly.

Finally, a remaining problem in the set-up of sponge layer has been noticed and will need a correction.

More details can be asked to: Jozef Vivoda, Tamas Szabo, Radmila Bubnova, Martin Janousek

## *4. Developments in the diagnostics.*

There has been no development in the last quarter of 1999.

## *5. Developments in the verification.*

The verif.pack tool should be extended to provide the scores of precipitation. The work has been started but it turned out that the length of measured precipitation period is not properly coded in the local SYNOP database in order to be correctly converted to the CMA format. A necessary technical development has began.

## *6. Technical developments.*

An effort has been devoted to the porting of SMS (Scheduler-Monitor-Supervisor) software to the NEC SX4 platform and to the design of the operational suite under SMS. Its practical implementation is planned for year 2000.

More details can be asked to: Metod Kozelj, Roman Zehnal, Martin Janousek.

### 7. *Work on documentation.*

A number of reports of the work carried on is available from the Prague Team. In particular, a practically useful paper on *Idealized studies with 2D version of ALADIN and associated tools* was written by Jozef Vivoda.

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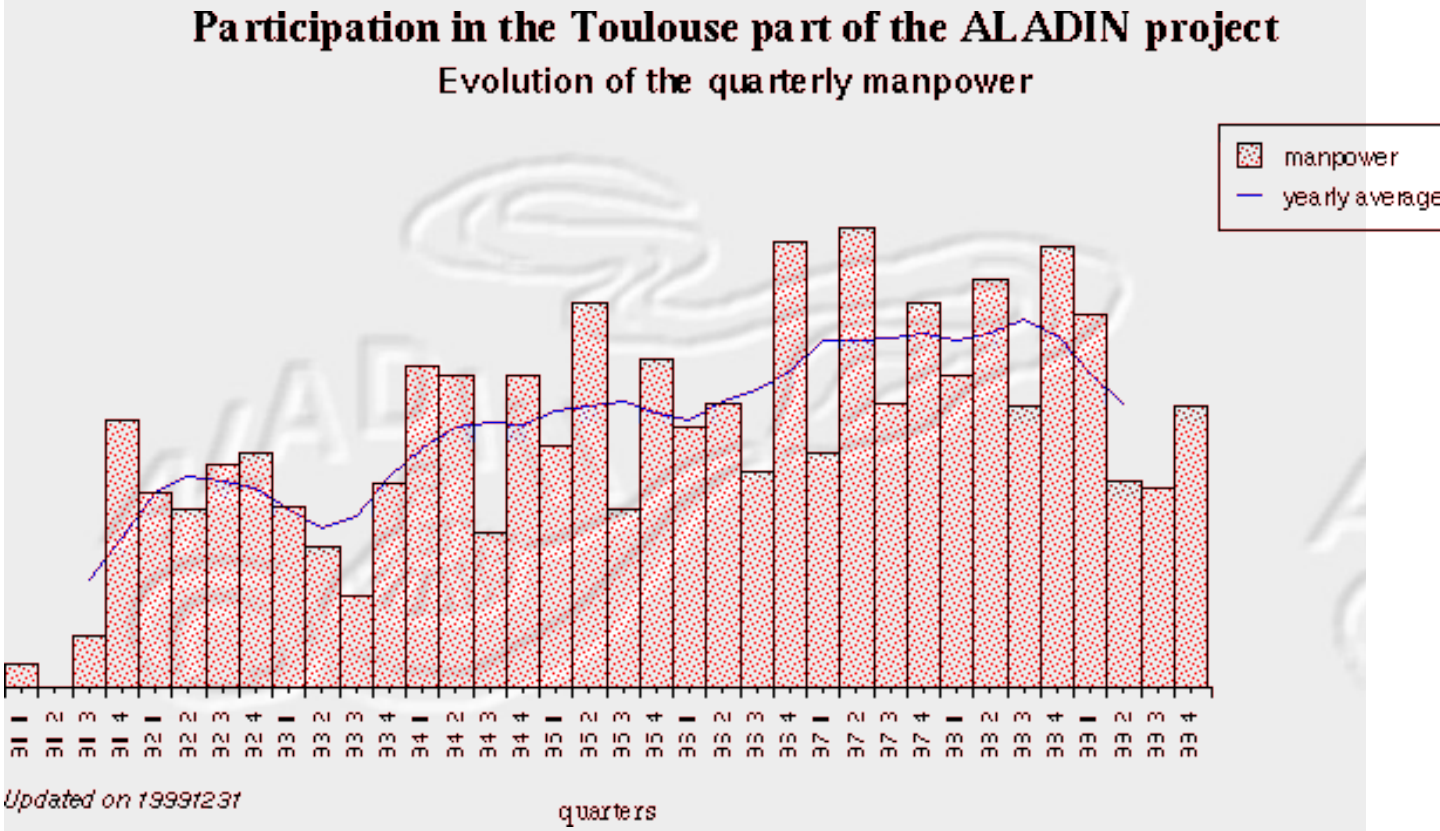
# ALADIN developments in Toulouse during the forth quarter of 1999

### Toulouse ALADIN visitors... the return !




As usual, the number of Toulouse visitors increased during the last quarter of 1999. The growth was all the more obvious since there were very few visitors during the last quarters. However, this Toulouse visitors participation during the forth quarter of 1999 is the smaller one within the participations of the forth quarters since 1993. But, do not worry, things will change in 2000. The first quarter of 2000 is reasonably crowded in Toulouse and the second quarter is already overbooked !... and ALATNET has not begun yet ...

## 1. Operational applications ...

- No major problem was encountered in operational ALADIN suites when entering year 2000, only some GRIB coding details in Prague.

## 2. Main events in Toulouse this quarter

- The ALADIN effort in Toulouse this quarter was mainly devoted to the preparation of a new cycle, AL12, phased with the cycle 22T1 of ARPEGE. The Toulouse team was helped by Radi Ajjaji, Martin Bellus, Lora Gaytandjeva, Ilian Gospodinov, Hassan Haddouch, Jure Jerman and Gabor Radnoti. Apart from the developments issued from AL11T2, this new library will allow an improved management of spectral transforms, the use of simplified physics, a new formulation of envelope orography, the use of CANARI in diagnostic mode at high resolution, the identification of lakes, the computation of the TL and AD parts of non-hydrostatic dynamics, ... and some cleaning, with some obsolete options suppressed.
- As you can see, ALADIN life went off quite well in Toulouse but, outside, the last quarter of 1999 was not so quiet : strong storms over North Sea and Baltic Sea, snow events over Central Europe, dramatic floods over Southern France (12-13/11/99), and the two french Christmas storms (25-28/12/99) were as many challenges for NWP. ARPEGE behave rather well, but unexpectedly ALADIN was not so good over some situations. For example, ALADIN/LACE missed the first Christmas storm (26/12/99) while ALADIN/FRANCE was not better than ARPEGE. Some experiments were performed afterwards by Ryad El Khatib and Radmila Bubnova, to understand the reasons of this failure. The main impact came from coupling : results improve as the frequency of coupling, from a 6h span (operational ALADIN/LACE) to a 3h span (operational ALADIN/FRANCE) and further with a 1h span. Using a quadratic rather a linear time-interpolation also led to better results. A quadratic 3h-coupling proved better than a linear 1h-coupling. On the other hand, changing the time-step or using non-hydrostatic dynamics brought only minor changes.

## 3. Other visitors research or development studies that ended during this quarter

- Jan Masek has thoroughly analysed the discretization of equations in the non-hydrostatic case, and justified some initial choices.
- André Simon studied the impact of the new envelope orography and of the lift parameterization in ALADIN / France and ALADIN / LACE on a wide set of situations.

## 4. Mixed Toulouse-deported studies

- July 97's floods
- In the framework of the Barrande exchanges between Toulouse and Prague, Elisabeth Gérard and Dagmar Dufkova studied the behaviour of the two last operational versions of ARPEGE/ALADIN (i.e. cycle AL11-CY21T1 and the CYCORA modset) on the dramatic floods of July 1997 over Central Europe. For each configuration, they launched a 3-weeks global assimilation suite starting on the 3rd of July and 2-days forecasts with increasing resolution, using ARPEGE (21 km), ALADIN/LACE (12 km) and ALADIN/CZ (8 km) successively. The detailed comparison of fields to observations will be pursued in Prague. However the first maps show a clear improvement from the former ALADIN/LACE forecast to ALADIN/CZ using CYCORA, with a significant increase in precipitations.
- Using high resolution data for clim files
- The Balaton (Toulouse-Budapest) exchanges benefited to configuration 923. A new module (the 7th) was written by Sandor Kertesz. It allows a modification of the characteristics of waterpoints (type, temperature, depth) and an identification of lakes using local high resolution data. It is the counterpart of module 5 for land points. In the meantime both modules were modified by Dominique Giard in order to better preserve sharp gradients from initial data. The management of sea domains was also corrected.

## 5. Other research or development studies by the Toulouse permanent staff

- MAKDO, a graphical tool for the creation of ALADIN domains, is born. In the meantime, Jean-

Daniel Gril wrote a new version of EGGX, simpler, preserving namelist directives, and avoiding some of the bugs discovered in the previous one.