Minutes from the 4th LACE Steering committee Meeting

Vienna, 21-22th February 2005

Participants:
LSC Members: Yong Wang (Austria), Martina Tudor (Croatia), Radmila Brožková (Czech Republic), András Horányi (Hungary), Jan Mašek (Slovakia), Mark Žagar (Slovenia).
Management Group: Dijana Klarić (Project Leader), Filip Váňa (Working Group Leader for dynamics), Neva Pristov (Working Group Leader for physics), Gergely Bölöni (Working Group Leader for data assimilation), Oldřich Španiel (ALADIN/LACE Sytem Coordinator), Stjepan Ivatek-Šahdan (Data Manager).
Observers: Gwenaelle Hello (Meteo France), Mária Derková (Networking Aspects ALADIN 2 Coordination), Per Unden (HIRLAM).

1. Opening

The Director of ZAMG, dr. F. Neuwirth welcomed the participants and opened the meeting.

2. Organizational matters

The organizational matters of the meeting were explained by Yong Wang.

3. Adoption of the Agenda

The agenda was adopted with two additional items: Addition of Enlargement of LACE telecom domain and about early cut-off problematics implying1 hour delay of LBC´s to Item 6.

4. Election of the new LSC chairperson

Radmila Brozkova explained that a new chairperson should be elected, according to the LACE MoU.
Decision: Mark Žagar was unanimously elected as the only candidate.

5. Technical Issues – Status of operational activities at Member Services, including telecommunications used for downloading the coupling files

Austria

One domain with the resolution of 9.6km and 45 vertical levels, quadratic grid, two times per day, dynamical adaptation 00 and 12 UTC runs, coupled to Arpege, up to 48 hours. The cycle AL25T1 is used operationally. AL28T1 is ported, but the results of the parallel suite were not satisfactory. To download the lateral boundary conditions files Internet is used and RETIM serves as back-up. It is planned to switch to linear grid, optimize namelist for AL28T1 and prepare for operational LAMEPS.

Hungary

The cycle AL15 is used operationally. Dynamical adaptation is used with the resolution of 6.5 km and 37 vertical levels. There are two parallel suites, intercompared subjectively and objectively: i) 3DVAR suite, assimilating surface (SYNOP), upper-air (TEMP) and satellite (ATOVS) measurements, with 12 km resolution, ii) dynamical adaptation suite at 12 km (old LACE). Both Internet and RETIM are used to download the coupling files.

The cycle AL28T1 is installed and tested for different model configurations.

A new IBM p655 cluster (4 nodes x 8 processors of 1.7 Ghz, 4Gb Ram per processor) is being installed. It is planned to switch to a new configuration that will have a resolution of 8 km, linear grid, 49 vertical levels and 3DVAR data assimilation.

Slovenia

The cycle AL25T1 is used operationally on an Intel cluster. The domain has resolution of 9.5 km, 270x256 points, quadratic grid, 37 vertical levels, 2 runs per day, dynamical adaptation, up to 48 hours. Among others products are disseminated to the Albanian weather service. Internet is used to download the coupling files and the reliability is acceptable.

The cycle AL28T3 has been ported, configurations e001 and fullpos were validated, but there are still problems in e927.

The software on the computer has been upgraded in mid-December 2004 from RedHat 7.3 to Fedora core 1, Score software (that governs the distribution of computing jobs) has been upgraded from 5.4 to 5.8. First a test cluster with the new version of software has been built and tested. Unforeseen problems related to the file system occurred, but were sorted out. However, meanwhile the operational suite had been disturbed many times during the 3 weeks period. It is planned to switch to AL28T3 and install the ODB.

Czech Republic

The operational library is based on AL25T1 with modifications in physics package and horizontal diffusion. Since the last LSC the low-level cloudiness modifications have been introduced and runs were prolonged up to 54 hours. The domain resolution is 9 km, 320x288 points, 43 levels, linear grid, mean orography.
Aladin/MFSTEP runs on the same software basis. The domain resolution for this project is 9.5 km, size 600x320 points, 37 levels.

Both RMDCN and Internet are used to download the coupling files.

The cycle AL28T3 is ported, and phased with the operational physics (this physics is fully phased in AL29T1, except the self-regulation of the heat roughness length over sea). Validation is made in comparison with the operational library. The Lancelot configuration is bit-identical. The Morgane configuration with physics gives still somewhat different results (at the 5th digit in the spectral norms) but the adiabatic model is bit-identical. AL28T3 is put into the parallel suite now. From non-operational configurations the NH Morgane runs fine in the standard set-up. A bug has been discovered in the configuration ee927 when the grid is not changed: the surface fields have values equal zero inside the extension zone.

The plan is to switch to AL28T3 first. Then there are plenty of parallel tests scheduled.

Croatia

The cycle AL25T1 is used operationally in the dynamical adaptation mode on the 12.176 km resolution old LACE domain. The 8-km resolution Croatian domain is nested inside. Further, there are 6 domains of 2 km resolution nested in the Croatian domain to have a dynamical adaptation with moisture and radiation processes excluded. Forecasts are up to 48 hours, 37 levels, on quadratic grid. Special forecast is provided for the purpose of the DART05 project (Dynamics of the Adriatic 2005).

After a change in telecommunication, internet is now used as a primary way for downloading the coupling files. Since a few machines were being physically moved within the service, problems with ftp started to occur so RETIM has been introduced as backup. When the internal network problem is solved, old regime will be re-established.

Porting of AL28T1 and AL28T3 to *mrcina* computer reached a dead end in September 2004, it was suspected that the problem is in the version of C (and/or F90) compiler, MPI or ... because there have been many problems with the operational suite since the introduction of the upgraded versions in February 2004. AL25T1_op4_CZ (containing "Czech physics") was ported in November 2004. On the 18th January 2005, new compilers and MPI had been installed on one SGI server in the service. AL25T1 (operational), AL25T1_op4_CZ, AL28T1 and AL28T3 had been compiled there. The obtained executables can be used on *mrcina* (the computer used for operational forecast).

It is planned to switch to one domain after receiving verification results from forecasters

department, and to switch to AL25T1_op4_CZ, after the problems concerning over-use of CPU are solved..

Slovak Republic

Machine: IBM Regatta with 32 CPUs of 1.7 GHz and 32 Gbytes RAM. The machine is operational since the 1st July 2004. The cycle AL25T1 is used in the dynamical adaptation mode on 9.0 km resolution (quadratic grid), 320x288 points on 37 vertical levels. Forecast is prolonged up to 54 hours.
Internet is used to retrieve the coupling files; RETIM is used as a backup.

The cycle AL28T3 is ported, e927, e001 and fullpos are validated. AL29 was ported and e001 validated.

It is planned to switch to AL28T3, introduce dynamical adaptation of wind at 2.5 km resolution, blending and technically master ODB, necessary step for implementation of the standard verification tool (VERAL).

France

- New developements from E. Bazile concerning interactive mixing length,
- Aladin 3DVar (AL29T1) operational in summer,
- New physics, Lopez micro-physics (e-suite in June),
- Benchmark for next computer in MF, based on AL29, decision about purchase is expected after summer

Current and forthcoming e-suites:

- Current: New developments
- Next: ALADIN 3Dvar (AL29T1) e-suite beginning in March for 2 months
- Next: ARPEGE/ALADIN new physics (Lopez + RRTM), e-suite beginning this spring

Maria Derkova: AL28T3 is not operational anywhere, but LACE countries are most advanced in porting, also ported in Romania. More effort should be put to make it operational, because of the guidelines about new fields in coupling files and externalized surface. (later discussion showed, however, that perhaps one should wait until the new complete cycle is ported).
Explicit interfaces are used only in CHMI.
The question occurred whether there will be an export version of 29T1 and 29T2? Gwenaelle Hello explains that an export version can be done upon a demand from ALADIN members.
29T1 already contains SLHD. 29T2 should contain clean NH code, Lopez prognostic microphysics and many other changes by Karim Yessad.
Maria Derkova will follow the chronology of the cycles. It is unclear what are the

advantages of installing each new cycle (28T3, 29) or if it is worth waiting for the joined cycle 30. The underlying issue is of course the time spent for installation.
Externalized surface should come in cycle 30, but some part of it might come earlier. As a consequence the structure of coupling files will change (2 files instead of one) so this change should be well synchronized.

Recommendations:
Follow closely the evolution of next cycles, i.e. not every new cycle will probably need to be ported.
Make 28T3 operational (including the "czech physics").

6. Technical issues - Short information on the RETIM 2000 status and possible upgrade of RMDCN

Due to the introduction of a new, short cut-off run in MF in summer, 00 products are going to be delayed. Detailed official information will follow. Possibly the LACE LBC can be produced from the short cut-off run.
Some members announced the need for boundary forcing data until +72 hours.
Due to the participation of CHMI in the MFSTEP project, it was asked if the LBC area could be increased and by how much it can be increased without (or with acceptable) impact. Maria Siroka will prepare a questionnaire in this question and receive answers by the 3rd March. Upon the answers, feasible telecommunication domains will be prepared from which the choice should be sent to Maria by the 16th March.

RETIM – we still have the contract until the end of this year. RMDCN is another option but the prices are far too high. Project leader proposes to continue with Retim 2000 since it is cheaper than RMDCN.
In an e-mail from MF the prolongation to 54 hours of the coupling files range was announced, however not all the members were aware of this fact. It is very important to distribute such kind of information and the participants should be careful to distribute the information to other involved people.
The PL will demand coupling files for up to 72 hours with constant, 3 hour frequency (up to now 3 hour frequency is used only until 54).

Conclusions:
LBC Schedule: LSC asked PL to continue to closely follow this aspect. Members need to be informed sufficiently in time to be able to adapt their own suites organization. LSC insisted that any change in LBC production is promptly announced to all Members. MF should provide to RC LACE the time-table of LBC dissemination valid until the end of 2005.
LBC prolongation up to 72h: LSC said that this prolongation should be only made by keeping the uniform (3h) time frequency of LBCs.
Change of the telecommunication domain: LSC endorsed the two-round-procedure described above.

7. Technical Issues - Reports of ALADIN/LACE System Coordinator and Data Manager

System Coordinator (ASC)

ALADIN/LACE System Coordinator (ASC) reported on his work done in 2004 and planned in 2005:

- During the autumn phasing in Toulouse, Oct-Nov 2004, AL 29 has reached good quality of code if we speak about portability,
- The xrd library was cleaned so it is easier to install to various platforms,
- The gmkpack was cleaned and validated in Toulouse, few bugs were removed. It was ported to IBM Regatta in Bratislava. Compilation is working including ODB. It is possible to use master pack and user pack, it is recommended to use gmkpack for AL28 and higher if there is no other (local) compilation tool. Advantages of gmkpack are support for ODB and explicit interfaces.
- Following an agreement between the SHMU and ZAMG, backup GRIB´s are produced at the backup facilities at ZAMG, and transferred to Bratislava, the two facilities being connected by ssh (secure shell) service, which replaced RMDCN and is 10x faster than before.
- The e-mail support for the LACE community has been offered.
- ASC future plan: practical instructions for compilation of ODB by gmkpack and for a few basic tests of ODB functionality, practical manual for gmkpack (options and behaviour that are not yet published), modifications for MPI on Regatta and phasing stay in Toulouse.

Data Manager (DM)

Data Manager (DM) too reported on his work done in 2004:

- MAP downscaling of the ECMWF Re-analyses, where the most advanced version of ALADIN is used (mean orography with improved parameterization of its unresolved part, SLHD, improved radiation and cloudiness schemes). This work was presented at the 14th ALADIN Workshop in Innsbruck. LSC asked about the availability of data and access to them. The reanalysis files are stored first on the archiving server at Meteo-France. Other tasks performed by DM in 2004:
- phasing,
- maintaining LACE web pages and FTP server,
- participation at Workshops and LSC meetings,
- extract of Verif for ARPEGE,
- research of conversion from SYNOP to BUFR format of observational data.

In 2005 new person should take the position of DM. If the major tasks of DM should include work on verification, somebody from Slovenia could take the position. Porting of verification software, developed in Slovenia, is well under way (now ported in all Member countries).
If the main concern would be data assimilation, then somebody from Hungary might be

interested, but as the Hungarian representative informed LSC the Hungarian weather service does not have any available manpower.
PL also expressed a request if Miha Razinger could be planned to spend 4 months on verification this year and LSC supports this request.
LACE WEB pages will remain maintained by the former Data Manager on a voluntary basis.

Conclusions:
LSC approved the activities of ASC and Data Manager.
LSC supports the proposal of PL to devote 4 man-months on verification as Data Manager activity in 2005, including the possible candidate Miha Razinger.

8. ALARO/AROME events since the last LSC meeting

Gwenaelle Hello gave a presentation about recent developments since September 2004 and plans for the first half of 2005.

AROME assimilation:
- hybrid assimilation, high resolution Jb, ported to olive,
- varpack – diagnostic variational analysis of surface observation, results comparable to diagpack, but more costly,
- Radar reflectivities – observation operator coded and tested with artificial data from 3dvar,
- GPS data, first version of the operator coded in 4dvar,
- Plan: to continue, 3dfgat, Jk.

AROME model
- equations – 4 papers written, an uniform paper to be written

Code evolution
- a prototype has been designed for the benchmark,
- reliability of the externalized surface (difficulty with NPROMA),
- the externalized surface part is covered by the plan of Dominique, AROME people do not work on it,
- phasing to cycle 29T2 in March, then internal phasing with MesoNH

Experimental environment
- definition of a complete suite for preparation of the initial files
- plans to have one unique script to prepare the input files and port it on olive. This script will still perform the task in several partial steps. Hydrometeors are initialized to zero. Test to couple AROME 2.5 km with AROME 10 km.

1D AROME model
- phasing of old AROME 1D version to the latest cycle of the code

- plan: to work on unified platform for several physics

Tests on model behaviour

- plan: tests of recommendations from LACE WG for dynamics on the NH dynamics,
- no diffusion of hydrometeors untill now,
- tests of behavior of the MesoNH physics,
- workplan: more cases; MAP, routine forecast

ALARO – AROME10

- first tests of the ALARO prototype as AROME-10 were performed showing better behavior of ALADIN at the same horizontal scales,
- it has then been decided not to perform a total import of the MesoNH physics, but to introduce it step by step
- then a bug was discovered and cleaned, which revealed that AROME10 and ALADIN results were in fact equivalent.
- Plan: to finish the comparison study on the Gard case
- Tests of the sensibility of the microphysics to the longer time step have shown less resolved rain (see the report of LACE WG for physics for details),
- Tests in the gray zone have additionally shown that there is less rain and the location is shifted when the convection is parameterized, as opposed to the resolved convective rain,
- Plan: to compare with ALADIN runs at 7 and 5 km

Discussion developed whether the old convection scheme should still be tested, or a new one should be implemented. There is no clear answer to the question. Some new approach to parameterizing the convection (the outcome of the Tartu meeting) is at the horizon and we will follow the evolution. Per Unden noted that other groups have demonstrated failures of the Kain-Fritsch-Bechtold (KFB) scheme at the scales we are speaking about.

8.1 Arome-Alaro: results since last LSC and work plan for the first half of 2005

While the results of AROME10 became comparable with those of ALADIN as regards the Gard case (the only case completely re-examined up to now), other problems were found. For example there are shifts of rain location of almost 200km pending whether the convection scheme (KFB) is switched on or off. It was said that it is normal to have such problems at the beginning of a new project. Nevertheless, based on past ALADIN experience, progress with respect to such problems is only fruitful in an environment where comparisons are possible “all things equal elsewhere” and where developments can take the best out of originally competing solutions to build better new ones. In this spirit the priority now given to the clean interfacing strategy is an important and founding

step.

8.2 Development of the physics/dynamics interface: introduction to the issue

Idea: to call cleanly different packages of physics but using the same ALADIN dynamics.
It appears to be important to clear a few shortcomings in MesoNH and AROME physics: for example neglecting of the heat transported by precipitation. Neglecting of this term in ALADIN was simulated and parallel tests were run and proved to have a huge impact on scores and precipitation amount. A second problem in the interface was identified leading to fictitious sources and sinks of energy. This one does not produce a big impact on scores, but it is locally important when looking at the maps of precipitation. Finally, a third parallel test was run, containing the minimum possible error of the first kind (minimum terms affected by the heat transport error) combined with the second problem. The scores show still the same nature of the error (in bias) but the amplitude is reduced. The actual amplitude of the error committed is very likely somewhere between the maximum clean test and the minimum one. The interface should be clean and such fictitious terms have to be avoided. Also the equations of the model should be correct.
There are common topics (resolution independent), like for example DDH (diagnostics) that have to be done.

A round table discussion showed that all the members are positive to the newly proposed organization of the work in so called streams. In particular the omitting of the strict nomenclature (AROME vs. ALARO) is appreciated. Still, there are a few things not completely clear in the organizational level. In particular, the new stream approach implies revision of the way of organization, not tied to the AROME, ALADIN-2 notion. It was also noted that many inconveniences would have been avoided if this new stream plan was prepared earlier. Additionally, it is not clear which part of the problem (combining two models into a third one) the stream approach aims to solve in priority.
What are plans for further development in the MesoNH group? Are they a partner or a building stone of the ALADIN project?
It was said that ALADIN project was not really informed on the future scientific evolution of MESO-NH and therefore it was proposed that MESO-NH scientists take part at ALADIN workshops and scientific meetings. It was also said that future software evolution of MESO-NH is unknown: will it evolve toward IFS/ARPEGE/ALADIN code-style? Following this question Gwenaelle Hello distributed a document on the internal phasing in MesoNH and AROME.
There are subjects requiring people, but the services are in general short of manpower. It is asked to change priorities for already experienced people in a measure of what is possible and reasonable (for example it does not mean that all people working currently on dynamics and data assimilation must now work on physics; it is about better employing those who already work on physics and involving a few of those who are not afraid to have more transversal experience). Newcomers are certainly welcome for those stream-tasks where indicated (and thus appropriate).

Conclusions:
LSC accepted the new, "stream" approach to the work organization. LACE WG working plans will be modified accordingly, to fit in the new scheme. MF has to continue to assure exchange of information and coordination between MesoNH and ALADIN.
Recommendations:
LSC encourages national weather services to ensure sufficient man-power for a completion of the future working plans by adapting priorities for experienced people in a possible and reasonable measure. Newcomers are welcome as well for those appropriate tasks.

8.3 Operationally styled environment (letter addressed to CNRM)

The LSC representatives have been informed about this issue over e-mail so this matter has not been discussed in more detail.

8.4 Consequence of the above points on the physics priorities for RC LACE

This point has been merged with the point for report and plan of Working group on physics.

9. Research and Development Issues - Working groups

Dynamics and coupling

Working Group Leader presented the fulfillment of the plan for the Working Group on the Dynamics and Coupling for 2004 and the working plan for 2005.

Physics

Neva Pristov presented the fulfillment of the plan. The plan for 2005 has been presented afterwards. A few topics require exchange of information with MF to organize details.
The working streams should be put into subjects for the physics WG.

Data assimilation

One more topic has been introduced, proposed by Claude Fischer, to run 3Dvar with

rectangular truncation.
Data assimilation WGL proposed to have a new working group for LAM-EPS. There is a possibility to have a one domain in LACE for LAM-EPS. Austria plans to run domain that covers LACE domain but extends westward to cover northern Atlantic with 16 km resolution, up to 48 hours, up to now did a few case studies, 3-4 members would be run in ZAMG and a certain number of members also in Bratislava. We could split the work so each country runs a few members. Initial conditions are perturbed by breeding. At first they use unperturbed LBCs since they have a very large domain, but plan to use ECMWF-EPS LBC. Initial and coupling boundaries have to be perturbed consistently. There is lack of flow of information, there are 3 countries that intend to do similar job so it would be good to coordinate this work. This emphasizes the need for LAMEPS WG to coordinate the research. This could be a WG for LAMEPS and predictability. For now assimilation, LAMEPS and predictability research should be coordinated by WGL for Data assimilation, but the need for separate WG for LAMEPS is still to be discussed.
There will be an exchange of information on Bratislava workshop about 3Dvar and LAMEPS and then in the next LSC we could propose for the next council to have a new WG?
It was also said that work on data assimilation should be more encouraged. So far only one Member (Hungary) is really involved in this area.

A few research tasks were not fulfilled since the new cycle had been delayed and/or there were many difficulties in porting.

<u>Conclusions</u>:
LSC has approved the reports and plans of the WGLs.
LSC recommends updating as much as possible the plan of stays according to the latest work plan adjustments before the Council meeting. LACE money for stays should preferably be spent with respect to the main priorities and not to details in the plan. In this way, the mostly artificial opposition of the transversal development and maintenance tasks could be avoided.

AOB

1. So far, Oldrich Spaniel from LACE (paid by LACE) and Martin Janousek from CHMI volunteered for phasing of CY30 in May and June 2005. According to MF, Austria and Slovenia are well behind the others in fulfillment of the phasing duties.
2. Francois Boutier is looking for a volunteer to work on externalized surface scheme. For this point the Hungarian representative proposed to verify with Laszlo Kullman whether he could take this topic. LSC and involved scientists will be informed on the decision after the meeting.

10. Short information on MAP/FDP (Yong Wang)

Yong Wang presented the background and roadmap for the last phase in the MAP project, the so-called D-phase, or MAP Forecast Demonstration Project. The project will produce operational forecasts in high resolution for hydrological applications in August-November 2006. AROME and ALADIN-Austria are two participants.
It is planned to run AROME 2.5 at ECMWF , perhaps also in Slovenia on 5km (if the environment is ready by 2006), use Aladin EPS (perhaps super EPS system between few LACE countries).

11. Reminder of meetings, trainings, and other actions in next half a year

The Project Leader presented some thoughts on the past and in particular future challenges for LACE. Here point 13 of the agenda is also completed.

12. Financial issues - Short information on the budget status of 2004 and 2005 prospective (Project Leader) – In camera

Dijana Klarić presented the fulfillment of the budget for the year 2004, particulary tables linked to the R&D budget cost.
Planned was 15 person months (32700 EUR) for the R&D Stays for the year 2004. Budget consumption for R&D was 29449 EUR, equivalent to the 13.5 person months (7.5 pm for Dynamics, 5 pm for Data Assimilation, participation of researchers to TCWGDPI WS for Physics). According to the decisions from 2004, 21000 EUR left for the research and development stays from the previous year has been activated for travel cost for workshops and training, as well for the common action related to the MAP Project and phasing.
Travel costs for ALADIN NH training (Toulouse), ALADIN WS (Innsbruck) and Verification WS (Utrecht) were supported. Those actions activated 14146 EUR from common LACE Budget.
PL informed LSC that still cca 10000 EUR left in savings exists that could be activated for common actions, workshops and trainings.

Decisions and Recommendations:
LSC is approving the way how the R&D was financed in year 2005. The activation of the savings from previous years brings a useful support for the training of scientists and students.
LSC reach the standpoint that Council should approve the excessive spending of R&D savings in year 2005 and if there is any additional change, the president of the Council should approve it.

13. Achievements in 2003-2004

See point 11.

14. Continuation in the future

See point 15.

15. Information on preparation of the next Aladin MoU

Project leader presented RC LACE environment, the structure is functioning, decentralized work is hard but brings contribution to research and development, a backbone has been established between LACE and Meteo France.

LACE MoU is valid until end of 2005 including budget and working plans) but Aladin has a working plan for 2005-2008, only Meteo France has allocated finances (resources) for the actions proposed in work-plan.

LSC opinion is that the next ALADIN MoU should be rather general. What structure will Aladin have and what structure should LACE have inside Aladin (and the role) – this is a general political question that should be answered.

PL thinks that the current LACE structure should be improved and adapted. Still there is no hard evidence that ALADIN will introduce so firm organization as it was introduced for RC LACE.
Unfortunately LSC did not have time to elaborate more this Item It was said that clearly, thanks to its structure and budget, LACE plays a significant role in ALADIN consortium (Per Unden said that 75% of things are done by LACE countries). It would be a challenge to enlarge LACE structure to ALADIN but financing is unclear. Given this uncertainty it would be irresponsible to weaken LACE structure. On the other hand the format of enlarged LACE meetings may be a good compromise, worthy to explore.

<u>Recommendations</u>:
The Council should provide the general political opinion about the future of RC LACE at the next Council meeting. The proposal for the next MoU should be prepared until September. An extra LSC session can be organized during the 15th ALADIN Workshop.