

Introduction and general report from All Staff Meeting 2004.

The HIRLAM All Staff Meeting (ASM) was held 1-3 March at INM in Madrid. The meeting was very well attended by 47 staff (see the list of Participants at the end of this Introduction). It is probably a record number; the ASM in 2000 was similar in size. We decided to hold the meeting at the INM headquarters for practical reasons, not at least allowing all INM staff involved with HIRLAM to easily participate. There were many talks and as always there was a tight schedule. All the talks were relevant to our work in HIRLAM and I don't think there was any that one could do without. The 2.5 days format is tight, but it allows many to participate and extending it makes it difficult for some. There were some discussions connected with the Working group issues, and if anything, one would like more room for discussions.

This Newsletter No. 45 is again a record breaking volume. The number of contributions is large (and touches the previous record) but the number of pages is larger than ever. This volume contains many valuable articles and documents scientific and technical developments and it also presents latest results. It contains mainly write-ups of ASM presentations, but it also includes a report from the J_b mini-workshop that was held at SMHI 17-19 December 2003 and a few additional articles.

Operational activities

The ASM started as usual with a summary of the operational implementations. Each of the 7 operational HIRLAM institutes plus Météo-France reviewed their implementation details and their hardware situations. Denmark has now got their full NEC configuration and DMI is planning a large upgrade of their model areas and resolutions. FMI has upgraded to the Reference version and is running the RCR and delivering products (to ECMF ecfs archive). See also separate articles about the RCR results. Météo-France has made a number of model upgrades and are revising schedule and particularly the stretching factor. Ireland feels the need to upgrade computer and have purchased a small Linux cluster. Norway is running a number of models with HIRLAM in 3 resolutions and the Met Office model at 3 km, which takes a significant part of the computer time. The optimisations from Jan Boerhout have speeded up HIRLAM very much. KNMI is running a new version close to the Reference and it gives very promising improvements. Spain is planning significant upgrades when operational on the CRAY-X1 and are developing multi-model ensembles for that machine.

The schedule was permuted a little bit from the traditional order. A few system talks followed. First about optimisations regarding FFTs in HIRVDA, both for 3D-VAR and for 4D-VAR. A new HIRLAM Project Administrator (HPA) has been written for HeXNeT, and this was demonstrated. It is hoped that regular reporting can be done through this mechanism, and then the Management Group can extract the information whenever required (throughout the year). A solution for using CVS for the whole of the HIRLAM system was demonstrated by Kristian Mogensen. The HIRVDA and the rest of HIRLAM will be merged. There are some problems to be solved, but it is possible to get around them. Ideally the domain/size dependencies should be removed from the code, to avoid re-compilation. There are scripts to work with and compile HIRLAM. Comments were invited.

Model Dynamics

There is work on the Tartu anelastic NH HIRLAM, to solve the known problems and bring it to a definite finish, resulting in an efficient scheme for NWP. There are modifications to the SL scheme and vertical smoothing. It is run at 3 km over Estonia and set up over Norway too. At EHMI it is to be run in a semi-operational manner (in the mornings, 00 and 06) with FMI cooperation.

Aidan McDonald has recently published the status of his work in TR 62, and instead spent the time at the ASM to discuss the importance of the LBCs. The more we go to 4D-VAR and we go to meso-scale, the more serious is the boundary question. Still it is difficult or even unlikely that the Davies' scheme will be replaced. The way we use it has not been revised for many years, and it can and should be improved, to provide tighter and more accurate coupling. Karina Lindberg has investigated the time step dependency of HIRLAM with the Reference and for forecast parameters as wind, pressure and precipitation and of course also for intense storms. The results showed quite small time-step dependency except for precipitation.

Synoptics and verification

There were talks about the RCR and about different HIRLAM versions and their results. Simo Järvenoja described the long and hard way towards the RCR, which is fully documented in his article. Kalle Eerola documented a case where recent observations had a strong forecast impact, compared with a 12 hour older ECMWF forecast. Xiaohua Yang has documented some of the extensive tests they have done at DMI of progressive versions of HIRLAM in order to implement the Reference (or close to it).

Model Physics

A novel development for the CBR scheme is the turning of the surface stress vector. Sander Tijm documented the first trials with this in NL44, with a fixed angle. Now Niels Woetman and Bent developed a theory for determining this based on stability and Bent presented the preliminary results. (Also in this issue is an article by Simo Järvenoja who tested this scheme after the ASM). José Antonio Parodi described the soil assimilations carried out for the ELDAS project, both with specified soil moisture and Reference scheme and with the variational soil moisture scheme. The latter seemed to be more realistic.

Then there was a sub-session around the meso-scale modelling. The Project Leader started with an overview of the strategy in HIRLAM and the reasons for basing the future model on the ALADIN model. There are many issues to be sorted out, both scientifically and technically. Physics will be interfaced in a general way so that either HIRLAM or AROME physics can be used from both systems.

Sylvie Malardel then talked about the physics processes in AROME, the processes included and microphysics with 6 prognostic hydrometeors. The coupling with the dynamics will be done differently for different processes. The turbulence scheme is being developed and there is a 1D-version. The surface scheme is an externalised ISBA model with tiling. The dynamics will include the effects of hydrometeors but not prognostically of falling precipitation.

Sander Tijm then gave a more philosophical but important talk about the future of HIRLAM modelling and use at KNMI. The synoptic scale model remains as the most important tool for the Netherlands, but it needs to be complemented with probabilistic information and post-processing. The meso-scale modelling will also follow, both for research and for certain situations. Please read this paper particularly as it contains several important arguments and discussion about the difficulties in meso-scale forecasting.

The always important climate HIRLAM climate generation system, its basic structure and new features were then described by Han The. High resolution data sets are now included. Kai Sattler showed more of these and at higher resolution, to be able to provide a high quality product. He has developed a better way of aggregation to handle the non-linear effects, by treating the different terms separately. Laura Rontu then showed result of experiments with different orography and different roughness lengths and orography parameterisations. Anastasia Senkova showed results from parameterising radiation for sloping surfaces. There was then a talk about evaluation of using the new ECOCLIMAP data in the surface scheme followed by one about the talks about the coupling of the statistical cloud scheme with the turbulence scheme and cloud top entrainment. There were further extensive results with the Kain-Fritsch convection scheme. Different periods were run and the verification and validation was very extensive and using a number of scores. At the end of this session Isabel Martinez showed the latest results about the coupling of the physics with the dynamics.

Working group discussions

There was even shorter time than scheduled for these, and thus the scope and outcome of the discussion was limited due the time available.

A. Orography, roughness and high resolution climate generation

There was first some discussion about definition of climate fields. Really they should be 30-year averages of fields that can be used for e.g. a cold-start. There are also other fields generally also referred to as "climate" fields, which are defining the lower boundary condition in HIRLAM and are either constant or a reasonable estimation, but which should really not be fixed, like vegetation.

In general as much of the surface specifications should come from the external files instead of correspondence tables. The data sets should be optimised for usage, but also be of high enough resolution for all applications in HIRLAM.

B. Meso-scale modelling in HIRLAM

There were many opinions on this subject. It will be a new role for the NWP in HIRLAM and in the institutes and it will be necessary to move into this direction. The requirements for meso-scale modelling were surveyed and it is important to find out about these. One way is to list the parameters that are better in meso-scale models and find the applications that require the high resolution. In high orography areas and in severe weather situations (convective) the non-hydrostatic meso-scale models are important. It is clear that Nowcasting is a very important application, but it was pointed out that the time constraint is critical for the delivery of this product and the computations have to be done quickly. It is also clear that ensembles or other probabilistic products will be essential. It will require much more computer resources. Military cooperations and computers might be one way to provide resources. It was pointed out that without perfectly matched boundaries, the errors from the boundaries will become

large very quickly. In stationary situations it might be better. Local adaptation will of course always take place, but if the large scale flow from the boundaries is wrong, the local forecasts will also be wrong. In the collaboration with Météo-France and ALADIN it was questioned what will be the role of the HIRLAM contributions, and this is indeed important for the Project to define.

C. Observation Usage Plan

For conventional data, it was agreed that the use of buoy data should be optimised. The data coverage at different institutes will be checked by exchange of ACMA files (for one or a few cases only).

The meso-scale requirements were furthermore discussed. First, it is clear that with the current J_b formulation it is not possible to do any meso-scale analysis.

One should make an inventory of the observations that can be used for the meso-scale, with respect to their observation characteristics, resolution and timeliness. Radar data seems like a natural type to start to experiment with.

Ensemble prediction

This is a new session at the ASM, reflecting the intensive activity in Spain and the ongoing work in Norway. The multi-model ensemble at INM was presented with some details of both the MM5 and the German HRM model implementations and issues of interpolation and areas. With HIRLAM it will be three models. Different boundaries will be used for each. The ensembles will be compared with the already developed lagged SLAF technique. Hilde Haakenstad showed the Norwegian results from using ECMWF EPS and TEPS for running HIRLAM.

Data assimilation

Dominique Giard informed first about the strategy for AROME and for ALADIN-2. The meso-scale physics for AROME will be up-scaled for ALADIN-2 to 5-10 km, rather than down-scaling synoptic scale physics. The different steps were described and ALARO will be the name of the library containing both options. ALARO or ALADIN-2 will deal with the grey-zone problems, whereas MF and AROME will not. She then talked about the data assimilation in ALADIN and for AROME. At the moment a hybrid assimilation with converters between model and analysis is used. Jana Sanchez showed results from assimilations of GPS ZTD data with two 3D-VAR J_b formulations and showed precipitation impact. Impact of observing system experiments at DMI were then presented, mainly for the ATOVS data, although very extensive results have been produced for all types. Alberto Cansado showed the results with the new OI snow analysis. There were then presentations about the EUMETSAT AMVs and their quality. With quality flags and good screening it is possible to use the winds. The trials with VAD winds from the Spanish radars were then described. The impact was small and there is a day-time bias. Finally, Xiang-Yu Huang summarised the current status of 4D-VAR including both technical performance issues and previous tests plus recent single observation experiments. The last slide in his show contained a noisy picture which was caused by an error found afterwards and a perfectly nice flow-dependent 4D-VAR impact can be seen in the replacement picture which is available from me or the author.

Please note that the many of the Powerpoint (or pdf) files of the presentations are available on HeXNeT. (hirlam.knmi.nl)

Recent meetings:

Organisational HIRLAM meetings:

- HIRLAM-6 Council Meeting No. 2, 3 December, 2003, ECMWF, Reading.
- HIRLAM-6 Management Group Meeting 9, 12 December, 2003, KNMI, De Bilt.
- HIRLAM-6 Management Group Meeting 10, 22 December, 2004, met.no, Oslo.
- HIRLAM-6 Advisory Committee Telephone Conference, 26 January, 2004.
- HIRLAM-6 Management Group Meeting 11, 1 March, 2004, INM, Madrid.
- HIRLAM-6 Management Group Meeting 12, 25 March, 2003, telephone conference.
- HIRLAM-6 Advisory Committee Meeting, 26-27 April, 2004, MF, Toulouse.

Workshops and other scientific HIRLAM-6 Meetings:

- BALTIC HIRLAM Workshop on fine scale and boundary layer modelling, 16-20 November, 2003, RSHU, Setrotersk, nr St Petersburg.
- HIRLAM Jb mini-workshop, 17-19 December, 2003, SMHI, Norrköping.
- All-Staff Meeting 1-3 March, 2004, INM, Madrid.

Publications:

HIRLAM Newsletter No. 44, November 2003.

Baltic HIRLAM Workshop Report, March 2003. (<http://hirlam.fmi.fi/Baltic/bhws/report>).

HIRLAM Technical Reports

62. Transparent lateral boundary conditions for HIRLAM. The final shallow water tests and a first multi-level implementation. Aidan McDonald. Norrköping, February, 2004.

Forthcoming meetings

- HIRLAM MG visit to FMI, 17-18 May.
- MGM13, 18 May, FMI.
- HIRLAM-6 Council Meeting No. 3, 2 June, Reading
- SRNWP Verification Methods Workshop, KNMI, 14-15 June.
- MGM14, 14/15 June.
- Surface WS SRNWP/HIRLAM, SMHI, 15-17 September 2004.
- EWGLAM/SRNWP, Oslo, 4-7 October 2004.
- Hirlam Advisory Committee Meeting, Gothenburg, 21-22 October 2004.
- Variational DA SRNWP/Met Office/HIRLAM, Exeter, 15-17 November 2004.

Per Undén, 5 May 2004

AGENDA

HIRLAM All-Staff Meeting, 2004

Instituto Nacional de Meteorologia

Madrid, Spain, 1 - 3 March, 2004

Version 2004-02-25

Monday, 1 March

09:00-09:30. Welcome and Introduction

Opening of the Meeting

- Opening and role of HIRLAM in Spain. *Jesús Patán* , INM
- Introduction and current status of HIRLAM-6: *Per Undén*, Project Leader.
- Practical Arrangements for the Meeting: *José Antonio García-Moya*.

Operational Implementations. Chair: Xiang-Yu Huang

- 09:30. Annual report of DMI's operational activities : *Bent Hansen Sass*. 15 mins
- 09:45. Operational HIRLAM at FMI : *Markku Kangas*. 15 mins
- 10:00. Report on operational activities at Météo-France and ALADIN status : *Dominique Giard*. 15 mins
- 10:15. Operational activities at Met Eireann : *Ray McGrath*. 15 mins

10:30-10:50. Coffee-break

- 10:50. Operational system and plans at KNMI : *Toon Moene*. 15 mins
- 11:05. Operational HIRLAM progress at met.no : *Ole Vignes*. 15 mins
- 11:20. HIRLAM status at INM : *Estrella Gutuiérrez Marco* . 15 mins
- 11:35-11.50. SMHI operational events : *Lars Meuller*. 15 mins

System and Embedding

- 11:50 4D-VAR performance optimisation : *Tomas Wilhelmsson*. 10 mins
- 12:00 HEXNET development : *Gerard Cats* 25 mins
- 12:25-12.50 New proposal for use of CVS for HIRLAM : *Kristian Mogensen* 25 mins
- 12:50-13.00 Discussion on tools : *Chair: Toon Moene* 10 mins

13:00-14:00. Lunch

Model Dynamics. Chair: Colin Jones

- 14:00. Recent progress with the SISL non-hydrostatic HIRLAM (Tartu model) : *Rein Rõõm*. 20 mins
- 14:25. Non-hydrostatic NWP environment at EHMI : *Aarne Männik*. 20 mins
- 14:45. Transparent boundary conditions - review of last years' work : *Aidan McDonald*. 20 mins

- 15:10-15.25. Sensitivity studies with the DMI-HIRLAM using different time-steps : *Karina Lindberg*. 15 mins

Synoptics and verifications Chair : Magnus Lindskog

- 15:30. Towards the operational RCR system - results from pre-operational runs : *Simo Järvenoja*. 30 mins

16:05-16:25. Coffee-break

- 16:25. Monitoring of the RCR - benefits of updated data assimilation : *Kalle Eerola*. 30 mins
- 17:00-17.20. Adaptation of the Reference HIRLAM to DMI's parallel suite - modifications, coupling and tests : *Xiaohua Yang*. 20 mins

Model Physics. Chair: José Antonio García-Moya

- 17:20-17.30. Some results on turning the stress vector in CBR : *Bent Hansen Sass*. 10 mins

Tuesday, 2 March

Model Physics and Meso-scale model (cont.). Chair: José Antonio García-Moya

- 09:00. HIRLAM contribution to the ELDAS project : *José Antonio Parodi*. 15 mins
- 09:20. Meso-scale modelling plans in HIRLAM : *Per Undén*. 20 mins
- 09:45. Meso-scale physics and physics interface in AROME : *Sylvie Malardel*. 25 mins
- 10.15. The future HIRLAM at KNMI : *Sander Tijm*. 20 mins

10:35-10:55. Coffee-break

- 10:55. Climate system features and new datasets : *Han The*. 15 mins
- 11:15. Climate generation developments for high resolution: *Kai Sattler*. 20 mins
- 11:40-12.00. Experimenting with HIRLAM orography : *Laura Rontu*. 20 mins

Working Groups Session.

Preliminary titles:

A: Orography, roughness and high resolution climate generation B: Meso-scale modelling in HIRLAM C: Observation Usage Work Plan

- 12:00-13:00. Working groups.

13:00-14:00. Lunch

Model Physics. Chair: José Antonio García-Moya

- 14:00 Radiation parameterisation for sloping surfaces : *Anastasia Senkova*. 15 mins
- 14:15 Evaluation of the HIRLAM surface scheme from semi-arid (EFEDA) to winter conditions : *Ernesto Rodríguez and Teresa Fernandez*. 15 mins
- 14:35 Coupling Statistical Clouds and turbulence - 1D tests of stratocumulus and shallow cumulus : *Colin Jones*. 20 mins
- 14:55. Progress on Kain-Fritsch/Rash-Kristjansson : *Javier Calvo*. 20 mins
- 15:15. Final tests prior to the operational implementation of the Physics-Dynamics coupling: *Isabel Martínez*. 20 mins

15:35-16:00. Presentations by working groups and discussion : *Chair: Per Undén*

- 15.35 Orography, roughness and high resolution climate generation
- 15.50 Meso-scale modelling in HIRLAM

16:00-16:20. *Coffee-break*

16:20-16:50. Presentations by working groups and discussion (cont.) : *Chair: Per Undén*

- 16.20 Meso-scale modelling in HIRLAM (cont.)
- 16.35 Physics interface and re-coding
- 16.50-17.00 Observation usage work plan

Ensemble prediction. *Chair: Bent Hansen Sass*

- 17:00. Initial experiments with MM5 ensemble members in INM's SREPS : *Daniel Santos*. 15 mins
- 17:15-17.30. Status of the HRM model in the INM SREPS : *Pau Escriba*. 15 mins

Evening: Social event

Wednesday, 3 March

Ensemble prediction (cont.). *Chair: Bent Hansen Sass*

- 09:00. Running HIRLAM with multiple boundary conditions to build members of the ensemble for SREPS : *Carlos Santos Burguete / José Antonio García-Moya*. 15 mins
- 09:15. SLAF and breeding for the SREPS : *José Antonio García-Moya*. 20 mins
- 09:40-09.55. Results from LAM-EPS : *Hilde Haakenstad*. 15 mins

Data Assimilation. *Chair: Harald Schyberg*

- 10:00. Data assimilation developments at Météo-France : *Dominique Giard*. 20 mins
- 10:20. Time-space aspects of radiosonde ascents : *Magnus Lindskog*. 10 mins

10:30-10:50. *Coffee-break*

- 10.50. Experiments with assimilation of ZTD GPS data : *Jana Sanchez*. 10 mins
- 11:05. Some results from the DMI impact studies : *Kristian Mogensen*. 15 mins
- 11:25. Improvement of the HIRLAM snow analysis : *Alberto Cansado-Auría*. 15 mins
- 11:45. Geostationary Satellite winds in HIRLAM : *Carlos Geijo*. 15 mins
- 12:00. VAD experiments using the INM weather radar network : *Carmen Salvador Durántez*. 15 mins
- 12:15-12:40. The current status of HIRLAM 4D-VAR : *Xiang-Yu Huang*. 20 mins

12:45-13:00. General Matters and wrap up. *Project Leader*

- 12.45 Meeting Programme for 2004 (Project Leader)
- 12.50 Any views and proposals for the organisation. (Staff).
- 12.55 Any Other Matters.

13:00. *Close of Meeting.*

13:00-14:00. *Lunch*

ASM Participants 2004

Met Éireann:

Aidan McDonald

Ray McGrath

FMI:

Simo Järvenoja

Kalle Eerola

Laura Rontu

Markku Kangas

Anastasia Senkova (St. Petesbourg Univ.)

Christoph Zingerle

Tartu Univ:

Rein Rõõm

Aarne Männik

KNMI:

Gerard Cats

Toon Moene

Sander Tijm

Han The

SMHI:

Per Undén

Colin Jones

Lars Mueller

Per Dahlgren

Tomas Wilhelmsson

Stefan Gollvik

Magnus Lindskog

Met.no:

Harald Schyberg

Frank Tvetter

Ole Vignes

Hilde Haakenstad

MF:

Sylvie Marandel

Dominique Giard

DMI:

Xiaohua Yang

Karina Lindberg

Xiang-Yu Huang

Bent Hansen Sass

Kristian Sten Mogensen

Kai Sattler

INM:

José Antonio García-Moya

Javier Calvo
Ernesto Rodríguez
Isabel Martínez
Beatriz Navascués
Carlos Geijo
Alberto Cansado
Estrella Gutuiérrez Marco
Carlos Santos Burguete
Pau Escriba
José A. Parodi
Jana Sánchez Arriola
Daniel Santos
Carmen Salvador Durántez