Application for NorFA's networks for research and research training

NorFA
Nordisk Forskerutdanningsakademi

Mottagit:	Prog:	Ref.nr.:

1 Last name	First name	Sex	Title/position
Savijärvi	Hannu	M	Professor of Meteorology

University	Academic degree
University of Helsinki	

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Postal code	City	Country	E-mail
00014	University of Helsinki	Finland	hannu.savijarvi@helsinki.fi

2 Title of the project/activity (max 50 characters)

Nordic Network on Fine-scale Atmospheric Modelling - NetFAM

3 Time span for the activity

01.01. 2005 31.12. 2007 x Year 1 ☐ Year 4

4 Subject area (See page 5)
Mathematics/Natural science, other and combined subjects (atmopheric/environmental physics)

5 Estimated number of participants	DK	FI	IS	NO	SE	EE	LV	LT	RU	Other inside the EU*	Other outside the EU*	Total	Men	Women
research students	2	10	5	5	3	4	-	5	7	3	-	44	29	15
other participants	11	8	3	7	5	3	-	1	5	7	-	50	39	11
research groups **	1	1	1	1	1	1	-	1	1	1	-	9	-	-

* Other countries France ** Each research group is a "national team" combined of two research groups

6 Summary. Give a short description of the network's targets and aims (max 200 words). NorFA reserves the right to use parts of or the text in full for information purposes.

The Nordic environment is unique in the world, with its extreme variability in time and space and thus poses a challenge for modelling and forecasting of the atmospheric behaviour and impacts. Its specific features require high temporal and spatial resolution together with adequate descriptions of the meteorological, climatological, environmental and physiographic conditions. Understanding, describing and properly predicting the Baltic and Nordic atmospheric variability is only possible using fine-scale models, capable of simulating all interacting physical processes of the atmosphere and the underlying surface. These special features and conditions must be properly taken into account also in most environmental and safety applications. On the other hand, this unique Nordic environment offers an excellent test bench for fine-scale models. Thus, the Nordic expertise in atmospheric modelling would make a valuable contribution to the understanding and prediction of global change processes and their impacts in specific and sensitive environmental conditions.

This Nordic Network on Fine-scale Atmospheric Modelling (NetFAM) aims to cover the whole chain from basic research and researcher training towards the application of these models. The network will share modelling tools, observational and physiographic data, as well as computing and educational resources, in order to strengthen the expertise in fine-scale atmospheric modelling in the Nordic countries and adjacent areas around the Baltic Sea. The network combines research groups from the leading universities and national weather services of the area. A special effort will be made to support, advice and monitor the training, mobility, communication/dissemination skills and research of young scientists in order to enhance their career profile.

7 Amount requested from NorFA: 3 x 300 000 NOK / year = 900 000 NOK

The department has accepted to administer the grant according to NorFA's rules and conditions	**X [1]**
The information about the persons and groups participating in the application is correct. NorFA may request confirmation (Letters of Intent) from the group leaders or network members.	**x**

[1] **Economically responsible institute/department: Finnish Meteorological Institute, Department of Meteorological Research P.O.Box 503, 00101 Helsinki, Finland**

8 Co-ordinating group (title, name, university, e-mail). A short presentation of the participants in the co-ordinating group must be enclosed. Use the enclosed form (Appendix 4).

Title	Name	University or equivalent	E-mail
Prof.	Hannu Savijärvi	University of Helsinki	hannu.savijarvi@helsinki.fi
Prof.	Sylvain Joffre	Finnish Meteorological Institute	sylvain.joffre@fmi.fi
Dr.	Katherina Kourzeneva	Russian State Hydrometeorological University	kourzeva@rshu.ru
Dr.	Marko Kaasik	University of Tartu	mkaasik@physic.ut.ee
	Paulius Jalinskas	Lithuanian Hydrometeorological Service	paulius@meteo.lt
Dr.	Patrick Samuelsson	Swedish Meteorological and Hydrological Institute	patrick.samuelsson@smhi.se
Dr.	Leif Laursen	Danish Meteorological Institute	ll@dmi.dk
Prof.	Thor Erik Nordeng	met.no	t.e.nordeng@met.no
Prof.	Haraldur Olafsson	University of Iceland	haraldur@vedur.is
Dr.	Eric Bazile	Meteo France	eric.bazile@meteo.fr
	Laura Rontu	Finnish Meteorological Institute	laura.rontu@fmi.fi

9 Other sources of funding

Source	Amount applied for (NOK)	Received (NOK)	Reply pending (date)
Vissby programme, Sweden Applied by RSHU and SMHI only for the academic year 2004-2005	135 000 SEK		reply expected: May, 2004

10 Budget

	Year 1 (Year 4)		**Year 2 (Year 5)**		**Year 3**	
EXPENSES	**Budget (NOK)**	**Result (NOK)**	**Budget (NOK)**	**Result (NOK)**	**Budget (NOK)**	**Result (NOK)**
a) refundable from NorFA						
Travel expenses	52 000		52 000		52 000	
Living exp.(room/board)	212 000		212 000		212 000	
Honoraria						
Administration	30 000		30 000		30 000	
Material	3000		3000		3000	
Other (venues + equipment)	3000		3000		3000	
b) not refundable						
Overhead	8000		8000		8000	
Computing	8000		8000		8000	
Communication	4000		4000		4000	
TOTAL EXPENSES	320 000		320 000		320 000	
INCOME						
Requested from NorFA	300000(35885€)		300000(35885€)		300000(35885€)	
Surplus from previous year (for extension only)						
Other income						
Own resources	20 000		20 000		20 000	
TOTAL INCOME	320 000 NOK		320 000 NOK		320 000 NOK	
BALANCE	0		0		0	
		Surplus may be transferred		Surplus may be transferred (not year 5)		

11 Obligatory and numbered appendices for the first year's application		Tick the enclosed appendices	
1	a five-page (maximum) description of the proposed activity, including:	X	
a	the current status of research and research training in the subject area in the Nordic countries		
b	an exposition of the prospects and need for Nordic co-operation in the subject area with particular reference to research training		
c	a detailed plan covering collaborative activities during the three first years		
d	targets to be achieved during the operating period of the network		
e	Visions for continued co-operation after the grant period		
f	What consideration are made to increase equal participation and equality of women and men?		
g	the estimated number of research students from each country expected to participate in the network		
2	the applicant's CV (maximum two pages)	X	
3	a list of the applicant's publications (maximum 20 titles)	X	
4	profiles of the participating groups (maximum one page per group)	X	9 x Appendix form 4
5	a detailed budget for the three years of the network, including specific information on the various items in the budget. (Please note that a maximum of 10 per cent may be used for administrative costs.)	X	

The application must reach NorFA no later than 16.00 pm on 2 May or the next working day if 2 May is a Sunday or public holiday. (See NorFA´s guidelines for applicants)

E-mail: nettverk@norfa.no
Address: NorFA, Holbergs gate1, N-0166 Oslo, Norway

12 Obligatory and numbered appendices when applying for extension		
A	**Application for extension on NorFA's application form together with the following numbered appendices**	
1	Activity plans for the coming year.	☐
2	A short profile of any new collaborative partners/research groups of the network (maximum one page per group).	☐
3	A detailed budget for the coming year, including specific information on the various items. Please note that no other appendices are necessary.	☐
B	**A progress report on the past year**	
1	Description of activities including:	☐
a	summary of the year under review, the results compared with the plans, explain differences if any.	
b	mobility within the network	
c	supervision of research students	
d	information on scientific results achieved through the network activities.	
e	List of members of the network: names, academic position, department, university and country.	
2	An economic report for the past year, clearly showing the allocation of funds to the various activities. The report should be signed by a representative of those financially responsible for administration of the grant..Account listings should not be submitted. If the network should change its financial administration during the period covered by the grant, the final accounts from the previous administration must be attached to the next progress report.	☐

The application must reach NorFA no later than 16.00 pm on 1 December or the next working day if 1 December is a Sunday or public holiday. (See NorFA´s guidelines for applicants)

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Appendix 1. Plan 2005-2007.

Nordic Network on Fine-scale Atmospheric Modelling (NetFAM)

The Nordic environment with its extreme and specific variability in time and space is unique in the world. However, these specific features are a real challenge for atmospheric modelling since it requires high temporal and spatial resolution. For instance in winter, hydrostatic stable conditions with low surface temperatures and strong shallow inversions over snow-covered ground and ice may prevail over extensive periods. The thermal contrast between the cold/warm sea and lakes, and the warming/cooling land surface creates specific opposite stability conditions influencing the local weather and mixing conditions. The long and complicated coast line and archipelagoes also demand increased resolution for predictions of, e.g., local weather, pollution dispersion, sea currents and waves and algal blooming.

All these special features and conditions must be properly taken into account in most environmental and safety applications. For instance, ensuring safety of the increasing maritime traffic over the sensitive Baltic Sea and fisheries at the western Scandinavian coast poses special requirements for environmental monitoring and prediction. Wave and ice prediction models require input wind data from fine-scale atmospheric models. Understanding and predicting air quality in cities requires the coupling of fine-scale numerical weather prediction (NWP) and air quality models. Ecological models for marine or terrestrial ecosystems also require high-resolution atmospheric deposition data in order to be in phase with biological cycles. Predicting regional impacts of climate changes will require advance physical parametrisations.

Thus, understanding, describing and properly predicting the Baltic and Nordic atmospheric variability (and downstream that of the sea, lakes and ecosystems) is possible only using fine-scale models, with new capacities in simulating interacting physical processes of the atmosphere and the underlying surface specificities. On the other hand, this unique Nordic environment offers an excellent test bench for these fine-scale models. Thus, the Nordic expertise in atmospheric modelling would make a valuable contribution to the understanding and prediction of global change processes and their impacts in specific and sensitive environmental conditions.

This Nordic Network of Fine-scale Atmospheric Modelling (NetFAM) aims at the promotion and development of a suite of complementary key aspects for comprehensive fine-scale atmospheric modelling of the complex Nordic-Baltic regional weather and climate processes and man-environment interactions, with a strong emphasis on the specificities of the Nordic natural environment and on the Baltic Sea feedbacks. To achieve these goals, the project is designed to cover the whole chain from basic research and researcher training towards the application of the models. The network will share modelling tools, observational and physiographic data, computing and educational resources, in order to strengthen the expertise on fine-scale atmospheric modelling in the Nordic countries and adjacent areas around the Baltic Sea. Individual training will be monitored.

The proposed network includes all leading research groups dealing with the fine-scale atmospheric modelling in the Nordic countries and adjacent areas. Nine united research teams were formed to represent the fine-scale atmospheric modellers of each country.

(a) Current status of research and research training in the fine-scale atmospheric modelling in the Nordic countries and adjacent areas

Fine-scale atmospheric models are used for basic atmospheric research, local NWP, climate studies and simulation of air quality and deposition to ecosystems. Recent developments in computing power offer new possibilities for a clear increase in spatial resolution of high-resolution model in the near-future down to the kilometre-scale, with a typical forecast range of one day. The development of such models requires expertise in 4 main areas: (1) Adaptation of observational information to the model (data assimilation), (2) Numerical methods for solving the hydrodynamic equations (model dynamics), (3) Parameterisation of subgrid-scale and microphysical processes and (4) Coupling the NWP-model with marine, hydrological and air chemistry models. However, the fine-scale resolution

poses special requirements in all these areas. For instance, it is necessary to relax the hydrostatic assumption used in larger-scale atmospheric models and thus to reformulate the basic equations of the models. For data-assimilation, new types of observation like radar information become essential. For physical parameterisations, models architecture must be developed to enable the full 3-dimensional description of turbulence, cloud-radiation interactions, etc. Thus, it is timely to combine expertise, synergize resources and form the basis for a future pole of excellence in this domain in the Nordic countries at this early stage of far-reaching new developments.

The proposed network includes all leading research groups dealing with fine-scale atmospheric modelling in the Nordic countries and adjacent areas. The participating national weather services (NWS) will develop, use and maintain the atmospheric research, weather prediction and regional climate model HIRLAM[1], while the atmospheric science departments of the participating universities will contribute to the model development and to researcher training in the critical areas of required expertise. All these universities have strong traditions of research and education in dynamical meteorology, which forms the basis for atmospheric modelling. This NWS-university cooperation will ensure effective and coordinated training.

All partners in NetFAM pursue research aimed at developing different aspects of fine-scale atmospheric models, but in a scattered manner and lacking critical mass for effective advances in the required areas of expertise, e.g.: expertise on non-hydrostatic dynamics is concentrated at UTa and MF, while DMI, FMI, met.no and SMHI have a key role in the development of data assimilation methods. There is a bias with most researchers and research students working on modelling of physical processes (particularly boundary layer (BL) physics and convection). Air quality modelling is addressed in most of the participating institutes but without concertation. Some institutes (e.g., LHMS and EMHI) are just starting work in atmospheric modelling and thus need support from the more experienced partners. The number of students and researchers in atmospheric physics in each university departments (except RSHU) is relatively small, with only a few specializing in (fine-scale) modelling, while research training in this field is often not possible at all. Moreover, ongoing training is not coordinated in any way, in spite of its societal relevance and the need for modellers in atmospheric science and other related fields such as oceanography, hydrology and environmental science.

The proposed NetFAM is an extension of the pilot project Baltic-HIRLAM (http://hirlam.fmi.fi/Baltic), which was funded during the academic year 2003-2004 by the Nordic Grant Scheme of the Nordic Council of Ministers. However, NetFAM will be a major stepwise advance in order to foster the deepening and extension of this Baltic cooperation, through a stronger integrated academic and research emphasis and a wider participation basis. A summary of the achievements of the Baltic-HIRLAM project is attached (Appendix 6).

(b) Prospects and need for Nordic co-operation in the fine-scale atmospheric modelling

The NetFAM-partners have so far concentrated on some aspects and applications of fine-scale modelling, but they all would benefit from strong research training and sharing of resources and expertise. Key areas where the strong expertise of some partners could be extended to the whole network are model dynamics and related numerical methods, fine-scale data assimilation, BL modelling and parameterisation. A critical component of any modelling development is the diagnosis and validation of model results, so that the network will put special emphasis in providing data and developing methods for validation.

The NetFAM partners will share important basic resources, including:

Models. The international HIRLAM project and Meteo-France will provide the network mem-

[1]Historically, HIRLAM (**H**igh **R**esolution **L**imited **A**rea **M**odel) is a genuinely Nordic initiative. Its development was started in 1984 as a cooperation of the meteorological institutes of the five Nordic countries. Till today, HIRLAM has grown to one of the main European limited area atmospheric models, consolidating into the international HIRLAM consortium nine national meteorological institutes and maintaining research cooperation with tens of research institutes and universities. The development of non-hydrostatic fine-scale HIRLAM takes place in close cooperation with Meteo France.

bers with the possibility to use the HIRLAM code and participate in the AROME[2] mesoscale NWP development. UTa will provide and maintain the Tartu non-hydrostatic HIRLAM code. In addition, other fine-scale modelling tools (MM5, the Unified Model from the UK MetOffice, the Canadian MC2 model) are used in some participating institutes.

Observational data. In addition to conventional meteorological observations, the partners of the network will share radar and satellite data, data from special observation campaigns (e.g. BALTEX, WINTEX, Icelandic SNEX) and micrometeorological data (e.g. Sodankylä mast and observatory).

High-resolution physiography data. These data describe the different properties of the underlying surface, including digital elevation maps and land-use data. In general they are freely available, but special methods are needed in order to apply them into fine-scale models. Data and methods will be shared within the network.

Computing resources. Fine-scale atmospheric modelling is computationally very demanding, some of the operations requiring supercomputing resources that are not widely accessible. These resources are available to the participating NWSs, and will be shared within the network during research visits.

Educational resources. A host of various educational and training materials related to atmospheric dynamics and numerical modelling is used in each country. A dedicated effort will be undertaken to make them available to all network members by using internet tools and resources.

Coupled models and components. Various systems for coupling NWP, air quality, hydrological, marine and land-surface models are applied within the network. Experience with each solution will be assessed and exchanged in order to produce optimized and advanced tools for all partners.

International contacts. Many members of the network are active partners in several international scientific programmes or projects involving atmospheric modelling. This will ensure strong links and exchanges between NetFAM and the international community, enable access to other data and raise awareness of model applications among the younger researchers. Relevant international research programmes and networks include: BALTEX (Baltic Sea Experiment), CEOP (Coordinated Enhanced Observing Period), and GABLS (Global Atmospheric Boundary Layer Study), COST-728 ("Enhancing Meso-scale Meteorological Modelling Capabilities for Air Pollution and Dispersion Applications"), the EUMeTNet programme SRNWP (Short Range Numerical Weather Prediction) for benchmarking and sharing joint model runs, and the EU FUMAPEX-project (Integrated Systems for Forecasting Urban Meteorology, Air Pollution and Population Exposure) to improve meteorological forecasts in urban areas through NWP and air pollution models coupling and feasibility studies in various cities (incl. Oslo and Helsinki).

(c) Detailed plan of collaborative activities during three first years

Most of the collaborative activities will be organized to support the identified key aspects of fine-scale modelling (cf. Section (a)) through dedicated training workshops but taking into account local needs through individual visits. The visits will be assessed and monitored by the Coordinating Group, though aiming at a fair distribution. The trainees will be asked to present their work at the network workshops, thus improving their communication/dissemination skills. The network partners can provide top class teachers and courses for the training and workshops, but whenever possible, experts from outside the Network will be invited. The team leaders in NetFAM will also aim at advising, supporting and monitoring research students in the planning of their curricula, mobility and research activities, in order to enhance their career profile. This will be organized through periodic meetings and using the web site.

Exchange visits

The resources of the network will be mainly used for one-three week's research visits between the institutes. Visits with a total length of approximately 30-35 weeks per year are planned. A detailed

[2]Fine-scale atmospheric model system "**A**pplications of **R**esearch to **O**perations in **ME**soscale" initiated by Meteo France

schedule of exchange will be prepared at the beginning of each year. A preliminary plan for the first year includes visits to study non-hydrostatic model system, boundary layer physics, radiation parametrizations, convection and microphysics, mountain effects, fine-scale data assimilation. Visits from nine groups directed to five groups are planned during the first year, see the budget for a preliminary plan of visits.

Workshops and summer schools to be arranged

Workshop on convection Helsinki, January-February 2005. For a state of the art description and discussion on improved representations of convection processes in NWP and air quality models since they critically influence the development of precipitation systems or the transfer of pollutants to the global atmosphere.

Participation in the **Sodankylä-2005 summer school and training campaign "Planetary boundary layers over complex and vegetated land surfaces"** arranged by FMI and UH in the framework of an ongoing EU project (Marie Curie Excellence Grants allocated to Prof. Sergei Zilitinkevich). For a broad approach to the BL theoretical and modelling aspects together with measuring techniques and data analysis on surface-atmosphere exchange over Nordic and Boreal ecosystems (e.g., lakes, forests, peat bogs).

Workshop on uncertainty in high-resolution atmospheric models, 2006. Fine-scale atmospheric models will provide deterministic and probabilistic forecasts of high impact weather (e.g. heavy precipitation), which may lead to severe floods and avalanches. However, as the resolution is improved the impact of uncertainties in model formulations becomes more significant. Thus new approaches and advanced methods of validation are required. The workshop aims at summarizing the state of the art and main lines of development in the field.

Summer school on "Non-hydrostatic dynamics and advanced data-assimilation methods for fine-scale models", St. Petersburg, summer 2006. To remove the paradox that this hard core topic of atmospheric modelling is poorly covered by current NetFAM's university curricula though NetFAM countries have world class experts. It will provide top-level lectures, practical exercises and training material, provided by the leading specialists within the network.

Workshop on cloudy boundary layer, Toulouse, 2007. Description of BL convection and its interactions with turbulent processes is a challenge for the fine-scale models. The workshop aims at a review, discussion and further planning of efforts in the area.

If resources will be remaining, NetFAM may support key researchers from the network to participate in the regular workshops of SRNWP on fine scale data assimilation, non-hydrostatic modelling, surface processes and verification.

Extended researcher training

During the three years, NetFAM plans to apply for separate mobility scholarships of 2-12 months for 1-3 young researchers from UTa and RSHU to the institutes with which they already cooperate.

The "Numlab-2005" course of UH, the MISU HIRLAM course and courses of dynamical meteorology and numerical modelling of RSHU are open for participants from NetFAM. The network will support LHMS/UV and EMHI who plan to send research students to attend these regular local courses. This will help enrolling research-oriented last-year students into fine-scale atmospheric modelling research already within their diploma projects.

Creation of a web page of NetFAM

A web page will be created for exchange and dissemination of information within the network as well as to promote the Nordic networking activities. The following services are planned: 1) Basic network information and documents (responsible: coordinating group); 2) educational resources and links (responsible: RSHU); 3) a simple discussion forum (responsible: UTa); 4) ftp server for data exchange (responsible: FMI).

(d) Targets to be achieved during the operating period of the network

The general objectives are:
1. To improve and support postgraduate research training and education on all aspects of fine-scale atmospheric modelling in Nordic countries and around the Baltic Sea.
2. To extend and deepen research and expertise in key areas of atmospheric fine-scale modelling in the region.
3. To establish long-lasting collaboration between the universities and meteorological institutes across the region in order to strengthen the chain from basic research to applications in fine-scale modelling.
4. To support the interactions and cooperation between fine-scale atmospheric modelling and researchers in marine, hydrological, aerosol and atmospheric chemistry modelling.
5. To promote the exchange of information and best practices on curricula and training on atmospheric simulation, fine-scale modelling and surface-atmosphere exchange.

Within the network, it is planned to create and make available to all participants
1. A non-hydrostatic research version of HIRLAM, suitable for application at the kilometre-scale. Knowledge and software for running alternative non-hydrostatic models will be exchanged.
2. Data sets applicable for model validation in stable atmospheric conditions (based on Sodankylä observations) and in convective cases.
3. Common definitions, tools and protocols for extended diagnostics and verification to be used in model comparison studies.

A system of extended visits, workshops and summer schools will be built in a coordinated way. Existing educational resources will be made available to all participants. Curricula and training will be also addressed during Workshops in a separate session. Scientific results obtained and presented during training and research visits will be published in appropriate scientific report series and peer-reviewed journals, whereby younger scientists will benefit from the insight of longer established scientists. The network activities will enhance the abilities of young researchers to be active in an international environment.

(e) Visions for continued co-operation after the grant period

The proposed network will help nurturing new common research projects and seeking external funding for joint activities, e.g. in the framework of EU and national science programmes. At present, NetFAM partners are already taking part in several international research programmes, which will last beyond the NetFAM grant period. This will enable continuation of cooperation and offer an opportunity to export the expertise acquired during NetFAM outside of the Nordic area but also to establish suitable grounds for implementing developments achieved elsewhere. Direct bilateral and multilateral collaboration between the partners will continue in different forms and guarantee the availability of resources also after the NetFAM period,

(f) Increasing of equal participation and equality of women and men

The percentage of women of the members of the research teams of NetFAM is 26 %. For historical and other reasons women and men are unevenly distributed in the different institutes of the network, as it is elsewhere in Europe in scientific discipline. Both men and women are guaranteed equal rights and conditions in participating in all network activities. In case of insufficient resources for visits and travelling we will aim at giving priority to the representatives of the minority.

(g) Estimated number of research students participating in the network

At present, the number of research student members in the national teams is about 40 or almost half of the total amount of researchers involved (see the project application for the distribution of students by groups). The number of research students estimated to participate in the network during these three years is 40-45.

APPENDIX 2

Short curriculum vitae: Mr. Hannu Ilmari Savijärvi

Born: 10 December 1947, Äänekoski, Finland. Nationality: Finnish
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Tel: 358 9 191 50857, Fax: 358 9 191 50860, email: hannu.savijarvi@helsinki.fi

University education:

- B.Sc., 1971, M.Sc.,1972, Phil.Lic., 1975 (physics, mathematics, meteorology).
  Faculty of Science, University of Helsinki, Finland
- Ph.D., 1981, in meteorology. University of Helsinki

Previous employment:

1969-1971 Scientist, Numerical Forecast Section, Finnish Meteorological Institute
1971-1977 Research Associate, Department of Meteorology, University of Helsinki
1977-1982 Senior Scientist, Deputy Head of the Diagnostics and Verification Section,
Research Department, European Centre for Medium Range Weather Forecasts
(ECMWF), Reading, England
1982-1997 Associate Professor, Department of Meteorology, University of Helsinki

Present position (1997-):

Professor of Meteorology, University of Helsinki. Head of the UH Modelling Group.
Head of the Department of Meteorology 1997-2001. Duties include original research and teaching at the undergraduate and graduate levels (4-6 courses per academic year).

Major research visits, memberships:

- Visiting invited scientist, Princeton University and Geophysical Fluid Dynamics Laboratory (GFDL), Princeton, New Jersey, U.S.A. 1.1.1986-6.1.1987.

- Visiting invited scientist, International Meteorological Institute, Stockholm U., many visits since 1990-

- UCAR Senior Visiting Scientist at the National Meteorological Center and Climate Analysis Center, Camp Springs, Maryland, U.S.A. 1.7.1993-30.6.1994.

- ECMWF Scientific Advisory Committee, member 1998-2002, 2003-
- Finnish Meteorological Institute Board, member 2001-
- The Finnish Academy of Science and Letters, member 1997-
- International Commission of Planetary Atmospheres and Evolution, member 2001-

Publications: About 130 publications, 36 first or single-authored in refereed inter-national journals (May 2003)

Research interests:

- Diagnostic studies of the general circulation. Verification and predictability of numerical weather forecasts. Climate simulation of planetary atmospheres.

- Atmospheric physics and parameterization of physical effects in numerical models (turbulent diffusion; radiative transfer; water phase changes; surface interactions).

- Mesoscale flow phenomena, their dynamics, physics, and numerical modelling, including applications to weather forecasting and to environmental and space sciences.

APPENDIX 3

List Hannu Savijärvi's 20 refereed articles after 1995
(of over130 in total 1971-2004, of which 38 first or single-authored in refereed international journals)

Savijärvi, Hannu
Error growth in a large numerical forecast system.
Monthly weather review 123 (1995) : 1, 212-221.

Savijärvi, Hannu
Mars boundary layer modeling : diurnal moisture cycle and soil properties at the Viking Lander 1 site.
Icarus : International journal of the solar system 117 (1995), 120-127.

Savijärvi, Hannu
Sea breeze effects on large-scale atmospheric flow.
Beiträge zur Physik der Atmosphäre 68 (1995) : 4, 335-344.

Savijärvi, Hannu
Water mass forcing.
Beiträge zur Physik der Atmosphäre 68 (1995) : 1, 75-84.

Savijärvi, Hannu
Shortwave optical properties of rain.
TelluSer.A.Dynamic meteorology and oceanography 49A (1997), 177-181.

Savijärvi, Hannu & Arola, A. & Räisänen, Petri
Shortwave optical properties of precipitating watercloud
Quarterly Journal of the Royal Meterological Society 123 (1997) : 540, 883-899.

Savijärvi, Hannu
Diural winds around Lake Tanganyika.
Quarterly Journal of the Royal Meterological Society 123 (1997) : 540, 883-899.

Savijärvi, Hannu & Räisänen, Petri
Long-wave optical properties of water clouds and rain.
TelluSer.A. Dynamic meteorology and oceanography 50A (1998) : 1, 1-11.

Savijärvi, Hannu
On the zenith angle integration in longwave wideband emissivity scheme
Beiträge zur Physik der Atmosphäre Vol. 72 (1999) : 1, 127-132.

Savijärvi, Hannu
A model study of the atmospheric boundary layer in the Mars Pathfinder lander condition
Quarterly Journal of the Royal Meteorological Society 125 (1999), 483-493.

Wyser, Klaus & Rontu, Laura & Savijärvi, Hannu
Introducing the effective radius into a fast radiation scheme of a mesoscale model.
Beiträge zur Physik der Atmosphäre Vol. 72 (1999) : 3, 205-218.

Savijärvi, Hannu & Järvenoja, Simo
Aspects of the fine-scale climatology over lake Tanganyika as resolved by a mesoscale model.
Meteorology and atmospheric physics 73 (2000) : 1-2, 77-88.

Savijärvi, Hannu & Amnell, Toni
High resolution flight observations and numerical simulations: horizontal variability in the wintertime boreal boundary layer.
Theoretical and applied climatology 70 (2001), 245-252.

Savijärvi, Hannu & Kauhanen, Janne
High resolution numerical simulations of temporal and vertical variability in the stable wintertime boreal boundary layer: a case study.
Theoretical and applied climatology 70 (2001), 97-103.

Savijärvi, Hannu & Liya, Jin
Local winds in a valley city.
Boundary-layer meteorology 100(2001), 301-319.

Niemelä, Sami & Räisänen, Petri & Savijärvi, Hannu
Comparison of surface radiative flux parameterizations: Part I: Longwave radiation.
Atmospheric research 58 (2001), 1-18.

Niemelä, Sami & Räisänen, Petri & Savijärvi, Hannu
Comparison of surface radiative flux parameterizations: Part II: Shortwave radiation.
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Appendix 4 (you can copy this page)
Presentation of participating groups

Group leader's last name	First name	Sex	Position
Laursen	Leif	M	Head, Meteorological Research Division

University	Academic degree

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Subject area (See page 5)
Mathematics/Natural Sciences, other and combined subjects (atmospheric/environmental physics)

Other participants in the group (use more space if necessary)

Last name	First name	Sex	Position
Sass	Bent	M	Senior Scientist/DMI
Lindberg	Karina	F	Scientist/DMI
Yang	Xiaohua	M	Senior Scientist/DMI
Huang	Xiang-Yu	M	Senior Scientist/DMI
Rasmussen	Alix	M	Senior Scientist/DMI
Walloe	Aksel	M	Associate Professor/UC
Baklanov	Alexander	M	Senior Scientist/DMI
Vedel	Henrik	M	Senior Scientist/DMI
Korsholm	Ulrik	M	Scientist/DMI
Sattler	Kai	M	Senior Scientist/DMI

Description of the group and it's activities

The Danish team combines researchers and PhD students of the Danish Meteorological Institute (DMI) and the University of Copenhagen (UC). The meteorological research division at DMI is mainly responsible for R&D in the areas of numerical weather prediction and modelling of air quality. UC is responsible for all academic education in meteorology in Denmark.

Within the team there is ongoing research in a number of areas.

- Development of data assimilation methods
- Use of satellite data in data assimilation
- Parameterisation of several physical processes (especially, convection, radiation and turbulence)
- Humidity analysis based on ground based GPS
- Development of optimal description of physiography
- Fluxes of momentum between the surface and the atmosphere
- Transport of substances in the atmosphere
- Chemistry, in particular ozone and aerosols
- Adaptation of suitable Non Hydrostatic models for use in the Nordic Area.

During the proposed NetFAM network, DMI and UC will participate in the planned workshops and training activities. Furthermore, DMI will participate in extended visits aimed at research collaboration in several of the areas mentioned above. The DMI staff will provide expertise and guidance in some of the key research topics as well as in associated technical work. Presently, there are no PhD students in the team, but DMI together with UC will aim at attracting them during the network period. DMI will provide appropriate data and computer resources for the participants in the network. The computing resources available for the group include a NEC-SX6 HPC cluster and a comprehensive storage facility.

Appendix 4 (you can copy this page)
Presentation of participating groups

Group leader's last name	First name	Sex	Position
Rõõm	Rein	M	Head of the institute

University	Academic degree
University of Tartu (Uta)	Ph.D.
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Subject area (See page 5)

Mathematics/Natural Sciences, Other and combined subjects (atmospheric/environmental physics)

Other participants in the group (use more space if necessary)

Last name	First name	Sex	Position
Kaasik	Marko	M	Researcher at Uta Member of the coordinating group
Männik	Aarne	M	Researcher at Uta
Luhamaa	Andres	M	PhD student at Uta
Zirk	Marko	M	MSc student at Uta
Ansper	Ivar	M	Head specialist at EMHI/ MSc student at UTa
Sarapu	Reidar	M	Specialist at EMHI

Description of the group and it's activities

The Estonian team combines researchers and PhD students from the University of Tartu/Institute of Environmental Physics (UTa, Tartu) and the Estonian Meteorological and Hydrological Institute (EMHI, Tallinn). The Institute of Environmental Physics has the responsibility for the curriculum in atmospheric physics and numerical meteorology. The main scientific activities are focused on numerical meteorology, nano-particle aerosol physics and atmospheric radiation studies. EMHI is the Estonian National weather forecasting agency under the Ministry of the Environment. The R&D team at EMHI is responsible for the implementation of numerical weather prediction at EMHI.

Ongoing research within this team mainly addresses the following topics of fine scale modelling:

- Development of physical models and numerical methods for very-high resolution non-hydrostatic atmospheric dynamics and applications to short-range weather forecasting,
- Investigations on boundary layer pollution dispersion and deposition,
- Implementation of numerical forecasting methods at EMHI.

In the proposed NetFAM network, the Estonian team will take responsibility of the maintenance work of all non-hydrostatic (NH) HIRLAM codes and of delivering know-how on NH HIRLAM setups and porting. Also, this team will provide the network with high resolution non-hydrostatic forecast data for analysis and initialisation, take part in the development of high resolution NH physics and participate in model inter-comparison studies.

The Computing resources of the group consist of the 12-node cluster computing facility at EMHI, the 8-node cluster computer facility at Tartu Observatory (Estonia), and workstations at UTa and EMHI.

Appendix 4 (you can copy this page)
Presentation of participating groups

Group leader's last name	First name	Sex	Position
Joffre	Sylvain	M	Research professor at FMI
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Subject area (See page 5)

Mathematics/Natural Sciences, Other and combined subjects (atmospheric/environmental physics)

Other participants in the group (use more space if necessary)

Last name	First name	Sex	Position
Bister	Marja	F	Lecturer at University of Helsinki (2006-2007)
Eresmaa	Reima	M	Researcher at FMI/PhD student at UH
Fortelius	Carl	M	Leader of the numerical modelling group at FMI
Gregow	Erik	M	Researcher at FMI
Hongisto	Marke	F	Senior researcher at FMI
Kangas	Markku	M	Senior researcher at FMI
Kauhanen	Janne	M	PhD student at UH
Niemelä	Sami	M	Researcher at FMI/PhD student at UH
Rantamäki	Minna	F	Researcher at FMI/PhD student at UH
Rontu	Laura	F	Researcher at FMI/PhD student at UH, member of the coordinating group
Savijärvi	Hannu	M	Leader of the modelling group at UH, coordinator of the network
Salonen	Kirsti	F	Researcher at FMI/PhD student at UH
Siljamo	Pilvi	F	Researcher at FMI/PhD student at UH
Sofiev	Mihail	M	Senior researcher at FMI
Tisler	Priit	M	Researcher at FMI/PhD student at UH
Zilitinkevich	Sergei	M	Professor emeritus, holder of Marie Curie chair at University of Helsinki
Zingerle	Christoph	M	Researcher at FMI

Description of the group and it's activities

The Finnish team combines researchers and PhD students in numerical modelling at the Finnish Meteorological Institute (Meteorological Research Dept., and Air Quality Research Dept.) (FMI) and at the University of Helsinki (Division of Atmospheric Sciences) (UH). The Department of Meteorological Research at FMI is responsible for the development of numerical weather prediction models and related applications. The Department of Air Quality Research develops dispersion models coupled with NWP models. The Division of Atmospheric Sciences of the University of Helsinki is responsible for the training of researchers and professionals in meteorology and atmospheric physics in Finland.

Ongoing research within this team mainly addresses the following topics or issues of fine scale atmospheric modelling:

- Use of radar wind data in fine-scale data assimilation
- Use of GPS information for the fine-scale humidity analysis
- Study of local atmospheric circulations over the Baltic Sea
- Parametrization and modelling of convective processes and microphysics of condensation
- Studies of the atmospheric boundary layer over heterogeneous surface and development of parametrization methods, especially undre stable inversion conditions
- Parametrization of radiative fluxes in a fine-scale model
- Study of the influence of small- and meso-scale orography on atmospheric momentum fluxes
- Development of methods for model diagnostics and verification
- Data assimilation for local air-quality models
- Fine-scale atmospheric modelling on planet Mars

HIRLAM is the basic model used and developed by the team for fine-scale atmospheric studies. The two-dimensional UH mesoscale model is maintained and used for development of parametrization schemes. The Finnish HIRLAM is coupled to the dispersion models SILAM and Hilatar both developed at FMI and to the wave model of the Finnish Marine Research Institute. In addition, the model MM5 from Pennsylvania State University / National Center for Atmospheric Research ihas been adapted and run for some specific studies on air quality and wind energy.

The team will provide the network participants with data from the unique Sodankylä micrometeorological mast (50 m high with turbulent flux sensors of momentum, heat, moisture, ozone and CO2) as well as data from measuring campaigns at boreal or subarctic environment (e.g., Hyytiälä, Värriö). The computing resources of the group consist of IBM supercomputing facilities at the Finnish IT Center for Science, SGI servers and workstations at FMI and UH. The team can provide guidance in the use of the HIRLAM system and model data.

The Finnish team is responsible for the coordination of the proposed NETFAM.

Appendix 4 (you can copy this page)
Presentation of participating groups

Group leader's last name	First name	Sex	Position
GIARD	Dominique	F	Responsible for international cooperations in NWP

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	Doctor

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Subject area (See page 5)

Mathematics/Natural Sciences, Other and combined subjects (atmospheric/environmental physics)

Other participants in the group (use more space if necessary)

Last name	First name	Sex	Position	
Bazile	Eric	M	Senior Scientist/MF	Member of the coordinating group
Benard	Pierre	M	Senior Scientist/MF	
Hello	Gwenaelle	F	Senior Scientist/MF	
Malardel	Sylvie	F	Senior Scientist/MF	
Montmerle	Thibaud	M	Postgraduate student	
Piriou	Jean-Marcel	M	Researcher at MF/PhD student at University of Toulouse	
Seity	Yann	M	Senior scientist/MF	
Pinty	Jean-Pierre	M	Senior scientist/University of Toulouse	
Zhang	Hua	M	Postgraduate student	

Description of the group and it's activities

The French team includes researchers and PhD students from Météo France (GMAP department) (MF) and the University Paul Sabatier (Department of Aerology) (UTo). The GMAP department is responsible for R&D in numerical weather prediction at Météo-France.Two NWP models are used in Météo-France: a global model (ARPEGE) with a variable mesh size (from 22 km over France to 250km over Australia) and a limited area model (ALADIN) with a resolution of 10km over France. The GMAP team participates in the HIRLAM cooperation and is now responsible for the development of the very high resolution non-hydrostatic NWP model AROME (Applications of Research to Operations in Mesoscale) in collaboration with the University of Paul Sabatier and several national (hydro) meteorological services in Europe.

Within the team there is ongoing research in the following areas:

- parametrization of physical processes : convection, microphysics, turbulence, surface, gravity wave drag
- variational data assimilation
- non-hydrostic dynamics
- use of new observations, especially radar reflectivities

Presently, there are two postgraduate people in GMAP and one PhD student. Next year we will have probably 3 PhD students from the University of Toulouse working on new observations and assimilation for AROME.

In the network we will exchange experience and knowledge on mesoscale modelling. In particular, we will focus on the cloud micro physics for AROME (J.P. Pinty, Y. Seity) and on the surface and snow parameterization, associated with the study of the stable boundary layer using the Sodankylä data. The team (MF and Uto) has also a large experience in nonhydrostatic modelling with the research model (Méso-NH) and in education in this area.

Computing ressources of the group consist of 2 Fujitsu supercomputer VPP5000 at Météo-France (one dedicated for research), workstation at Météo-France and at Uto.

Appendix 4 (you can copy this page)
Presentation of participating groups

Group leader's last name	First name	Sex	Position
Ólafsson	Haraldur	M	Professor

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University of Iceland	Dr.
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Subject area (See page 5)

Physics of the atmosphere

Other participants in the group (use more space if necessary)

Last name	First name	Sex	Position
Rögnvaldsson	Ólafur	M	Executive, Institute for Meteorological Research
Ágústsson	Hálfdán	M	PhD student
Einarsson	Einar	M	Researcher/student
Arason	Teitur	M	Researcher/student
Halldórsdóttir	Sæunn	F	student
Ólason	Einar	M	student
Rögnvaldsson	Örnólfur	M	Researcher

Description of the group and it's activities

In the area of fine-scale numerical modelling, the Icelandic group has an emphasis on the impact of complex terrain on wind and precipitation. The group has carried out several research projects that involve fine-scale simulations of the atmosphere and its interaction with the ocean (ocean modelling), and land (snow modelling and modelling of the transport of sand by wind). Currently, the group is concentrating on mapping of precipitation and wind climate in complex terrain by numerical modelling on scales from 300 m to about 10 km. The group cooperates in projects that aim at providing data for validation. These projects consist of running automatic weather stations, gathering of snow data for validation of precipitation simulations. A dense portable network of automatic raingauges is in the planning phase.

The group is responsible for running high-resolution (3km) real-time simulations for forecasting purposes for the Icelandic Meteorological Office and other local institutes (http://www.os.is/~or/vedurspa/).

The Icelandic group is led by professor Haraldur Ólafsson (http://www.vedur.is/~haraldur) who has authored about one hundred scientific papers, conference proceedings and technical reports. The group has active cooperation with several international research groups in Europe, including the Nordic countries and in America. Locally, the group has active cooperation with the road authorities, the agricultural university at Hvanneyri and the national energy authorities.

Icelandic group may provide data for validation of fine-scale models: precipitation from the Reykjanes experiments (REX) and upcoming REX2, wind and temperatures from a dense network of automatic weather stations, including the SNEX-experiment.

Appendix 4 (you can copy this page)
Presentation of participating groups

Group leader's last name	First name	Sex	Position
Kilkus	Kestutis	M	Head of department

University	Academic degree
University of Vilnius	professor
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Subject area (See page 5)

Mathematics/Natural Sciences, Other and combined subjects (atmospheric/environmental physics)

Other participants in the group (use more space if necessary)

Last name	First name	Sex	Position
Ovadnevaite	Jurgita	F	Researcher at LHMS/PhD student at UV
Jalinskas	Paulius	M	Researcher at LHMS/PhD student at UV Member of the coordinating group
Stankunaite	Inga	F	Master student at UV
Janusauskas	Martynas	M	Master student at UV
Kazlauskas	Martynas	M	Master student at UV

Description of the group and it's activities

The Lithuanian team combines researchers and PhD students from the University of Vilnius/Department of Hydrology and Climatology (UV) and the Lithuanian Hydrometeorological Service/Division of Climatology and methodology.

The Department of Hydrology and Climatology (University of Vilnius) consists of 7 lecturers, 3 of which teach meteorological courses. There are 15 Master and 4 Post Doc students. The main research fields are: atmospheric physics, applied meteorology and climate change. The research themes cover the formation of long lived weather anomalies in Lithuania; atmospheric circulation classification techniques; weather patterns linked to different NAO/AO phases; applications of observational and reanalysis data; UV radiation modelling. There is no course on "Numerical methods" and "Dynamic meteorology" at the department. NetFAM could give an opportunity to share scientific resources between different institutions, and the possibility for Master and Postgraduate students from Lithuania to attend courses on "Numerical methods" and "Dynamic meteorology". This would further ensure its possibilities for developments in numerical modelling together with the Lithuanian Hydrometeorological Service.

Division of climatology and methodology carries out NWP implementation at LHMS and is responsible for climate studies and applications as well as preparation of methodological works. Division consists of 7 persons (2 of them are postgraduate students). According to an approved project by the Lithuanian Hydrometeorological Service called "Institution strengthening in preparation for upgrading of Lithuanian meteorological network", LHMS aims at implementing HIRLAM and developing the its physical parametrizations (convection, surface layer).

The computing resources available at LHMS and UV are limited to workstations, one of which is devoted to HIRLAM.

Appendix 4 (you can copy this page)
Presentation of participating groups

Group leader's last name	First name	Sex	Position
Nordeng	Thor Erik	M	Head, Numerical Weather Prediction Programme

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Subject area (See page 5)

Mathematics/Natural Sciences, Other and combined subjects (atmospheric/environmental physics)

Other participants in the group (use more space if necessary)

Last name	First name	Sex	Position
Midtbø	Knut Helge	M	Head of Section, met.no
Ødegaard	Viel	F	Senior Scientist, met.no
Jensen	Marit	F	Scientist, met.no
Vignes	Ole	M	Senior Scientist, met.no
Bjørge	Dag	M	Senior Scientist, met.no
Kristjansson	Jon Egill	M	Professor, University of Oslo
Skeie	Ragnhild B.	F	Student, University of Oslo
Akre	Guri	F	Student, University of Oslo
Student	#3	?	University of Oslo
"	"	"	"
"	"	"	"

Description of the group and it's activities

The Norwegian team combines researchers and PhD students at the University of Oslo/Department of Geosciences (UiO) and the Norwegian Meteorological Institute (met.no).

The Research Department at met.no consists of approximately 60 scientists working in the area of atmospheric sciences focusing on numerical modelling at all scales (from climate simulations to microscale dynamics), on oceanography (currents, ice, climate issues), on air pollution ranging from the regional (European) scale to to the local scale i.e. cities, and on the use of observations in data assimilation with emphasis on objective analysis of remotely sensed data and software developments. The Department has strong links to the Department of Geosciences at the University of Oslo through lecturers, common seminar series, employees (adjoint professors) and as supervisors for Master and PhD- students.

The team participates and contributes in the HIRLAM cooperation and its model development work but has in addition a team working with high resolution non-hydrostatic models capable of resolving the km-scale dynamics. At present, the Unified Model of the UK MetOffice is run operationally twice a day over an area covering southern Norway and adjacent seas with a horizontal resolution of 3 km up to 48 hours ahead. The MM5 model is used to provide meteorological input data for air pollution transport models on the city scale and is also run up to 48 hours ahead for selected Norwegian cities with a 1 km resolution. These models as well as the Canadian MC2 model are also used as research tools to study interesting flow situations set up for instance by the complex Norwegian topography and the contrast between land, sea and snow/ice. The team participates in numerous projects funded by EU or the Norwegian Research Council. Worth mentioning in this respect are the ATREUS and FUMAPEX projects aimed at describing the local meteorology (in cities) by use of high resolution models.

Research within the area of numerical weather prediction is also carried out at MetOs. In particular, there is an activity using targeted singular vectors for ensemble predictions. Another activity uses water vapour imagery and potential vorticity inversion to improve the initial state of the NWP model. In addition, research on the impact of orography on airflow is being carried out, using the MM5 and HIRLAM models The meteorology and oceanography section (MetOs) at the Department of Geosciences of the University of Oslo has strong activities in large-scale modeling of atmospheric chemistry, aerosols and clouds, as well as interactions between these components and the climate system itself. These activities are supported through numerous projects funded by the European Union and the Norwegian Research Council. The group is also a partner in a Nordic Center of Excellence, led by Prof. Markku Kulmala of the Helsinki University. The most important modeling tools for these activities are the Oslo CTM2 Chemical Transport Model and the NCAR CCSM coupled climate model.

Even though modeling is the main focus at MetOs, there is an emerging research activity in remote sensing and its applications. Satellite data, mainly from MODIS, are being used extensively for studies of aerosols and their influence on clouds and radiation. Furthermore, a tropospheric LIDAR system, designed to retrieve ice crystal and aerosol properties, is being installed at Andøya in Northern Norway, in close collaboration with scientists at MetOs.

In the NETFAM network, we will focus on exchanging knowledge and experiences with our partners in particular with regard to operational (daily) use of high resolution models and the challenges this requires. We will particularly concentrate on the interaction of the atmosphere with complex topography and coastal effects (flow enhancements, i.e. strong wind is here a keyword), but other key areas are parameterization of physical processes with emphasis on how to parameterize cloud microphysics and turbulence and not least the verification problem (how to verify modelled versus observed discrete events).

Appendix 4 (you can copy this page)
Presentation of participating groups

Group leader's last name	First name	Sex	Position
Repinskaya	Raisa	F	Head of the Weather Prediction department

University	Academic degree
Russian State Hydrometeorological University	Prof.
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Subject area (See page 5)

Mathematics/Natural Sciences, Other and combined subjects (atmospheric/environmental physics)

Other participants in the group (use more space if necessary)

Last name	First name	Sex	Position
Genikhovich	Eugene	M	Head, Air Pollution Modelling and Forecasting Lab, MGO
Ziv	Alexander	M	Senior Scientist, MGO
Kourzeneva	Katerina	F	Lecturer, RSHU Member of the coordinating group
Senkova	Anastasia	F	PhD student, RSHU
Kozlova	Dina	F	PhD student , RSHU
Kanoukhina	Anna	F	Student / PhD student, RSHU
Atlaskin	Eugene	M	Student / PhD student, RSHU
Mironov	Dmitri	M	Senior scientist, RSHU and DWD
Gavrilov	Alexander	M	Professor, RSHU

Description of the group and it's activities

The Russian team combines researchers and PhD students from the Russian State Hydrometeorological University/Weather Prediction Department (RSHU/WPD) and the Main Geophysical Observatory/Air Pollution Modelling and Forecasting Laboratory (MGO/APMFL), St.Petersburg. The main scientific activities of RSHU/WPD focuses on studying atmospheric processes for weather analysis and forecasting methods development, as well as on natural and anthropogenic climate changes. The RSHU/WPD course in numerical weather prediction and climate modelling is one of the major educational topics. MGO/APMFL is the leading Russian scientific centre working on atmospheric diffusion theory, air pollution modelling/forecasting and corresponding problems in geophysical hydrodynamics and boundary-layer meteorology.

Ongoing research within this team mainly addresses the following topics or issues of fine scale modelling:

- Parameterisation of radiative fluxes in a fine-scale model
- Surface parameterisation: coupling with a lake model
- Implementation of surface parameterisation to newly developed model and verification
- Prediction, study and parameterisation of convective processes
- Data assimilation for local air-quality models
- Dispersion modelling in local and regional scales
- Assessment of the environmental and health impacts in local and regional scales
- Downscaling of meteorological fields governing dispersion processes in the atmosphere

At RSHU, the following atmospheric models have recently been installed for research and educational purposes: the weather fine-scale model HIRLAM, the FMI dispersion model SILAM, the weather prediction model of the Institute of Numerical Mathematics of the Russian Academy of Science (INM RAS), and the lake model Flake of the German Weather Service (DWD). A set of non-Gaussian dispersion models based on numerical integration of the advection-diffusion equation has been developed at MGO; these models can be used to estimate different statistics of the concentration fields. The Vorticity-Topography Model TVM (developed at the Catholic University of Louvain, Belgium) is presently in use as a meteorological driver for dispersion models.

A comprehensive theoretical course on dynamical meteorology and numerical atmospheric modelling has been lectured at RSHU historically since a long time. A further updating of the numerical atmospheric modelling course for postgraduate students is planned. The RSHU team can provide educational materials for PhD students. The RSHU team has also close contacts with the team of the Institute of Numerical Mathematics (Russian Academy of Sciences, Moscow), which is developing the new Russian weather prediction model, and DWD, who provides the expertise in coupling the lake model with fine-scale atmospheric models.
The MGO/APMFL team cooperates with scientists from the Finnish Meteorological Institute in the framework of a bilateral agreement between Russian and Finnish meteorological services; it works also in cooperation with scientists from the Catholic University of Louvain, Belgium, the National Environmental Research Institute of Denmark, and the Goddard Space Center, USA.

At present , the computing resources at RSHU and MGO are limited to workstations, which are mainly used for preliminary modelling studies. We would greatly benefit from sharing of the computing resources within the network.

Appendix 4 (you can copy this page)
Presentation of participating groups

Group leader's last name	First name	Sex	Position
Gustafsson	Nils	M	Head of NWP research

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Stockholm University	Assoc. Professor
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Subject area (See page 5)

Mathematics/Natural Sciences, Other and combined subjects (atmospheric/environmental physics)

Other participants in the group (use more space if necessary)

Last name	First name	Sex	Position	
Samuelsson	Patrick	M	Researcher at SMHI	Member of the coordinating group
Wille'n	Ulrika	F	Researcher at SMHI / PHD-student	
Andrae	Ulf	M	Researcher at SMHI /PHD-student	
Lindskog	Magnus	M	Researcher at SMHI /PHD-student	
Jones	Colin	M	Researcher at SMHI	
Gollvik	Stefan	M	Researcher at SMHI	
Perov	Veniamin	M	Researcher at SMHI	

Description of the group and it's activities

The Swedish team combines researchers and PhD students from the Swedish Meteorological and Hydrological Institute (SMHI,Norrköping) and the University of Stockholm/Institute of Meteorology (MISU).

There is a lot of research in the area of fine scale modelling within this team, i.a.:

- Fine-scale data assimilation, with emphasis on remote sensing data (radar, GPS, satellite)
- Study of local atmospheric circulations over the Baltic Sea
- Parametrization and modelling of convective processes and microphysics of condensation
- Studies of atmospheric boundary layer over heterogeneous surface and development of parametrization methods
- Parametrization of radiative fluxes in a fine-scale model
- Development of methods for model diagnostics and verification
- Parameterisation and modelling of surface processes, including forests and lakes

The main modelling tool for the team is the fine scale HIRLAM model. Our work will be concerned with data assimilation, parameterisation and modelling of surface processes, parameterisation of convective processes and microphysics of condensation and studies of atmospheric boundary layer. The team is experienced in education in the area of fine scale modelling in relation to HIRLAM.

Computing resources of the group consist of supercomputing facilities at the National Centre for Supercomputing NSC) located in Linköping.

Appendix 5. Budget of the proposed NetFAM, 2005-2007

Basic assumptions concerning travel, accomodation and board

For one person, an average travel cost (boat, train, plane) per visit is estimated to be 1700 NOK; per diem of 250 NOK are paid during the visits or a corresponding amount used by the host for day expenses; during long visits from 2 weeks to 3 months, the cost of accomodation is 1300 NOK per week; during training course,s the cost of accomodation is 300 NOK per day; during short visits the cost of hotel accomodation is 600 NOK per day. A typical short visit lasts 3 days and costs 4250 NOK, a typical long visit lasts two weeks and costs 7300 NOK.

Expenses and income

1 euro $\approx$ 8.3 nok (norwegian krone)

Expenses	2005	2006	2007	Notes
Exchange visits	157 700	160 000	174 000	total 30-35 weeks per year
Mini-workshop on convection	42 500			2-3 days, 15 NetFAM participants
Sodankylä summer school	49 000			one week, 10 NetFAM participants
Uncertainty workshop		40 000		2-3 days, 10 NetFAM participants
St.Petersburg summer school		50 000		one week, NetFAM teachers etc
Toulouse workshop			60 000	2-3 days, 15 NetFAM participants
Short visits and meetings	13 800	14 000	30 000	total 3-6 visits per year
Training material	3 000	3 000	3 000	
Workshop equipment+venues	3 000	3 000	3 000	
Administration	30 000	30 000	30 000	
Subtotal	300 000	300 000	300 000	
Computing and data	8 000	8 000	8 000	
Communication	4 000	4 000	4 000	
Other expenses	8 000	8 000	8 000	
total	320 000	320 000	320 000	
Income	2005	2006	2007	
Requested from norfa	300 000	300 000	300 000	
Own resources	20 000	20 000	20 000	

Workshop and summer school, 2005

Workshop on convection, Helsinki, January 2005

3 days, accomodation in an economy hotel, meeting at FMI

10 participants outside Helsinki x 3 days x (250 NOK per diem + 600 NOK accomodation) + 10 x 1700 NOK travel = 42500 NOK

Sodankylä summer school, Sodankylä, summer 2005

6 days, economy accomodation, school at Observatory

10 participants from NetFAM x 6 days x (150 NOK daily expenses + 250 NOK accomodation) + 10 x 2500 NOK travel = 49 000 NOK

Preliminary estimation of the expenses of possible research visits

Table 1: Exchange visits within the planned NetFAM

From	To	Topic	Weeks	Euros
DMI/UC	MF/UTo	Physiography	1	700
UTa/EMHI	MF/UTo	Convection	1	700
UTa/EMHI	MF/UTo	Nonhydrostatic	1	700
FMI/UH	MF/UTo	Microphysics	1	700
RSHU	MF/UTo	Surface layer	1	700
SMHI/MISU	MF/UTo	Nonhydrostatic	1	700
UTa/EMHI	FMI/UH	Air quality	2	800
UTa/EMHI	FMI/UH	Nonhydrostatic	2	800
MF/UTo	FMI/UH	Sodankylä data	1	700
RSHU	FMI/UH	Radiation	3	1200
RSHU	FMI/UH	Air quality	2	800
SMHI/MISU	FMI/UH	Data assimilation	1	700
MF/UTo	DMI/UC	HIRLAM physics	1	1000
VI/UI	DMI/UC+Risoe	BL + topography	1	1000
FMI/UH	SMHI/MISU	Radar simulator	1	700
LHMS/UV	SMHI/MISU	Dynamics edu + convection	10	3500
RSHU	UTa	Convection	2	600
mn/UO	VI/UI	Mountain effects	1	1000
LHMS/UV	RSHU/MGO	Dynamics + numerics edu	12	2000
Total euro				19000
Total NOK				157700

Appendix 6

Preliminary summary of the Baltic HIRLAM project 2003-2004

The Baltic HIRLAM project is funded by the Nordic Grant Scheme of the Nordic Council of Ministers during the academic year 2003-2004. This is the first, and in its present form also the final year of the project.

The project is successfully following the accepted plan. A system of information exchange was set up, based on the web site http://hirlam.fmi.fi/Baltic and a related mailing list baltic-hirlam@helsinki.fi. Detailed information related to the cooperation is available at this web site.

A Baltic HIRLAM workshop was arranged in St.Petersburg in November. The workshop was scientifically successful and created new contacts for the cooperation network. A total of 46 persons from all partner institutes plus France, United Kingdom and Germany took part in the workshop. The workshop programme, list of participants and files of the presentations are available at the project web site. A printed workshop report (142pp), containing the extended abstracts of the presentations, was published in April, 2004.

During the academic year, 25 exchange visits of total length of about 50 weeks have taken place (or planned till the end of June, 2004) between the institutes (Table 1). 18 students and researchers, representing all 5 participating countries, have taken part in these exchange visits. During these visits, different areas of the plan have been covered: development of the fine-scale HIRLAM system and physical parametrization schemes, application of fine scale HIRLAM results for air quality and nowcasting studies. Four of the visits are related to basic training on the numerical modelling system of HIRLAM.

A project meeting was arranged in connection with the St.Petersburg workshop. Minutes of the project meeting are available at the project web site. Another meeting in Tartu 5-6.4.2004, was devoted to preparing a NorFA network application aimed at the continuation of the cooperation.

Table 1: Exchange visits in Baltic HIRLAM 2003-2004

From	To	Topic	Visit weeks	Persons	Cost
RSHU	FMI	Convection	6	G.G.Tarakanov, A.Kanuhina	1800
RSHU	FMI/UH	Radiation	8	A.Senkova	2500
RSHU	FMI	HIRLAM reanalysis	4	Y.Atlaskin	1200
RSHU	FMI	Air quality	3	Y.Atlaskin	900
RSHU	FMI	Radar applications	4	V.Terekhova,T.Ermakova	1000
UT	FMI	Air quality	2	M.Kaasik	700
UT	FMI	Convection	0.5	R.Room, A.Luhamaa	300
UT	FMI	Nonhydrostatic	3	A.Männik	800
EMHI	FMI	HIRLAM training	1	R.Sarapu, I.Ansper	300
FMI	RSHU	Supervision	1	M.Sofiev, L.Rontu	200
FMI	UT	Opponent of PhD	0.5	C.Fortelius	100
RSHU	SMHI	Lake model	4	K.Kourzeneva	2900
SMHI	RSHU+FMI	Boundary layer	1	V.Perov	1000
LHMS	SMHI/MISU	HIRLAM course	10	P.Jalinskas	4100
LHMS	SMHI	Convection	2	P.Jalinskas	1200
total			50	18	19000

The estimated cost is given in euros.

A final report about the fulfillment of the plan and budget will be given to the administration of the Nordic Grant Scheme of Nordic Council of Ministers by the end of the project in June, 2004.

Helsinki, 25.4.2004. Carl Fortelius, coordinator of Baltic HIRLAM project