



FINNISH METEOROLOGICAL INSTITUTE

2005



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FINNISH METEOROLOGICAL INSTITUTE

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The Finnish Meteorological Institute – For people and the environment

THE FINNISH METEOROLOGICAL INSTITUTE IS AN EXPERT BODY IN ISSUES CONCERNING THE ATMOSPHERE. PRODUCING OBSERVATIONAL DATA AND RESEARCH FINDINGS ON THE ATMOSPHERE, THE INSTITUTE DRAWS ON ITS EXPERTISE TO PROVIDE SERVICES BENEFITING PEOPLE AND THE ENVIRONMENT.

The Finnish Meteorological Institute works to be a forerunner in European atmospheric know-how. Our vision requires that we represent the highest standard not only in the scientific study of the atmosphere but also in operative production and methodology, as well as in information and observation technology. Through this know-how, we can have a positive effect on society:

providing services that make it easier for the authorities and businesses to do their work, and making people safer in their environment.

Founded in 1838, the Finnish Meteorological Institute has played a pioneering role, for instance, by creating a weather observation network covering the whole of Finland and by developing the first weather services intended for the general public. The Institute has

contributed to international efforts to solve the acid rain problem and has participated in Finland's first space projects.

Besides the weather and safety, the Finnish Meteorological Institute's major challenges and areas of focus in the 21st century include the impact of the atmosphere on the environment and people, and climate change and adaptation to it.



The Finnish Meteorological Institute - An Expert on the Atmosphere

THE OBJECTIVE OF THE FINNISH METEOROLOGICAL INSTITUTE IS TO BE A FORERUNNER IN ATMOSPHERIC EXPERTISE AND TO MEET THE EXPECTATIONS AND NEEDS SET BY SOCIETY FOR THE INSTITUTE'S SERVICES.

Our new premises at the Dynamicum mean many new opportunities for us. The location in Kumpula enhances synergies and expands cooperation, for instance, with the Finnish Institute of Marine Research and various departments of the University of Helsinki. The Dynamicum offers us a modern infrastructure enabling increasingly efficient operations. The move was of historical importance also for our internal modes of operation: with the exception of our regional units, the Institute's entire staff is finally under the same roof. We are now able to benefit from internal partnership, common values and goals, and uniform practices.

The importance of partnerships for business processes is a widely known concept in the economy. Enterprises concentrate on their precisely defined core competences and seek efficiency by means of partners. This type of model works well for the Finnish Meteorological Institute, too: The common denominator for our wide range of activities is the atmosphere, and we provide services associated with the atmosphere for all branches of administration and business. By combining our expertise in atmospheric issues with the expertise of other players, we can increase people's safety in their environment.



The traffic sector – airline, road, marine and rail traffic – is the FMI's biggest customer. Therefore the Institute works in the administrative sector of the Ministry of Transport and Communications. Other major customers include the Finnish Defence Forces, the administrative sector of the Ministry of the Interior, the Ministry of Trade and Industry, the Ministry of Agriculture and Forestry, the Ministry of Education, the Ministry of Social Affairs and Health, the Ministry for Foreign Affairs, and the Ministry of the Environment. In addition, the FMI produces a wide range of weather warning services

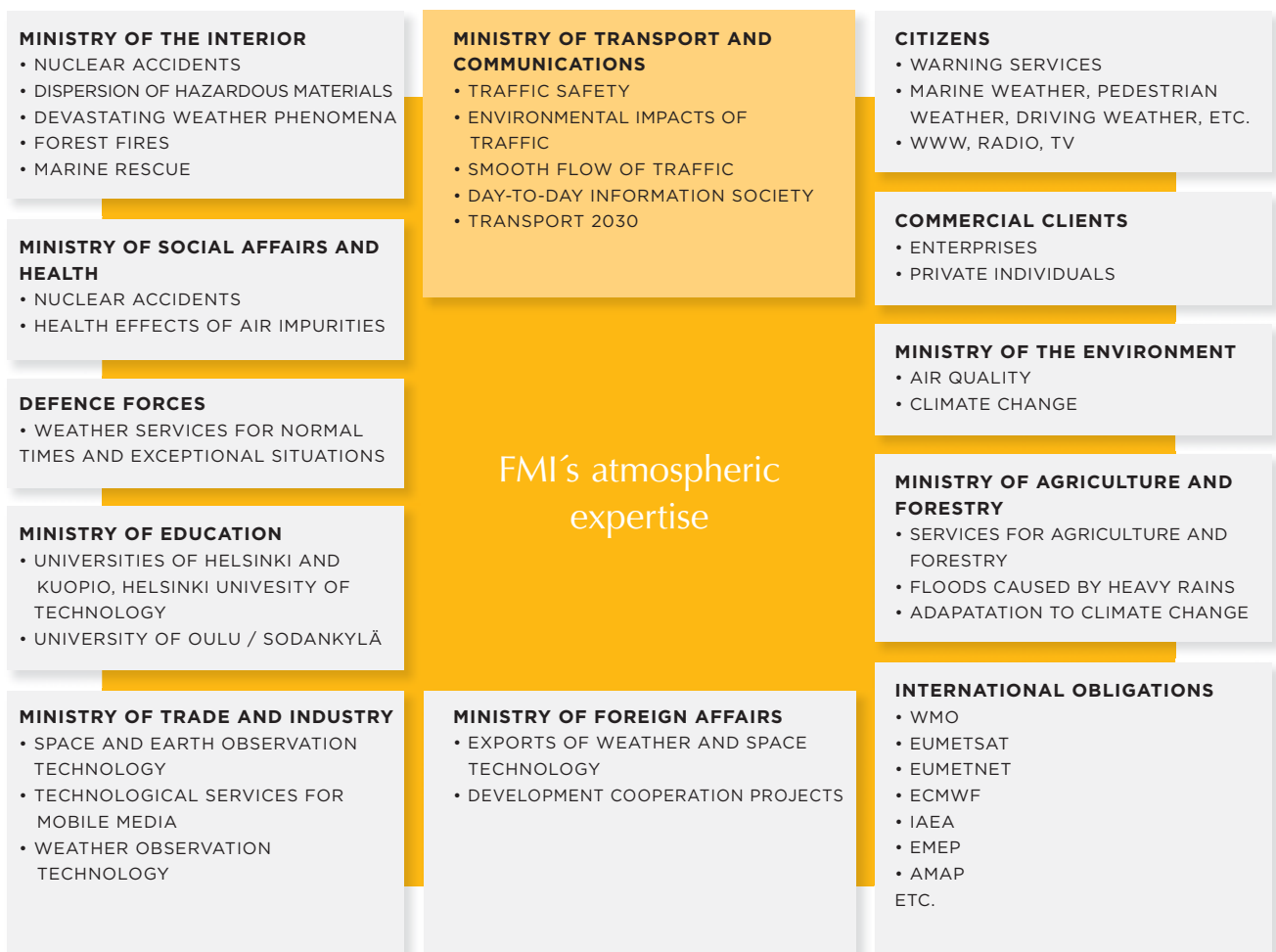
free of charge for all citizens, as well as diverse commercial services to meet the specialised needs of businesses and private individuals.

The Finnish Meteorological Institute has also been vested with many atmosphere-related research and service obligations set down in international agreements. These operations and all scientific work done in our Institute support our objective of meeting society's needs. In consequence, our scientific competence must meet high international standards in the Institute's all fields of operations.

According to the VIP2005 survey conducted by TOY Research (Taloustutkimus), the Finnish Meteorological Institute has the image of an expert of high-level competence. For the second time, we were ranked first among public service-providers. This proves that we are doing the right things – and doing them well.

Our aim is to continue fulfilling the expectations placed on us by society and the business world. To succeed in this, we depend on cooperation with our good partners.

PEKKA PLATHAN
Director General



The Dynamicum enhances efficiency

AFTER YEARS OF WAITING, THE HELSINKI UNITS OF THE FINNISH METEOROLOGICAL INSTITUTE WERE ABLE TO MOVE UNDER THE SAME ROOF WHEN THE NEW OFFICE BUILDING - KNOWN AS THE DYNAMICUM - WAS COMPLETED IN SEPTEMBER 2005.

The move added to internal efficiency and brought new synergy benefits with the Institute's neighbours, the Finnish Institute of Marine Research and the University of Helsinki.

The first entries on the need for new premises were made in the memoranda of the FMI Management Group as early as in the 1980s. More space would have been needed, and internal cooperation suffered from decentralisation. After the economic recession and other postponements, the project in Kumpulanmäki was finally kicked off in 1997.

"First the need for premises was analysed thoroughly; then the financing options were under detailed scrutiny," recalls Keijo Leminen, who led the Kumpula project. "The design, building and financing were all subject to competitive tendering in 2002."

Of the five tenders submitted, the winner was a concept called Atrium.

"Contracts were signed in spring 2003 and excavations in Kumpula started in August of the same year. The foundation stone was laid in January 2004," Leminen states. He summarises the seven-year project with satisfaction: "The construction work proceeded well, and the building was completed on time."

Construction planning was organised as a project within the FMI. Several working groups were set up to assist the steering group responsible for the project. Cooperation was close with the Finnish Institute of Marine Research, which moved to the same building. Decisions on issues pertaining to both institutes were made in a joint steering group.

"The synergy of shared premises was achieved in a good spirit. The solutions made, for instance, in the lobby and conference rooms, in the restaurant, the library and the workshop bring savings in the overall cost structure. Moreover, we



founded a joint property service that is responsible for the Dynamicum's functioning and maintenance. Postal, meeting, transport and security services are also shared," Keijo Leminen explains.

Leminen gives credit to both Senate Properties, which commissioned the building, and YIT Construction Ltd, which carried out the practical work, for their professional approach. The FMI personnel also deserve thanks: the enthusiasm to achieve a well-functioning building was sustained till the end of the project. The architects' demanding task was to reconcile users' needs with the technical and financial framework of the project.

The Dynamicum is now where the Finnish Meteorological Institute draws up its weather forecasts, carries out research in various sectors – meteorology, climate change, air quality, space and earth observation – and develops and maintains obser-

vation systems. "Physical proximity and easy access mean more efficient processes throughout the organisation," says Leminen.

The move to Kumpula enables increasingly close cooperation with the University of Helsinki and other specialists in the field. The goal is to create an internationally successful concentration of excellence in the fields of mathematics and natural sciences in Kumpula, where the operations of the Finnish Meteorological Institute, the Finnish Institute of Marine Research and the University of Helsinki support each other. Another goal is to attract enterprises that make use of scientific know-how when developing new products.

The FMI units outside the Dynamicum are the Arctic Research Centre in Sodankylä, the Kuopio Research and Service Unit, and the Aviation Weather Units in Tampere, in Rovaniemi and at the Helsinki-Vantaa Airport.

Architectural design:

Architects Timo Vormala and Erkki Karonen of Gullichsen Vormala Arkkitehdit Ky

Interior design:

Interior designer Aulikki Jylhä of Gullichsen Vormala Arkkitehdit Ky

Builder

YIT Construction Ltd

Client: Senate Properties

The name 'Dynamicum' reflects the dynamic and changing nature of sea-water and air, the main topics of study of the two institutes housed in the building.



Tarja Halonen, President of the Republic, inaugurated the Dynamicum on 8 November 2005. On her left Petteri Taalas, Director General of the Finnish Meteorological Institute (on leave of absence until autumn 2007), and on her right Eeva-Liisa Poutanen, Director General of the Finnish Institute of Marine Research.



"Physical proximity and easy access mean more efficient processes throughout the organisation," says Keijo Leminen (right), who managed the Dynamicum project for the FMI, when commenting on the advantages for the Institute's operations brought by the new premises. The photo also shows Hannu Grönvall, who led the Dynamicum project at the Finnish Institute of Marine Research.

Weather Service: Working for public safety around the clock

BY PROVIDING WEATHER SERVICES AND BY KEEPING THE GENERAL PUBLIC, THE AUTHORITIES AND BUSINESSES INFORMED, THE WEATHER SERVICE OF THE FINNISH METEOROLOGICAL INSTITUTE HELPS ENSURE THE SAFE FUNCTIONING OF SOCIETY AND THE SAFETY OF PEOPLE. THE BEST-KNOWN PRODUCTS OF THE WEATHER WARNING SERVICE ARE THE NATIONWIDE 1-10 DAY WEATHER FORECASTS FOR LAND AND MARINE AREAS, AND VARIOUS WARNINGS PERTAINING TO SEVERE WEATHER. THE AVIATION AND MILITARY WEATHER UNIT PROVIDES WEATHER SERVICES FOR CIVIL AVIATION AND FOR THE DEFENCE FORCES. THE WEATHER SERVICE ALSO MAINTAINS PREPAREDNESS FOR EXCEPTIONAL DISTURBANCES AND SITUATIONS AT ALL TIMES.

The forecasts provided by FMI Weather Service exceeded all quality targets set for 2005.

	% in 2005	% in 2004
The hit rate of one-day temperature forecasts	87.1	84.7
The hit rate of two-day temperature forecasts	80.2	78.9
The accuracy of one-day forecasts for the probability of rain	85.3	84.4
The accuracy of two-day forecasts for the probability of rain	81.7	77.9
The accuracy of wind warnings in one-day forecasts	84	82
The accuracy of wind warnings in two-day forecasts	80.3	78

The targets set for customer satisfaction were also exceeded. The average satisfaction index measured among the authorities using the FMI's services was 3.9 (3.7 in 2004) on a scale of 0-5.

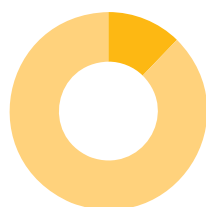
The year 2005 was the first full year when the Aviation and Military

Weather Service Unit applied the ISO 9001:2000 quality system. The system was audited in 2005 and its implementation was found to be exemplary. A new measurement method was introduced for surveying how customers' requirements are fulfilled; during its first year, the

method already helped improve the reliability of the timely delivery of products.

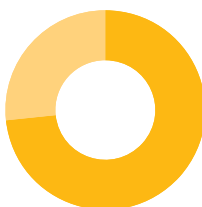
In 2006, the quality system will also include a definition of the professional competence required of meteorologists working for the Aviation Weather Service.

Weather Service
Total Expenditure €6.0 Million



Weather Service	6.0
Other Divisions	42.7

Weather Service
109 Person-years



Budgetary Funding	80
Earned Revenue	29
External Funding	0

Weather Service
Funding €6.0 Million



Budgetary Funding	2.5
Earned Revenue	3.5
External Funding	0

Good cooperation between the authorities even in special situations

EVENTS SUCH AS NEAR MISSES DURING OIL TRANSPORTS, TERRORIST ATTACKS AND HURRICANES MADE PEOPLE MORE AWARE OF SAFETY IN 2005. THE FINNISH METEOROLOGICAL INSTITUTE OFFERS ITS EXPERTISE IN ATMOSPHERIC MATTERS TO HELP OTHER AUTHORITIES IN MANY SPECIAL SITUATIONS.

An oil tanker has run aground, a passenger may have fallen into the sea from the ferry travelling to Sweden, a chemical plant has emitted dangerous gases. These are among the situations where the Weather Warning Service of the Finnish Meteorological Institute is one element in the network of authorities working to ensure public safety. Other important members of the network include the Radiation and Nuclear Safety Authority of Finland, the rescue authorities, the Defence Forces, the Border Guard, the Finnish Broadcasting Company, the Finnish Institute of Marine Research, the Finnish Environment Institute, the social and health authorities, and the police.

Head of team Markku Seppänen and senior meteorologist Sari Hartonen of the Weather Warning Service assure that cooperation between the Finnish authorities is smooth. "Information is passed on effectively. The authorities have clear-cut roles and duties," says Seppänen.

The FMI is responsible for analysing the situation in terms of the weather and atmospheric currents. Knowledge of transport, dispersion and drift models is essential, and the on-duty meteorologist must be ready to make decisions. Situations are practised both in-house in the FMI and together with national and international partners. Bilateral training exchange has been arranged, for instance, with the Radiation and Nuclear Safety Authority, the Finnish Broadcasting Company, and the Border Guard.

In order to keep up its preparedness for radioactive emissions, the FMI participated in the European ConvEx exercise in 2005, as well as in the rescue operation exercise held at Olkiluoto Nuclear Power Plant. In addition, the FMI took part in the comprehensive crisis management exercise arranged within State administration.

Once more, a new version of SILAM, the dispersion model for radioactive particles developed

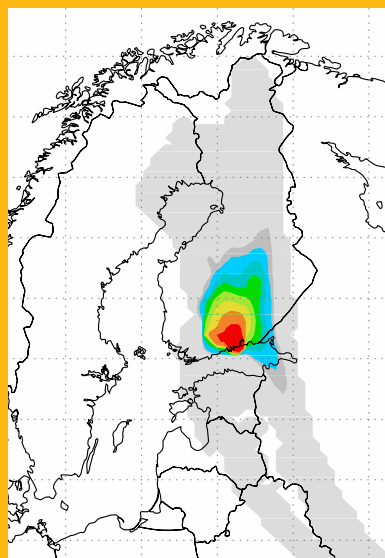
together by the FMI and the Technical Research Centre of Finland (VTT), was taken into operative use in 2005. "Dispersion models are developed constantly, mainly in the units for air quality and meteorological research. SILAM did quite well in international comparisons carried out during the year," Markku Seppänen comments.

"Assistant meteorologists and meteorologists were trained in the use of radioactive dispersion models and drift models. Regular weekly practice with drift models began in summer," Sari Hartonen explains.

Luckily no major accidents occurred in 2005, but the FMI helped in various rescue operations about twenty times. The Weather Warning Service also supported the safety and rescue organisation of the World Championships in Athletics by working extra readiness shifts. Forecasts of the prevailing weather conditions were made, for instance, in the event of accidents involving discharges of hazardous substances.



In cooperation projects with the various authorities, the FMI's task is to form a picture of the weather and atmospheric currents in any given situation. Meteorologists Jenni Teittinen (left) and Juhana Hyrkkänen with senior meteorologist Sari Hartonen.



Deposition of the radioisotope caesium-137, as calculated by SILAM, 42 hours after the start of the emission. The imaginary emission is from Loviisa Nuclear Power Plant. The calculation is based on dispersion data computed for the five closest nuclear power plants four times a day.

“During the readiness service experiment, our goal was to forecast phenomena for which no warnings had been issued previously,” says meteorologist Ari-Juhani Punkka.



Readiness Service in test use: More efficient communications about hazardous weather conditions

THE NEW READINESS SERVICE EXPERIMENT OF THE WEATHER WARNING SERVICE GOT A REAL KICK-START IN EARLY JANUARY 2005, WHEN A STORM HIT THE SOUTHERN COAST OF FINLAND AND THE SEA ROSE, FOR INSTANCE, TO THE MARKET SQUARE IN THE HELSINKI HARBOUR AREA.

“The ultimate goal of the experiment was to enhance the safety of Finns. Our communications with the rescue authorities was made more efficient and more systematic in potentially hazardous weather conditions,” explains meteorologist Ari-Juhani Punkka.

Briefings sent to the rescue authorities define the quality of the weather phenomenon, the period of risk, and the geographical location. Using this information, the authorities can be prepared for inclement – or even dangerous – weather conditions, for instance, by raising their state of readiness. “The lead time for the briefings has ranged from a few hours to three days,” says Ari-Juhani Punkka.

Naturally, the new briefings do not replace conventional weather

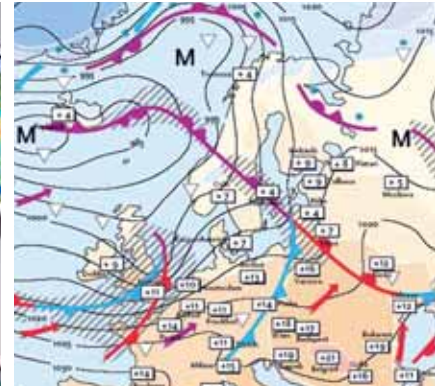
warnings; they merely supplement them. In the experiment, resources were allocated, in particular, to monitoring blizzards in winter and thunderstorms in summer. “For quickly developing summer storms, we introduced new tools and forecast phenomena for which no warnings had been issued previously. The week of the World Championships in Athletics in Helsinki was a good example: in the morning we were able to give warning of a storm that would hit the Helsinki area in the evening.”

During the three test periods in 2005, the readiness service group recorded 14 hazardous weather situations and sent altogether 36 briefings to the rescue authorities. Compared to earlier practices, communications was more systematic and

utilised both e-mail and a website specifically created for the purpose.

Moreover, in connection with each briefing, the readiness staff and the FMI Communications Unit considered whether the same information should also be disseminated to the general public through the media and the FMI website. Thus the news supported the normal weather forecasts and the warnings issued. Whenever human life, health or property is in serious danger, the FMI issues emergency briefings to the authorities through specialised channels.

The Weather Warning Service is likely to continue its readiness service throughout 2006.



The Customer Services of the Finnish Meteorological Institute provide diverse commercial services for the special needs of businesses and private individuals.

Customer Services provide tailored forecasts

THE FINNISH METEOROLOGICAL INSTITUTE'S CUSTOMER SERVICES PROVIDE WEATHER SERVICES ON COMMERCIAL GROUNDS, PROFITABLY AND COMPETITIVELY. THE UNIT PROCESSES WEATHER FORECASTS TO MAKE STATE-OF-THE-ART PRODUCTS TRANSMITTED VIA MOBILE MEDIA, THE INTERNET AND TELEPHONE NETWORKS TO CUSTOMERS. THE NUMBER OF PRODUCTS CREATED WITHIN 24 HOURS IS OVER 40,000. THE TARGET GROUPS INCLUDE THE MEDIA, TRADE AND INDUSTRY, TRAFFIC AND BOATING, AND AGRICULTURE AND FORESTRY.

Income from the FMI's commercially priced services rose in 2005. The greatest increases were recorded in traffic services and mobile services. The Institute's com-

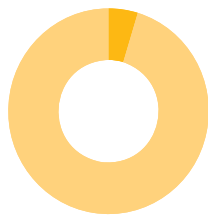
mercial operations yielded a surplus of 3.8 per cent, thus exceeding the target of 1.3 per cent.

The market share of the Finnish Meteorological Institute's Customer

Services remained unchanged.

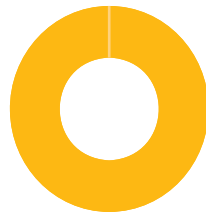
According to a customer satisfaction survey, satisfaction with the FMI's services rose to 3.9 on a scale of 0-5 (3.8 in 2004).

Customer Services
Total Expenditure €2.2 Million



Customer Services	2.2
Other Divisions	46.4

Customer Services
32 Person-years



Earned Revenue	32
Budgetary Funding	0

Customer Services
Funding €2.2 Million



Earned Revenue	32
Budgetary Funding	0

A Service to Drivers Developed through innovative cooperation

THE GOAL OF THE DRIVERS' WARNING SERVICE VARO, DEVELOPED BY THE FINNISH METEOROLOGICAL INSTITUTE AND THE FINNISH ROAD ENTERPRISE, IS TO IMPROVE TRAFFIC SAFETY BY ANTICIPATING DRIVING CONDITIONS ON A CERTAIN ROUTE AND BY WARNING OF UNEXPECTED TRAFFIC DISTURBANCES. THE SERVICE IS BASED ON INNOVATIVE WORK DONE BY SEVERAL ORGANISATIONS, E.G. IN THE SECTORS OF TELEMATICS AND CONTENT PRODUCTION.



Development of the Varo service within the FMI required input from the Weather Service, Research and Development, Technical Services and Customer Services. From the left: Vesa Kurki, Markku Kangas, Tuula Summanen, Lea Saukkonen, Juhani Damski, Karita Lesojeff, Mikko Strahlendorff, Leila Maiche and Pekka Keränen.

The Varo service developed during 2005 is a real-time route forecast and warning service intended for professional drivers on the main roads. Varoreitti utilises the Internet to give the driver a forecast of the weather, road conditions or traffic disturbances to be expected on the route. Based on cellular positioning, Varoviesti warns the driver of sudden changes while driving along a certain route. The warning is sent through a speech synthesizer to the mobile phone as a voice message. Drivers can also report their own observations in traffic by means of Varoilmoitus.

Marketing Manager Sari Leppävuori characterises the Varo service as an innovative and customer-oriented telematic service created in cooperation by several organisations. "Varo is an individually target-

ed service: the driver can receive relevant and real-time information on driving conditions and traffic disturbances while on the road," she says.

Masses of data from various sources are used to produce the service; final verification of the data rests with an experienced professional. For instance, data on the weather and road conditions are always checked by the road weather centre operator and the meteorologist on duty.

Development of Varo began after the tragic road accident in Konginkangas in 2004. "In this first phase, Varo is a service for professional drivers. In the next phase, we'll develop the service for the general public and for a multioperator platform," says Sari Leppävuori.

Varo was developed under the auspices of AINO, the real-time traf-

fic information programme of the Ministry of Transport and Communications. Cooperation between the various partners was effective: the Finnish Meteorological Institute was responsible for project management and meteorological elements while the Finnish Road Enterprise was responsible for traffic-related elements and technical specifications. Telia Sonera Finland participated in development of local technology and data transmission, and VTT was responsible for testing.

"A good many transport firms and other enterprises have also been ready to put much time and effort to the development of Varo for improved traffic safety," Sari Leppävuori acknowledges.

International Recognition for the Finnish Meteorological Institute's Mobile Services

AT THE SURFPORT AWARDS GALA HELD IN COPENHAGEN IN OCTOBER, THE MOBILE SERVICES OF THE FINNISH METEOROLOGICAL INSTITUTE RECEIVED THE LIFETIME ACHIEVEMENT AWARD; THIS WAS THE FIRST TIME WHEN INTERNATIONAL RECOGNITION WAS GIVEN FOR THESE SERVICES. THE AWARD WAS BASED ON THE FMI'S LONG-TERM DEVELOPMENT OF CONTENT SERVICES DESIGNED FOR MOBILE PHONES AND ON THE POPULARITY AND HIGH QUALITY OF THE SERVICES OFFERED.

"The weather makes good content for mobile services," says Vesa Kurki, Account Manager.



"The Finnish Meteorological Institute has been a real pioneer in mobile phone services in the whole of Europe. Long-term work has been done since 1995. We have been among the first to utilise the latest technology; at the same time we have taught Finns how to use richer content services," says Vesa Kurki, Account Manager.

The Institute's Weatherproof mobile phone service offers the latest weather information for each postal code area in Finland and for the major regions on all continents. Weather services have also been tailored to serve several purposes

and interests. At present, development teams are working on a variety of products intended for the latest 3G phones.

For the development of mobile services, the Finnish Meteorological Institute has a small innovative team whose members have acquired solid expertise over the years. "We have the strong will and motivation to develop new products. However, the keystone is good networks with other players in the field," Vesa Kurki stresses.

The Finnish Meteorological Institute has well over a hundred different mobile phone services. "Weather

information suits mobile services because it is useful for the user and easy to adapt to mobile phones," says Vesa Kurki.

These popular services have received much positive feedback from customers. "One key to success is to listen to customer feedback and to take this feedback into account when developing services." The services have received several awards in this sector in Finland. Vesa Kurki believes that the Lifetime Achievement Award will help make the FMI's mobile phone services better known and will open more doors to markets outside Finland.

Research - a solid foundation for atmospheric expertise

THE RESEARCH CARRIED OUT BY THE FINNISH METEOROLOGICAL INSTITUTE SERVES THE NEEDS OF PEOPLE AND SOCIETY IN MATTERS CONCERNING THE ATMOSPHERE. SIMULTANEOUSLY, RESEARCH LAYS THE FOUNDATION FOR THE FMI WEATHER SERVICE'S PRODUCT DEVELOPMENT. THE FOCAL AREAS OF RESEARCH ARE THE WEATHER AND SAFETY, CLIMATE CHANGE AND ADAPTATION TO IT, THE IMPACT OF THE ATMOSPHERE ON THE ENVIRONMENT AND ON PEOPLE, AND SPACE AND ATMOSPHERES.

The Finnish Meteorological Institute's move to Kumpula in autumn 2005 created an important concentration of atmospheric and space research. Good examples of cooperation are the Kumpula Space Centre operated jointly by the University of Helsinki and the FMI, and the extensive observation system for urban air.

The Kumpula Space Centre started operations in January 2006. The Centre is engaged in high-quality space research, and offers expert and laboratory services to other actors in the space sector. The core of the research consist of the scientific and earth observation programmes of various international bodies, such as the European Space Agency (ESA), the National Aeronautics and Space Administration (NASA), the European Organisation for the Exploitation of Meteorological Satellites (EUMETSAT), and the European Union. The observation system for urban air, operated by

the University of Helsinki and the FMI, consists of five measurement stations and modelling services.

The Unit of Meteorological Research is responsible for research associated with, and supporting, weather service. Among other things, the unit is included in an extensive international network and develops the HIRLAM weather prediction system based on the physical modelling of atmospheric phenomena. The unit also develops the forecast production of the European Centre for Medium-Range Weather Forecasts with a view to creating products that support weather service. In addition, the unit provides expert services on the atmosphere

and air quality, and conducts applied research pertaining to renewable energy and the built-up environment, both in Finland and abroad.

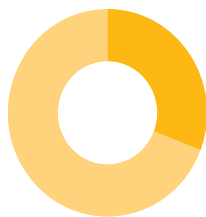
The unit's safety-related cooperation projects have included a project to develop the forecasting of heavy rains and flood warning systems and a project to devise accurate road-specific forecasts of driving conditions.

The Climate and Global Change Unit produces and analyses climate statistics, carries out international and domestic cooperation to create models for climate systems, and studies the climate, greenhouse gases and the interaction between fine particles and the climate. The FMI contributed to drafting of the

The Finnish Meteorological Institute carries out research in seven fixed-term research programmes.

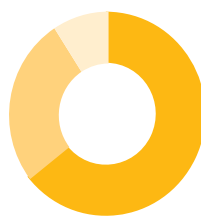
Year	2005	2004	2003
New doctoral dissertations	7	5	4
Publications subject to international peer review	173	133	104
Scientific publishing index	10 384	8 549	7 666

Research and Development
Total Expenditure €15.0 Million



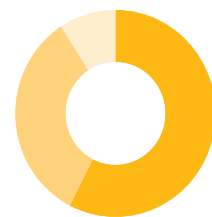
■ Research and Development 15.0
■ Other Divisions 33.7

Research and Development
248 Person-years

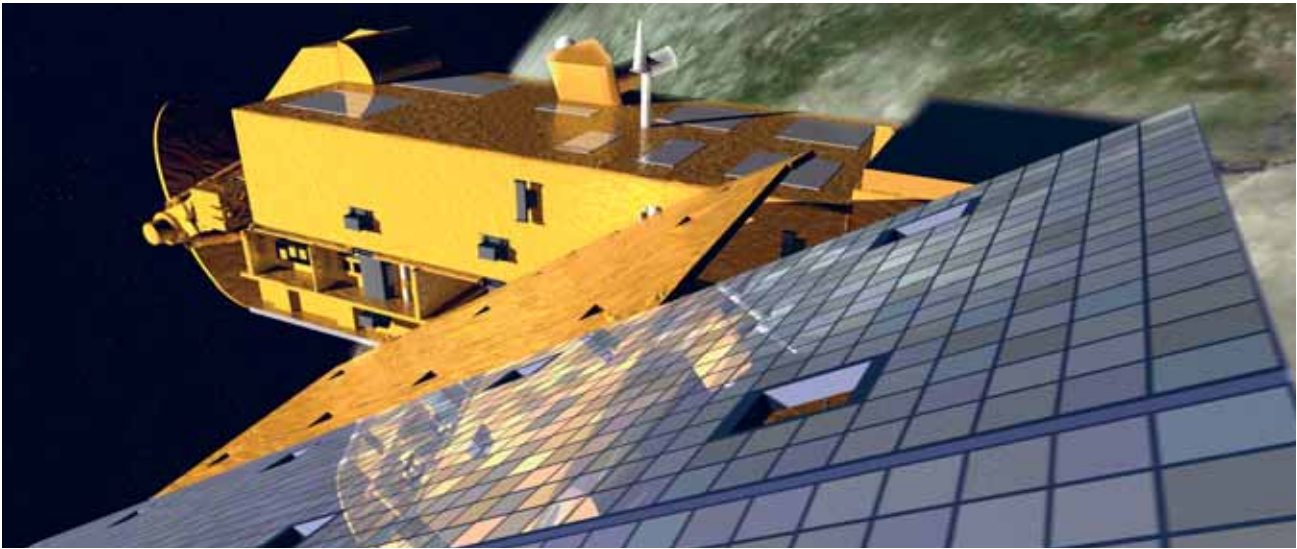


■ Budgetary Funding 160
■ Earned Revenue 65
■ External Funding 23

Research and Development
Funding €15 Million



■ Budgetary Funding 8.9
■ Earned Revenue 4.7
■ External Funding 1.4



Finnish research programme on adaptation to climate change, and is coordinating the Finnish preparation of the fourth IPCC Assessment Report. By means of data obtained from the modelling of global change, the FMI has provided information for the State administration on how to adapt to climate change.

The Air Quality Research Programme monitors air quality trends in Finland by utilising a measurement network for background areas, which is also included in several international monitoring programmes. The Unit analyses samples in an accredited chemical laboratory and is responsible for the operations of the National Reference Laboratory of Air Quality. This means, for instance, participation in intercomparison measurements arranged by the EU. The scope of research encompasses the impact of air quality on the environment, on human health and on the climate.

A Europe-wide system monitoring the chemistry and dynamics of the atmosphere and predicting atmospheric trends has been developed within international and domestic research programmes. The unit has also devised modelling methods, for instance, for predicting air quality and the concentrations of allergenic pollens and for assessing hazards associated with nuclear power and chemicals.

More information on air quality

will become easily accessible when the Internet portal prepared by the FMI and the Ministry of the Environment is taken into use in 2006. The portal will offer both the latest and earlier results on air quality measurements for the authorities, researchers and the general public.

The Space and the Upper Atmosphere Programme focuses on space weather phenomena, near-Earth space and auroras, and the space environments of other planets and comets. During 2005, the FMI had several space measurement instruments in operation: some were on satellites orbiting the Earth, the Moon and Mars; some were measuring the structure of solar wind, while some were on their way to a comet and to Venus. A network of magnetometers and cameras for photographing auroras was in use on the Earth.

The Earth Observation Unit investigates atmospheric phenomena by means of diverse remote-sensing measurements. The material consists of measurement data obtained, for instance, from satellites, radar stations and ozone probes. The unit participates in the design and implementation of equipment and in the processing of measurement data, and develops end-products based on remote-sensing material. Satellite data are utilised, for instance, when studying ozone depletion, UV radiation and climate change. The FMI

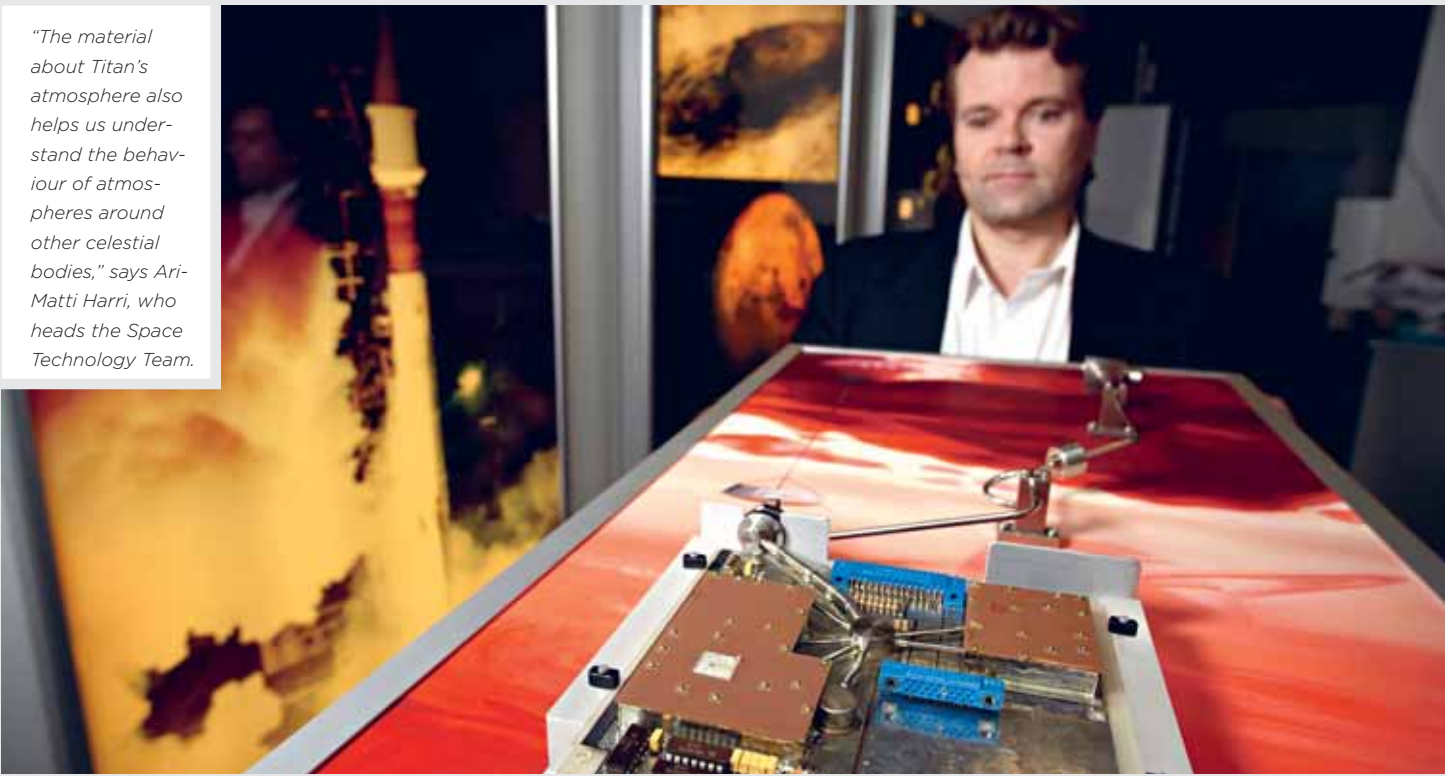
also plays an important role in the development of computing algorithms.

The measurement results of the GOMOS instrument in the Envisat satellite have been used, for example, when studying the impact of solar activity on the composition of the middle atmosphere. The Finnish-Dutch Ozone Monitoring Instrument (OMI), travelling with the EOS-Aura satellite, transmits a global image of the current state of the ozone layer each day. Ozone and UV radiation charts over Europe are updated three times a day, using data from the best satellite overflights.

The Arctic Research Centre makes observations of cold-climate phenomena and conducts atmospheric research pertaining to arctic global change. The unit in Sodankylä also includes an observatory and a satellite service centre, which offers extensive data reception, processing and filing services for both Finnish and international customers.

The Kuopio Unit, together with its regional partners, concentrates on the study of fine particles and clouds. The main applications concern prediction of climate change and air quality. The Kuopio Unit also coordinates the ice formation studies conducted by the FMI. After reorganisation, the unit commenced operations at the beginning of 2005.

"The material about Titan's atmosphere also helps us understand the behaviour of atmospheres around other celestial bodies," says Ari-Matti Harri, who heads the Space Technology Team.



First measurements of the atmosphere on Saturn's moon Titan

THE HUYGENS PROBE, WHICH LANDED ON SATURN'S MOON TITAN IN JANUARY 2005, INCLUDED AN INSTRUMENT DESIGNED AND MADE BY THE FINNISH METEOROLOGICAL INSTITUTE: THE HASI/PPI INSTRUMENT, WHICH MEASURES THE PRESSURE PROFILE OF TITAN'S ATMOSPHERE. THE PROBE HAS REVEALED NEW FACTS ABOUT THIS DISTANT ATMOSPHERE.

The Finnish Meteorological Institute's PPI instrument measured the pressure profile of Titan's atmosphere during and after the probe's landing. "Our calculations show that the pressure on Titan is one and a half times the pressure on the Earth. It was additionally confirmed that Titan's atmosphere consists mainly of nitrogen, like the Earth's atmosphere," says Ari-Matti Harri, head of the Space Technology Team. Although many organic compounds are formed constantly by the action of sunlight in Titan's atmosphere, the circumstances on the moon are not favourable to life. For instance, the temperature on Titan is nearly -200°C .

"Our instrument has registered the pressure profile of Titan's atmosphere just as precisely as we had planned," Ari-Matti Harri says. The instrument is based on measurement device solutions developed by the Finnish Meteorological Institute and on Vaisala's sensors. Similar technology has also been used in earlier Mars projects. Suomen Optomekaniikka and the Helsinki University of Technology also participated in the manufacture of the pressure indicator. The instrument is used in the joint Cassini-Huygens mission of the National Aeronautics and Space Administration (NASA) and the European Space Agency (ESA).

The observation material obtained of Titan's atmosphere also helps us understand the behaviour and development of atmospheres around other celestial bodies. It is additionally hoped that the findings obtained by Huygens will shed more light on the initial stages of development of the Earth's atmosphere. It may even be possible to learn more about the mechanisms essential for the emergence of life.

"Titan has interesting similarities with our own Earth, but it also has qualities that are unique in the whole solar system," Ari-Matti Harri concludes.



"By combining dense observation material with observation data covering the whole country, or even the whole continent, it is possible to detect local weather phenomena lasting only a couple of minutes," Jani Poutiainen, Testbed project manager, explains.

Research and test system for local weather put to use

HELSINKI TESTBED, THE DENSE WEATHER OBSERVATION NETWORK HOSTED BY THE FINNISH METEOROLOGICAL INSTITUTE, HAD ITS KICK-OFF IN AUGUST 2005. THIS SYSTEM, INTENDED FOR OBSERVING MESOSCALE WEATHER PHENOMENA, IS CURRENTLY THE ONLY ONE OF ITS KIND IN THE WORLD.

More than a hundred new weather transmitters and many other observational instruments supplementing the existing observation stations have been installed in an area measuring 150 x 150 kilometres in Southern Finland.

"Local, dense observation material is needed to support observation data covering the whole country, or even the whole continent, so that we can reliably detect weather phenomena typically occurring in an area of 2–20 kilometres and lasting from a couple of minutes to a few hours. These phenomena include sea breezes, fogs and thunderstorms, which despite their local character and short duration may be hazardous and may cause even extensive material damage. By combining observation data of different types we can establish new points of departure for the modern software used for ana-

lysing and forecasting atmospheric events," Jani Poutiainen, project manager, explains the basic principles behind the compact weather observation network.

The data collected during the five measurement campaigns of the Helsinki Testbed project will be used as research material for several years around the world. The project has also enabled the testing of new observation equipment, systems and methods.

"The basic infrastructure has now been created. New services associated, in particular, with the analysis and forecasting of the local weather and air quality can later be built on this foundation. Research findings obtained by means of the new system are utilised when planning weather services intended for both the authorities and private individuals," says Jani Poutiainen.

The Testbed project also played an important role in the World Championships in Athletics arranged in Helsinki in August 2005.

"Several weather transmitters measuring wind, rain, pressure, temperature and humidity had been installed at the Olympic Stadium, and the observation data were given to the organisers of the games. Together with remote measurement observations, these data also provided an excellent opportunity for studying the heavy rains that interrupted the competitions," Poutiainen recalls.

The project has involved extensive national cooperation with many enterprises and research institutions. Practical implementation has been the responsibility of the Finnish Meteorological Institute and Vaisala Oyj.

Sesquiterpene - An unknown factor in climate change

SESQUITERPENES, OR HYDROCARBONS PRODUCED BY TREES, MAY FORM NEW PARTICLES IN THE AIR AND THUS PLAY AN IMPORTANT ROLE IN CLIMATE CHANGE.



Natural sources also emit great volumes of hydrocarbons into the atmosphere. Team leader Hannele Hakola is among the researchers studying these emissions at the Laboratory of Atmospheric Chemistry.

Besides hydrocarbons produced by human activity, great volumes of volatile hydrocarbons are also emitted from natural sources. The Laboratory of Atmospheric Chemistry of the Finnish Meteorological Institute measures the emission coefficients of these hydrocarbons for each plant species.

“Last year we concentrated largely on studying sesquiterpene emissions from trees. Sesquiterpenes are especially interesting, since they seem to be able to form new particles,” says Hannele Hakola, researcher and team manager. “If this is true, they may play quite an important role in climate change.”

Sesquiterpenes react with atmospheric ozone so rapidly that they cannot be detected in the air. At the research station of the University of Helsinki in Hyytiälä, tree branches are therefore enclosed in a Teflon chamber. Both the air entering the chamber and the air exiting the chamber are measured for sesquiterpene concentrations.

“We provide other researchers

with information about the quantities of compounds that forests emit into the atmosphere. Both the Finnish Meteorological Institute and the Academy of Finland’s Centre of Excellence in Research, operated together by the FMI and the University of Helsinki, utilise this information, for instance, in studies investigating the impact of sesquiterpenes on atmospheric chemistry in boreal regions or on ozone deposition,” Hannele Hakola explains.

It is currently believed that plants produce sesquiterpenes when they are under stress; this may be caused, for instance, by drought or high ozone concentrations. However, many more measurements are needed because the rhythm of natural emissions is associated with the growing season. “Measurements must always extend at least over one growing season,” Hannele Hakola points out.

One aim of future studies is to determine whether sesquiterpenes have any other natural sources. It is challenging research, as the answer cannot be sought in the air.

The new measurement station enhances understanding of the health effects of fine particles

FINNISH AIR QUALITY RESEARCH GAINED NEW IMPETUS IN 2005 WHEN A MEASUREMENT STATION FOR URBAN AEROSOLS BEGAN FULL-SCALE OPERATIONS IN KUMPULA, HELSINKI. THE STATION IS THE MOST COMPREHENSIVE IN ITS FIELD IN THE NORDIC COUNTRIES.

It is estimated that more Europeans die of the consequences of atmospheric pollutants than in traffic accidents. Finnish studies have also indicated that atmospheric fine particles may affect people’s morbidity and mortality. In 2005 the FMI and the University of Helsinki started continuous air quality monitoring at a joint measurement station. These measurements are important, for instance, when deter-

mining the health effects of fine particles.

“It’s not known for certain what makes fine particles detrimental to people’s health. To establish this, we need exact information about the chemical composition and sources of particles,” says Docent Risto Hillamo, who leads the Aerosol Research Team. Research into the harmful effects of fine particles requires multidisciplinary skills. For many years now, the

Looking for the missing piece in the climate change puzzle

THE FINNISH METEOROLOGICAL INSTITUTE'S OPERATIONS EXPANDED IN KUOPIO, WHEN THE LOCAL RESEARCH ACTIVITIES WERE MERGED WITH THE AVIATION AND MILITARY WEATHER UNIT IN KUOPIO. ONE OUTCOME OF THE ACTIVE COOPERATION WITH THE UNIVERSITY OF KUOPIO IS A MEASUREMENT STATION IN PUIJO TOWER.

The new research and service unit in Kuopio concentrates on environmental and climate research and on the provision of weather services. The unit moved from Rissala Airport to the campus of the University of Kuopio; this enables closer cooperation with the University and with other specialists in the field. An internationally important centre of excellence focusing on health, the environment and well-being is being created in Kuopio.

During 2005, the Kuopio unit of the FMI and the Department of Applied Physics of the University of Kuopio founded a measurement station in Puijo Tower. The station produces data on the formation of atmospheric fine particles and clouds and on their interaction.

"Continuous and simultaneous measurements of the size ranges of particles and cloud drops give valuable information on the types and sizes of particles that can form cloud drops," says Research Pro-

fessor Kari Lehtinen, who leads the Kuopio unit.

The empirical data accumulated is used, for instance, in the international Community Earth System Models (COSMOS) project, which is studying factors that affect climate change. The project is expected to provide reliable information concerning climate change and its impact.

"It has been estimated that the indirect effects of fine particles on the climate are the greatest single uncertainty factor for predicting climate change. This is exactly the piece of the climate change puzzle for which the scientific community is expected to find answers. The observations made in Puijo Tower are an important element of this research," Kari Lehtinen stresses.

The measurement point also gives an interesting opportunity to study how air impurities in Kuopio affect the formation of clouds. This can be done by comparing



the results with the corresponding measurements made in the clean air of Pallastunturi.

"In the Helsinki area, most fine particles in the air are emitted by traffic," says Docent Risto Hillamo.

Finnish Meteorological Institute has cooperated with the National Public Health Institute to study the toxicity of particles both in Finland and elsewhere in Europe.

"The data produced by the new measurement station in Kumpula open up new opportunities for studying the exposure and health of people in the Helsinki area in more detail than before," Risto Hillamo explains.



In Finland, the most severe air pollution situations are caused either by the long-range transport of pollutants or high concentrations of harmful chemical compounds in urban areas close to the ground because of unfavourable meteorological conditions. Especially in winter and in autumn, windless inversion situations prevent atmospheric pollutants from mixing; instead, they remain near the ground

and weaken the air quality dramatically. "In the Helsinki area, most fine particles in the air are emitted by traffic. In cooperation with the National Public Health Institute, we are studying how these situations are reflected in people's health."

"In future, these findings may guide town planning and traffic planning, because it is essential to take measures to halt the increase in

motor traffic. For example, within a few years, increasing traffic volumes in Helsinki may lead to a situation where newer cars or improvements in engine technology are no longer sufficient to raise the air quality from the present level. The only means left is to impose restrictions of one kind or another on motor traffic that causes emissions," Risto Hillamo concludes.

Carbon balance measurements help understand the direct climate effects of society

Climate conventions require that States pay for their gaseous emissions. Meteorology can serve as help in meeting challenges associated with emissions and their measurement.

For measuring greenhouse gas balances, the Finnish Meteorological Institute utilises the means offered by micrometeorology, which studies microclimates. Thanks to the additions made to the measurement network in 2005 and the methods developed by the FMI, it is also possible to measure and understand the direct effects of Finnish society on the climate.

"By the end of the year, it will no longer be enough for signatories to the Kyoto Protocol to calculate emissions from the use of fossil fuels; in addition, they must be able to calculate the balances of greenhouse gases from forests, fields and bogs, as well as the changes in these gases. We already have experience of the measurement of gas sinks and sources in all of these environments," says Tuomas Laurila, who leads the Greenhouse Gases Team.

With methods developed by the Finnish Meteorological Institute's researchers, and by utilising micrometeorology, it is possible to carry out needs-based measurements of emission balances, say, at landfills. Laurila predicts that the need for measurements will increase.

"For instance, emissions trading does not encompass landfills at



With methods developed by the Finnish Meteorological Institute, and by utilising micrometeorology, it is possible to carry out needs-based measurements of emission balances, for instance, at landfills. Tuula Aalto and Tuomas Laurila, team leader.

present, but certainly will at some point in future. Then the landfill operator will benefit financially if he can show that good landfill maintenance has reduced emissions," Laurila illustrates.

The Finnish Meteorological Institute measures carbon dioxide exchange in Sodankylä, Inari, Pallas and Loppi. The measurements are part of international research projects that study carbon balances and the effects of atmospheric and environmental factors on these balances. The Pallas-Sodankylä station

is the only Northern European measurement point in the World Meteorological Organization's Global Atmosphere Watch (GAW) network, which monitors the trends of greenhouse gas concentrations in the atmosphere by means of highly precise measurements. There are also several national needs-based research programmes under way, such as programmes studying the gas balances of peatlands and the gas balances of wastes and waste flows.

Technical Services provide for observations and databanks

THE TECHNICAL SERVICES UNIT OF THE FINNISH METEOROLOGICAL INSTITUTE WORKS AROUND THE CLOCK TO PRODUCE OBSERVATION MATERIAL DESCRIBING THE PHYSICAL STATE AND CHEMICAL COMPOSITION OF THE FINNISH ATMOSPHERE. THE UNIT MAINTAINS AND DEVELOPS PRODUCTION AND OBSERVATION SYSTEMS, AND PROCESSES OBSERVATION AND MODEL DATA. IT IS ALSO RESPONSIBLE FOR THE INSTITUTE'S INFORMATION MANAGEMENT AND INFORMATION SECURITY, AND MAINTAINS AND DEVELOPS CENTRALISED DATABANKS.

The greatest challenge for the Technical Services in 2005 was to carry out the move to the new premises in Kumpula without interruption to operations. Owing to the planning, acquisitions, software updates and secur-

ity arrangements involved, this was one of the biggest ICT projects ever completed by the Institute.

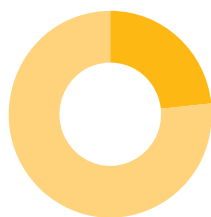
The biggest project to be carried out by the Technical Services in 2006 is the automatic weather data production system, which should

be taken into use in 2007. This Institute-level project is unequalled even globally, and the Technical Services are responsible for the design and implementation of its ICT architecture, databases and workstation software.

The Technical Service Unit exceeded all its quality targets set for 2005.

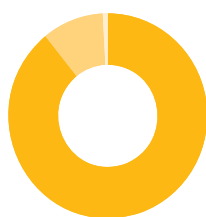
	% in 2005	% in 2004
Reliability of the FMI's basic weather observation stations	98	98.8
Mean availability of radar systems	99.3	99.2
Mean availability of satellite systems	98	98
Availability of information systems	99.9	99.9

Technical Services
Total Expenditure €11.3 Million



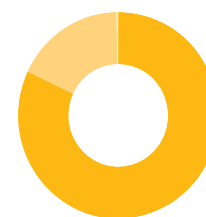
Technical Services	11.3
Other Divisions	37.4

Technical Services
138 Person-years



Budgetary Funding	123
Earned Revenue	14
External Funding	1

Technical Services
Funding €11.3 Million



Budgetary Funding	9.0
Earned Revenue	2.3
External Funding	0.02

The Finnish Meteorological Institute's information systems updated

ALONGSIDE THE MOVE TO KUMPULA, THE FMI'S INFORMATION SYSTEMS WERE UPDATED RADICALLY. THE RESULT IS AN ENTITY WITH UNPARALLELED EFFICIENCY.

The core of the demanding yet successful ICT project was duplication of the FMI's information systems before the move to Kumpula. Thanks to this duplication, meteorological services continued without significant interruptions during the move, because weather services could be produced both in Kaisaniemi and in Kumpula.

In practice, servers and network devices were replaced and production machinery and applications were duplicated and placed physically in separate computer rooms. The outcome is two identical production systems that support each other. For external customers, this meant uninterrupted availability of weather services; for the personnel, a smooth and controlled move to the new premises as far as technology was concerned.



Following updating of the ICT systems, the FMI now has two computer rooms and duplicate production systems. Mikko Aalto and Kimmo Aaltonen in the computer room.

The benefits of the new information systems are not limited to the move. Two computer rooms and two identical production systems guarantee an increasingly safe and

modern information system for the Institute. Kimmo Aaltonen, who managed the ICT project in Kumpula, says that the greatest benefit of the duplex system comes from reliability and safety – qualities that are required of an official body such as the Meteorological Institute.

“In the event of an accident, say a fire, we are no longer dependent only on one system. This means increasingly reliable weather services and thereby enhanced safety for the whole of society. Our present information systems are without doubt among the best in Finland,” Kimmo Aaltonen stresses.

Technical staff across organisational boundaries contributed to the updating of the information systems.



The new radar improves traffic safety

THE LATEST ADDITION TO THE FINNISH WEATHER RADAR NETWORK, THE NEW RADAR BUILT IN VIMPELI IN 2005 IMPROVES, IN PARTICULAR, FORECASTS OF WINTER WEATHER CONDITIONS.

“Since there was no radar in Ostrobothnia, it was difficult to detect rainclouds in the area, especially in winter,” says Jani Gustafsson, who managed the project, when asked why the new acquisition was needed. With the radar in Vimpeli, the problem has disappeared. Now the whole of Finland –except a narrow strip in the North – is covered by a weather radar network.

Project manager Jani Gustafsson says that the new radar is particularly useful for forecasting precipitation in winter.

The Finnish Meteorological Institute's supercomputer: More efficient weather services and support to research

THE FMI'S NEW COMPUTER ENABLES INCREASINGLY DETAILED AND ACCURATE WEATHER FORECASTS.

Besides improving weather forecasts, the new supercomputer enables more efficient calculation of climate change models. Niko Sokka, a researcher specialising in weather models, with Johan Silén, head of unit.



The Finnish Meteorological Institute has acquired a new supercomputer for weather forecasts and other scientific computation. The computer selected has a total of 304 processors and a central memory of 304 Gb. At the time of purchase, the computer was the most powerful of its class in Finland; having a capacity over 30 times greater than that of its predecessor, it is among the 400 most powerful computers in the world. In this respect, the FMI is at the forefront in the field of meteorology.

Only a few meteorological institutes in Europe have corresponding computers.

For instance, the new computer enables the calculation of approximately 48-hour forecasts for the whole of Europe at an accuracy of nine kilometres, instead of the earlier 20 kilometres. Thanks to the more powerful equipment, customers receive up-to-date forecasts more quickly.

"For example, the time to compute a 54-hour weather forecast has so far been a little less than an hour.

Now it will be less than three minutes," says Johan Silén, Head of ICT Services. Moreover, the computer provides excellent opportunities for calculating forecasts on the dispersion of radioactive substances, for making models of extreme weather phenomena, and for climate modelling.

The new computer will enable constant development of computation models for weather forecasts. It is estimated that the computer's capacity will be sufficient for the Institute's needs for at least three years.

The radar project started in May 2004 with a search for potential locations. No time was wasted: the Vimpeli radar was inaugurated in October 2005. Lakeaharju Ridge is an excellent location for the radar. "A high place, a good horizon, no masts or other obstructions," Jani Gustafsson lists the advantages.

Observations made by the new weather radar improve the Finnish Meteorological Institute's weather service especially in Ostrobothnia. Weather radar is an important observation instrument when forecasting quickly changing weather

conditions. It is also very effective in detecting regional rains.

"Road, airline, rail and marine traffic all benefit from the advanced weather service utilising radar data. For instance, the Finnish Road Enterprise makes use of weather service when roads are salted and other maintenance is planned. In addition, groups such as boaters and plant growers benefit from more accurate forecasts, and Regional Environment Centres get more precise precipitation data," Gustafsson continues. Jani Gustafsson believes that the need for radar

observations in weather services will definitely increase in future. "More is invested in traffic safety, and radar data are needed as help."

At present, the Finnish Meteorological Institute's weather radar network comprises eight radars. "Uninterrupted observations must be ensured. That's why the next challenge is the modernisation of the oldest radars in the network," Jani Gustafsson concludes.

Evaluation sparked new ideas for developing observational services

INTERNATIONAL EVALUATION OF THE FINNISH METEOROLOGICAL INSTITUTE'S OBSERVATION ACTIVITIES PRODUCED A NUMBER OF RECOMMENDATIONS FOR DEVELOPMENT THAT WILL MEAN EVEN BETTER SERVICES FOR THE FMI'S CUSTOMERS.

The one-year independent evaluation gave a comprehensive picture of the present state and development targets of the FMI's observation activities. On the whole, the evaluators concluded that the Institute's observation activities meet high international standards. The Institute was commended, among other things, for the brisk automation of observation stations. A good example was the radar network covering the whole of Finland.

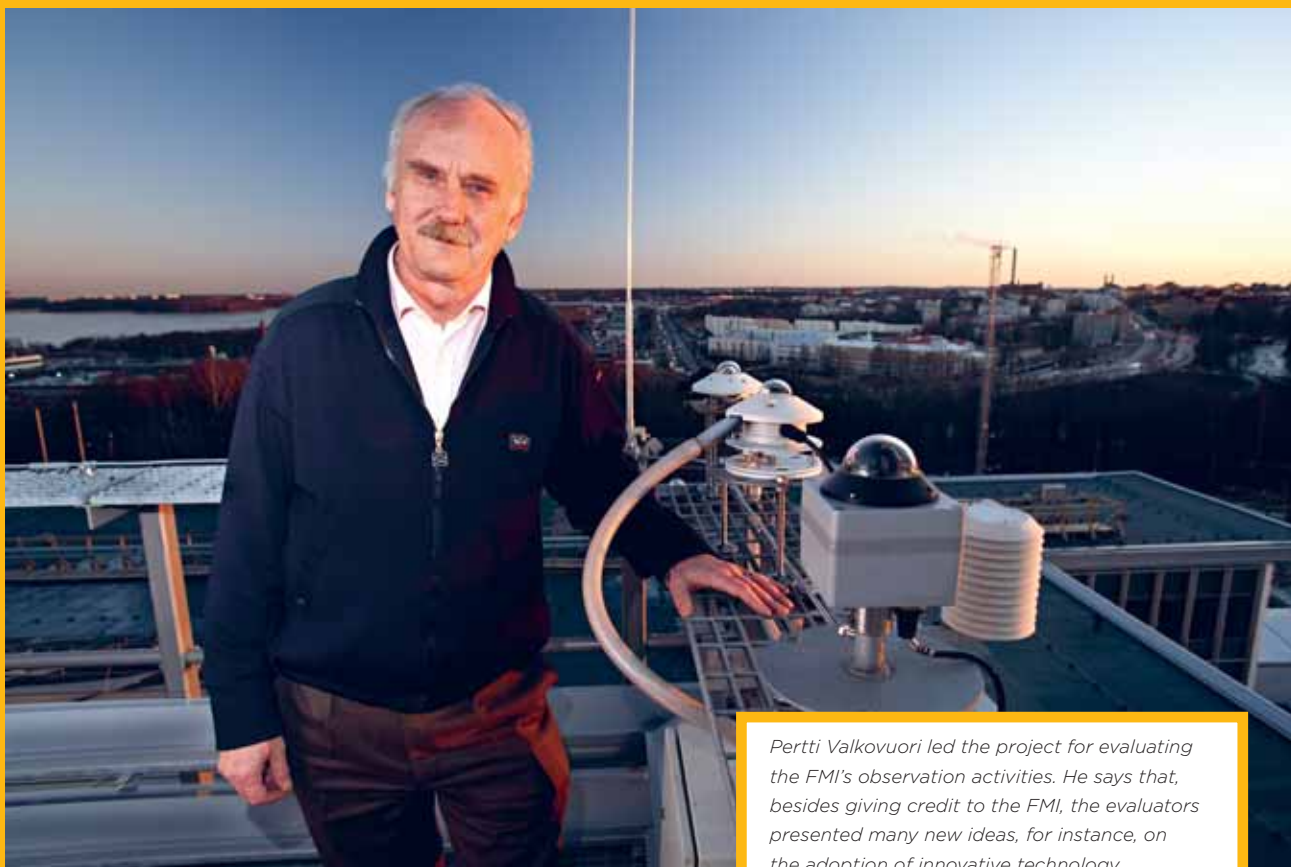
"We are very satisfied with the evaluation. Through the project, we got many new ideas for development," says Pertti Valkovuori,

project manager. "The evaluation generated outlines and a shared vision about the future and about measures that will facilitate the utilisation of innovative technology and improve customer satisfaction and cost-effectiveness."

The recommendations centred on three themes, the most important of which was the increasingly rapid automation of observation stations. "The report recommends that automation should be close to 100 per cent in future; this will enable even more frequent weather observations. With the help of an automated network and new technology, there will be more reli-

able observations in real-time, with easier quality control. This will also mean improved customer service."

One goal of the evaluation was to raise customer satisfaction. "In future we want to meet our customers' needs even better; this will mean more precise surveys of these needs. The benefits obtained from close cooperation and partnership will be utilised in customer relations, for instance, when putting new technology to use. The goal is that customers can easily and quickly receive observation data based on the whole range of the Institute's expertise," Pertti Valkovuori summarises.



Pertti Valkovuori led the project for evaluating the FMI's observation activities. He says that, besides giving credit to the FMI, the evaluators presented many new ideas, for instance, on the adoption of innovative technology.



2005 – An unusually warm year

THE YEAR 2005 WILL BE REMEMBERED AS AN UNUSUALLY WARM YEAR IN THE WHOLE OF FINLAND. AS SHOWN BY THE STATISTICS COMPILED FOR EACH SEASON, CLIMATE CHANGE IS VISIBLE IN FINLAND, TOO.

Senior meteorologist Anneli Nordlund and other weather service specialists answer questions about weather statistics.

When analysing the year's temperature statistics, Anneli Nordlund, senior meteorologist at the Climate Services of the Finnish Meteorological Institute, mentions especially Northern Finland:

"In the North, all months of the year, except March, were warmer than average. The highest one-day temperature was also measured in Lapland: the warmest day of the summer, 30.8° C, was recorded in Sevettijärvi, Inari, on 9 July," says Anneli Nordlund.

Temperatures did not go below -40° C at any point during the year. The lowest temperature, -36.5° C, was measured on 29 January in Naruska, Salla. Nordlund says that, on average, temperatures do not fall below -40° C in one out of four winters.

The sunny March with its low precipitation was the only month of the year that was clearly colder than average in the whole of Finland. In contrast, January and November were exceptionally mild months.

Thermal summer (when the daily mean temperature is above 10° C) continued in Southern Finland well into October. Although thermal winter (daily mean temperature below 0° C) did not start until 16 December on the Åland Islands, it started one month earlier, or at a fairly typical time, on Hango Peninsula and in Vantaa.

"2005 is another link in the series of warmer years, pulling the long-term mean temperature upwards. The view that the effects of climate change can be seen during all seasons in Finland, too, has gained ground since the year 2000."

RAINS AT AN INOPPORTUNE TIME

August was the rainiest month of the year. Anneli Nordlund is sorry for the organisers of the World Championships in Athletics. "Sometimes there may be heavy rains on several days in a row in July and August. The week of the athletics games was annoying for a meteorologist, too, because the next week

was very sunny."

Helsinki-Testbed, the denser weather observation network, was in test use during the championships games, too, and provided interesting information. "The organisers' decision to interrupt the event is easy to understand when you hear that the downpour – similar to those in the tropics – lashed 1.5 million litres of water on the Stadium area in one evening," Nordlund relates.

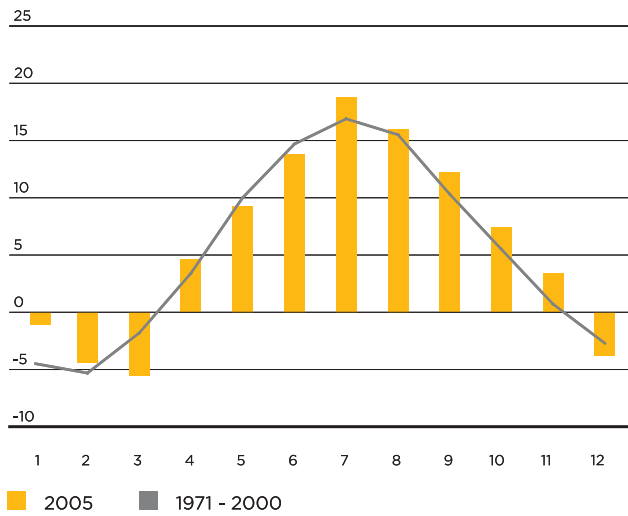
The greatest daily precipitation, 74 mm, was measured in Vilppula on 6 August. The greatest monthly precipitation, 211 mm, was measured in August in Nupuri, Espoo. "When the precipitation of a summer month exceeds 200 mm, it's worth an exclamation mark," Anneli Nordlund points out.

People often contact the Meteorological Institute to report even heavier rainfalls. "However, statistics must be based only on official measurement points. By using weather radars, we can also confirm higher precipitation figures,

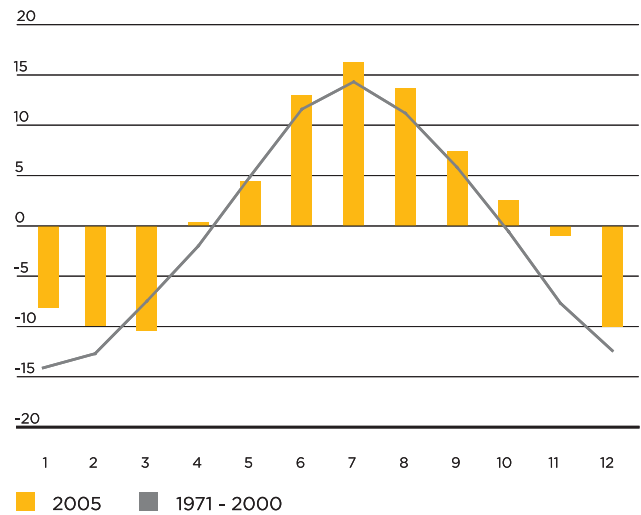
Thermal growing season 2005

	the beginning	length/ day	the end	sum of effective temperature	sum of precipitation
Helsinki-Vantaa	25.4.	180	22.10.	1558	400
reference	26.4.	176	19.10.	1364	108%
Jyväskylä	3.5.	164	14.10.	1309	357
reference	2.5.	161	10.10.	1142	110%
Sodankylä	20.5.	117	14.9.	931	288
reference	20.5.	127	24.9.	786	125%

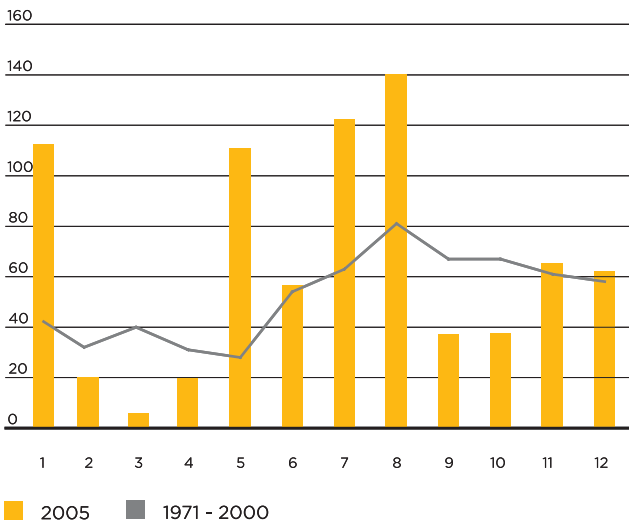
Turku (Monthly mean temperature, °C)



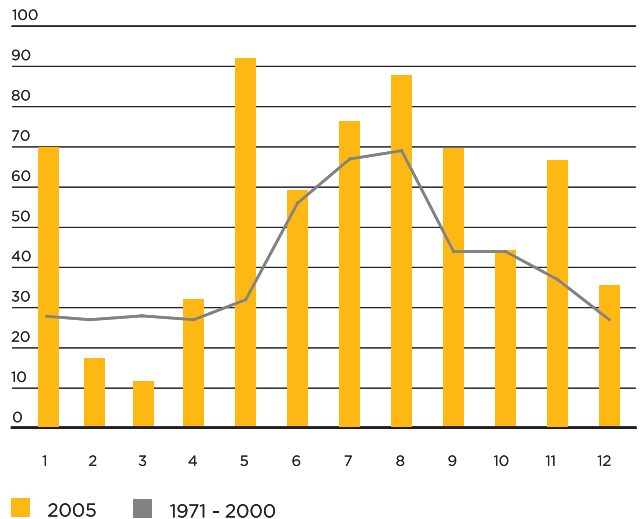
Sodankylä (Monthly mean temperature, °C)



Lappeenranta (Annual precipitation, mm)



Muonio (Annual precipitation, mm)



such as the well over 100 mm that came down one night in mid-June in Multia,” Nordlund explains.

A RECORD NUMBER OF RAINY DAYS IN WINTER

In early 2005, Northern Finland had a normal snow cover; in some areas the cover was even thicker than average. A highly unusual feature was the simultaneous lack of snow on the ground in the southern and western parts of the country.

“Since the winter of 1988–1989, the snow cover has become thinner south of Salpausselkä Ridge, in the southwest of Pirkanmaa, in Häme and Varsinais-Suomi and in the low-lying areas of Ostrobothnia. The difference is a good ten centimetres. Snow volumes in what is known as ‘Snow Finland’ have remained unchanged.”

More rainy days than before were measured throughout Finland in winter 2005. For instance in January, there were 14 rainy days in Helsinki (the mean being five), and 12 in Jyväskylä (the mean being two). Lapland, where the mean is under one,

had rain on four days in January.

A TYPICAL YEAR OF WINDSTORMS

In 2005, windstorms were recorded on 25 days, while the long-term average is 24. Anneli Nordlund says that not a single violent windstorm occurred during the year. “That’s something to be satisfied about! People have become more aware of storms, and after some years that had been even calmer, many may have felt that the number of storms was unusually high,”

For Nordlund, the most memorable event occurred in early January when the water level in the Gulf of Finland had been rising for 10 hours and it seemed that the sea might soon drench the Market Square in Helsinki, threatening even the Presidential Palace.

“A strong wind had been blowing from the southwest for a long time, and as the heaving water masses of the Baltic Sea moved in the right way, great volumes of water pushed all the way to the edges of the Gulf

of Finland,” Nordlund describes the background. Thanks to marine researchers, (at least some) precautions could be taken against flooding.

MANY TROMBS, FEW LIGHTNING STROKES

The Meteorological Institute received 65 reports of trombs – a record number. “Awareness of trombs has increased, which certainly affects the number of observations. But a remarkable number of trombs did occur last summer, owing to highly favourable weather conditions,” Anneli Nordlund recognises.

In summer the number of thunderstorm days was normal, but the number of lightning strokes was merely half of the average figure. Since trombs and lightning rarely occur together, the connection between these two will certainly be studied more. Nordlund points out that trombs are a challenging object of study; not even weather radars can detect them.



The Finnish Meteorological Institute has international responsibility

BEING INTERNATIONAL IS A VITAL AND SELF-EVIDENT PRECONDITION FOR THE FMI. PARTICIPATION IN INTERNATIONAL COOPERATION ENABLES US TO BENEFIT FROM SCIENTIFIC, TECHNOLOGICAL AND OPERATIONAL DEVELOPMENT AND EXPERTISE IN OTHER COUNTRIES WHILE ALSO CONTRIBUTING, WITHIN OUR OWN AREAS, TO THE EFFECTIVENESS OF THE TOTAL INTERNATIONAL EFFORT FROM WHICH ALL COUNTRIES BENEFIT.

Maria Hurtola, who coordinates issues pertaining to international organisations within the Finnish Meteorological Institute, says that the Institute has spent some time in the last few years to consider its internationalisation strategy, the role the Institute should have in Europe and globally, as well as how to ensure the availability of internationally competent staff. Working in an international sector, an organisation must plan, for instance, how to ensure an easy return home for a staff member who has had a stint abroad.

“About ten Finns work in international organisations in this field, but the number of researchers from the FMI working abroad is even higher,” Maria Hurtola estimates. She points out that Petteri Taalas, Director General of the FMI, has shown a good example: at the beginning of 2006 Taalas started a fixed-term assignment at the World Meteorological Organization, where he heads the Regional and Technical Co-operation for Development Department.

At present, there are some 15 people who have come from abroad to work at the FMI in Finland.

THE IGACO OZONE SECRETARIAT TO THE FMI

The Finnish Meteorological Institute has been appointed to host the IGACO-O3 Ozone Secretariat set up by the WMO at the start of 2006. The main goal of the Secretariat is to coordinate ozone and UV measurements and pro-

motes cooperation between users of ozone data. The IGACO's goal is to develop a global, uniform monitoring network for the key indicators of atmospheric chemistry. The Ozone Secretariat works to increase the availability and comparability of ozone observations, to improve the coverage of the observation network and, in particular, to ensure continued satellite measurements.

“Obtaining the Secretariat in Finland is an indication of the international community's esteem,” says Maria Hurtola, who has also spent some time working at the WMO.

The GEO (Group on Earth Observations) set up a Secretariat under the WMO. The goal of this global cooperation is to coordinate the data collected by all Earth observation systems around the world. The Finnish Meteorological Institute plays an active role in GEO and supports the Secretariat's work by paying part of the salary costs of one Finnish employee in the Secretariat.

The meeting of the WMO Regional Association for Europe, held once in four years, decided to draft a strategy for Europe. Among the topics addressed is how to integrate recently joined European members and non-EU members more effectively into the organisation's activities.

The Council of the European Centre for Medium-Range Weather Forecasts (ECMWF) decided to approve an amendment to its Convention, which will enable the current co-operation members and the

new EU Member States to become full-fledged ECMWF members. In the original Convention adopted in 1975, the number of member states is limited to 18.

“The enlargement will bring along new scientific know-how and will thus improve the work of the ECMWF. At the same time, the operations of meteorological institutes in different countries will become more harmonised,” Hurtola says.

THE FMI CONTRIBUTING TO THE DEVELOPMENT OF SATELLITE MONITORING OF SNOW

Meteosat 9, the latest satellite of Eumetsat, was successfully launched into orbit before Christmas 2005. This is the second of the 'second-generation' series of satellites. “Meteosat 9 guarantees European forecasters and researchers continued access to the good data and image material that is now transmitted by Meteosat 8,” Maria Hurtola comments.

Eumetsat's centre of excellence focusing on hydrology, HydroSAF (Satellite Application Facility), started operations in 2005. Together with the Turkish State Meteorological Service, the Finnish participants – the FMI, the Finnish Environment Institute and the Helsinki University of Technology – were given the responsibility for coordinating the centre's work on snow. The project will develop an operative system for monitoring the snow situation in Europe.

INTERNATIONAL ORGANISATIONS IN THE ATMOSPHERIC SECTOR

WMO (World Meteorological Organization) is a specialised agency of the United Nations that has its headquarters in Geneva. The primary objective of the WMO is to ensure that its member states have sufficient technical and material resources to provide the weather services and the related warnings required of their authorities. Finland has been a member of the WMO since its establishment in 1950.

EUMETSAT (European Organisation for the Exploitation of Meteorological Satellites) is an intergovernmental organisation that has 19 European Member States and 11 Cooperating States. EUMETSAT designs and operates meteorological satellite systems and utilises the meteorological data thus obtained for daily use and for climate research needs. The FMI has

two representatives at EUMETSAT: one as Chairperson of the Science Working Group and one as Coordinator of the Centre of Excellence for Atmospheric Chemistry. The FMI also participates in the work of the Centre of Excellence for Climate Monitoring and the Centre of Excellence for Hydrology.

ECMWF (European Centre for Medium-Range Weather Forecasts) is an independent international organisation. It develops and produces medium-range numerical weather forecasts covering a period of approximately ten days. The weather forecasts are available to the Member States. The Centre's tasks also include scientific research and development of models, as well as the collection and archiving of meteorological materials. The Centre has 18 Member States and has concluded cooperation agreements

with eight countries. Finland has been a member of the ECMWF since its establishment in 1975. The FMI has a representative, for instance, as Chairperson of the Technical Advisory Committee.

EUMETNET (Network of European Meteorological Services) coordinates the observation activities of European meteorological institutes, and finances development and research projects that help enhance the quality and cost-effectiveness of activities. The projects pertain, for instance, to observation systems, information technology, weather service products, environmental and climate issues, research and development, and training. At EUMETNET, the FMI is responsible for the radar programme (OPERA) and the training programme (EUMETCAL), and is also represented in several other programmes.



In September, Lars Prahm, Director-General of EUMETSAT, talked to representatives of Finnish industry about the possibilities offered by satellites.

The Finnish Meteorological Institute acts as a consultant and engages in research cooperation in many countries around the world. In El Salvador, the FMI studies the applications of wind power.



In his address at the inauguration of the Dynamicum, Michel Jarraud, Secretary-General of the WMO, brought up the Finnish Meteorological Institute's strong role as a proponent of long-range development cooperation in meteorology.



The EUMETNET Council held a meeting in the Dynamicum in autumn 2005.

SPEAKING WITH ONE VOICE TO THE EUROPEAN COMMISSION

At its meeting held in Helsinki in autumn 2005, the EUMETNET Council made a decision together with the WMO and the ECMWF to establish a new post for one office holder who would then represent the organisations and bring up issues associated with meteorology in contacts with the European Union.

Petteri Taalas, Director General of the FMI, who served as Chairman of EUMETNET in 2005, worked actively to encourage the new EU Member States to join the EUMETNET cooperation network. The new EMMA programme of EUMETNET will provide Europe-wide information on potential meteorological risks via a joint Internet site. The operative phase of the programme has now started.

Nordic cooperation on the atmosphere is carried out through the NORDMET network. The FMI participated, among other things, in the project to harmonise weather warning practices and criteria that apply especially to the Baltic region. Nordic aviation weather service cooperation was restarted after a break of several years. The FMI took the leading role in the new international COST project, which is developing a method for estimating and predicting ice formation on aircraft.

A ROLE IN THE PREVENTION OF NATURAL DISASTERS

"The Finnish Meteorological Institute has played – and continues to play – a role in international efforts to prevent natural disasters," Maria Hurtola stresses. In early 2005, Petteri Taalas attended the interna-

tional meeting that reviewed the sustainable development of small island developing states. FMI representatives were also included in the Finnish delegation in the World Conference on Disaster Reduction, held in Kobe.

The FMI participated in the development of a tsunami warning system for the area around the Indian Ocean. The feasibility study for an advance warning system planned for Thailand was conducted by the FinEWS consortium and was funded partly by the Finnish Ministry for Foreign Affairs. The final report was given to the Government of Thailand in December 2005.

International expert activities were under vigorous development in cooperation with bodies such as the Ministry for Foreign Affairs and the WMO. "The objective of our expert services is to support the UN Millennium Declaration and Finland's development cooperation goals by implementing projects that help strengthen the operations of meteorological institutes in partner countries. Warning systems for natural disasters play an important role in development projects."

CONSULTANCY AND RESEARCH COOPERATION IN THE FOUR CORNERS OF THE WORLD

During the past few decades, the FMI has implemented various development and consultancy projects in over 50 countries. These projects have involved activities such as meteorological consulting, air quality studies and training services.

In 2005, after international competitive tendering, the FMI secured a contract for drawing up a devel-

opment plan for the Lithuanian Hydrometeorological Service. The FMI also won the first phase of the competitive tendering that was arranged for the further development of the Lithuanian service. Negotiations on the development of weather service in the Caribbean region were also concluded and contracts were signed.

The FMI's air quality projects in 2005 included the design of dispersion models for a power plant in Kosovo, development of air quality monitoring in St. Petersburg, and air quality consulting for Botnia's new pulp mill in Uruguay.

The FMI has research cooperation, for instance, with India, Argentina and China. One goal of the research project conducted together with the TERI Institute of India is to study the properties of a pollution cloud over South Asia and to assess the effects of pollution on human health and on the climate. A successful presentation of the project was made at the Conference of the Parties to the UN Climate Change Convention, held in Montreal.

Together with Argentina, the FMI has conducted ozone soundings at the Marambio station on the Antarctica since 1988. The long time series obtained of the sounding results are valuable, for instance, when studying the impact of climate change on the development of the ozone layer. The cooling of the middle atmosphere caused by climate change is predicted to intensify chemical ozone depletion over polar regions. With the China Meteorological Administration, the FMI started cooperation in the measurement of fine particles.

The move, productivity and value discussion

THE ADMINISTRATION OF THE FINNISH METEOROLOGICAL INSTITUTE PRODUCES EXPERT SERVICES IN THE SECTORS OF FINANCES, HUMAN RESOURCES, PERSONNEL DEVELOPMENT AND PROPERTY SERVICES. THE HIGH POINT OF THE YEAR 2005 WAS THE MOVE TO KUMPULA.

The new Dynamicum building was completed on time, and the project remained within its budget. The move required success in various phases: the management of financing, the introduction of new operating models, and the actual process of moving. The synergy benefits to be obtained both in-house and with the new neighbour, the Finnish Institute of Marine Research, are not without challenges, either.

Additional requirements are being set for the measurement of cost-effectiveness and productivity both within State administration in general and in the operations of the FMI. Within the FMI, the share of administration out of total costs has been reduced, for instance, by

concentrating administrative tasks from other units to the Administration Unit. Special attention has been paid to purchases. The financial regulations and the handling of risk management have been revised.

The result-based bonus scheme was in test use for the first year. Altogether 30 bonus applications were received for the year 2005. The result-based bonus scheme encompasses the entire FMI personnel, with the exception of the upper management. A group that was appointed to follow and develop the Institute's pay system began the revision of job descriptions during autumn.

Recruitment guidance and training were used as help to strengthen the role of experts in the personnel structure.

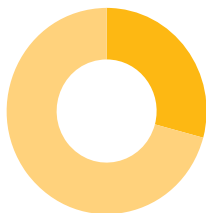
ATTENTION TO WELLBEING

Wellbeing at work was supported by means of change management within organisations and a supervisor coaching project. Within the coaching project funded by the State Treasury, 21 supervisors were offered management training. The participants were either heads of units or heads of teams. Change management within organisations utilised services provided by an occupational psychologist. The Institute also set up two rehabilitation groups.

VALUE DISCUSSIONS WERE STARTED

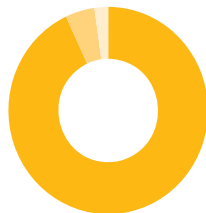
The organisation's values, vision and strategy form a solid entity. The FMI's strategy, vision and organi-

Administration
Total Expenditure €14.2 Million *



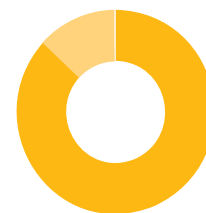
Administration	14.2
Other Divisions	34.5

Administration
44 Person-years



Budgetary Funding	41
Earned Revenue	2
External Funding	1

Administration
Funding €14.2 Million



Budgetary Funding	12.3
Earned Revenue	1.8
External Funding	0.05

*Share of international membership fees €4.7 million

sational structure were revised in 2004 and 2005; it was therefore time to review the relevance of the values. Value discussions started in autumn 2005 and will continue until spring 2006. The purpose of these discussions, encompassing the entire organisation, is to identify common values that are both important for successful operations and respected by the personnel.

In 2005, the Management Group defined the Institute's core competences, and the process of competence management was developed. Extensive programmes for the development of supervisor training and management group working were completed.

The meteorological PD programme (MetPD) continued and another demanding further education programme, the Hydrological-Meteorological Diploma (HydMet), was brought to a successful conclusion. Altogether 25 students completed the HydMet, and 14 specialists from the Institute are enrolled in the MEPD programme.

A development programme intended for executive assistants and secretaries, the Secretary Academy, was launched in the FMI towards the end of the year. The programme consists of four study segments. These cover the principal professional competence areas that are required for meeting the internal and external challenges posed by

the FMI's operating environment.

The Institute started a programme for handing down senior workers' competence to younger people, and participated in the two-year EU programme Improve (Improvement of personal working life quality of older workers).

An information management project that will result in an information management plan for the FMI's administrative materials was launched in November 2005. A project that had started a year earlier will yield a management plan for information relating to the Institute's continuous operations, such as observation and measurement materials, models, products and services.

A COMMUNITY OF EXPERTS

At the end of 2005, the Finnish Meteorological Institute had 599 employees, including part-time employees and the employees hired with the help of outside funding. Budgeted funding covered the expenses of a full-time equivalent staff of 404, while revenues from commercial operations and other outside funding covered the expenses of a full-time equivalent staff of 167.

In all, 311 persons worked in the capacity of experts. 55 per cent of the personnel have a higher academic degree, and 15 per cent have a postgraduate degree.

Days spent for training

2003	2004	2005
801 days	1 836 days	2 200 days

The move from five locations to the Dynamicum was carried out simultaneously within four days. Meteorologist Anu Petäjä busy packing.



The constructor handed over the building on 1 September 2005.



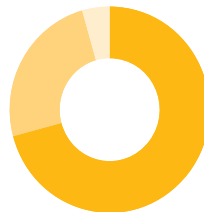
The first task in the new building was to sign for a key and an ID card.

Breakdown of the Personnel's Education



General Education	9.9
Secondary Level	27.9
Lowest Post-Secondary	7.4
Lowest Tertiary	8.2
Higher Tertiary	32.0
Doctoral and Licentiate's Degree	14.5

Staffing in Person-years The Whole Institute



Budgetary Funding	404
Earned Revenue	142
External Funding	25

Projects to develop job satisfaction bearing fruit

THE RESULTS OF THE FINNISH METEOROLOGICAL INSTITUTE'S JOB SATISFACTION SURVEY OF 2005 FOLLOWED THE TREND OF PREVIOUS YEARS: IMPROVEMENT IN NEARLY EVERY AREA.

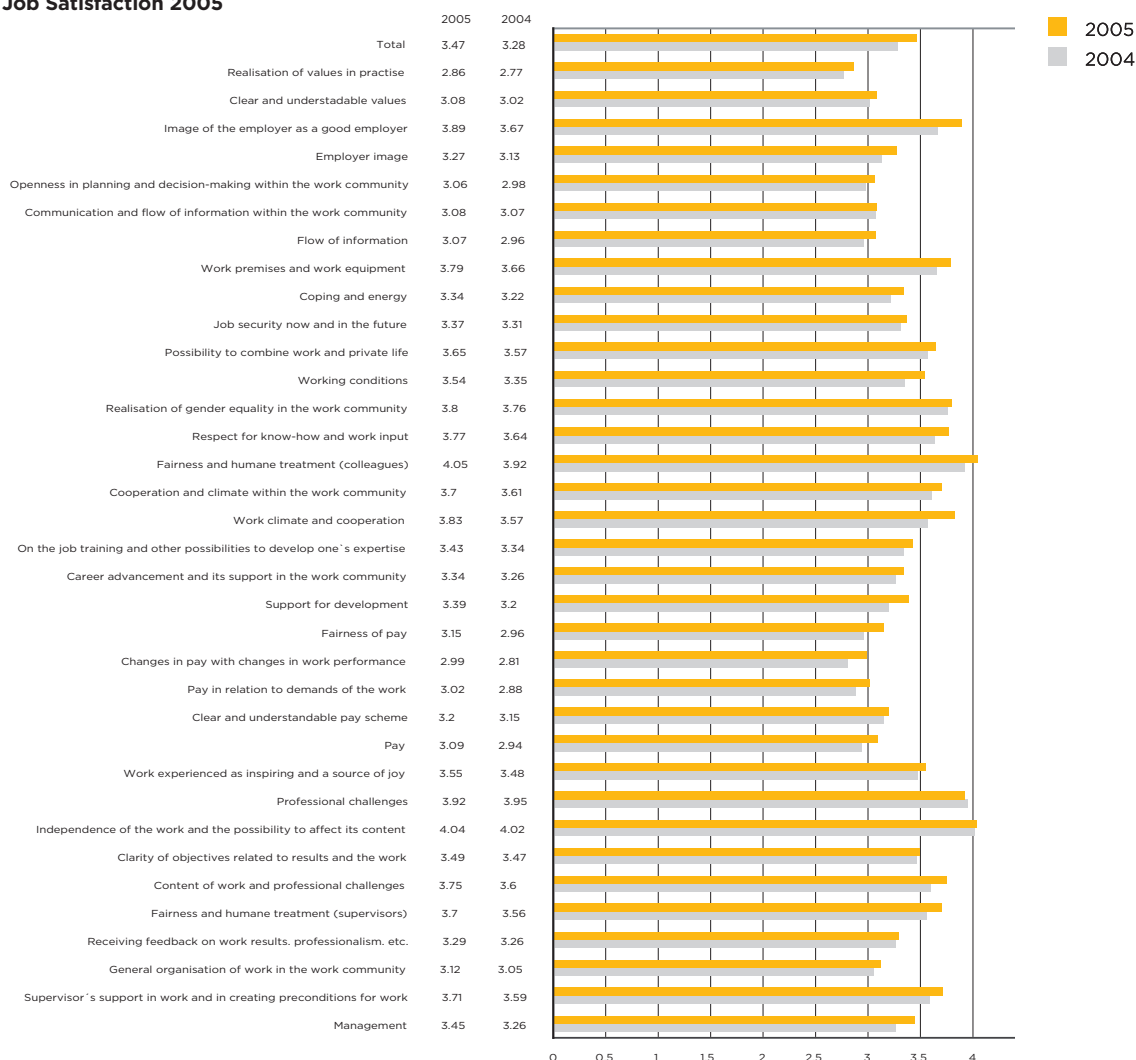
The FMI personnel's job satisfaction is followed regularly, for instance, by means of annual surveys on the Intranet. All staff members may participate in these surveys, which are a good way to bring out the development targets that should be emphasised when developing the work organisation and work practices. When people can affect their own work, it is easier for them to take pleasure in their work and feel satisfied with their achievements. As enthusiasm tends to spread, it has an impact on the wellbeing of the entire organisation.

On the whole, the results were good and give cause for satisfaction. "Especially as concerns career advancement and support for it in the organisation, the Institute stood out positively next to other State agencies. The employer's public image was also considered to very good. Higher ratings than before were given, for instance, to support from supervisors and the clarity of objectives related to results and the work. These areas have undoubtedly been the focus of much attention in recent years," says Merja Kaikkonen, occupational psychologist.

Despite the good results, there is still room for improvement, for instance, in the realisation of the organisation's values in practice. In 2006, the Institute has started a value process in which every employee has the chance to participate. During value discussions, staff members and trained professionals can together present ideas for new value proposals.

Maintaining and improving job satisfaction is a constant process. An essential element of this process is to develop working conditions in cooperation with the personnel.

Job Satisfaction 2005



The Supervisor Academy: The goal competent supervisors and good management

THE FINNISH METEOROLOGICAL INSTITUTE'S PROGRAMME TO DEVELOP SUPERVISORS' WORK, THE SUPERVISOR ACADEMY, AIMS AT CONSTRUCTIVE INTERACTION BETWEEN SUPERVISORS AND SUBORDINATES AND BETWEEN THE ORGANISATION'S ALL UNITS.

The Supervisor Academy is a training programme intended for everyone holding a supervisory position in the FMI. The programme is part of a more extensive project to develop management. A separate development programme, JOKO, was tailored for the upper management. The programme concentrated on the management group's strategy work. The first Supervisor Academy started in May 2004, prompted by factors such as the Institute's reorganisation and newly hired supervisory personnel. In addition to eight days of classroom teaching, participants have the opportunity to get individual counselling that helps them to prevent workload stress in advance and to acquire tools for coping with everyday work.

After the first and second Supervisor Academy courses, there was demand for a third one, which was subsequently launched in January 2006. "People have been really satisfied with the training. The threshold

to keep in contact and to have open discussions has become lower. The best thing is that the participants have been clearly eager to develop themselves as supervisors," says Carola Sundius, Training Manager.

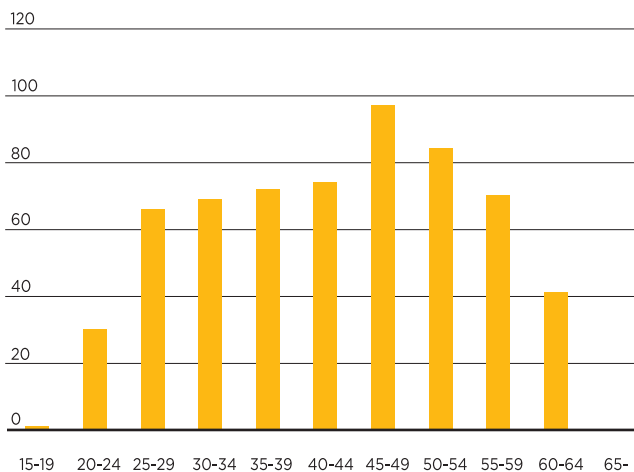
The programme to develop supervisors' work has been planned and implemented in cooperation with the Finnish Institute of Public Management Ltd (HAUS). Of vital importance for the project has been the FMI personnel's active participation, from the planning of the development programme and the production of materials to the training itself.

The aim has been to keep the training as practical and interactive as possible. "All groups have included both experienced supervisors and newcomers who have just started in a supervisory position. In this way, people have had excellent opportunities to exchange experiences and to learn from each other," says Hanna Koski, Personnel Developer and one planner of the Supervisor Academy.

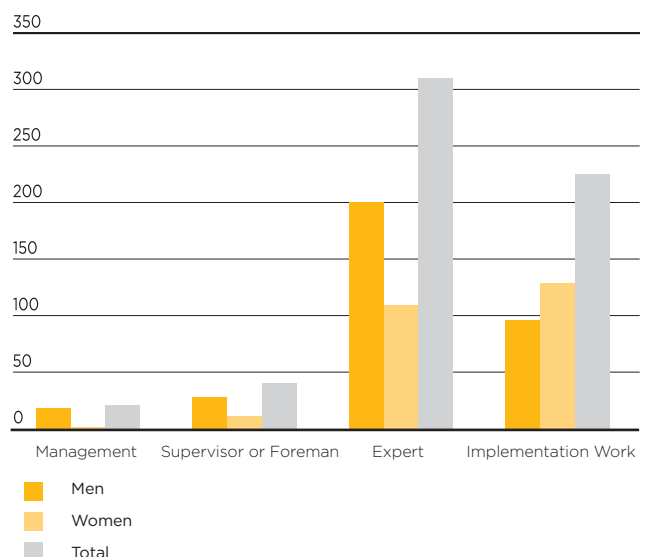


The Administration unit concentrates on issues such as productivity, job satisfaction and development of competence. From the left: Carola Sundius, Janna Karasjärvi, Merja Kaikkonen, Hanna Koski and Jaana Palmunoksa.

Breakdown of the Personnel by Age Brackets
(Number of Persons)



Gender Breakdown by Personnel Groups
(Number of Persons)



The FMI cost accounting system in a good shape

THE FINNISH METEOROLOGICAL INSTITUTE'S COST ACCOUNTING SYSTEM WAS EVALUATED IN 2005. THE OUTCOME OF THE EVALUATION WAS POSITIVE; NOW IT IS TIME TO MAKE INTERNAL ACCOUNTING EVEN MORE EFFECTIVE.



The reorganisation of the Finnish Meteorological Institute in 2004 brought out the need to revise the Institute's accounting system. After the revision, it was necessary to determine whether the system produces a sufficient amount of information in accordance with the State Budget Decree, especially as concerns the costs of commercial operations.

"We wanted to check that the revisions did not compromise the clarity of the system as concerns the combined costs of the Institute's commercial and public operations, or that the calculation model didn't become too complicated. Reorganisation always involves risks of this kind," explains Janna Karasjärvi, Controller.

The auditing company KPMG Oy Ab conducted the evaluation on the basis of spot checks, interviews and document reviews. The outcome was positive in all respects: the cost bases are reliable and the accounting system produces essential and sufficient information on the costs

of the Institute's commercial operations.

According to KPMG's assessment, the Institute's cost accounting follows the principles of activity-based cost accounting. "Through various activities, the Institute's costs are allocated to account items according to the matching principle. In other words, where money has been used, it's also seen as a cost," Karasjärvi clarifies.

Based on auditing, the Institute's accounting can be developed even further. "We're developing the system by reducing the share of manual work in our accounting system and by improving the reporting done on the basis of the cost accounting system," Karasjärvi says.

"In addition, we are developing the system so that we'll be able to produce more accurate information on the costs of operations to support the management's decision-making. We'll also be able to obtain increasingly accurate information for monitoring productivity trends through the accounting system."

Finances 2005

ALLOCATIONS FROM THE STATE BUDGET COVER TWO-THIRDS OF THE INSTITUTE'S EXPENSES. AN INCREASING PERCENTAGE IS FINANCED BY REVENUES FROM COMMERCIAL OPERATIONS AND BY OUTSIDE RESEARCH FUNDING.

The Institute's new organisation, which had been adopted in 2004, was in effect for the first full calendar year. Business operations were separated from the Institute's other functions, and were carried out by the Customer Services-profit centre and in the Expert Services unit under Research. These units purchased services from the Institute's basic functions at cost price.

A good amount of project financing from both Finland and abroad was secured for research in the Institute's focal areas. The principal external sources of funding were the Academy of Finland, Tekes, the European Commission, the European Organisation for the Exploitation of Meteorological Satellites (EUMETSAT), and the European Space Agency. Expert services based on high-level research were also augmented during the year.

FINANCING AND COSTS

The Institute's total expenditure amounted to EUR 48.67 million, or

EUR 7.2 million more than the year before. The increase stemmed from moving costs and investments in the new premises. The expenditure was covered as follows: income from operations, EUR 14.53 million (30%); direct outside funding, 1.44 million (3%); and allocations from the State budget, 32.70 million (67%).

Revenues from commercial operations increased by 1.46 million on the previous year; this clearly exceeded the target. The income proper from commercial services came to EUR 9.06 million, while income from jointly funded research totalled EUR 4.2 million.

The Institute's expenses were monitored by means of an activity-based costing system. In the cost structure, the share of payroll costs remained at 58 per cent of total expenses. The share of operating costs rose to 37 per cent, while capital costs accounted for five per cent of total expenses. In all, the Institute's expenses rose by six per cent on the previous year.

Commercial services yielded a surplus of four per cent. Compared against the year before, the expenditure recovery of cost-priced public services was better, but services still showed a slight deficit.

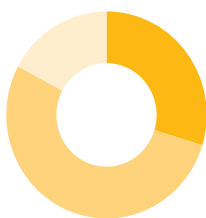
REVIEW OF THE FINANCIAL STATEMENTS

The Account of Income and Expenses describes the structure of the Institute's revenues and expenses, excluding the allocations from the State budget. Revenues from operations increased by EUR 1.60 million on the previous year; increases were recorded in revenues from both commercial and other operations.

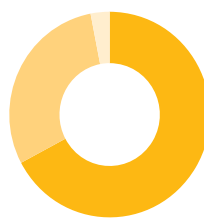
Expenditure arising from activities rose by EUR 2.11 million on the previous year. The greatest increases were recorded in personnel expenses, rents and in purchase of services. The increases were mainly attributable to the move to the new premises.

Total depreciation increased slightly on 2004. The depreciation

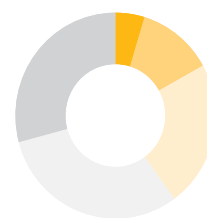
Total Revenue by Sector
€13.3. Million



Funding
€48.7 Million



Total Revenue from Fee-based Operations by Sector
€48.7 Million



Public Sector	€4.0 Million	30%
Business	€7.0 Million	53%
Other	€2.3 Million	17%

Budgetary Funding	€32.7 Million	67%
Earned Revenue	€14.6 Million	30%
External Funding	€1.4 Million	3%

Customer Services	€ 2.2 Million	5%
Weather Service	€ 6.0 Million	12%
Technical Services	€ 11.3 Million	23%
Research	€ 15.0 Million	31%
Administration	€ 14.2 Million	29%

method used by the Institute was straight-line depreciation according to economic service life; the write-off period ranged from 3 to 10 years. The balance sheet value of fixed assets and other long-term investments rose from EUR 5.98 million to EUR 9.72 million. The balance sheet value of current assets and inventories increased to EUR 3.25 million. The balance sheet total rose from EUR 8.472 million to EUR 12.972 million.

Extraordinary income decreased by EUR 0.494 million. The change was mainly caused by a decrease in the share of Russia's debt conversion. In total EUR 0.5 million, or EUR 0.20 million less than the year before, was transferred as income from the equalisation fund of the EUMETSAT membership fees.

Overall, the deficit for the financial period increased by EUR 2.16 million on the previous year. The change stemmed from the above-mentioned factors: increase in revenues from operations (effect on the

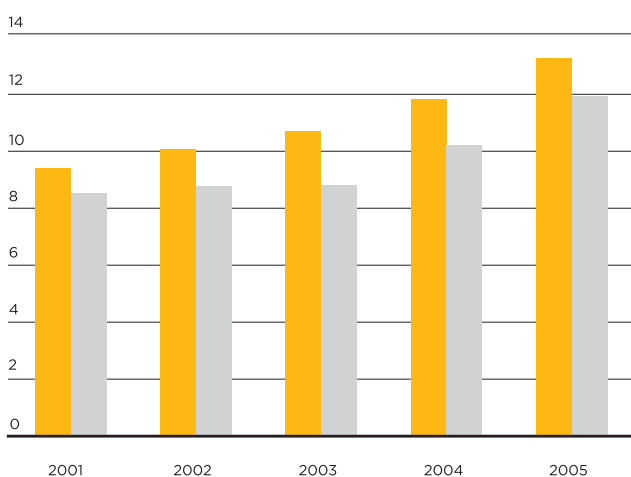
Revenue	2004	2005	Change, %	Share, 2005
Commercial Services	8 419	9 063	8%	62.38%
Jointly Funded Research	3 403	4 216	24%	29.02%
Other	1 019	1 250	23%	8.60%
TOTAL	12 841	14 529	13%	100%

Expenditure	2004	2005	Change, %	Share, 2005
Salaries	24 036	25 848	8 %	53%
Operating Expenditure	15 858	16 995	7%	35%
Investment	1 580	5 824	269%	12%
TOTAL	41 474	48 667	17%	100%

Costs	2004	2005	Change, %	Share, 2005
Salaries	24 169	25 493	5%	57%
Operating Costs	15 120	16 249	7%	37%
Capital Costs	2 483	2 610	5%	6%
TOTAL	41 772	44 352	6%	100%

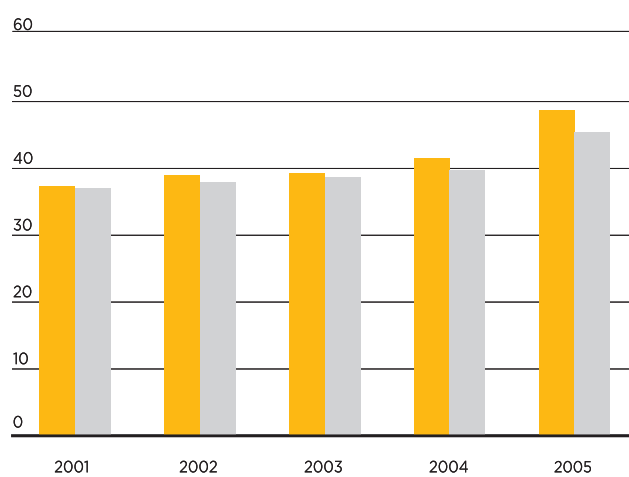
deficit EUR +1.60 million); increase in expenses (effect EUR -2.11 million); decrease in extraordinary income (effect EUR -0.49 million); decrease in transferred income (effect EUR -0.25 million); and VAT adjustments (effect EUR +0.90 million).

Revenue Trends



■ Revenue
■ Budget

Expenditure Trends



■ Expenditure
■ Budget

Income and expense account 2005

	1.1.2005 - 31.12.2005		1.1.2004 - 31.12.2004	
Operating income				
Income from fee-based operations	9 040 185.60		8 400 255.13	
Rents and compensation for use	15 728.60		15 227.21	
Other income from operations	4 740 360.60	13 796 274.80	3 784 659.78	12 200 142.12
Operating expenses				
Materials, supplies and goods				
Purchases during the year	1 748 162.86		1 766 506.48	
Personnel costs	25 536 256.02		24 169 378.43	
Rents	2 599 617.31		2 302 385.89	
Purchased services	6 251 611.05		5 991 933.58	
Other expenses	6 088 081.60		6 112 023.59	
Depreciation	2 417 589.00		2 278 828.00	
Adjustment to internal expenses	144 384.32	-44 785 702.16	55 658.99	-42 676 714.96
Surplus I	-30 989 427.36		-30 476 572.84	
Financial income and expenses				
Financial income	1 506.54		1 906.85	
Financial expenses	-2 404.88	-898.34	-1 097.29	809.56
Extraordinary income and expenses				
Extraordinary income	403 125.49		896 262.38	
Extraordinary expenses	-1 511.41	401 614.08	-2.40	896 259.98
Surplus II	-30 588 711.62		-29 579 503.30	
Income and expenses from payment transfers				
Income				
Revenues from non-profit organisations	0.00		48 300.00	
Other foreign income	500 000.00	500 000.00	700 000.00	748 300.00
Expenses				
Other foreign expenses	-4 647.31	-4 647.31	0.00	-0.00
Surplus III	-30 093 358.93		-28 831 203.30	
Income from taxes and obligatory expenses				
Value added tax collected	1 701 499.97		1 561 292.58	
Value added tax paid	-3 258 676.71	-1 557 176.74	-2 214 622.30	-653 329.72
Surplus for the financial period	-31 650 535.67		-29 484 533.02	

Assets 2005

	31.12.2005		31.12.2004	
ASSETS				
FIXED ASSETS AND OTHER NON-CURRENT INVESTMENTS				
IMMATERIAL ASSETS				
Immaterial rights	161 837.86		258 236.85	
Other non-current expenditure	58 676.95	220 514.81	79 763.95	338 000.80
MATERIAL ASSETS				
Structures	125 821.83		111 905.95	
Machinery and equipment	8 084 043.58		5 339 250.56	
Fixtures and furnishings	1 250 992.47		164 100.07	
Other material assets	4 589.90	9 465 447.78	6 018.90	5 621 275.48
SECURITIES HELD IN FIXED ASSETS AND OTHER NON-CURRENT INVESTMENTS				
Securities held in fixed assets	29 441.00	29 441.00	18 441.00	18 441.00
TOTAL	9 715 403.59		5 977 717.28	
STOCK AND FINANCIAL ASSETS				
CURRENT RECEIVABLES				
Trade receivables	2 618 623.44		2 454 985.15	
Prepaid expenses and other accrued income	598 585.97		1 342.20	
Other current receivables	29 705.28		25 158.04	
Prepayments	7 854.04	3 254 768.73	12 046.90	2 493 532.29
CASH, BANK RECEIVABLES AND OTHER MONEYS				
Cash accounts	1 880.60	1 880.60	1 028.95	1 028.95
TOTAL	3 256 649.33		2 494 561.24	
TOTAL ASSETS	12 972 052.92		8 472 278.52	
LIABILITIES				
EQUITY CAPITAL				
STATE CAPITAL				
State capital 1.1.1998	5 439 282.69		5 439 282.69	
Change in capital for previous financial periods	-4 500 548.65		-4 100 380.89	
Transfer of capital	34 928 499.47		29 084 365.26	
Surplus/deficit for the financial period	-31 650 535.67	4 216 697.84	-29 484 533.02	938 734.04
CREDITORS				
CURRENT				
Advances received	1 224 908.33		521 906.92	
Trade payables	1 937 018.82		1 595 968.09	
Transactions between accounting offices	580 931.69		538 629.05	
Items to be forwarded for payment	406 209.59		333 449.53	
Accrued liabilities	4 139 353.08		3 903 022.33	
Other current liabilities	466 933.57	8 755 355.08	640 568.56	7 533 544.48
TOTAL	8 755 355.08		7 533 544.48	
TOTAL LIABILITIES	12 972 052.92		8 472 278.52	

Management group 1.1.2006



From the left: Marko Viljanen, Pekka Plathan, Eeva-Kaisa Heikura, Joanna Saarinen, Kristiina Soini, Veijo Mäkelä, Martti Heikinheimo, Jaana Palmunoksa, Yrjö Viisanen and Mikko Alestalo.

Director General

Pekka Plathan

Director General Petteri Taalas
on leave of absence 1.1.2006–31.10.2007

Deputy Director General

Mikko Alestalo

Director

Martti Heikinheimo

Weather Service

Director

Yrjö Viisanen

Research

Director

Kristiina Soini

Technical Services

Director

Marko Viljanen

Administration

Director

Vesa Kurki

(Invited expert)

Customer Service

Administration Manager

Jaana Palmunoksa

(Invited expert)

Administration

Communications Manager

Eeva-Kaisa Heikura

Communications

Senior System Analyst

Veijo Mäkelä

Representative of the
personnel

Executive Assistant

Joanna Saarinen

Secretary

Board 1.1.2006



Back row from the left: Pekka Plathan, Sakari Karjalainen, Joanna Saarinen, Mikko Alestalo, Reino Lampinen, Veijo Mäkelä, Markku Kulmala, Pentti Partanen ja Marko Viljanen. Front row from the left: Reetta Meriläinen, Marja Happonen and Outi Berghäll.

Director-General

Pentti Partanen

Ministry of the Interior
Department for Rescue Services
Chairman

Deputy Director-General

Reino Lampinen

Ministry of Transport and
Communications
Vice Chairman

Director

Outi Berghäll

Ministry of the Environment

Director

Sakari Karjalainen

Ministry of Education

Academy Professor

Markku Kulmala

University of Helsinki
Department of Physical Sciences

Editor-in-Chief

Reetta Meriläinen

Helsingin Sanomat, News

Director, Human Resources

Marja Happonen

Vaisala Oyj

Senior System Analyst

Veijo Mäkelä

Finnish Meteorological
Institute
Representative of the
personnel

Vision

The Finnish Meteorological Institute

- Cutting-edge expertise in European atmospheric know-how

Objectives

The Finnish Meteorological Institute produces high-quality observational data and research findings on the atmosphere. The institute uses its expertise effectively to provide first-rate services benefiting people and the environment.

The Finnish Meteorological Institute

- observes the physical state, chemical composition and electromagnetic phenomena of the atmosphere
- produces information about the past, present and future states of the atmosphere
- conducts high-standard research in the fields of meteorology, air quality, space physics, earth observation and geomagnetism
- carries out competitive commercial activities, based on expert services both in Finland and abroad
- takes an active part in national and international cooperation
- actively disseminates information about matters associated with the atmosphere
- foresees changes and responds quickly to changes in the environment and to changing expectations.

Organisation 1.1.2006

