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The Helsinki testbed will help to develop, refine and test instruments and methods for observing and forecasting mesoscale weather phenomena in high-latitude conditions, e.g. on the south coast of Finland. Weather phenomena can be called mesoscale if they are too big to be observed from one point, but too small to be studied with a traditional network for weather observations. Some well-known mesoscale phenomena are thunderstorms and fog.

The testbed is intended to become a meeting point for international research in the atmospheric sciences. The database can be used as input for various kinds of research, and great attention is paid to the quality and usability of the collected data. The platform will be open, to enable new instruments and parallel projects to join in. The first tests are scheduled for summer 2005 and the full database facility will be in operation from November 2005. The most intense activities will concentrate on specific measurement periods, the first phases of which have been tentatively scheduled for November 2005, January-February 2006, and May 2006.

Mesoscale forecasting

The shorter the forecast period, the more accurate the weather forecast must be. "Nowcasting" is a subset of mesoscale forecasting, and the term is used for forecasts lasting for up to the next two hours or so. On this scale, weather information is mainly based on observations and rather simple methods of extrapolation. Beyond a couple of hours, the importance of numerical modeling increases.

A typical rain shower lasts less than two hours, and moves at a speed of 30-50 km/h. When, according to the national-scale forecast, we have "local scattered showers in southern X" for example, the mesoscale forecast can show that "...the showers now at X are expected in XY in 45 minutes." This simple example shows

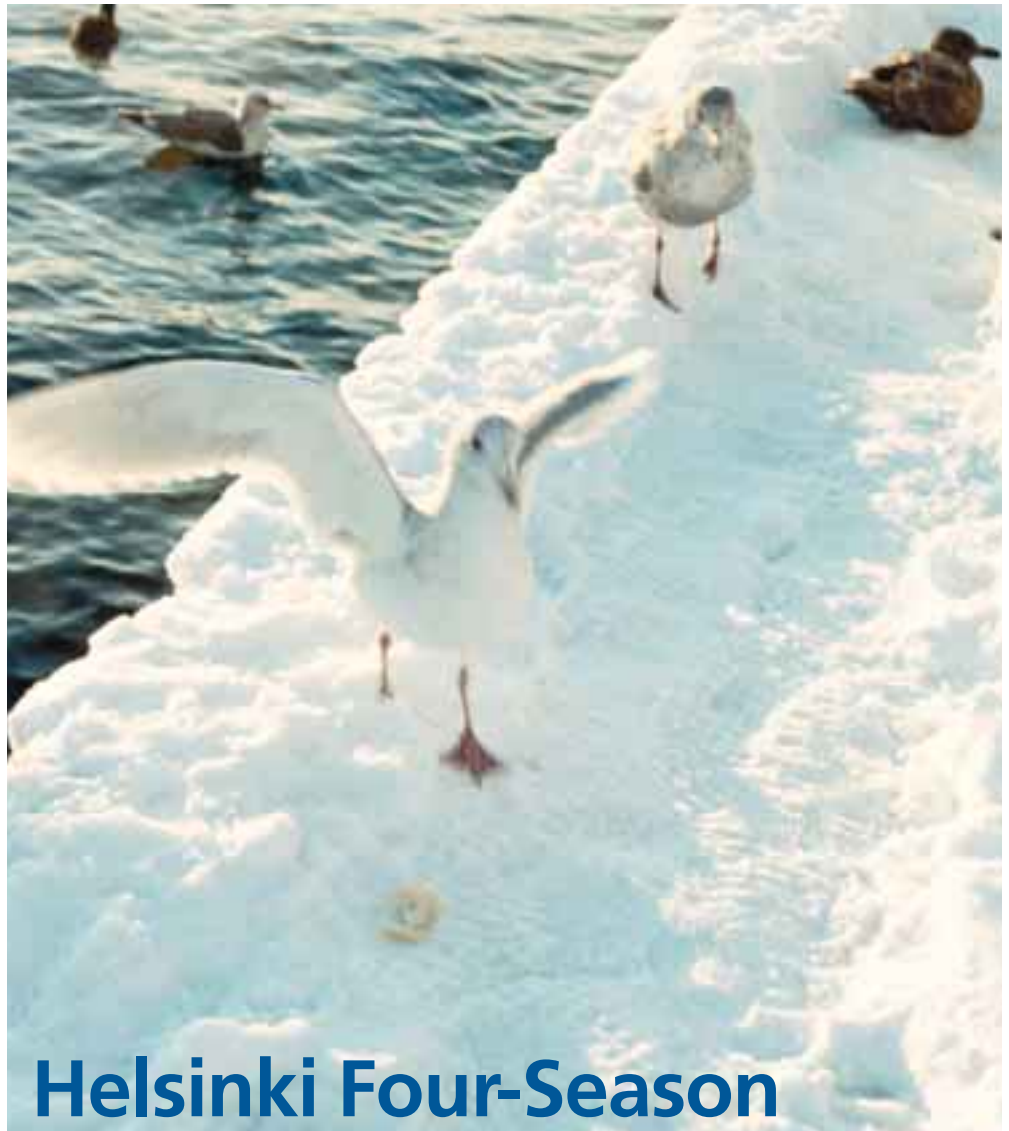
the importance of quick data transfer in the testbed project: the observations must get to database, be processed, and the final products distributed to the users fast. On mesoscale, we can never really see the weather "now" - all observations show measurements "a while ago". This is where the

shortness of the latency period becomes crucial.

Perfect platform for evaluation and experimentation

According to a recent publication summarizing the results of the 2003 US Weather Research Pro-

gram (USWRP) mesoscale workshop, testbeds are the preferred method to accelerate the infusion of science and technology into operations, to evaluate new technologies and products, to train forecasters, and to serve as a pathway to operations. Testbeds are tools with which new science and



Helsinki Four-Season Mesoscale Testbed

Vaisala and the Finnish Meteorological Institute (FMI) have announced plans to establish a mesoscale weather testbed in the greater Helsinki area. The testbed will be a comprehensive platform for research and development by companies, universities and research institutes worldwide.

technology are evaluated in a setting that mimics the operations of national meteorological services, facilitating the transfer of findings to operations.

Testbeds should be regional in scope, focusing on regional weather hazards and user communities. They should utilize and expand on existing technologies and investigate optimal methods for combining different nowcasting techniques. Universities, government entities, and the private sector are all expected to play significant roles in the Helsinki testbed project. Established and new end-users should be included in related activities. Testbeds should serve as a training resource for both forecasters and end-users, and provide support to undergraduate and graduate students.

The USWRP workshop concluded that the most successful testbeds are those that engage a broad range of talents and roles, from scientific expertise to forecasting skill to end-user decision-making. Much of this skill can be found in existing operational centers, laboratories, forecast offices, universities, companies, etc., and collaborative efforts can be established within this framework. However, it was also recognized that a core effort is required, and is likely to involve more than one of the key organizations through dedicated staff and facilities (e.g., computing, observing systems), and through granting activities. The Helsinki testbed will meet the set criteria.

Helsinki – the capital of slush

Helsinki and its surroundings provide the perfect setting for a mesoscale testbed. Often all phases of precipitation can be observed, as anyone who has traveled in wintertime from the wet coastal area to the Vaisala offices in Vantaa, north of Helsinki, knows. The Helsinki archipelago and frequent ferry traffic allow detailed sea and coastline observations. Additionally, the

existing network of weather instruments is of high quality.

Specific periods will be dedicated for measurement campaigns, and the existing observation networks will be supplemented with numerous new sites. New Vaisala Weather Transmitters WXT510 will be installed on ships and on the antennas of the Helsinki cellphone network. The number of radiosoundings and wind profiler observations will be increased. A network of Vaisala laser ceilometers will be established to map both cloud base and boundary-layer structure. Satellite and expanded radar data will be extracted from FMI and research equipment, and saved at high resolution.

The sheer amount of data will set high demands on the database structure. The data will be available to project partners online, and to the research community with some delay through web access. The data collected will be used as input for nowcasting systems and demo projects. The World Championships in Athletics, held in Helsinki in August 2005, will be one of the demo campaigns where measurements and short-term forecasts are distributed using modern mobile media. The data will also serve research in many branches of atmospheric science: air quality, nuclear safety, road conditions modeling, etc.

Open Invitation

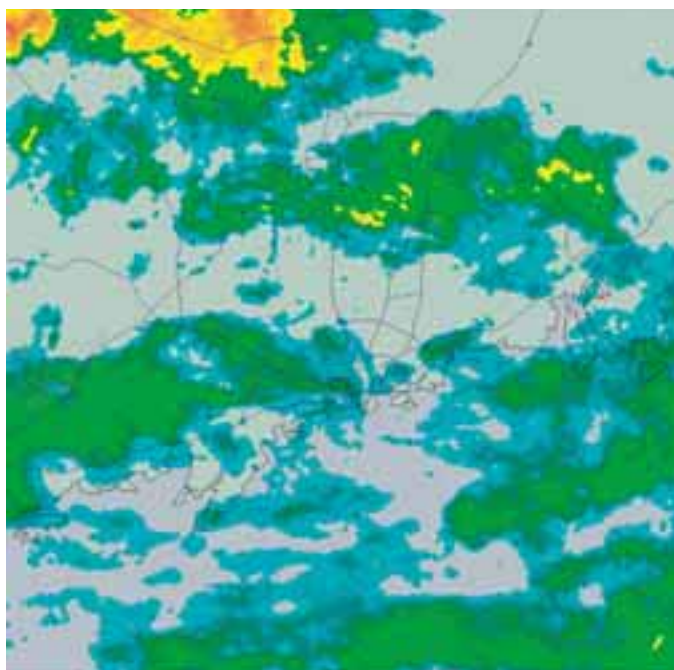
The Helsinki testbed will be open to researchers around the world to test measurement and modeling systems in a high-latitude coastal environment. Please contact Jussi Mykkänen (jussi.mykkanen@vaisala.com) in the Helsinki office or Walter Dabberdt (walter.dabberdt@vaisala.com) in Boulder, Colorado. ●

More information on the 2003 US Weather Research Program (USWRP) mesoscale workshop is available at
<http://box.mmm.ucar.edu/uswrp/reports/DDMMONweb.pdf> and on the Helsinki testbed at <http://www.fmi.fi/testbed>

What is a testbed?

A testbed is a platform for experimentation for large development projects, allowing the rigorous testing of scientific theories, new technologies, and improved weather products for end-users.

Testbeds provide a development environment that is shielded from the hazards of testing in an operational environment – but mimic it, so that the findings are applicable in real conditions. ●



Rain around the Helsinki area on 19 October 2004, 7:30 a.m. local time. In blue areas rain is light, in green areas moderate, in yellow and orange areas heavier. The area covered is 120 x 120 km. Note how much variation there is in such a small area. Can you say if it is raining in Helsinki? If you would commute to neighboring Vantaa, would you take an umbrella, even if there were no raindrops on your car window just now?



New Vaisala Weather Transmitters WXT510 will be installed on ships and on the antennas of the Helsinki cellphone network in conjunction with the testbed project.