Testbed phase one complete

Five campaigns' data now available in Helsinki Testbed database.

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The Finnish Meteorological Institute (FMI), Vaisala and partners completed the fifth and final campaign of the Helsinki Testbed project in August 2006. A dense weather observation network is utilized for various measurement campaigns. The fifth campaign was aimed at convective phenomena, such as storms and lightning. The campaigns produce information for research on small-scale weather phenomena.

Data from all of the Helsinki Testbed campaigns is now available for researchers on the Internet. Users must register but the data is free for non-commercial purposes. The database can be accessed at http://testbed.fmi.fi, click on "Researchers' Interface". The application enables users to make Testbed database queries without any specific database or programming language know-how. The Researchers' Interface is administered and maintained by the Finnish Meteorological Institute.

The Helsinki Testbed is primarily a research project and thus occasional breaks in service may occur. For the time being, data acquisitions are limited to cover a few weeks at a time.

Using the Researchers' Interface, you can choose data as files, or browse ready-made datasets such as radar images, analyzed daily weather maps, or outputs from a wind profiler, ceilometers or the Canadian Precipitation Occurrence Sensor System (POSS). Campaign months were August 2005, November 2005, January-February 2006, May 2006 and August 2006. A Weather Diary is provided for selecting interesting datasets. The Weather Diary lists notable storms, and periods of bad air quality as well as exceptionally warm or cold days.

Convection and storms

In Finland, the most dangerous weather phenomena in August are storms that include heavy rain, wind and lightning. Many remember the World Athletics Championships in Helsinki in 2005, when heavy convective rains caused the event to be interrupted at times.

A Finnish proverb states "years are no brothers", and indeed, August 2006 was a very dry month. Official FMI stations in Helsinki Kaisaniemi recorded 12 mm precipitation, and at Vantaa airport 38 mm, while the numbers for August 2005 were 180 and 160 mm respectively.

Convection is caused by temperature and density differences in matter, which produces an upward movement of air. The upward motion in turn creates clouds and rain. During the summer season this mechanism is strong as the ground warms substantially due to heat radiating from the sun. As a result, heated air bubbles ascend, being lighter than the surrounding air.

In summer, the temperature differences between the ground and upper air layers are intensified. Convection balances these differences. As the air bubbles ascend, they cool down, the speed of ascent decreases and the motion weakens until it stops altogether. Rains produced by convection can be heavy, and at times include lightning or hail.

Practical consequences

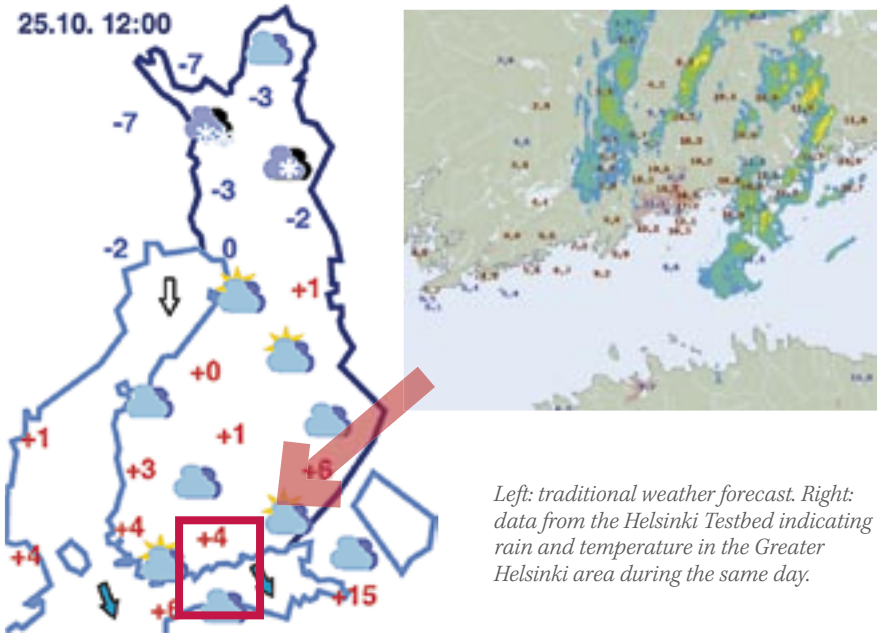
Convection also enables glider flying, for example. The upward movement is substantially greater in convective clouds than in large layered clouds.

All around the world, lightning detection is important for the protection of life and property. It enables preventative measures and helps in limiting damages. Lightning observations are important for short-term weather forecasts and warnings. Users and applications include power plants, power transmission, explosives handling, insurance companies, aviation and ground operations, flammable materials handling, boating, and other outdoor activities.

Occurrence of convective weather phenomena

In Finland, the thunderstorm season typically lasts from May until September. The occurrence of storms usually declines after the first weeks of August. Approximately 16 thunderous days are observed in southern Finland annually (the average for the whole country is 12).

The annual total of cloud to ground lightning across the whole of Finland is approximately 150,000, which corresponds to 0.4 lightning occurrences per square kilometer. Severe thunder is often connected to large and durable mesoscale thunder cloud systems, particularly in mid and late summer. ■



Left: traditional weather forecast. Right: data from the Helsinki Testbed indicating rain and temperature in the Greater Helsinki area during the same day.

Further information:
http://testbed.fmi.fi