

# Observations – the backbone of DMI's work

The Observation Department is responsible for planning, establishing and running DMI's operational measurement stations.

In accordance with international agreements, DMI is responsible for observations in Denmark, Greenland and the Faroes, including their marine waters and air space. Taken together, this comprises a very large and inaccessible area.

The activities in Greenland in particular impose very special demands, the work often being carried out under expedition-like conditions. Over the years, the Observation Department has thus built up special expertise in logistics and Arctic conditions. The Department possesses a number of technical facilities for the development, testing and repair of measurement equipment.

With regard to software, the Department has built up expertise in data communication, satellite technology, digital image processing, automatic measurement equipment and data presentation systems for use at airports.

In addition, the Observation Department runs training programmes for observers, aviation personnel, etc.

## SURFACE OBSERVATIONS

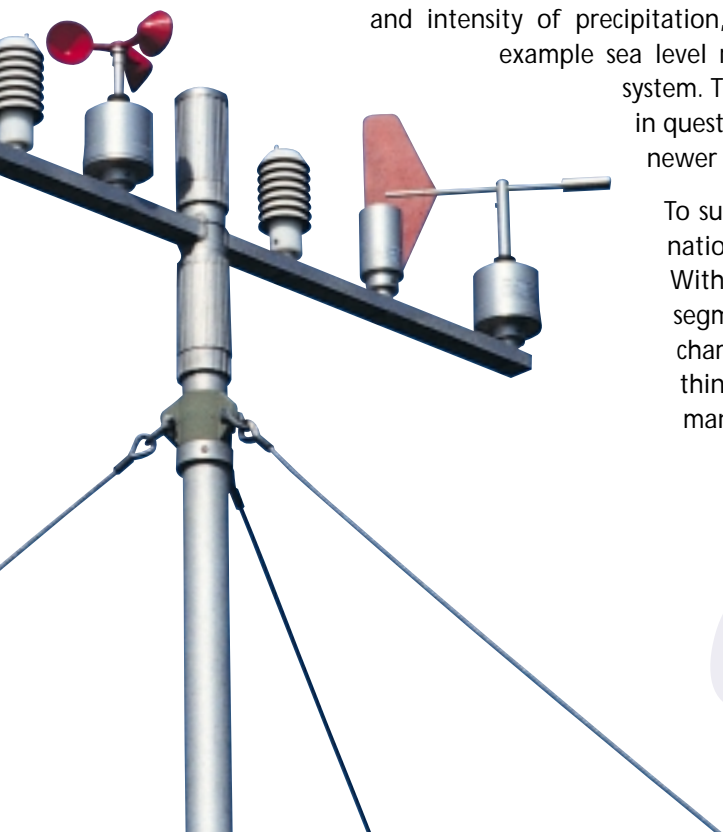
DMI operates an extensive surface observation network consisting of more than 100 automatic stations encompassing a wide range of observation programmes. These generally serve routine operational meteorological purposes and are in direct communication with DMI. They report on wind direction and speed, visibility, type of weather, cloud cover, cloud type and altitude, barometric pressure, temperature, humidity, the amount and intensity of precipitation, etc. Some stations serve special purposes, for example sea level recorders, which are part of the storm warning system. The observation frequency depends on the purpose in question, and can be as high as every 10 minutes at the newer stations.

To supplement the automatic stations, DMI operates a nationwide network of manual precipitation stations. With one measuring device for each 10x10-kilometre segment the network provides particularly accurate charts of Danish precipitation patterns. Among other things, this is important for agricultural purposes and management of Denmark's groundwater resources.



*Top:*  
Automatic ozone  
spectrometer.

*Bottom:*  
Launching of a radiosonde.



*on land*

## AEROLOGICAL OBSERVATIONS

Twice daily, measuring devices – so-called radiosondes – are transported up through the atmosphere to an altitude of approx. 30 km by weather balloons released from radiosonde stations in Greenland, the Faroes and Copenhagen. The radiosondes transmit meteorological information back to earth by means of radio signals. Special radiosondes can measure levels of radioactivity or ozone. Two radiosonde stations are deployed on ships plying routes between Denmark and Greenland.

## AERONAUTICAL OBSERVATIONS

DMI is responsible for the Aeronautical Observation Service at the military air bases and certain civilian airports. For this purpose, special equipment is used for measuring wind speed, barometric pressure, visibility and cloud altitude.

## MARITIME OBSERVATIONS

The most important maritime tasks are the collection and processing of meteorological and oceanographic data from ships on regular services and from coastal stations. Observations are received regularly from a large number of ships.

## SATELLITE OBSERVATIONS

Satellite receiver stations in Greenland and Denmark download data that are thereafter processed and forwarded to the various divisions of DMI's Forecasting Services Department in Denmark, Greenland and the Faroes, as well as to foreign users via EUMETSAT.

## ICE OBSERVATIONS

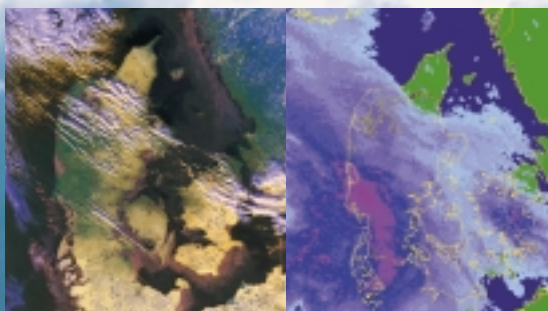
The extent of the sea ice is charted on the basis of satellite data so as to help vessels navigating through icy marine waters. In addition, routine reconnaissance flights are made from Narsarsuaq in Greenland by aircraft and helicopter.

## WEATHER RADAR

DMI's network of weather radars provides an up-to-the minute picture of the nationwide geographical distribution of precipitation.

## LIGHTNING DETECTION

The extent of thunder storms is monitored from lightning detection stations located throughout the country and the location of lightning strikes is identified. The system provides important information not only to DMI's Forecasting Services Department, but also to public and private institutions such as power companies, who use the information for fault location, for ensuring the safety of cable workers, etc.



*Left:  
Denmark as seen from  
a meteorological satellite.*

*Right:  
Precipitation in Denmark  
registered by weather radar.*



*The Central Forecasting Office.*

## **HIGH PERFORMANCE COMPUTING**

The Data Processing Department is responsible for ensuring that information and prognoses are available to the meteorologists round the clock every day. The Department is responsible for providing computing services to other DMI departments and external customers, as well as for national and international data exchange.

The processing of data from the global telecommunication network and the calculation of weather forecasts and regional/global climate scenarios require enormous computing capacity. The meteorological data alone comprise more than 100 million numbers daily. DMI's in-house supercomputer NEC-SX6 can carry out more than 500 billion computations per second.

The Data Processing Department is also responsible for ensuring that the meteorologists have computer monitors showing directly transmitted satellite and radar images, calculated prognoses, road temperatures and data from the many weather observation stations at home and abroad. The meteorological information is stored in DMI's climate database.

## **CLIMATE DATABASE**

The climate database contains mainly Danish, Faroese and Greenlandic data. These can be instantly accessed to help answer enquiries and for investigation of special weather situations or climatic conditions.

About 65,000 new observations are added daily. At the beginning of 2003 the database contained over 200 million observations, the oldest of which stem from 1872.

An observation can contain information on such parameters as precipitation, barometric pressure and temperature. The Weather and Climate Information Division provides climate information daily to insurance companies, the police, lawyers, contractors, the agricultural sector, county and municipal authorities and the general public. In all, the Division handles approx. 5,000 telephone enquiries and 2,000 written enquiries each year. Climate data are used to prepare diagrams and tables and for the customer's own analyses. Observations and climate data are made available on discs, CD or magnetic tape, or via direct Internet access to the database.