Royal Netherlands
Meteorological Institute
Ministry of Infrastructure and the Environment

KNMI

fulfilment of predictions


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A favourable climate for research and innovation

Providing society with knowledge on weather, climate and seismology is our core mission and what motivates our meteorologists, climate scientists and seismologists. The interest of their work is to make sure that citizens and authorities are not surprised by geophysical risks. KNMI provides severe weather warnings for today and the best climate change scenarios for tomorrow.

We warn and advise the Dutch public and furnish our customers, which include ministries, the aviation sector, private weather companies and international partners, with knowledge and data. Supercomputers, sophisticated satellite instruments and radars help us to closely monitor air quality, the ozone layer, earthquakes, dangerous weather and volcanoes.

However, our view goes well beyond that, too. The future weather forecast for 2050, for example. How is the climate developing, how high do the dykes need to be, and should the Netherlands perhaps build and construct in a different way? Connecting today's insights with tomorrow's outlook is what it's all about.


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Climate advice you can build on

A small country can do great things. Dutch climate research is recognised as state-of-the art, which isn't so surprising. A large part of the Netherlands is below sea level, which makes research on climate change vitally important. The reliability of this research gives the Netherlands another valuable export product: climate advice.

On the home front, KNMI encourages municipalities to adapt to climate change, most notably to downpours and rising temperatures in cities. Partly based on information provided by KNMI, they are reconfiguring sewer systems to accommodate future extremes in rainfall. We advise the municipality of Utrecht on the layout of the city centre. How do we keep the city centre a pleasant place to live, work and play, even on hot days? We also advise municipalities on air quality on school routes for children travelling by bicycle.

At the national level, KNMI advises the Delta Programme Commissioner and Rijkswaterstaat, responsible authorities to protect the Netherlands from flooding. For example, about the potential risks that our country faces with respect to the rising sea level in combination with changes in wind direction and speed. KNMI expertise was used for the final component of the Delta Works: the Maeslantkering storm surge barrier. In the event of high water, two huge doors are shut to protect the province of Zuid-Holland from flooding. The periodic dyke and coastal reinforcements along the coast were also based on a risk analysis by KNMI.

Today, the combination of knowledge on climate scenarios and experience with water management is explored by KNMI all over the world.

The energy forecast for tomorrow

KNMI also contributes to help slow down the greenhouse effect. We can determine the appropriate site for a wind turbine park because we know exactly the local wind climate in the Netherlands. We are able to estimate the annual energy yield from this type of park. We can also pinpoint the locations in the Netherlands with the most sunshine hours. In other words, KNMI provides renewable energy suppliers an energy forecast, instead of a weather forecast.


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Over a million flying weather stations

In the aviation sector, safety is of huge importance. Given the strong competition, efficiency is that too. KNMI is closely involved with both. Every runway at Schiphol airport has its own set of measuring instruments and a meteorologist is directly connected with air traffic control and the airport.

KNMI scientists are internationally recognised for developing innovative applications and for gathering and analysing data. This triggered the aviation industry to approach KNMI about working together in a project based on a novel idea: Can we use every aircraft as a weather station?

The initial results showed that aircrafts provide a wealth of information about different layers of the atmosphere. All aircraft-derived data is received at De Bilt. KNMI receives information about wind speed, temperature and atmospheric humidity for millions of points in the atmosphere. We process all of the data in weather models and forward the model output to air traffic control. This enables them to coordinate the planes coming in for landing with more precision, which reduces delays in the holding areas above the airport.

For the aviation sector, this has socio-economic as well as environmental benefits. It saves time and fuel for airlines, and passengers spend less time waiting. Just as importantly, flying more efficiently also means lower CO_2 emissions. Environmental benefit is noticeable on the ground, too. Aircrafts that enter into a glide at an early stage make less noise.

Radar, screen and... binoculars

Visibility at Schiphol airport is of vital importance. In addition to all information on screens, KNMI observers at Schiphol also look out the window using binoculars, mostly looking for a specific type of cloud: the Towering Cumulus Cloud. Just like ships that sail around icebergs, planes must avoid these clouds. The strong movements in different directions in this type of cloud cause severe turbulence and may damage an aircraft.

Since 1854

On 31 January 1854, thanks to King Willem III and Christophorus Buys Ballot the Netherlands started a meteorological institute. Buys Ballot was not impressed by the popular weather messages in the newspapers. He was able to make a strong case that a scientific weather institute was of national interest: reliable weather forecasts would save lives at sea. Moreover, this was enabled by his own physical law, which describes the relationship between wind direction and air pressure.

Advances in technology following the Second World War enabled our scientists to increasingly grasp complex physical processes and the climate system. The current KNMI knowledge and expertise on weather and climate is internationally highly acknowledged. We play a leading role in international weather satellite programmes and our climate scenarios are respected worldwide.

When weather is a risk

KNMI issues warnings about severe weather conditions such as iciness, snow, thunderstorms, rain and wind gusts based on a set of fixed criteria. Our warnings use an international code of yellow, orange and red.

KNMI is an agency of the Ministry of Infrastructure and the Environment. The total staff is approximately 400 employees.

Internationally, KNMI is affiliated with groups including the IPPC (Intergovernmental Panel on Climate Change), WMO (World Meteorological Organization), ECMWF (European Centre for Medium-Range Weather Forecasts), EUMETNET (network of European national weather services) and EUMETSAT (European organisation for the exploitation of weather satellites).

De Bilt.
Epicentre of seismology.

When the Earth moves, KNMI seismometers record the vibrations for the Netherlands and the Caribbean Netherlands. In the Netherlands, alongside naturally occurring earthquakes in the south, we have induced earthquakes in the north as a result of gas extraction.

If a nuclear test is conducted somewhere in the world, the network of seismic equipment will detect it. KNMI informs the authorities and society about such nuclear tests.

An international network of seismometers on land, hydrophones at sea and infrasonic detectors exists to monitor the compliance with the Nuclear Test Ban Treaty. Besides seismic activity, the network is also able to record supersonic aircrafts, infrasonic waves from a meteorite and communication between whales.

Working together with KNMI?

Weather and climate are playing an increasingly important role for government organisations and businesses. We would be happy to discuss what KNMI can do for your organisation.

For more information or an introductory meeting, please contact one of our account managers at: info@knmi.nl

Every day.
At midnight.
A weather balloon.

Every day at midnight a weather balloon is launched in De Bilt. This occurs at the same time at virtually every national meteorological station around the world. Probes under the balloon transmit measurements from different layers of the atmosphere up to approximately 25 kilometres directly to KNMI, giving the meteorologists a wealth of information. When the weather balloon's work is done, a parachute ensures a soft landing for the probes.

We give our scientists space

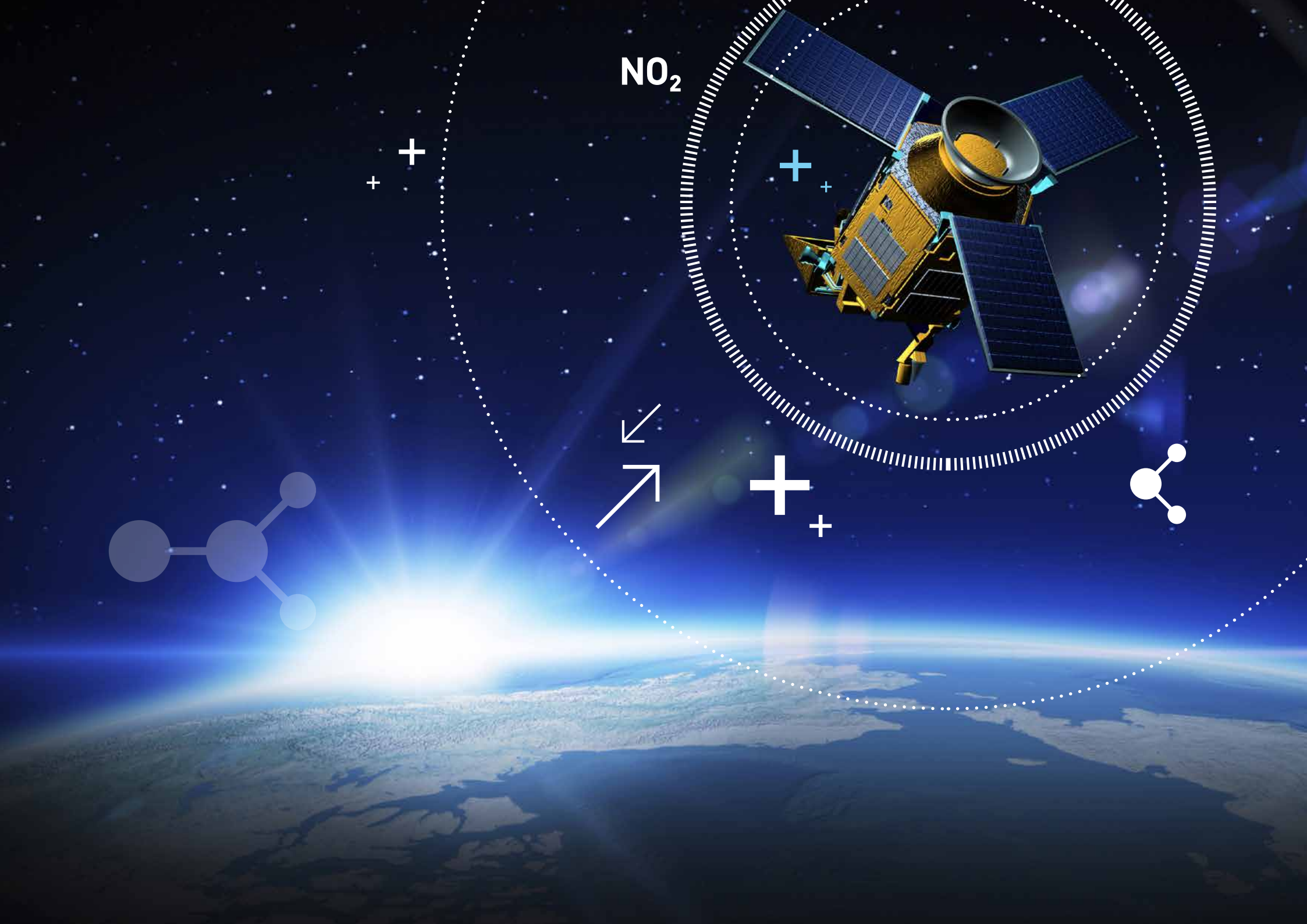
Every weather satellite has a look-alike

A satellite launch is always a tense moment. This is true for satellites with instruments like TROPOMI on board, as well as for the new generation of weather satellites. If anything goes wrong during the launch of a weather satellite, there is often a backup satellite. From 2021 onward, this will also apply to satellites that measure air quality and greenhouse gases. This extra investment illustrates the huge importance of these satellites.

Mapping the level of concentration of air polluting particles over land and sea is possible – every day and above the entire globe. The latest generation of satellites is so precise that emissions can be linked to an area and in some cases even to a power station or factory. Satellite images may have tremendous impact on public understanding. The ozone layer debate is one example. Ground measurements had long shown that the ozone layer was diminishing. Only when this was visible on satellite images the public opinion changed. Satellites provide similar recognition of air pollution. Thanks to satellite imagery, countries are now actively trying to lower emissions. The KNMI scientists can see from space that this works.

Using the high-tech TROPOMI satellite instrument it is possible to measure the difference in air quality between the harbour of Rotterdam and the city centre. Together with industrial and scientific partners we are working hard on the next generation satellites that will provide images with a resolution of 1 x 1 kilometre. The development and launch of TROPOMI is the result of close European cooperation under the scientific leadership of KNMI. TROPOMI is the successor of OMI, which started orbiting the earth in 2004. With a detail that is six times as high compared to OMI, TROPOMI is able to map even more accurate and precisely the substances that are important for air quality, the ozone layer and climate change.

The first European ozone instrument of 20 years ago viewed the world in samples as big as the Netherlands. TROPOMI measures samples of 7 x 7 kilometres and provides extremely reliable data about the concentrations of substances including ozone, nitrogen dioxide, sulphur dioxide, methane and particulate matter in the atmosphere.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This is a publication of

KNMI

PO Box 201 | 3730 AE De Bilt
The Netherlands
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February 2017