



Royal Netherlands
 Meteorological Institute
 Ministry of Infrastructure
 and Water Management



KNMI

AMBITION 2035

Services and products

Models and data

AI

Observations

Core values



WEATHER

CLIMATE

SEISMOLOGY

Pillars

- Kralendijk
- Schiphol
- Herwijnen
- De Bilt
- Cabauw

Together with our partners we form an
Early Warning Centre



Content

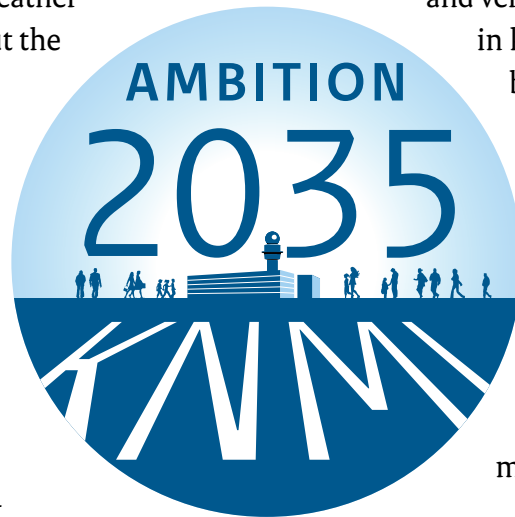
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Foreword

Our story. That is what this plan can rightly be called. A story that began in conversation with Dutch people at the market in Vreeswijk and continued at all sorts of different tables. We heard about extreme weather in the already changing climate. Got questions about our weather warnings. And talked about the earthquakes in Groningen and confidence in our measurements.

It was good to see that the Netherlands is counting on us. And that our knowledge and expertise is appreciated. But we also heard that we must continue to earn that trust, especially in a time of growing risks and rapid technological developments, in which at the same time the reliability of science and the government are sometimes questioned.



Our responses to those challenges were coloured by countless KNMI staff, together with our Societal Advisory Council, colleagues from the central government, but also from provinces, municipalities and water boards working on policy and implementation, and very many of our partners in knowledge institutions, businesses and civil society organisations. Of course, this strategy was also regularly discussed with our Works Council and Supervisory Board, which ultimately adopted the final version. I thank everyone for all their involvement over the past months.

Ambition 2035 outlines how, in the coming years, KNMI will continue to contribute to a safe and liveable Netherlands as a national knowledge institute in the field of weather, climate and seismology. With the best

possible services, around the clock, in close cooperation with other parts of the Ministry of IenW, other departments, knowledge institutes, companies and organisations, including our international partners, and with a focus on public interests and values, as expressed in the IenW Compass.

How do we keep direction in rapidly changing circumstances? With a view to the horizon, ten years ahead, what does KNMI aspire to? To give a hint: a key aspect is simply continuity, a solid beacon for reliable knowledge. First of all of our measurement infrastructure (radars, weather stations, seismometers, satellites) and the unique long-term measurement series that KNMI has maintained, developed and exchanged with our colleagues in Europe and worldwide since 1854.



But also of our forecasts and scenarios, for instance to make society better prepared for more erratic weather in a changing climate, including combinations of risks, such as increasing drought and extreme rainfall. The lightning-fast development of Artificial Intelligence will help, and here, too, we explicitly seek cooperation with our European colleagues.

And above all: we want this knowledge to make a real difference in society, particularly from our Early Warning Centre (EWC). Sometimes directly from KNMI, but also via a strong network of partners in government, industry and civil society organisations.

I look forward to working together with all the wonderful KNMI staff and all our partners to realize these wonderful ambitions over the coming years.



Maarten van Aalst
KNMI-General Director

Our direction

For more than 170 years, KNMI has been practising weather, climate, and seismology to understand phenomena in the atmosphere and the earth and to interpret them for society. In the year 2024, we do this differently from how we did a hundred, fifty or even ten years ago. The earth, the atmosphere and society are changing and we are changing with them, following and looking ahead. This Ambition 2035 is our reassessment of this direction. Our mission, vision and core values serve as signposts.

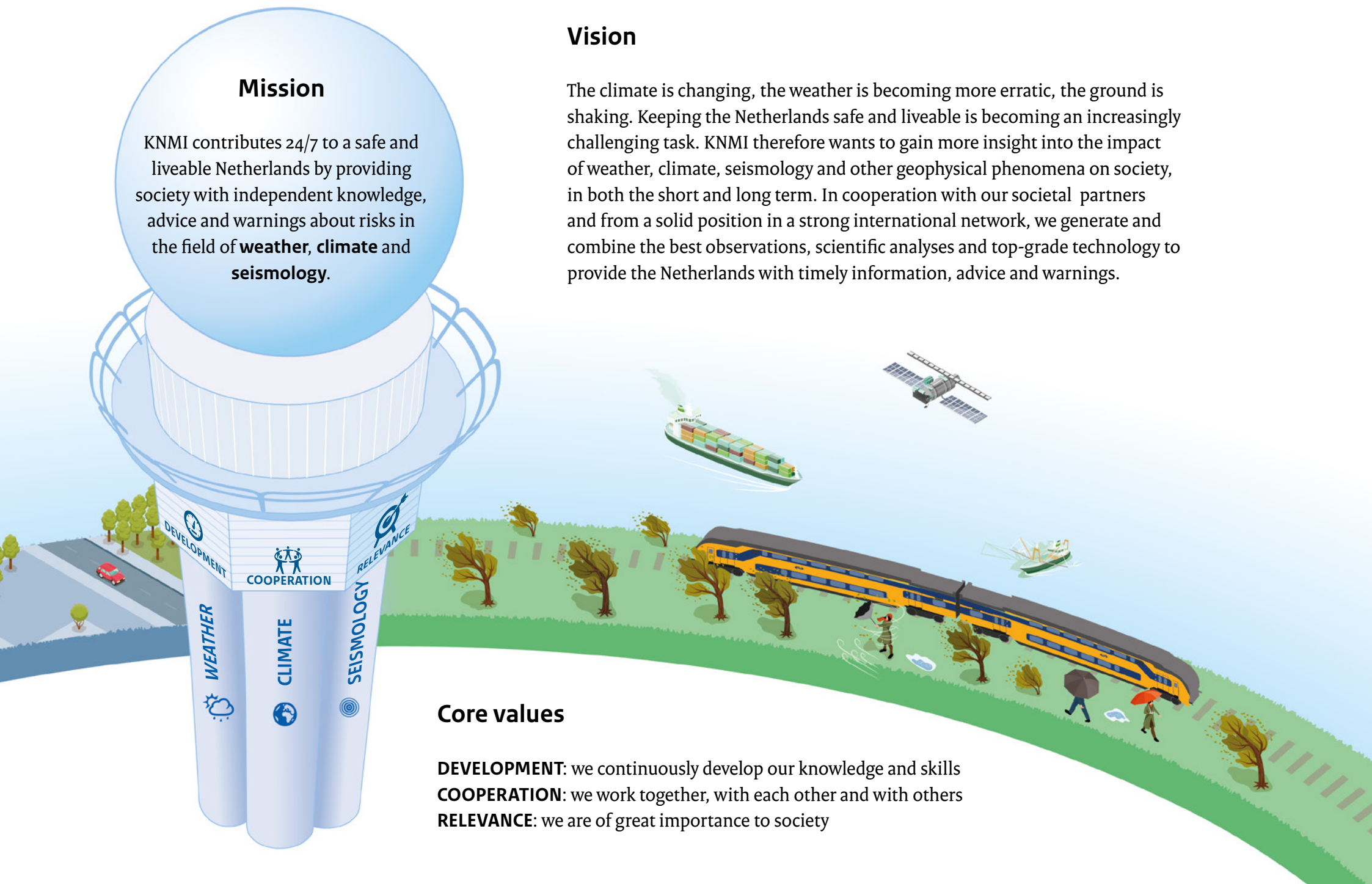


Mission

KNMI contributes 24/7 to a safe and liveable Netherlands by providing society with independent knowledge, advice and warnings about risks in the field of **weather, climate** and **seismology**.

Vision

The climate is changing, the weather is becoming more erratic, the ground is shaking. Keeping the Netherlands safe and liveable is becoming an increasingly challenging task. KNMI therefore wants to gain more insight into the impact of weather, climate, seismology and other geophysical phenomena on society, in both the short and long term. In cooperation with our societal partners and from a solid position in a strong international network, we generate and combine the best observations, scientific analyses and top-grade technology to provide the Netherlands with timely information, advice and warnings.



Core values

DEVELOPMENT: we continuously develop our knowledge and skills

COOPERATION: we work together, with each other and with others

RELEVANCE: we are of great importance to society

Trends

Citizens, businesses and government agencies base important decisions on current and expected weather conditions, and have a growing need to understand both the origins and consequences of weather extremes, climate change and seismic activity. This underlines the importance of KNMI's independent and high-quality knowledge. To best fulfil this function, we recognise important trends and respond to them.



Weather, climate and seismology have more impact on daily life

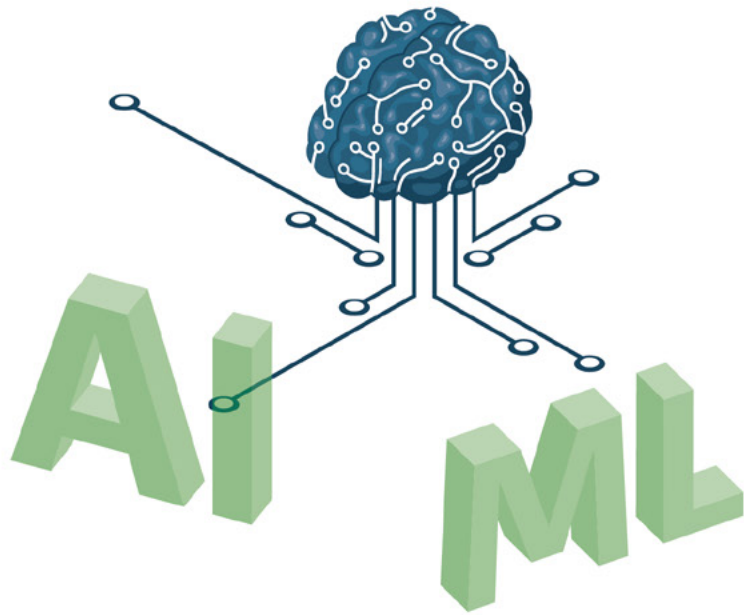
Climate change and more erratic weather worldwide have far-reaching humanitarian, economic and legal consequences. This raises numerous questions about the consequences and how to respond and anticipate. As the likelihood of nuisances, calamities and social disruption continues to increase, it becomes more urgent to identify the causes and find solutions.

Some climate questions are already much more urgent than we thought. Tipping points in the climate system are approaching. Some risks are piling up, or are difficult to tackle together. How do we deal with increasingly extreme rain fall and, at the same time, hotter and drier summers? But also: how does the climate develop in urban areas, where heat is concentrated and rises much faster than

for the average of the country? How do our possible interventions affect other risks? And on the side of causes: there is an increasing need to trace greenhouse gas emissions back to specific sources. What emissions are taking place? Where? KNMI wants to help governments answer this question.

Information on weather, climate and seismology is also indispensable in the transition to renewable energy (such as solar, wind and geothermal). What effects do these options have, and how do we deal with any risks (such as the effects of wind farms in the North Sea or the possible seismic consequences of developing geothermal energy or CO₂ storage)? With tailored information and advice, KNMI aims to help make the most of opportunities and manage risks.



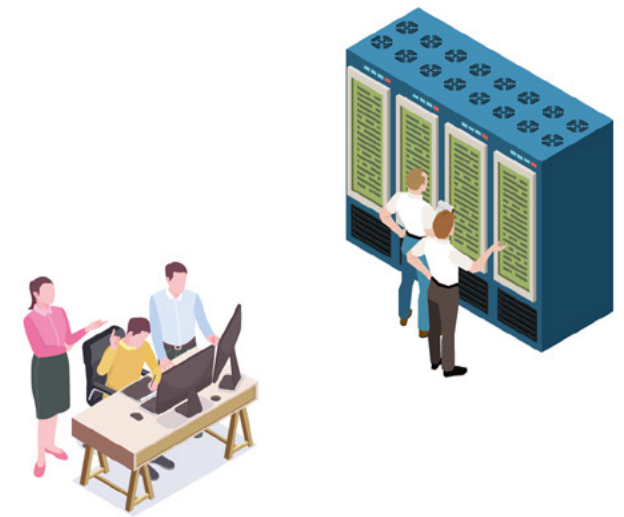


Artificial Intelligence and Machine Learning

The advance of Artificial Intelligence (AI) is substantially changing KNMI's field of work. In particular, the self-learning capability (Machine Learning or ML) of AI-based computer systems makes it possible to create new forms of information and services or to complement, improve and speed up existing forms.

Automated interpretation and learning from large amounts of weather and climate data provides insights into climate and weather in different ways from the traditional physical models that produce our current weather forecasts and climate scenarios. This opens up opportunities, for example, for faster warnings with a higher spatial resolution.

By interlinking various sources of information, the impact of weather and climate on the living environment and society can be better analysed. Effects of policy and measures in the field of mitigation, adaptation and crisis management can be quickly visualised by means of a virtual replica (digital twin) of the physical reality. Large amounts of seismic data can also provide new insights through the application of AI and ML, such as insight into the sources of observable vibrations, from natural earthquakes to gas extraction to nuclear tests elsewhere in the world.



The advance of AI means that large tech companies are also using weather and climate data to market services and products. National weather institutes such as KNMI (as well as existing weather companies) thus face a changing playing field.



Changing world

It is not only the weather that is becoming more extreme. In public debate and social interactions, there is more frequent emphasis on contradictions between groups and parties. This polarisation is sometimes accompanied by declining appreciation for public administration and institutional frameworks, including for knowledge development. Trust in information substantiated by observations and scientific research is less obvious than before. Moreover, information needs are fragmenting and a multitude of information sources are available in addition to public channels. Disinformation is more easily disseminated



through digital channels. It is also a challenge for KNMI to reach people, especially young people, and provide them with objective information.

A changing world order and increasing geopolitical tensions are not going quietly by KNMI. Continuous availability and accessibility of unique measurement time series and real-time observations and data are important for reliable warnings and information. The

strategic value of information on weather, climate and seismology is increasing, also in relation to national and European security and autonomy. European cooperation in the protection of vital data and infrastructures and in cybersecurity is becoming more important, also in the application of AI.

Finally, KNMI notes that pressure on available space is increasing, putting more pressure on certain activities. This applies to both physical space (the installation of measurement stations on land and at sea) and radiofrequency space (the undisturbed operation of precipitation radars).

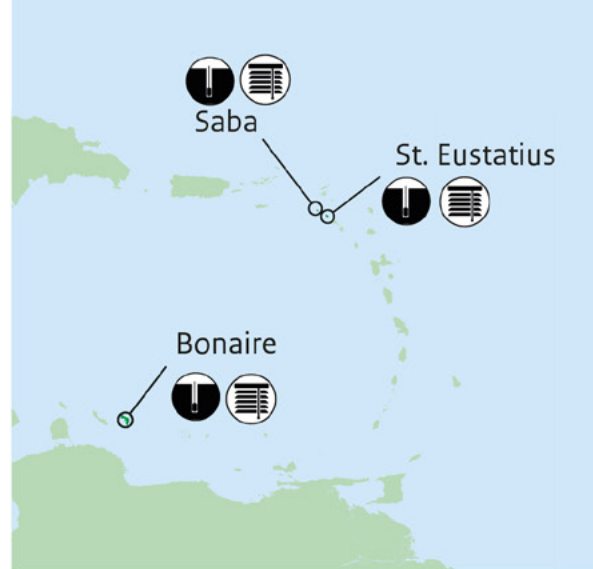


Observations

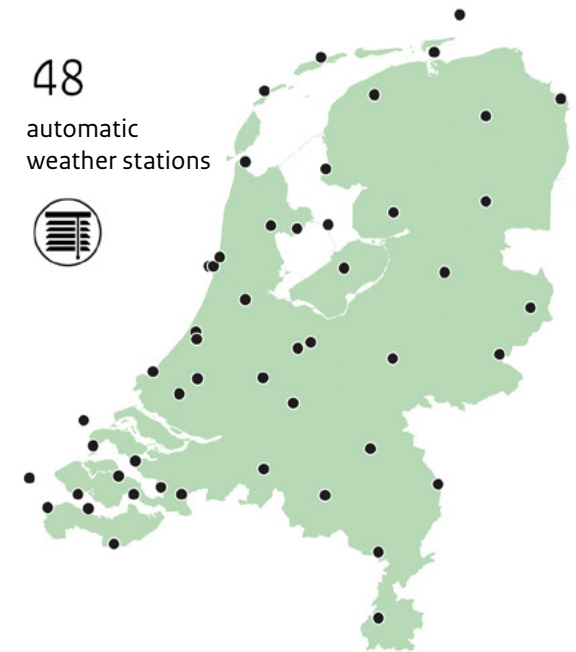
KNMI has been making observations since 1854. With the data we collect, we can immediately identify risks and immediate danger, draw up weather forecasts and monitor the climate and sources of vibrations. In the form of analyses, advice and warnings, we offer others an action perspective. This is how we make an essential contribution to a safe and liveable Netherlands.

KNMI ensures that the Netherlands, including the Caribbean, continues to have reliable meteorological, seismic and atmospheric information. Continuity of observations, especially of our unique long-term measurement series, is essential.

In doing so, we combine observations from our own measurement networks with



Seismic stations and automatic weather stations on the BES islands.



48
automatic
weather stations



319
precipitation
observers

Collaborations in observations and warnings

Exchanging and combining data in international cooperation is in KNMI's DNA. As early as 1854, KNMI founder Professor Buys Ballot saw the great importance of sharing weather data. This started with the countries around the North Sea.

As a seafaring trading nation, the Netherlands had major shipping interests; storms at sea led to a lot of damage and casualties. In 1864, following the example of colleagues in the UK, Buys Ballot took the initiative for the storm warning service, which led to branches



of KNMI in the ports of Rotterdam and Amsterdam around 1880. Incidentally, the calibration of ship compasses was also a task of these branches; this was done using geomagnetism, which was later replaced by satellites.

After 1916, the year of a devastating storm, KNMI and Rijkswaterstaat began working together to combine weather and tidal data, a cooperation that continues to this day. In 1873, Buys Ballot also gave the go-ahead in De Bilt for the establishment of the International Meteorological Organisation (IMO), now succeeded by the United Nations

World Meteorological Organisation (WMO), in which 191 member states exchange meteorological data and methods worldwide. After all, weather and climate do not care about national borders. Early Warning for All is the current top priority of the WMO, to achieve adequate weather forecasts and warnings worldwide. KNMI's Early Warning Centre implements this ambition for the Netherlands. The objective remains unchanged: to limit damage and casualties and contribute to the safety and quality of life in the Netherlands. This can only be achieved by working together with other countries.



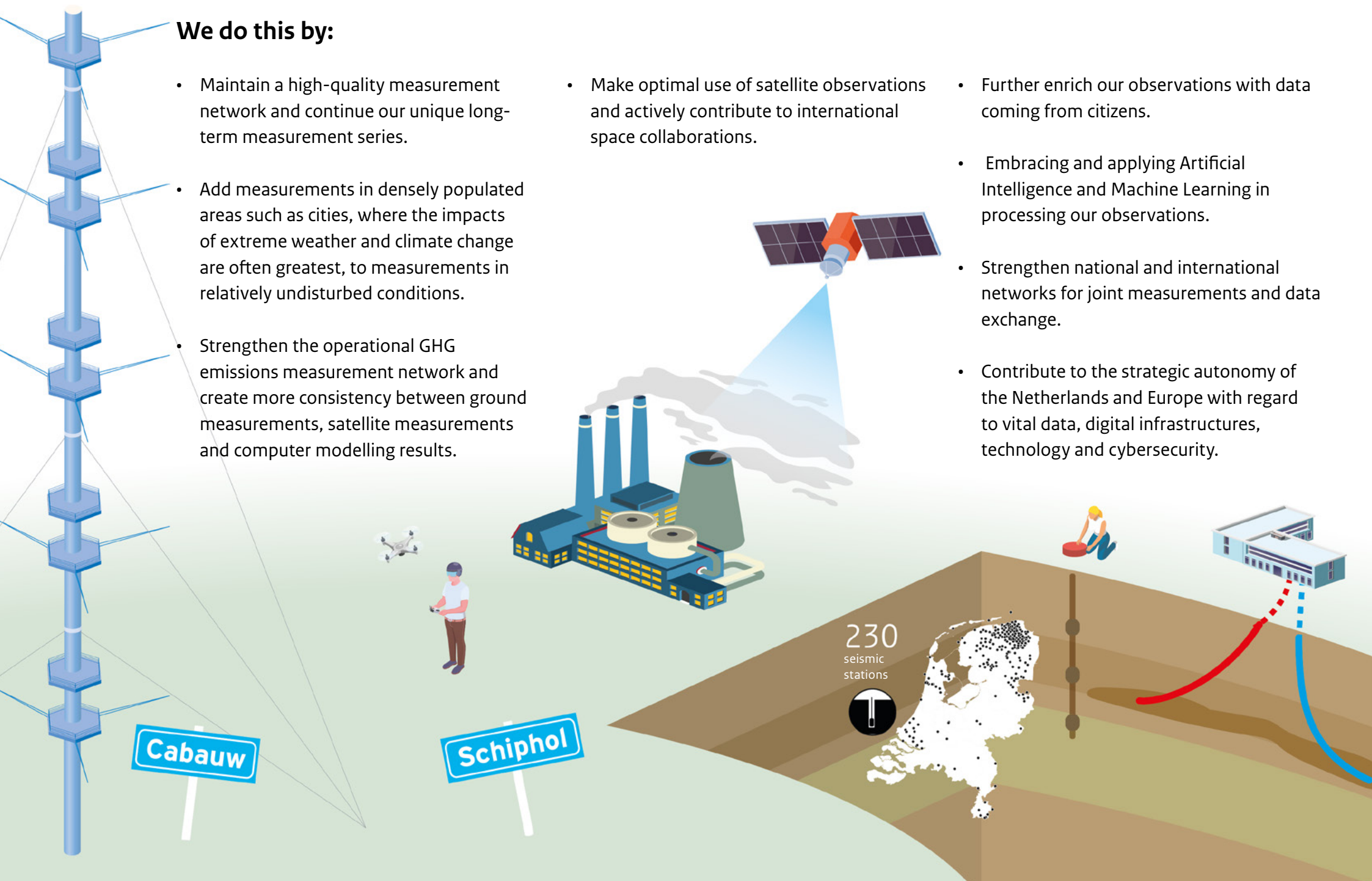
De Bilt

Herwijnen

Kralendijk

We do this by:

- Maintain a high-quality measurement network and continue our unique long-term measurement series.
- Add measurements in densely populated areas such as cities, where the impacts of extreme weather and climate change are often greatest, to measurements in relatively undisturbed conditions.
- Strengthen the operational GHG emissions measurement network and create more consistency between ground measurements, satellite measurements and computer modelling results.
- Make optimal use of satellite observations and actively contribute to international space collaborations.
- Further enrich our observations with data coming from citizens.
- Embracing and applying Artificial Intelligence and Machine Learning in processing our observations.
- Strengthen national and international networks for joint measurements and data exchange.
- Contribute to the strategic autonomy of the Netherlands and Europe with regard to vital data, digital infrastructures, technology and cybersecurity.



Knowledge, models and data

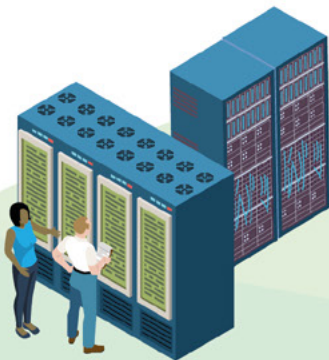
KNMI is the national knowledge and data centre for weather, climate and seismology. We ensure that the Netherlands has access to the best data and models to support warnings, advice and policy. Open data and open science are - and have been for many years - the guiding principles here. Observations, outcomes of computer models and research results: we collect, validate and open up various data for numerous users, who use them to create added value in all kinds of ways. We continuously improve accessibility, such as through open data platforms and by providing software interfaces (API). We ourselves turn data into targeted information - knowledge -

which we offer in various forms: from current weather reports, warnings and earthquake catalogues to climate scenarios. Good, secure and sustainable information management is a cornerstone of our organisation. And it will remain so.

In doing so, KNMI aims to put the consequences of weather conditions, climate change, earthquakes and other geophysical processes on the map for society even more clearly, issue more effective warnings and thus help prevent damage and casualties.

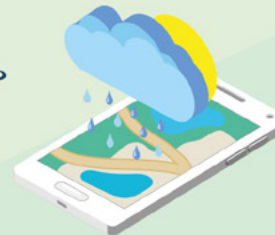
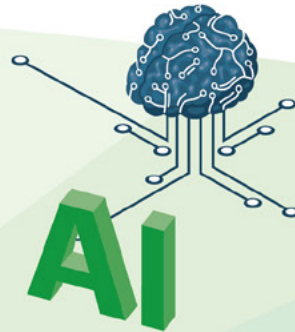
This not only means constantly developing, supplementing and renewing our tools - information and communication technology. We also want to be better able to respond to the demand for more differentiated information.

Here, weather and climate are inextricably linked. We link the past, present and future to the risks we can expect and avoid.



We do this by:

- Maintain and develop our knowledge based on scientific quality and independence.
- Analyse natural phenomena and their consequences for better risk management.
- To invest in the development and application of AI/ML, achieving an optimal combination of AI/ML, physical models and human interpretation.
- Pay extra attention to identifying and analysing emerging risks such as wildfires and extreme heat, combinations of risks, and new risks resulting from the energy transition and interventions in the climate system.
- Be complementary in knowledge and safety networks.
- Establish international data platforms for efficient storage and computing capacity, analysis and distribution.
- Strengthen international cooperation, including in the development and operational use of models, aiming for a European weather and climate model.
- Making our data and model results openly and unambiguously available and usable for citizens, organisations and businesses.



Services and products

As an independent national knowledge institute, KNMI develops reliable knowledge that responds to current and future questions in society. We do this in close cooperation with an enormous network of partners, both in the Netherlands and internationally.

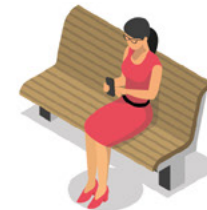
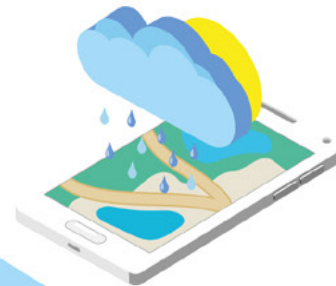
As the national Early Warning Centre we signal chances for nuisance, inconvenience, damage and disasters earlier and more accurately. We do this for partners such as the Directorate-

General for Public Works and Water Management, air traffic control and the safety regions, but also for the general public through our warnings. We ensure unambiguous reporting of potential disasters and danger from weather, climate and seismology. We identify trends, such as the relationship between extreme weather events and climate change.



We do this by:

- The further development of the Early Warning Centre, where we have a clear position in the network of safety partners and are in continuous contact with users.
- Develop a single front office at KNMI, simplify internal steering and further strengthen the links between different parts of KNMI (such as operational tasks, R&D and ICT).
- Engage society and partner organisations in our work on weather, climate and seismology, educate them about it and work together to build knowledge and awareness of the risks, with an extra focus on young people.
- Effectively and proactively advise on complex risks, causes and uncertainties, including on tipping points in the climate system.
- Contribute to insights into the societal consequences of extreme weather and climate change in the financial sector and in legal contexts.
- Collaborate with and create opportunities for citizens, businesses and organisations that use KNMI data.
- Continuously evaluate and improve our services and products.



Organisation in development

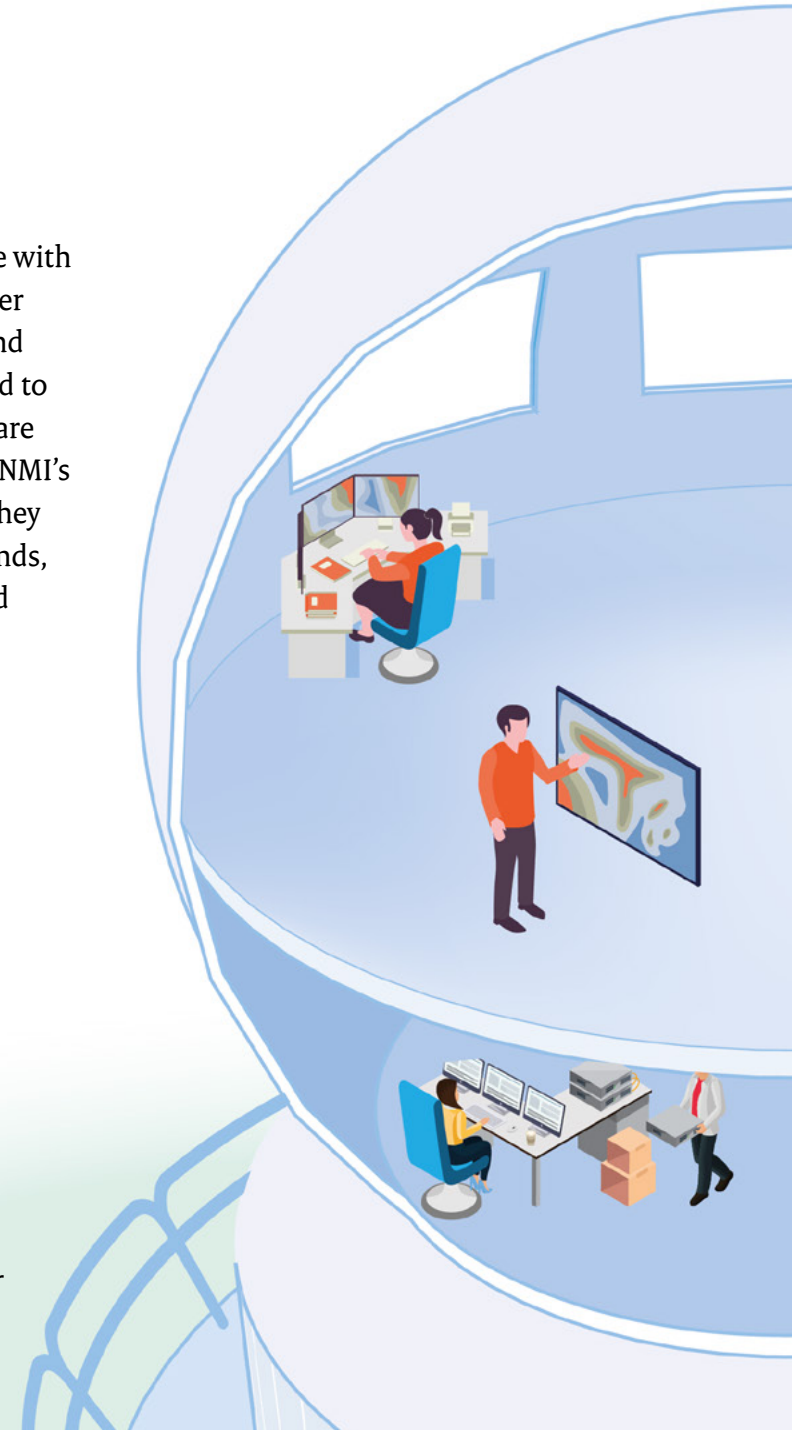
How we organise and perform our work is also changing, not only because of developments in the content of our work, but also because societal trends, such as the increase in more flexible employment relationships and labour mobility. Employees stay on for shorter periods of time, which affects the continuity of processes and the knowledge base. We continuously look for talent with a connection to the latest technological developments.

KNMI wants to strengthen its internal cohesion and approach all partners in society in a univocal manner. This also requires even more effective multidisciplinary cooperation between individuals, teams and professional groups.

Above all, KNMI is a great place for people with different skills and talents to work together on top science, innovative applications and effective advice. Employees feel connected to the organisation and to each other. They are proud of the contribution they make to KNMI's tasks. By taking personal responsibility, they contribute to a safe and liveable Netherlands, now and in the future. They are supported by effective management based on clear objectives and a good infrastructure.

We do this by:

- Develop a strong and diverse team in an inviting and inspiring working environment.
- To ensure an agile organisation with unambiguous steering based on jointly defined and achievable goals, with attention to the continuity of our knowledge base.





- Strengthen cohesion between parts of the organisation (e.g. in connecting weather and climate, within our observational ambitions, and between models and data) and focus on responsibilities for internal chains.
- Investing extra in the connection between operational services, Research and Development (R&D) and information and communication technology (ICT), with a focus on innovation and continued learning from experience . For example, we learn from each time extreme weather occurs.
- Have staff working as advisers in the Early Warning Centre, mindful of the societal environment and context, and employable in the network of partner organisations.
- Offer current and new talent an attractive and socially safe workplace with prospects for personal development and job satisfaction.
- Develop an inspiring and sustainable new building for the institute with an inviting appearance.



We are strongly committed to strengthening our national and international networks, which we contribute to but, above all, benefit enormously from to keep the Netherlands safe and liveable, by:

- Strengthen cooperation with knowledge institutions, universities and colleges, for example through shared appointments, joint talent development and efforts towards a strong knowledge landscape.
- Exchange expertise in international organisations such as WMO, ECMWF and EUMETSAT, in operational processes and research collaborations; as national delegates, in decision-making positions, and through staff exchange.
- Contribute with other countries to achieve ambitions in international conventions and under the United Nations' Early Warnings for All efforts.

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