High-quality Climate Projections

Knowledge for Climate

Vision and goal

Climate change is a global phenomenon, but most impacts are felt at the regional and local scale. To be able to analyse the impact of climate change, researchers require high quality information on regional climate, now and in the future. This research programme aims to provide this climate information and to improve the access to climate data. A central theme in the programme addresses the uncertainty related to the pace and extent of climate change: how to reduce, quantify and communicate these uncertainties?

The research programme will provide high quality information on current and future climate in the Netherlands on a regional scale, for climate impact studies and for developing national and regional climate (change) adaptation strategies.

We do so by:

- Performing and analyzing regional and global climate model simulations
- Providing showcases of high impact future weather situations at very high resolution
- Providing coherent time series, and estimates of extremes and uncertainty ranges
- Applying climate projections to various sectors, including dealing with uncertainty
- Communicating climate change and climate change impact to users

KNMInext climate scenarios

This research programme contributes to the development of the next generation KNMI climate scenarios. These scenarios form the base for adaptation policies in the Netherlands on national, regional and local level. In close collaboration with the climate scenario users, our researchers provide state-of-the-art information as input for the KNMInext climate scenarios that are expected to be launched at the end of 2013. An important aspect in this research is connecting the climate information to impacts.

Research activities

Mechanisms of local climate change in the Netherlands

The impacts of climate change will be experienced at a local scale, whereas climate information is mainly available on much courser time and spatial scales. We aim to increase our knowledge of small-scale meteorological phenomena that have a large impact on the Dutch society: extreme periods of precipitation and drought, extremes in wind conditions and the pace of sea level rise. Showcases (e.g. for Schiphol airport) will be provided of a new generation of climate information obtained from a climate model at very high resolution.

Time series, extremes and probabilities

The fact that climate changes are uncertain poses a challenge when developing adaptation strategies with a long time horizon. Therefore, we study methods to quantify uncertainties. Various methods are being investigated to obtain information at small spatial and temporal scales, taking into account regional differences within the Netherlands due to land characteristics (cities) and the influence of the North Sea for example. In addition, a more complete picture of climate change will be obtained by providing examples of weather events and time series for a future climate.

Coupling of climate projections to impact research

Many couplings exist between climate models and impact models. However, generally climate data sets are made separately for each discipline and with different methods. We aim to improve the consistency of couplings between climate and impact models, thus enabling better integration of climate impact projections. The latter include models of hydrology, ecology, agriculture, air quality, and spatial planning. By using consistent climate data sets the effect of uncertainties in climate change projections on estimated climate change impacts is studied.

Climate services

Information on (local) climate change and its impacts for specific sectors is sometimes sparsely available and/or scattered. We aim to improve the exchange of climate information (including uncertainties) in the chain of climate research – impact/adaptation research – decision making, and vice versa, by providing more overview and integration of data on climate change and its impacts. Therefore a webportal is constructed, the Climate Impact Guide (www.klimaatportaal.nl > Klimaat Effect Wijzer), which provides climate and impact information. Information is given on the assumptions behind the information, on the interaction between disciplines, and on how the information can be interpreted.

Programme highlights

Simulation of precipitation trends

Observed precipitation trends in Europe in the past century are not simulated well by climate models. This research programme provides information that is necessary to improve these models and simulations by using high-resolution climate models. Research shows that in winter the atmospheric circulation is the main cause of the poor representation of precipitation trends and in summer the sea surface temperature of the Atlantic Ocean.

Precipitation extremes in changing climate

Return levels of precipitation extremes are currently determined assuming a stable climate over the last 50-100 years. As climate is changing, the standard method can cause an over- or underestimation of extremes. Within this research programme a new statistical method for the estimation of precipitation extremes has been developed, that takes the changing climate into account. With this new method it was determined that the 100-year winter rainfall in De Bilt is likely to have risen from 39 mm to 47 mm per day over the period 1950-2010. The new method reduces the associated uncertainty by about 35% compared to the standard approach. The increased accuracy is valuable for water managers.

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Future Weather

We develop methods to embed the new high spatial resolution weather model HARMONIE into the regional and global climate modelling systems RACMO and EC-EARTH. This enables studying meteorological conditions that may occur in the future climate at a very high, unprecedented spatial resolution.

Example of possible application in the Delta Programme

With simulations of HARMONIE, generated for specific extreme situations, the impact and effectiveness of adaptation measures can be tested. For example for the Delta Programme on the Maeslantkering barrier near Rotterdam. Decisions on the construction and functioning of this large scale infrastructure for adaptation depends on the chance of occurrence of two possibly coinciding events: 1) extremes of precipitation in the Rhine basin, which should force the Maeslantkering to be open and 2) high sea levels due to persistent strong northwesterly winds, which should force the Maeslantkering to be closed. The combination of EC-EARTH/RACMO and HARMONIE will provide much more detailed meteorological information for such extremes, which makes better impact assessment of various adaptation strategies around the Maeslantkering possible.

Example of application at Schiphol airport

Also for Schiphol airport, high resolution weather information is of high importance. In the coastal area where this airport is situated, the temperature difference between sea and land can be sharp, inducing strong local effects in particular on shower activity. A combination of EC-EARTH/RACMO and HARMONIE will be used to study the meteorological conditions that are of importance to the infrastructure and operations at Schiphol airport in detail.

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- Hotspot Schiphol Mainport
- Hotspot Major rivers
- Impact researchers
- National and regional government organisations
- Private companies, NGO's

Consortium partners

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Knowledge for Climate

To develop the scientific and applied knowledge required for climate proofing the Netherlands and to create a sustainable knowledge infrastructure for managing climate change

Knowledge for Climate is a research programme (2008-2014) that develops knowledge and services needed to make the Netherlands climate proof. Governmental organisations (national government, provinces, municipalities and water boards) and businesses actively participate in the research programme. Knowledge for Climate focuses on eight areas, called hotspots: Mainport Schiphol, Haaglanden Region, Rotterdam Region, Major Rivers, South-West Netherlands Delta, Shallow waters and Peat Meadow Areas, Dry Rural Areas and the Wadden Sea Region. The scientific research is carried out in eight themes by consortia.

- Climate Proof Flood Risk Management
- Climate Proof Fresh Water Supply
- Climate Adaptation for Rural Areas
- Climate Proof Cities
- Infrastructure and Networks
- High-quality Climate Projections
- Governance of Adaptation
- Decision Support Tools

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This research programme is co-financed by the Ministry of Infrastructure and the Environment.