Royal Netherlands
Meteorological Institute
Ministry of Infrastructure and the Environment

Newsletter
climate scenarios

Knowledge for Climate

Issue 1, April 2011

The purpose of this newsletter is to inform users of climate and climate impact information about the process leading to the KNMInext climate scenarios and the progress of the consortium of High-quality Climate Projections (theme 6). These subjects are strongly related: research and user inventory's done in theme 6 will be used to make better KNMInext climate scenarios.

The chosen language of this newsletter is English to keep our international consortium partners SMHI, DWD and the University of Exeter informed. This newsletter will be published with a frequency of at least once per year. If you don't want to receive this newsletter, please send an e-mail to klimaatdesk@knmi.nl.

KNMInext climate scenarios

In 2006 KNMI issued the four KNMI'06 scenarios, which are plausible pictures of the future climate in the Netherlands. They are frequently used in climate change impact and adaptation studies. Supplements to these scenarios were issued in a publication in 2009. The KNMInext scenarios will succeed the KNMI'06 scenarios some time in autumn 2013. Note that KNMInext is only a temporary working title.

Why new scenarios?
Both new insights from climate research and additional user requirements will be included in the KNMInext scenarios. The new scenarios coincide with the publication of the Fifth Assessment Report (AR5) of the IPCC Working Group I (the physical scientific aspects of the climate system and climate change).
The global model runs, which are performed in support of the new IPCC report, will be used as input for the KNMInext scenarios. KNMI contributes to IPCC with runs of our own global model EC-Earth. The first results of these simulations are starting to become available. KNMI is doing preparatory work for evaluation of these results and for further downscaling with the KNMI regional climate model RACMO. However, it is important to note that the KNMInext scenarios are not simply downscaled model projections. The added value of KNMI scenarios is that they blend available model information with process information and observations. This results in state-of-the-art tools that can be used to assess vulnerability and explore robust adaptation options. As such, the new scenarios will contribute to science-based decision making.

Consortium on High-quality Climate Projections (theme 6)

November 2010 - 2014

Arnout Feijt (KNMI)

Arnout Feijt, consortium leader: "This theme aims to provide high quality information on regional climate in The Netherlands, now and in the future, for developing national and regional adaptation strategies. These aims are carried out in the following four work packages:

WP1: Mechanisms of local climate change in The Netherlands: How do the sea surface temperature, the land surface, and small-scale atmospheric dynamical processes impact on our future climate at the local scale? And what is the uncertainty in these processes?

WP2: Time series, extremes and probabilities: How can uncertainty of future climate change projections be represented in time series and scenarios of future climate change?

WP3: Scenario development for climate change impact: How to couple climate projections to impact assessment models in a methodically consistent manner and how can uncertainty in the impact assessment be incorporated in such a way that it can effectively be used by the climate adaptation community?

WP4: Climate services: How to improve the 2-way data and information exchange in the process chain climate research - impact/adaptation research - policy making?

User requirements

In April 2011 the KNMI report "Inventory of user demands on climate information" (PDF) (Dutch, English summary) was published. This report is a compilation of user requirements based on two workshops in March/April 2010 (Dutch) and earlier inventories.

During the KNMI workshops the user requirements for the KNMI-next scenarios were discussed. About 120 users with different backgrounds (policy, research, consultancy) and from different sectors (water, health, transportation and others) participated.

All user requests are seriously considered but for practical and scientific reasons it is unlikely that all can and will be fulfilled in KNMInext. Examples of user requests are:

- The change in daily maximum and minimum temperature. Many users in agriculture and ecosystem modelling indicated that the change in (extremes of) maximum and minimum temperature for a given day is more relevant than the change in mean temperature. In KNMI'06 little information was given for these variables.
- The change in heavy precipitation during showers, such as the hourly precipitation amount with a return period of 100 years, for urban water management. We started to present additional information on hourly extremes in the 2009 supplement, and will extend this in KNMInext.
- Quantitative information about the change in occurrence of hail, fog, snow and black ice for impact assessments in agriculture and transportation. So far, there is little scientific evidence for this type of information.
- The change in average and maximum wind speed (only maximum daily wind speed per year is given in KNMI'06). For wind energy farms the change in the mean daily wind speed per season is also relevant. Wind is a key variable of the model results.
- More information about spatial variations in the anticipated changes (e.g. coastal effects in precipitation for water management). KNMI's high resolution modelling will give insight in potential differences between regions in The Netherlands.
- Gridded datasets for temperature, precipitation and evaporation for the Delta Programme. From the 1st of May 2011 gridded datasets of observations and KNMI'06 scenarios can be downloaded at the Deltaportal (Dutch).

Scenarios instead of a full probabilistic approach

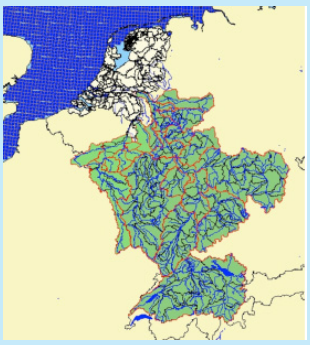
For the KNMInext scenarios we will retain the scenario approach instead of a full probabilistic approach as used in the UK probabilistic climate projections. An important disadvantage of probabilistic projections is that it is difficult to generate time series for a given scenario. Because of the importance for impact analysis, we delivered and will deliver time series as part of KNMI'06 and KNMInext. Another reason not to choose probabilistic scenarios is the experience of users in the UK, who were overwhelmed by the information density.

I am proud that we have such a broad consortium of high scientific quality that works together on a wide range of topics for society."

Flyer on High-quality Climate Projections (PDF)

System for coupling data and models

Deltares set up a model platform, called Climate Knowledge Facility-system (CKF-System). This system can be applied to consistently assess the effects of climate change on the Dutch water system. Hydrological and hydraulic models of the Rhine/Meuse watershed, including the delta of The Netherlands and the North Sea, were linked using existing technology (Delft-FEWS) into a data and model framework. The CKF-system allows for regularly updating (data and models) and thus guarantees that the results (scenarios) will be based on up-to-date science and technology.



Overview of the model area

Case study: risk of high discharges and high North Sea water levels

To demonstrate the capabilities of the system, Deltares performed a case study, requiring a full run of the complete model suite. As input, a 30-year dataset (2001-2030) from the climate-modelling project ESSENCE was used (made available by KNMI). With these the risk of co-occurrence of extreme discharges at the main rivers and extreme water levels at the North Sea coast was explored.

Future work

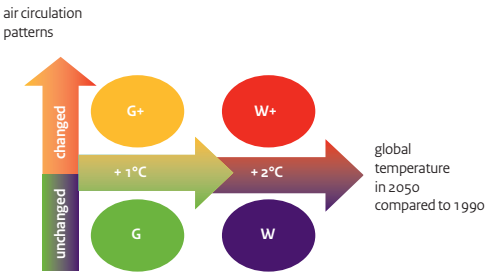
The CFK-System was set up within the Knowledge for Climate Programme and will be used and extended in work package 3 of theme 6. The focus will be on the assessment of more extreme events. Other focal points are the bias correction of climate model outputs (Deltares/KNMI), uncertainty related to hydrological modelling (Deltares), the impact of land use changes on hydrology (Deltares/VU) and the coupling of nature and ecosystem models (KWR and VU), agronomic models (WUR) and climate and air quality models (TNO).

Wind and visibility research at Schiphol

The operations at Schiphol airport are highly sensitive to the local weather. For safe and efficient airport operation now and in the future, monitoring and prediction of the critical weather parameters is essential.

Defining steering variables

The four KNMI'06 scenarios differ in the degree of global temperature rise and the degree of change in atmospheric circulation patterns in our region. Currently, the new model results are being evaluated to determine the best steering variables for the KNMI-next scenarios.



Improving time series

For KNMI'06 a transformation tool (Dutch) was made to transform historical time series to future time series. This tool was made to transform observed precipitation and temperature series. The intention is to improve/extend this tool. Currently the tool is not able to change year-to-year variation and persistence explicitly. The sequences of warm and dry periods in transformed time series are determined greatly by the historical time series. However, changes in these sequences are relevant for many stakeholders. We will also investigate whether it is possible to provide time series for the future which are more directly based on climate model simulations.

A Wind and Visibility Monitoring System is being developed at Schiphol in the project Windvisions. This project is partly carried out in work package 1 of theme 6.

3D-wind field

This new and innovative project aims at integrating a horizontally averaged wind-measurement (a crosswind scintillometer) and a vertically sensing instrument (SODAR/LIDAR) into one system to monitor the 3D-wind field between the surface and several hundreds of meters height. Especially the wind component across the runway, which can be measured with a scintillometer (see figure), leads to dangerous landing and take-off situations.

Future work

Future research will focus on the testing of the visibility meter and the construction of a 3D picture of the wind-field.

The new wind meter (scintillometer): left two transmitters; right a receiver

Data for climate impact analysis

The Climate Impact Guide (Dutch) is a pilot website for researchers who search for data and background information for climate impact analysis. The guide is a first attempt to give an overview of data and information about climate and climate impacts in the Netherlands. The relations between the sectors (Dutch) are described on the website: the exchange of data between sectors, the differences in use of data and the consequences of these per sector.

Logo Climate Impact Guide

Five sectors

At the moment information about the following sectors can be found: Climate, Nature, Agriculture, Water and Land use. These will possibly be complemented in the future with air quality (TNO). The information is supplied by KNMI, Wageningen UR (University & Research centre), Deltares, VU University Amsterdam en KWR Watercycle Research Institute.

Feedback

The Climate Impact Guide is in a pilot fase and will be filled with information the coming three years as part of theme 6. We would be glad to receive feedback for improvement.

Other "climate guides" (Dutch).

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