

Visualization of climate information

Examples from the Netherlands

Bernadet Overbeek, KNMI

Aim: to make people aware of what
a future climate in the Netherlands
might look like, including the
uncertainties therein





If I just explain the facts, they get it, right?



The problem isn't that people haven't been given enough facts. It's that they haven't been given facts in the right ways.

If facts attack the values of a group, they're likely to become defense.

Do: Look for shared values
- make a real connection to your public.

Do's for effective communication

Dahlstrom (2014)

1. Close the distance
2. Provide an action perspective

Moser (2014, 2017) argues:

3. Focus shift to adaptation
('preparedness' for climate change) instead of
only mitigation of climate change.



& visualize...



Examples from KNMI

- 1) Generic KNMI climate scenarios – tool for adaptation
- 2) Facts & figures in 'my backyard' – close the distance – tool for adaptation
- 3) Future weather – close the distance
- 4) Climate information in the weather forecast - close the distance
- 5) Online magazines - close the distance
- 6) Storylines – provide action perspective



Generic KNMI climate scenarios

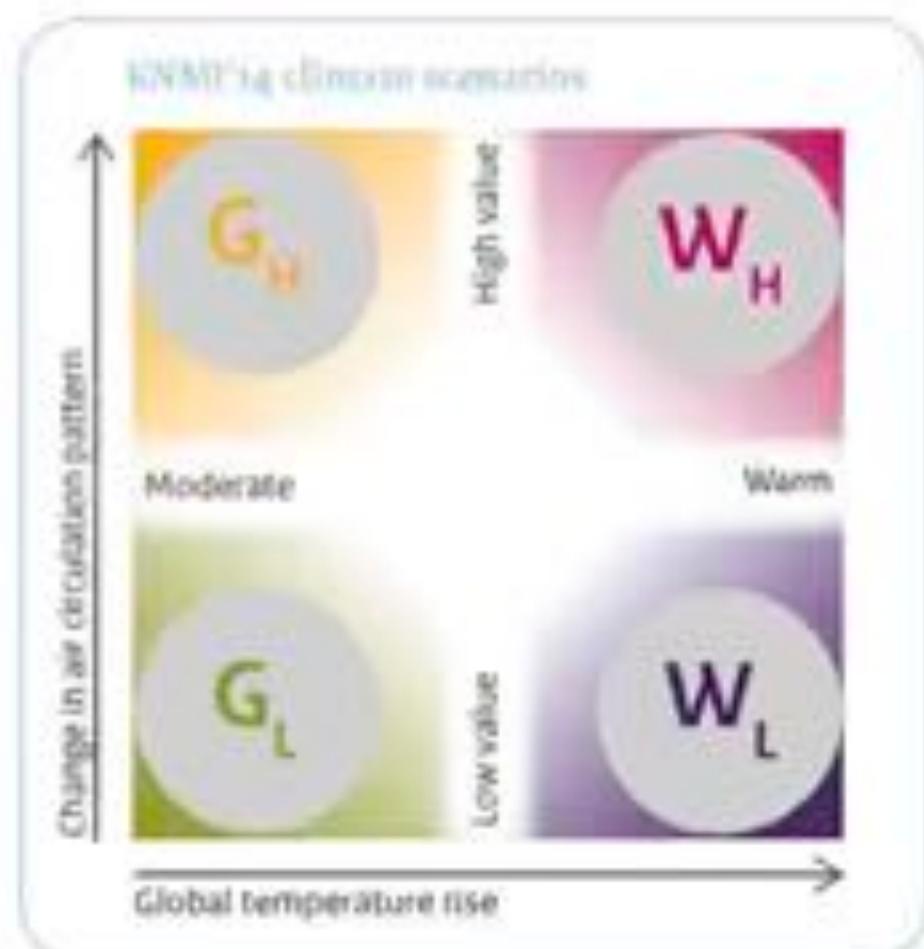
Colors are intuitive:

G_L: low temperature rise & limited drying in summers

G_H: higher temperature rise & dry summers

W_H: higher temperature rise than yellow & dryer summers

W_L: high temperature rise (red) & enough rain in summers (blue)



Example 1

Folder policy makers



The temperatures in the Netherlands will continue to rise. More warm days in spring. The number of cold winter days decreases. The number of warm summer days increases in almost all regions of the country. Temperature differences between the coast and inland will increase in summer and reduce in winter.



In general precipitation will increase further. The likelihood of extreme rain showers with thunderstorms will both increase. Increases in extremes (Δ_{L} and Δ_{U}) indicate a change of the total probability of extremes.



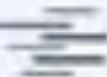
The rate of seasonal change will increase and greatly depends on global temperature rise. The rate will force us to reconsider crop rotation to adapt quickly. As such, the rate of soil degradation will be much more pronounced. Higher winter temperatures will contribute to more snow melting in spring.



Changes in wind speeds are small. The number of days with consistently low monthly wind speeds in summer will decrease slightly, but even in the best scenario with minor change in the mean circulation pattern, these Δ_{L} and Δ_{U} uncertainties allow more variability speeds in summer.



Solar radiation has slightly increased during the last decades, partly due to the reduction in air pollution. This climate trend is likely to become more homogeneous showing an increase of solar radiation under current conditions. In the Δ_{L} and Δ_{U} , indicates a small decrease in low-level access to solar radiation due to more hazy skies.



The number of days with dry weather and relatively little rainfall increases. This is almost entirely due to the reduction in air pollution. The linear trend in aridity will not be as strong as in the last few years. There are considerable regional differences within the Netherlands how progressive along the coast they spread.



Increased winter rainfall and
increased drought and
heatwave risk in the
second half of the century.
More intense extremes.

We are exposed to
extremes that cannot be
predicted (e.g. heatwaves,
dry summers, early
autumn frosts and early
frogs). This increases the
risks.

The number of extreme heatwave days increases strongly

The presence of increased heat is
secondary to the. The number of
extreme heat days above 30°C
increases, but rising seasonal
temperature variability
and climate projection
uncertainty

Summer temperatures heating
extreme will decrease, but
with decreasing heat
extremes. The supply of
water causes the maximum
temperatures will remain.

Temperature and heat
increased markedly during
winter heat extremes are mainly
greenhouse warming and
natural air quality and
atmospheric. Future projections
the number of heatwaves
due to a reduction of the
growing and flowering season.

Long-term dryness is expected to
increase markedly. Increased
heatwave days can increase
heat stress on humans and
livestock. Heat waves
increasing the potential
damage to health and welfare.

Increased crop yields and
the increased storage of energy
resources and improved
availability of renewable
energy sources. Heat waves
and long periods of drought
reduce agricultural yields.

Long periods of drought can
lead to water shortages, water
scarcity and fire outbreaks.
Heatwaves will contribute to
heat stroke.

Example 1

Maps of multiple scenarios



Summer precipitation: It's getting dryer, or not

1981-2010

Scenario WH
2050

Scenario WL
2050





Regional translations of climate scenarios

Facts & figures in 'your own backyard'

- Pictures of the own region
- Observed changes
- Future scenarios
- Effects

Region Utrecht



Region Veluwe

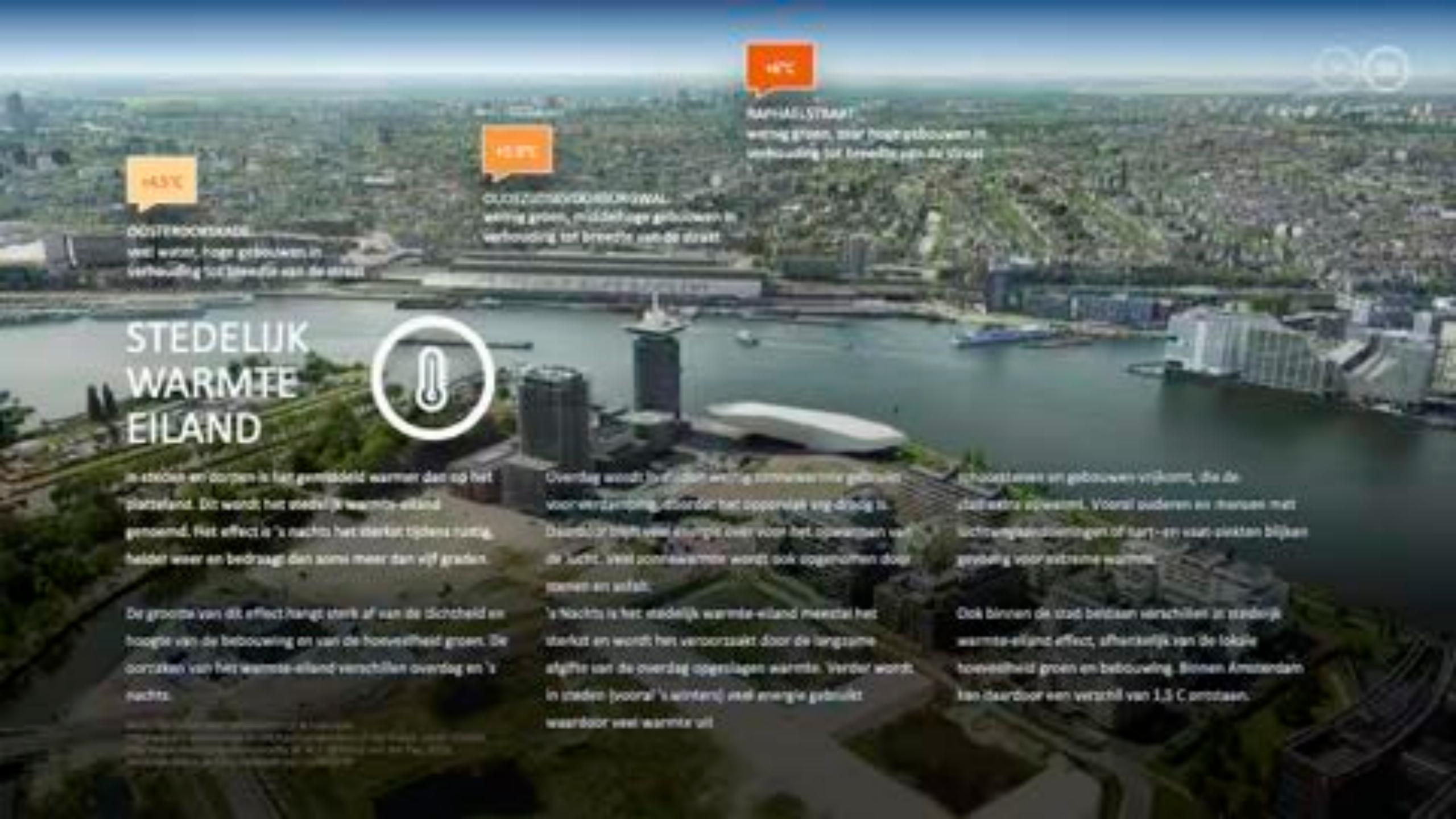


Region Flevoland



Region Amsterdam





STEDELIJK WARMTE-EILAND

In steden en dorpen is het gemiddeld warmer dan op het platteland. Dit wordt het stedelijk warmte-eiland genoemd. Het effect is 's nachts het sterkeste: tijdens de nacht, helder weer en bedraagt dan soms meer dan vijf graden.

De grootte van dit effect hangt sterk af van de dichtheid en soortgoed van de bebouwing en van de hoeveelheid groen. De verschillen van het warmte-eiland verschillen overdag en 's nachts.

Overdag voelt een dicht bebouwd gebied veel minder voorverdamping aan omdat het oppervlak erg droog is.

Droogte is een belangrijke factor voor het overdenken van de nacht. Veel zonnewarmte wordt ook opgenomen door groen en water.

's Nachts is het stedelijk warmte-eiland meestal het sterkst en wordt het veroorzaakt door de langzame afgeleiding van de overdag opgeslagen warmte. Verder wordt in steden (vooral 's winters) veel energie gebruikt waardoor veel warmte uit

gebouwen en gebouwen vrijkomen, die de stad extra verwarmt. Vooral ouderen en mensen met lichtwegbehandelingen of hartritmushelpers blijven gevoelig voor extreme warmte.

Die binnen de stad bestaan verschillen in stedelijk warmte-eiland effect, afhankelijk van de lokale hoeveelheid groen en bebouwing. Binnen Amsterdam kan daardoor een verschil van 1.5 C ontstaan.

RAPHAËLSTRAAT

Verhoogde groen, maar hoge gebouwden in verhouding tot breedte van de straat

+0.9°C

OLDE ZIJDEHOEKSEWAAL

Veel groen, middelhoge gebouwden in verhouding tot breedte van de straat

DOESTERHOEKSEWAAL

veel water, hoge gebouwden in verhouding tot breedte van de straat

+0.7°C

+4.3°C

STEEDS MEER NEERSLAG



De afgelopen vele jaren een grote stijging in
neerslag en waterstaal.

Sinds 1900 nam de jaarlijkske
hoeveelheid neerslag in de regio Amsterdam
daartijd toe met 25 procent, van gemiddeld
750 mm naar 933 mm.



NAP 2100

Aanwijzingen voor snellere zeespiegelstijging

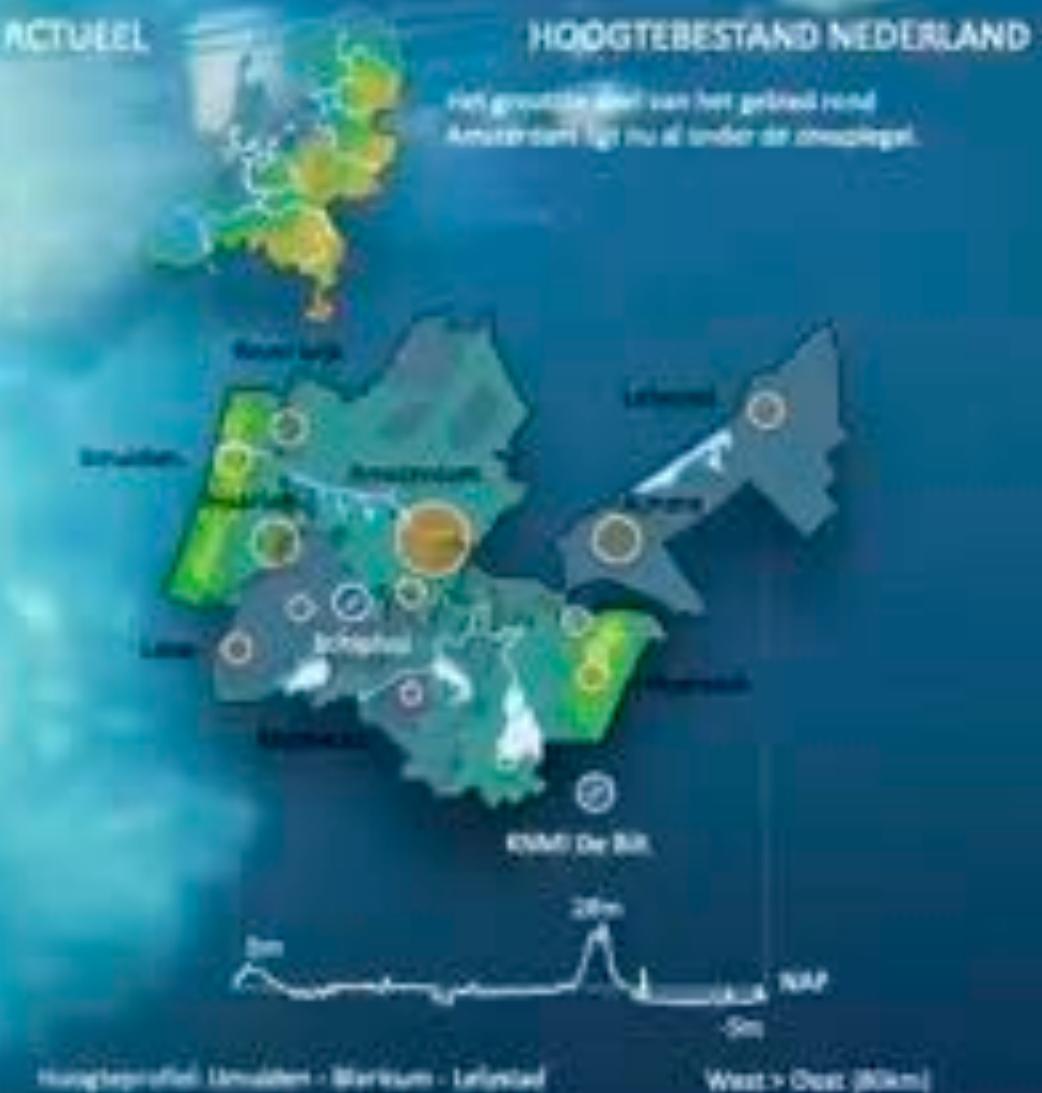
In de KNMI SLA-klimaatscenario's ligt dit landengebied op 2 meter zeespiegelstijging rond 2100.

Er zijn verschillende indicatoren dat de zeespiegel sneller kan stijgen dan de scenario's van KNMI. De snellere stijging wordt vooral toegeschreven aan het snellere afwarmen van Antarctica.

Van UNCCC kan vermoed worden dat de scenario's te weinig rekening houden met de snellere zeespiegelstijging die mogelijk kan optreden door de snellere verwarming van Noord-Europa.

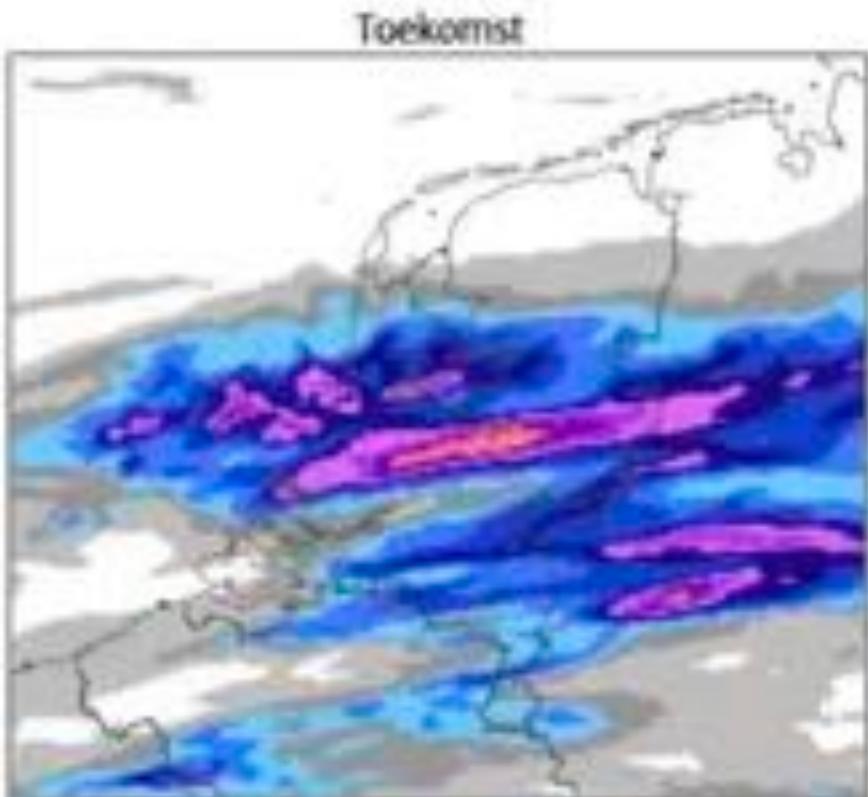
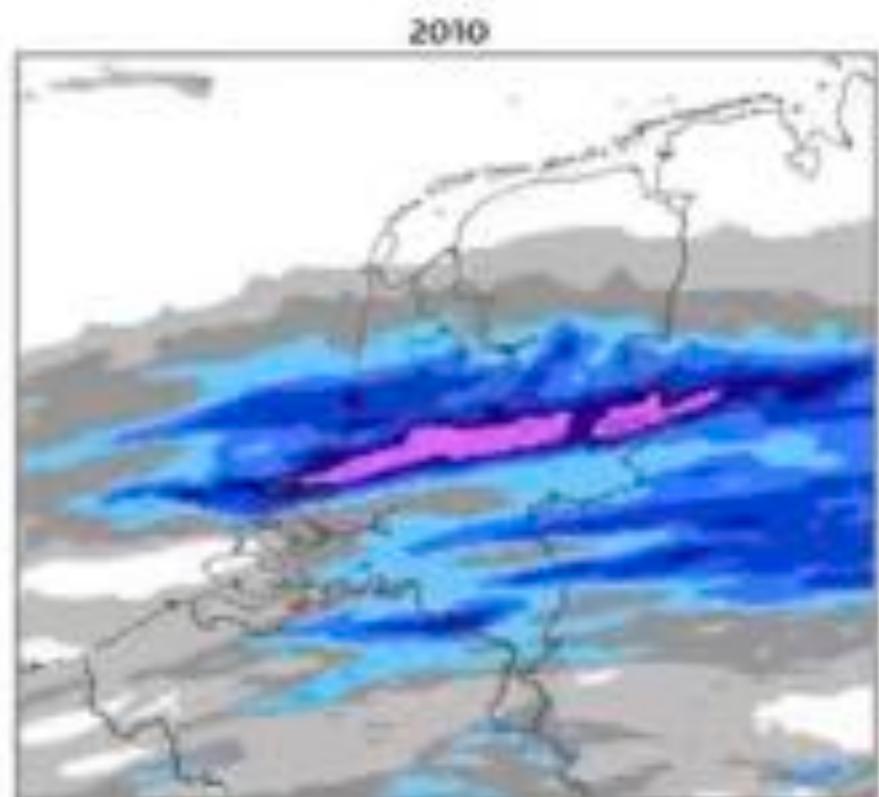


ACTUEEL



Future weather

Extreme weather event translated to a 2 degrees warmer climate



mm
165 - 180
150 - 165
135 - 150
120 - 135
105 - 120
90 - 105
75 - 90
60 - 75
45 - 60
30 - 45
15 - 30
0 - 15

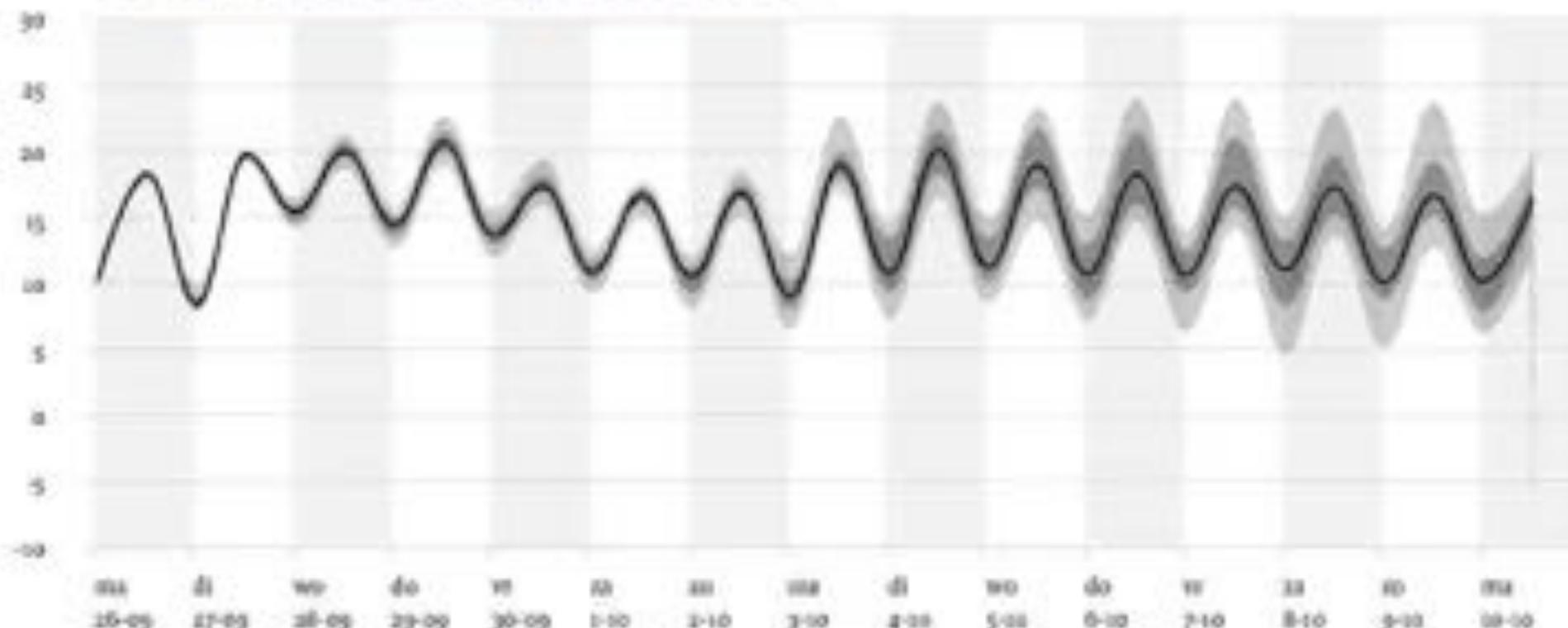
Example 4

knmi.nl/weer-en-klimaatpluim



Climate information in the weather forecast

Temperature ($^{\circ}\text{C}$, forecast)

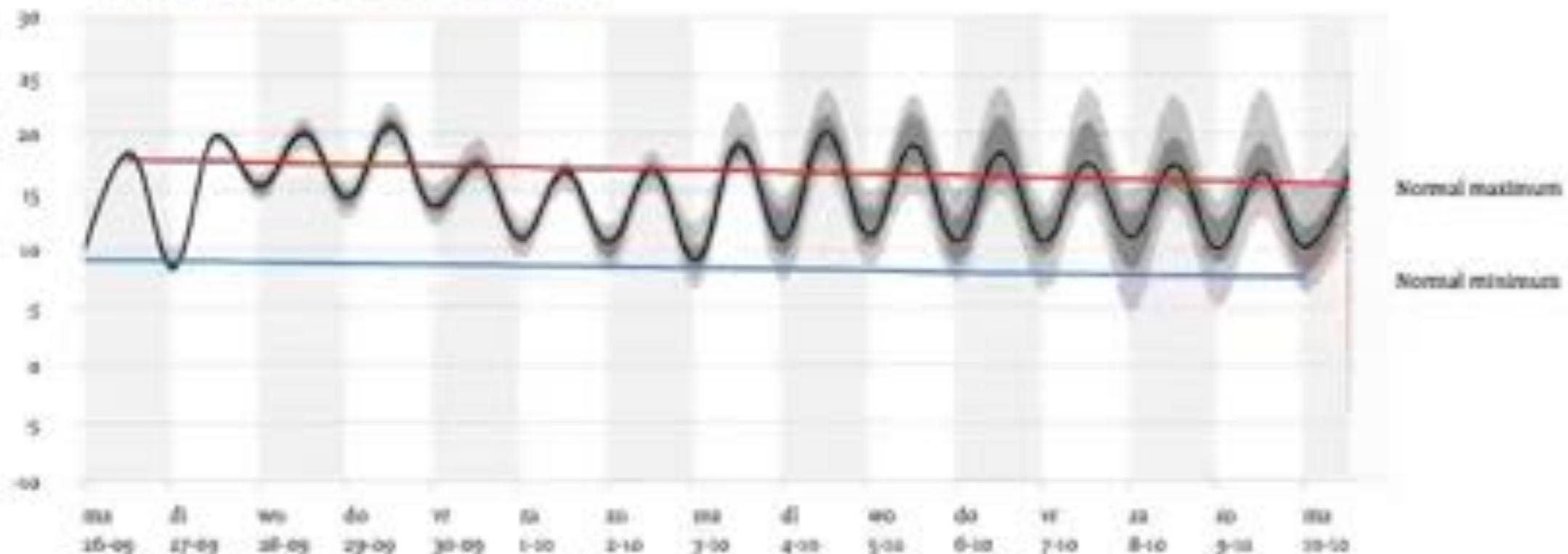


Example 4

knmi.nl/weer-en-klimaatplaat



Temperature (normal)

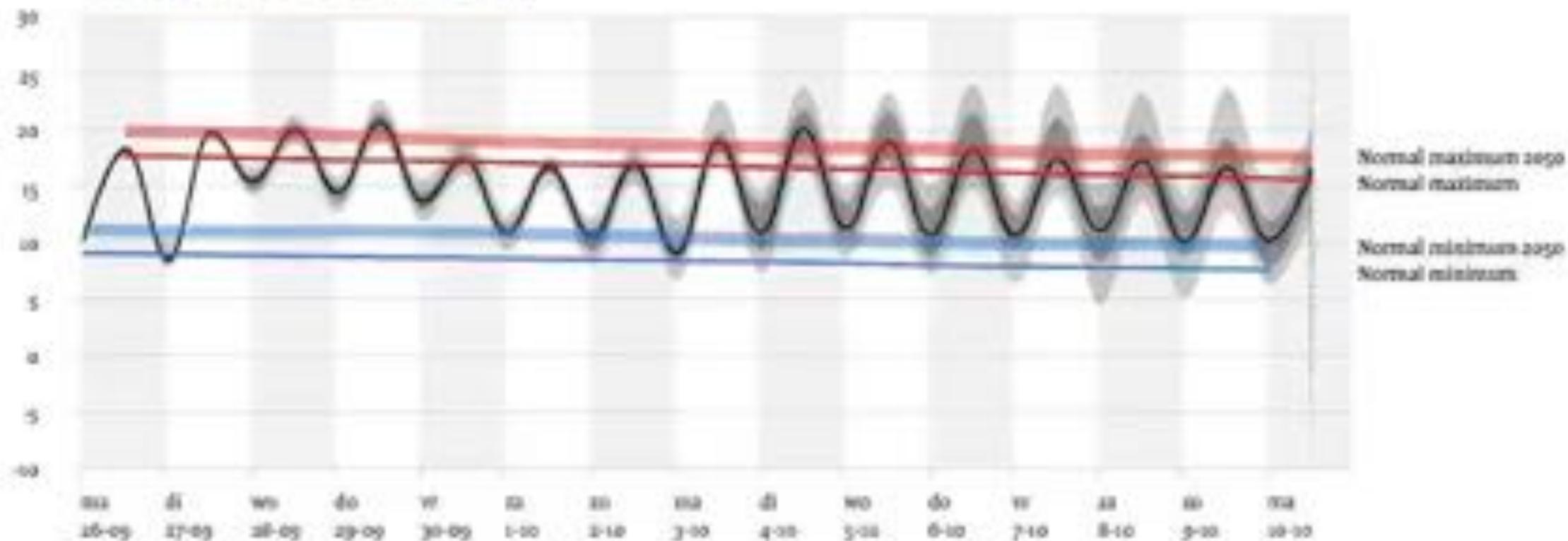


Example 4

knmi.nl/weer-en-klimaatpluim



Temperature (2050)

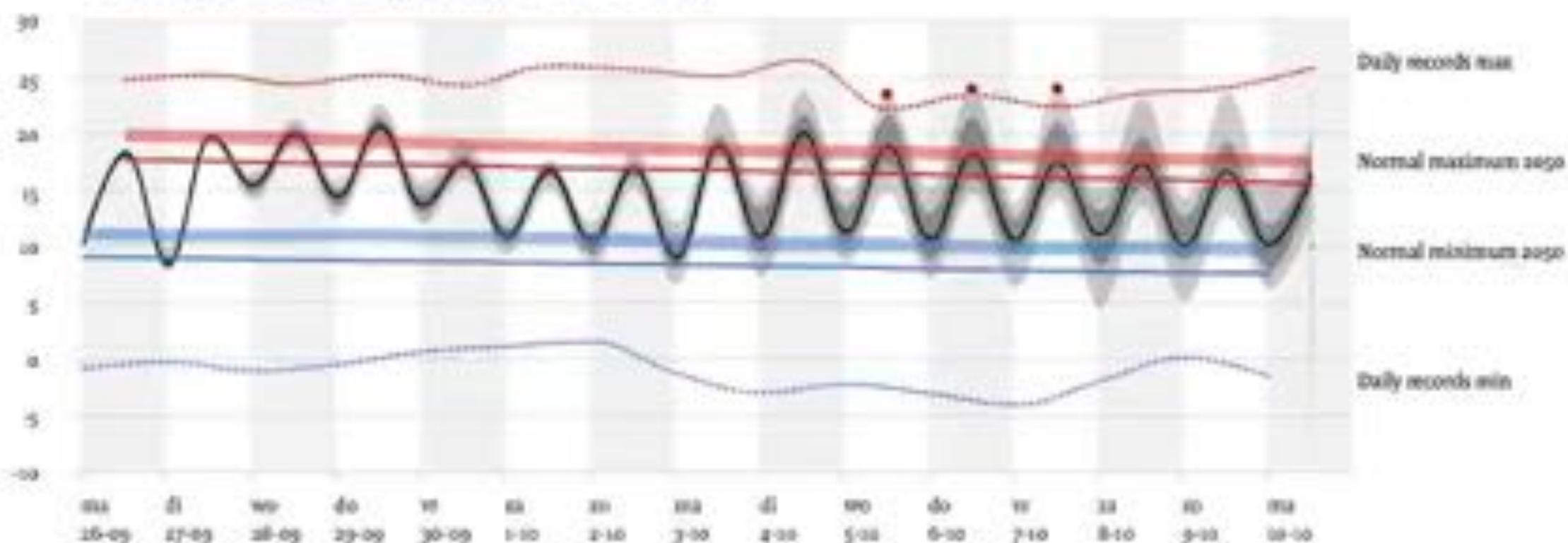


Example 4

knmi.nl/weer-en-klimaatpluim



Temperature (daily records)

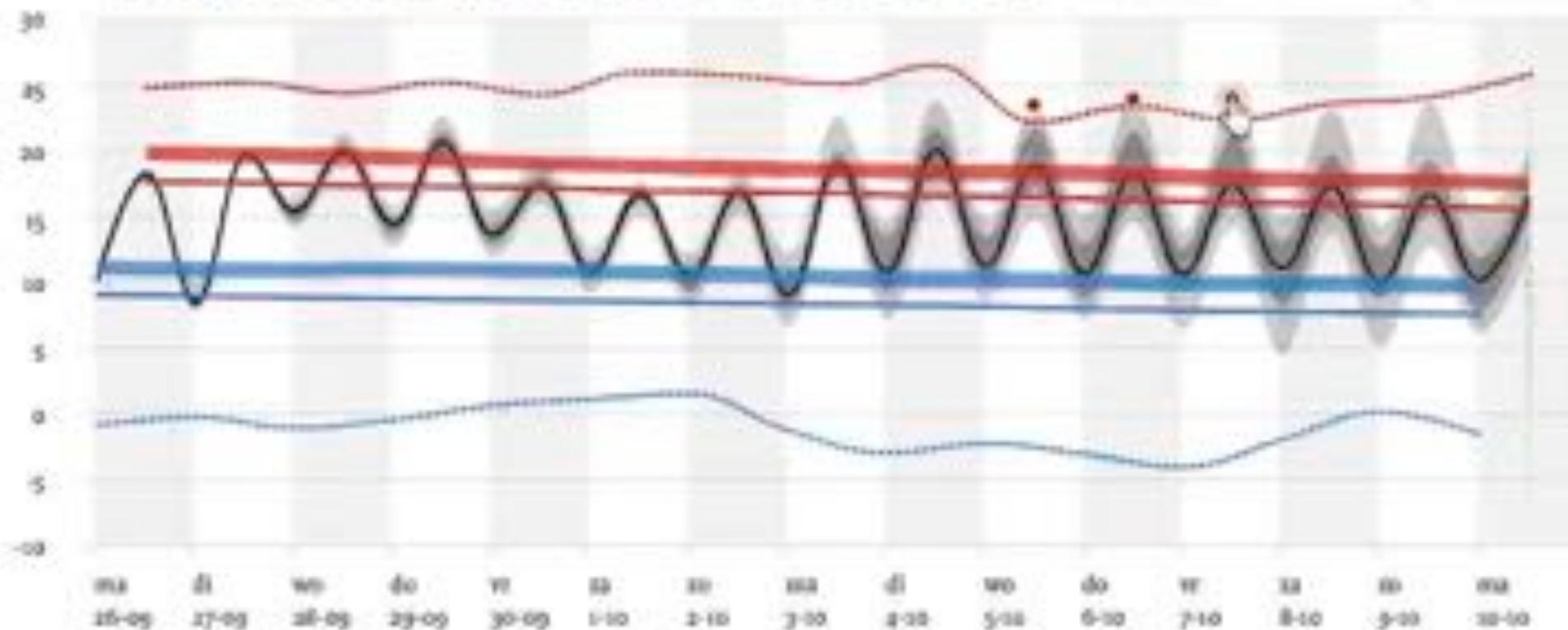


Example 4

knmi.nl/weer-en-klimaatpluim



Temperature (extremes in forecast)



Friday 7 october

Maximum of 22°C occurs in this period between once every year or 2 years. Around 2050 the maximum will be around 1 a 3 °C higher.

Example 5

The banner features the title "KNMI specials" in large, bold, serif capital letters at the top. Below it is a subtitle: "De laatste inzichten uit het IPCC-rapport over oceanen en de cryosfeer". In the bottom left corner, there is a call-to-action button labeled "Lees dit artikel". In the bottom right corner, there is a photo credit: "Photo: Steffen Olsen, DMI".

KNMI specials

De laatste inzichten uit het IPCC-rapport over oceanen en de cryosfeer

Lees dit artikel

Photo: Steffen Olsen, DMI

The sidebar contains two main text blocks with "Lees dit artikel" buttons:

- Zeespiegelstijging nu en de toekomst**
- Wat doet Nederland om de gevolgen te beperken?**



Storylines: indentify yourself with someone

Oplossingen voor zakenverlies?

Sacha Stijlga werkt voor hen!

Ingenieursbureau van de directeur Amsterdam. "We heffen ons best om de opbrengste ruimte in de stad te beschermen en daarmee de stad klimaatveranderig te maken," met Ingenieursbureau het op de 'spullen van de stad', zoals bruggen, wegen, het mobiliteitssysteem. Per jaar beschikt men 250 miljoen euro om de stad te beschermen tegen klimaatverandering.

De gemeente probeert de stad voor te bereiden op de gevolgen van klimaatverandering. Vooral het snel gaat het in de toekomst maken kan! Regenval, met klimaat in de wereld, en dus ook in Nederland, wordt sterker. Warmte lukt dus meer water vasthouwen. Hoe meer water er in de lucht zit, hoe meer er ook weer uit kan vallen.



Hans Vugts is de directeur van Haze Casa in Amsterdam. Op het dak van het hotel ligt hij een grote dakkamer aan te leggen voor zijn gezin.

Een van de redenen om dit dakkamer aan te leggen, is om de omgeving voor te bereiden op klimaatverandering. Volgens Hans gaat het in de toekomst harder regenen. Dat komt door klimaatverandering, met klimaat in de wereld, en dus ook in Nederland, wordt warmer, warme lucht kan meer water vasthouden. Hoe meer water er in de lucht zit, hoe meer er ook weer uit kan vallen.



Oplossingen voor wateroverlast?

Arnoot Hakkens is lid van het Jan Blaauw collectief in de van Giezenbuurt in Amsterdam. Samen met de buurt maakt hij van een leegstaand tennispleintje een openbare klimaatruimte.

Dit tuinmeubel is onder andere bedoeld om de buurt voor te bereiden op de gevolgen van klimaatverandering.

Volgens het collectief gaan het in de toekomst welke hand regenen. Dat komt door klimaatverandering. Het klimaat in de wereld, en dus ook in Nederland, wordt warmer. Warme lucht kan meer water vasthouden. Hoe meer water er in de lucht zit, hoe meer er ook weer uit kan vallen.

Dit veranderen in het regenpatroon kan veel problemen opleveren. "Wie begrijpt dat een typische bijgedachte voor kinderen in het oude schampelhuis aan het platteland. Tien minuten na dat bij-echte regentje het plein blank komen te staan. Wat is een soort beschutting. Al het water wat op de omringende gebouwen valt, komt hier neerdruppelen. De afwatering is ook niet goed, bij regenbuien loopt het op de straten in."



Key-messages

- We have to give the facts a save landing
- Visualizations can effectively support:
 - the connection to your public
 - the bringing of your main message
- Carefully look if the information presented can be interpreted in other ways

TIP!

Follow an online course



Visualization and communication of uncertainties



C3S ULS: Hands-on Case Study

40 min • Emma Daniels +
21/12/2018

0.00 (0) 0 likes



C3S ULS: Sectorial Application - Water

40 min • Emma Daniels +
21/12/2018

0.00 (0) 0 likes



C3S ULS: Bias Correction and Downscaling

20 min • Emma Daniels +
21/12/2018

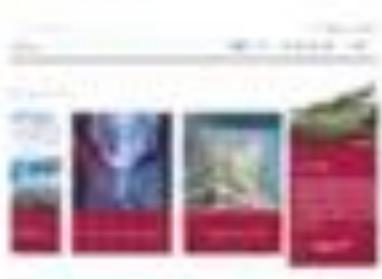
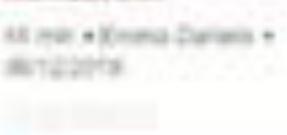
0.00 (0) 0 likes



C3S ULS: Climate Change & Tools

20 min • Emma Daniels +
21/12/2018

0.00 (0) 0 likes



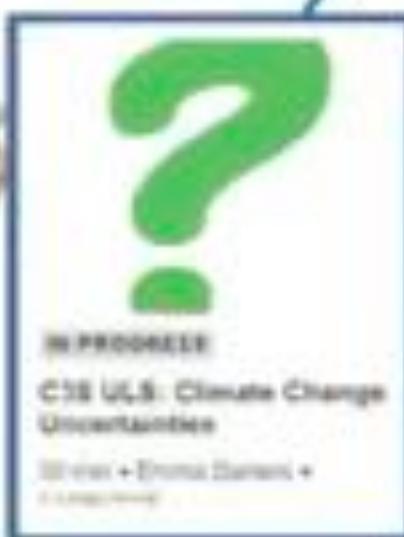
Copernicus Climate Change Services Introduction

10 min • 80 likes



C3S ULS: Climate Data Discovery - entry level

30 min • Emma Daniels +
21/12/2018



IN PROGRESS

C3S ULS: Climate Change Uncertainties

30 min • Emma Daniels +
21/12/2018



C3S ULS: Climate Data Store Dataset

3 min • Emma Daniels +
21/12/2018



C3S ULS: User Engagement - Engaging your students

10 min • 80 likes



C3S ULS: User Engagement - Identifying training needs

10 min • 80 likes



Use the Image gallery of Climatevisuals.org



ABOUT BENCHMARK IMAGES EVIDENCE NEWS

About Climate Visuals





Check out the 7 principles for visual climate change communication

- 1 Show that people
not abstract statistics**

A person expressing an identifiable situation is powerful. But our audience groups favoured ‘authentic’ images over abstract photographs, which they saw as difficult to even that qualitative. Politicians – notoriously low on credibility and authority – attracted more of the lowest scores on all three metrics in our survey.
- 2 Tell your stories**

Images that participants could quickly and easily understand – such as snowstorms, deforestation, and polar bears on melting ice – tended to be positively rated in our online survey which required rapid recognition by images, rather than deeper deliberation. Familiar ‘classic’ images may be especially useful for audiences with limited knowledge or interest in climate change but they also promoted concern and belief in our discussion groups. They are effective ways of communicating to an audience that the story ‘without climate change’, but is it a story they want to hear? Less familiar (and more thought provoking) images can help shift a narrative about climate change, and increase the social transmission of climate science in the public mind.
- 3 Show climate
changes at scale**

We found that people did not necessarily understand the links between climate change and their daily lives. Individual issues of climate change (such as flooding) may not be recognized as such, and if they are may provide different reactions. If communicating the links between greenhouse behaviours and climate change, it is best to show those behaviours at scale – e.g. a congested highway, rather than a single tree.
- 4 Climate impacts are
emotionally powerful**

Survey participants in all three nations were moved more by climate impacts – e.g. floods, and the destruction wrought by extreme weather – than by abstract or political images of climate impacts (as proven in these two experiments). Because they are emotionally powerful, they can also be overwhelming. Coupling images of climate impacts with a concrete behavioural action for people to take can help overcome this.
- 5 Show how the poorest
climate impacts**

When images of broad-based climate impacts drew an individual person or group of people, with identifiable names, they are likely to be most powerful. But there is a balance to be struck (as in visual and written communication) between highlighting climate change (so that people realize the issue is relevant to them) and minimizing the issue (by not making clear enough who is the target person).
- 6 Be very careful with
global averages**

Images depicting climate (or anything) affected widespread opinion and sense of the lowest rating in our survey. In our discussion groups, images of future people described as typical environmentalists only really resonated with the small number of people who already considered themselves as activists and campaigners. Most people do not feel an affinity with climate change activism so images of impacts may reinforce the view that climate change is for them rather than us. Photos images showing directly affected by climate impacts were less effective, and therefore more compelling.
- 7 Consider
political
polarization**

Surprisingly, levels of communication about climate change determined how people reacted to the images we tested. But other differences emerged too – images of distant climate impacts produced much higher emotional responses among those on the political right. Images showing extreme climate change generated mostly positive emotions – for those on the political right, as well as those on the left.