

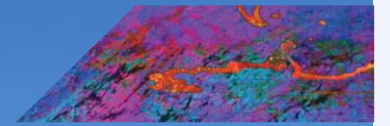


Deltares

Setting the scene from a hydrological scientific viewpoint

Bart van den Hurk
Deltares & VU University
Amsterdam

Lead Author IPCC AR6



The WG-1 report in numbers

Author Team

234 authors from **65** countries

28% women, **72%** men

30% new to the IPCC

Why a new report?

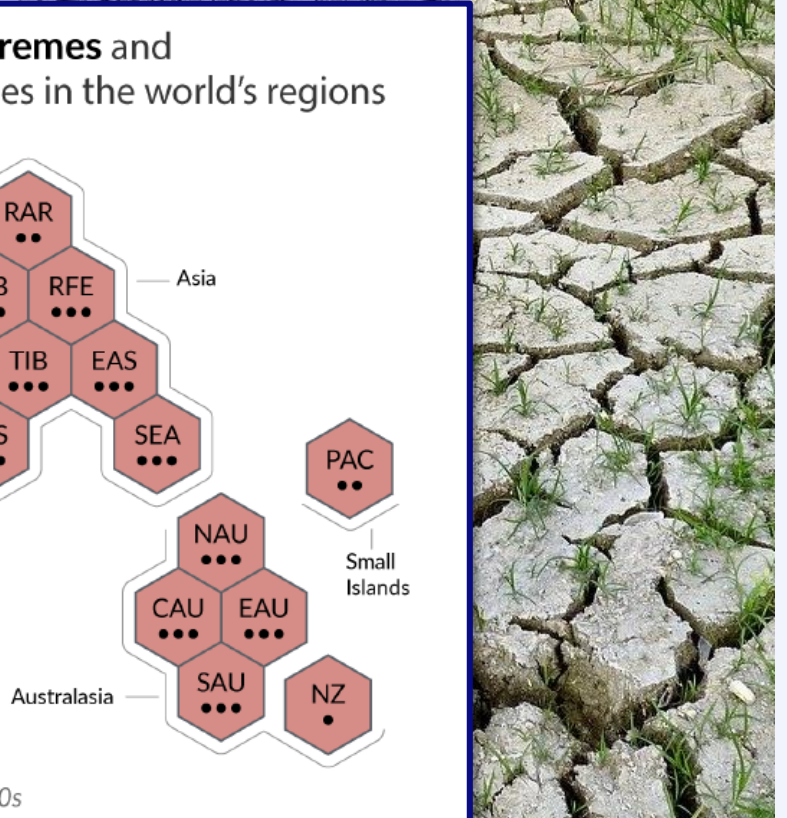
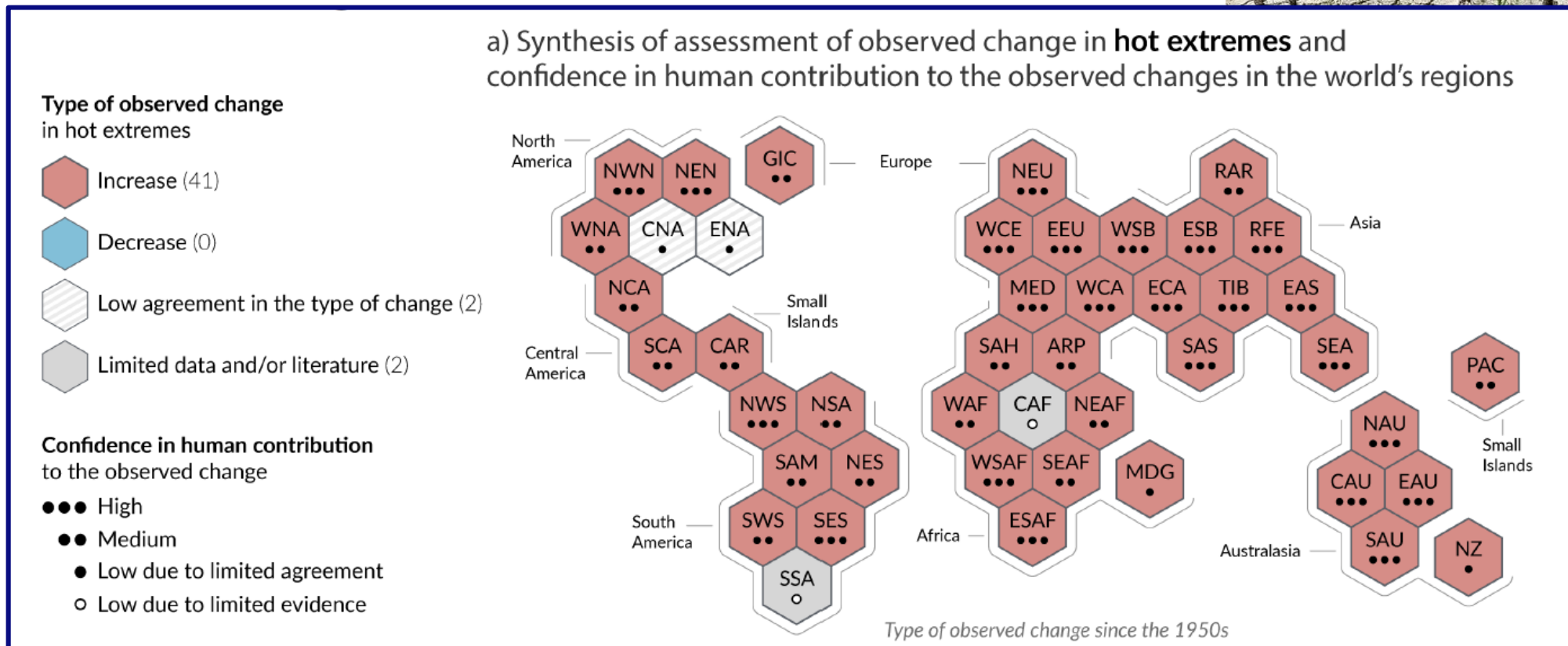
- Science has evolved
 - (most papers are newby's)
- Climate has evolved
 - (we've seen a lot of events)
- Society has evolved
 - (we have a Paris treaty now)

Government Distribution

A photograph of a sunset over the ocean. The sun is a bright, glowing orb in the upper right quadrant, casting a warm orange and yellow light across the sky. The horizon is visible in the distance, with the sun's reflection shimmering on the water's surface. The foreground shows the dark, textured surface of the ocean with gentle waves.

Some IPCC high-level messages

Climate change is **already** affecting every inhabited region on Earth, in multiple ways.

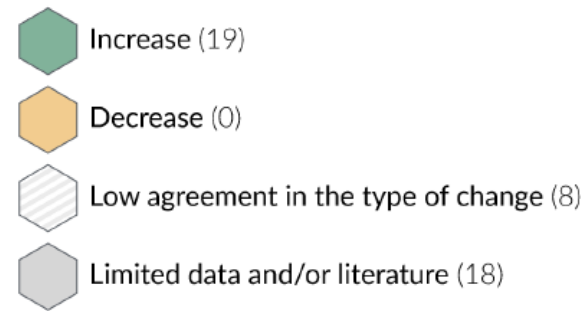


Climate change is **already** affecting every inhabited region on Earth, in multiple ways.

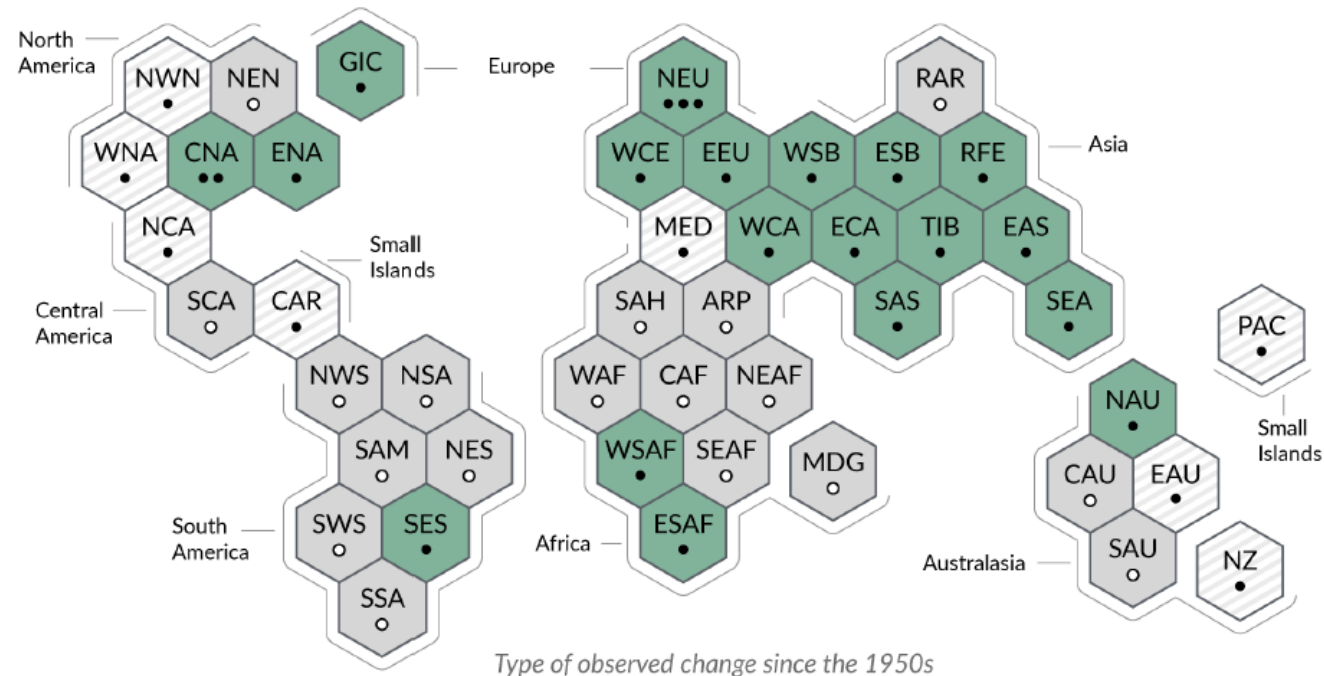
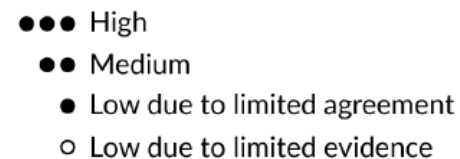


b) Synthesis of assessment of observed change in **heavy precipitation** and confidence in human contribution to the observed changes in the world's regions

Type of observed change in heavy precipitation



Confidence in human contribution to the observed change

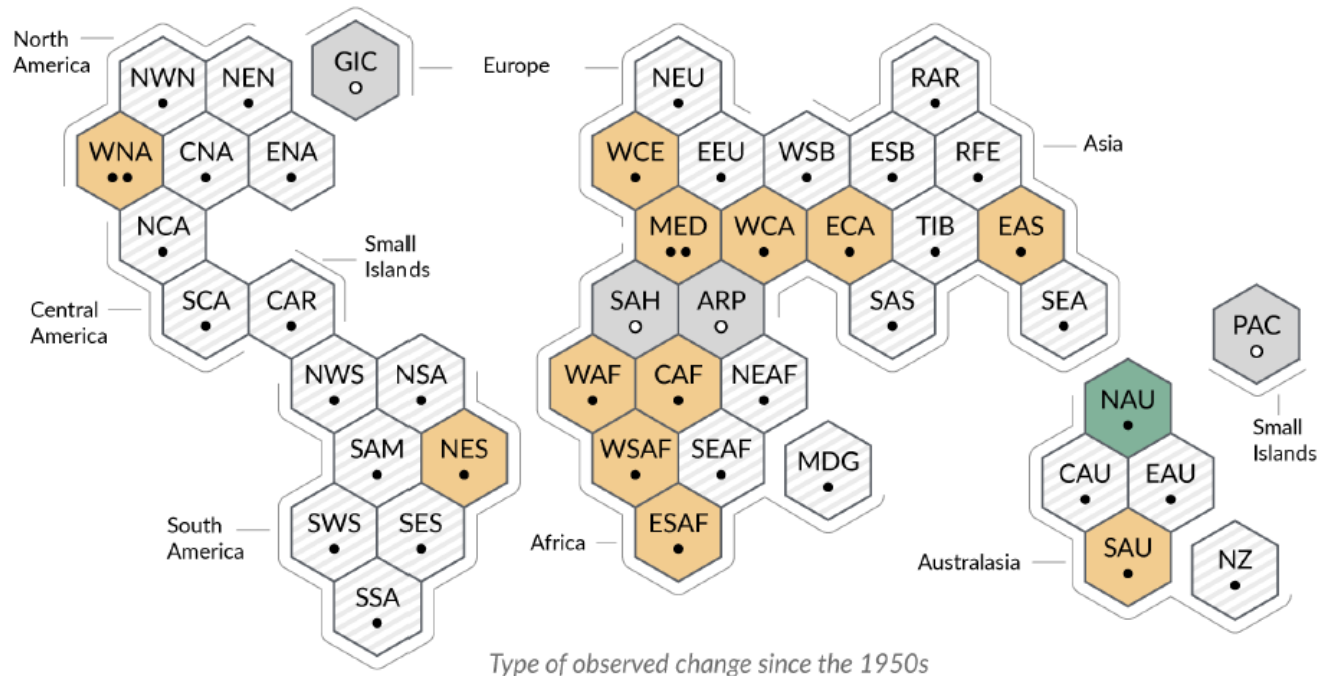
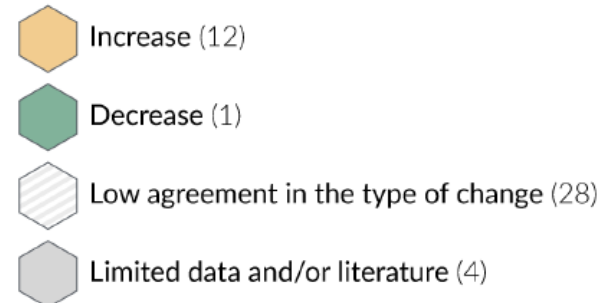


Climate change is **already** affecting every inhabited region on Earth, in multiple ways.

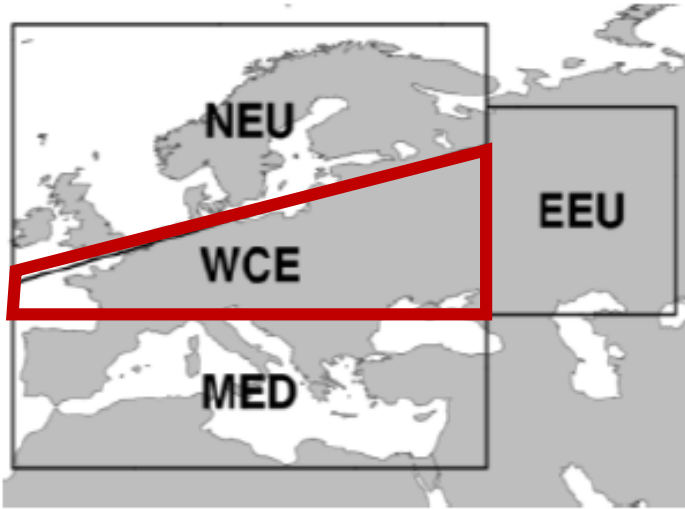


c) Synthesis of assessment of observed change in **agricultural and ecological drought** and confidence in human contribution to the observed changes in the world's regions

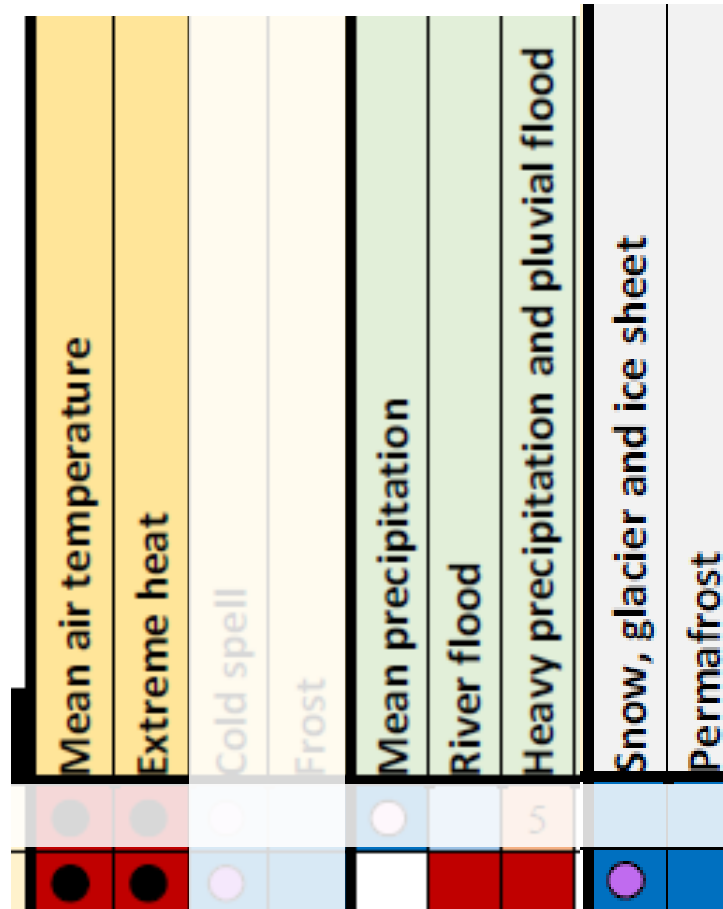
Type of observed change
in agricultural and ecological drought



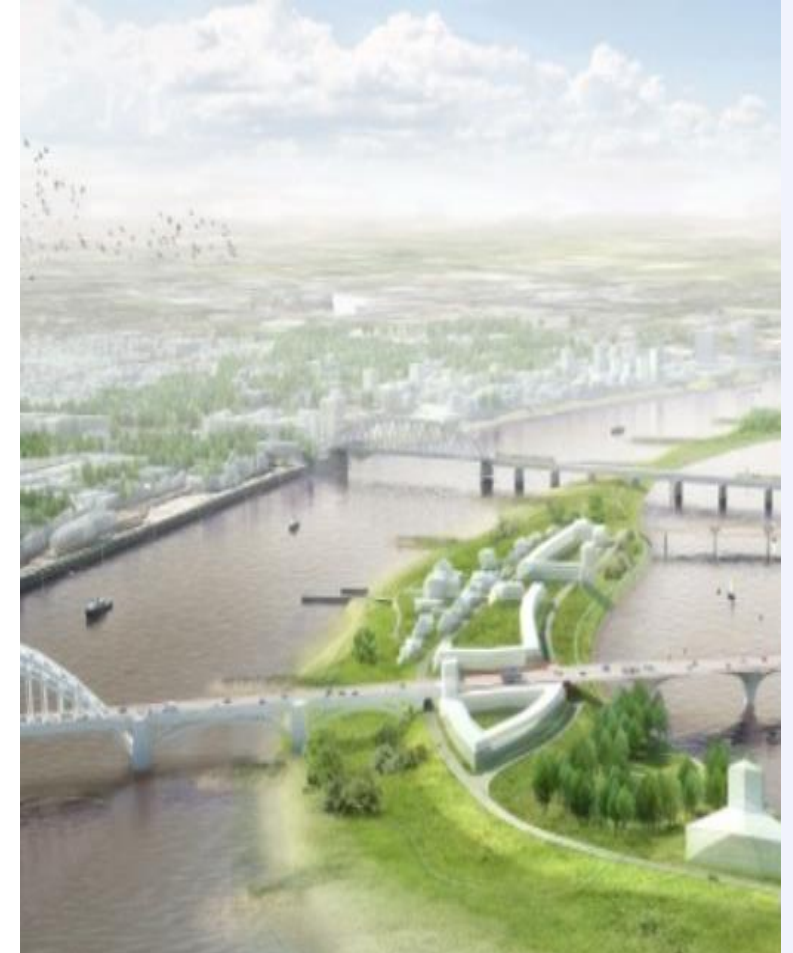
River discharge and fresh water supply



- Warmer
- Wetter
- More extreme temperature and precipitation
- Increased flood likelihood
- Less snow and glaciers

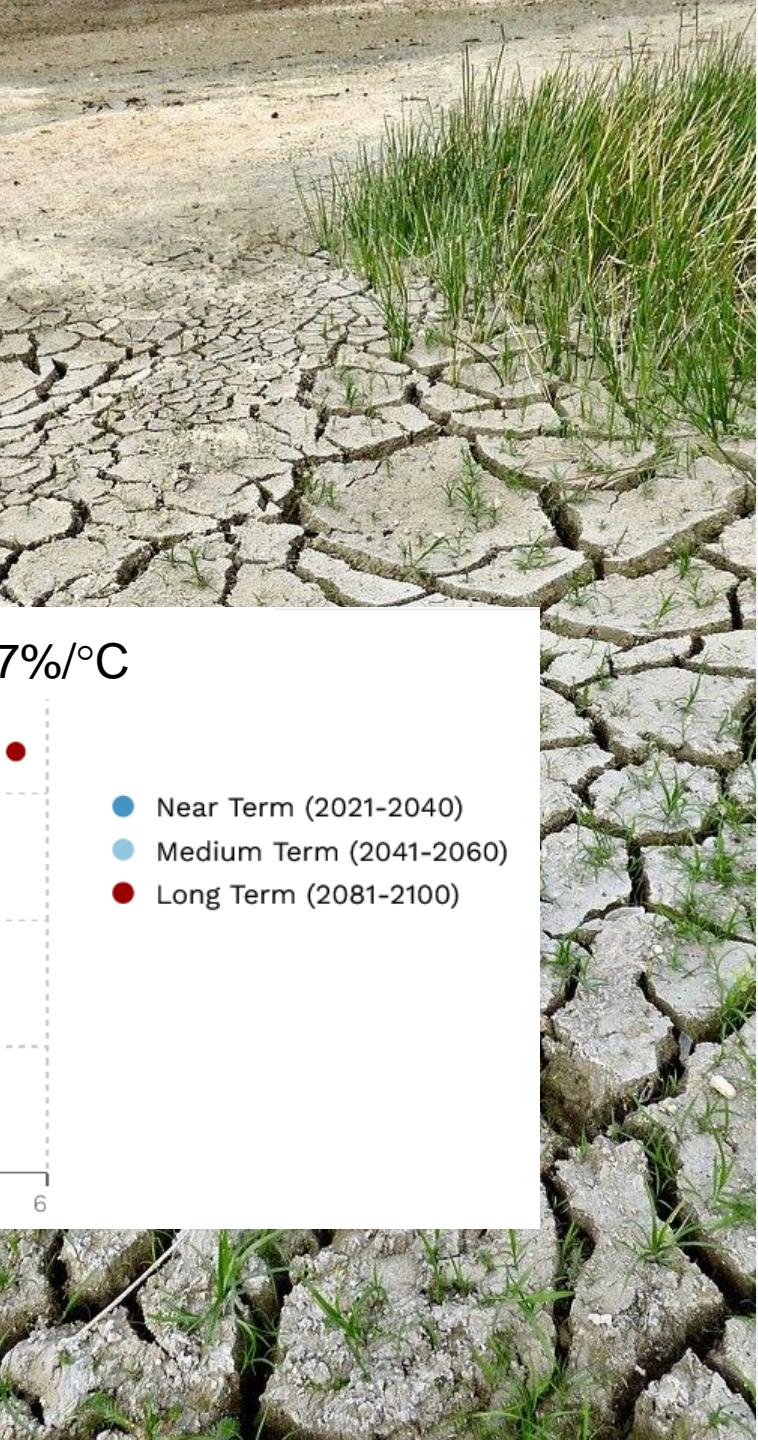
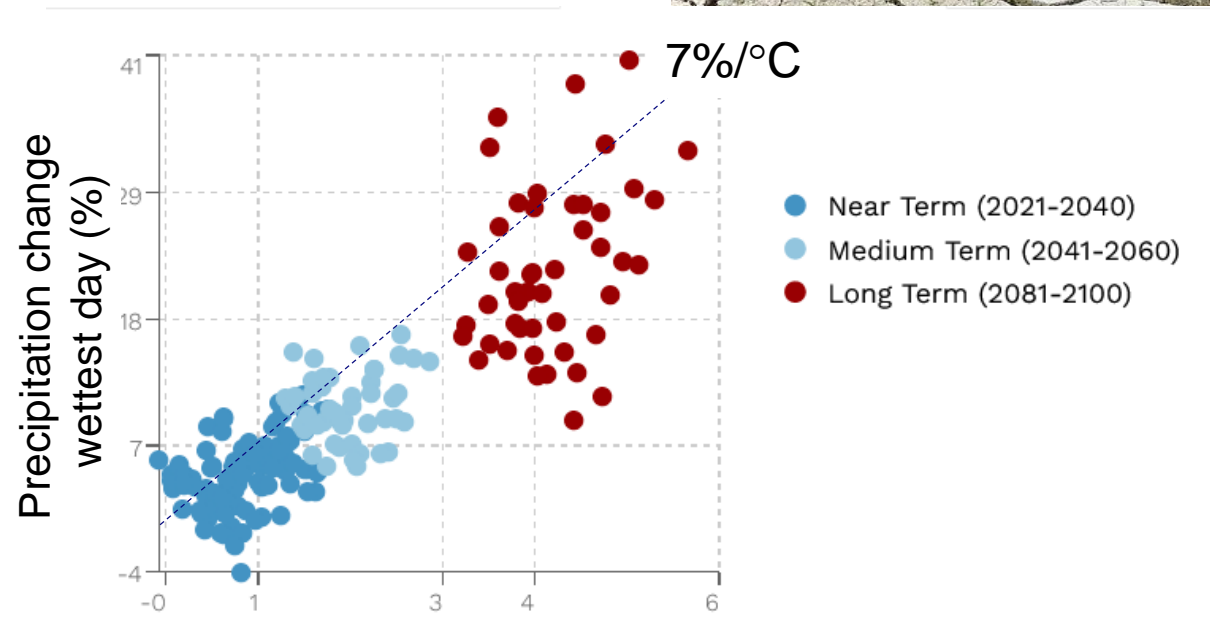
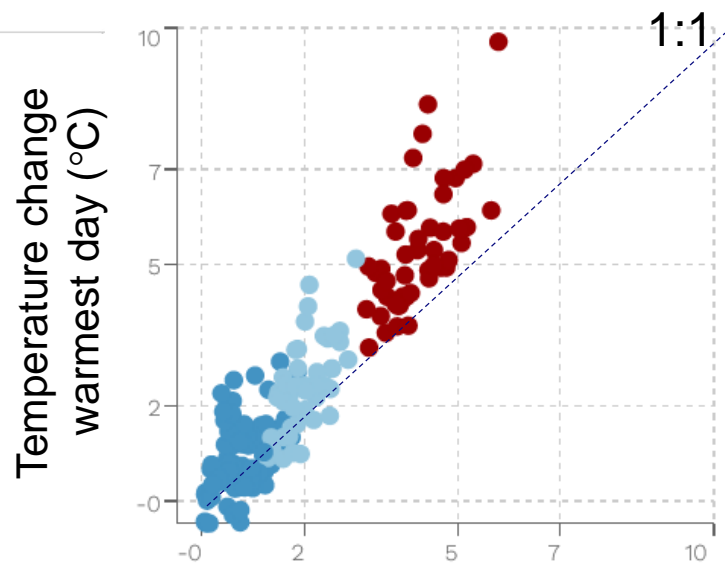
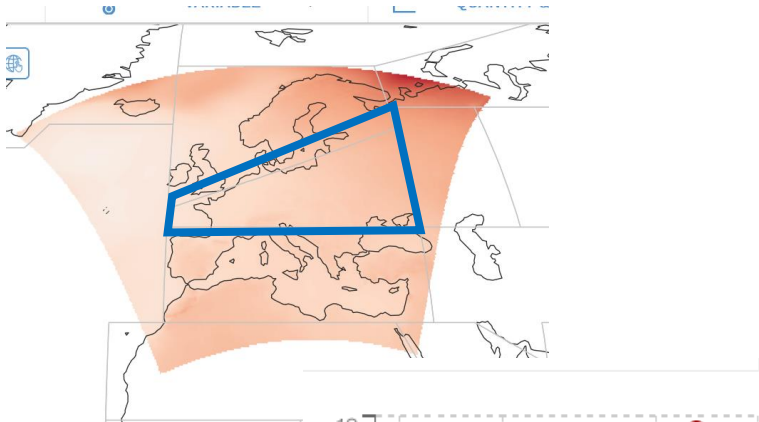


Deltares



Key	
	High confidence of decrease
	Medium confidence of decrease
	Low confidence in direction of change
	Medium confidence of increase
	High confidence of increase
	Not broadly relevant

Basic information for regional climate scenarios



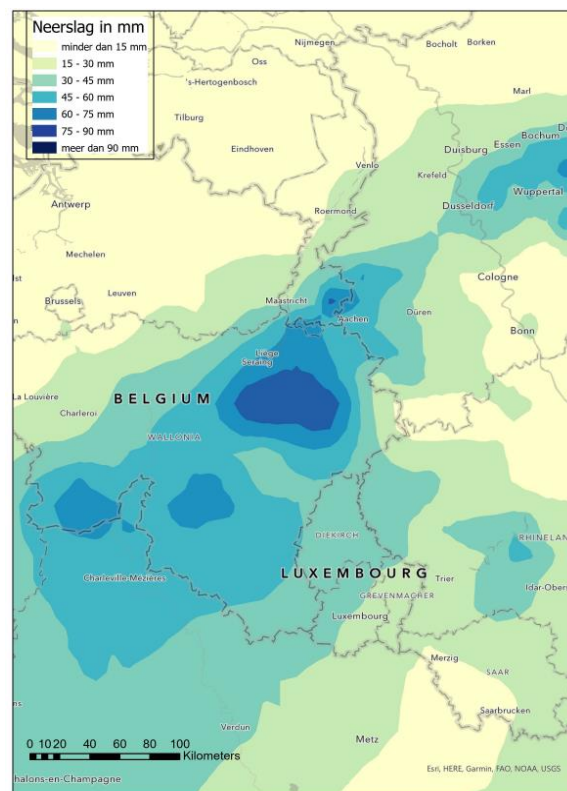
A close-up, low-angle shot of a person's legs from the knees down, wearing dark green rubber boots. The person is walking through a shallow, muddy flood. The ground is a reddish-brown color, likely soil or brick, and is covered in water and mud. The person is holding a white umbrella, which is visible at the top of the frame. The boots have orange soles and a small orange strap near the top. The water is splashing around the boots, creating white foam and ripples. The overall scene depicts a flooding event.

The 2021 flooding event

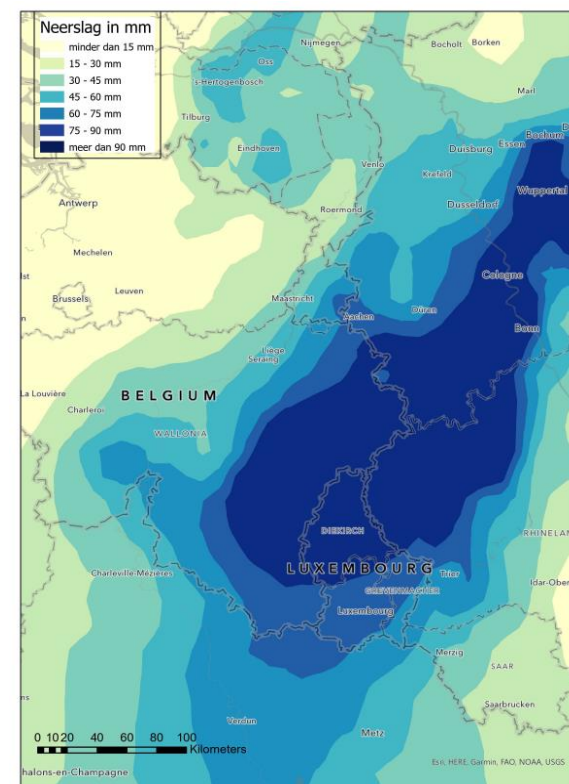
Extraordinary event – at this location



Precipitation 13 juli

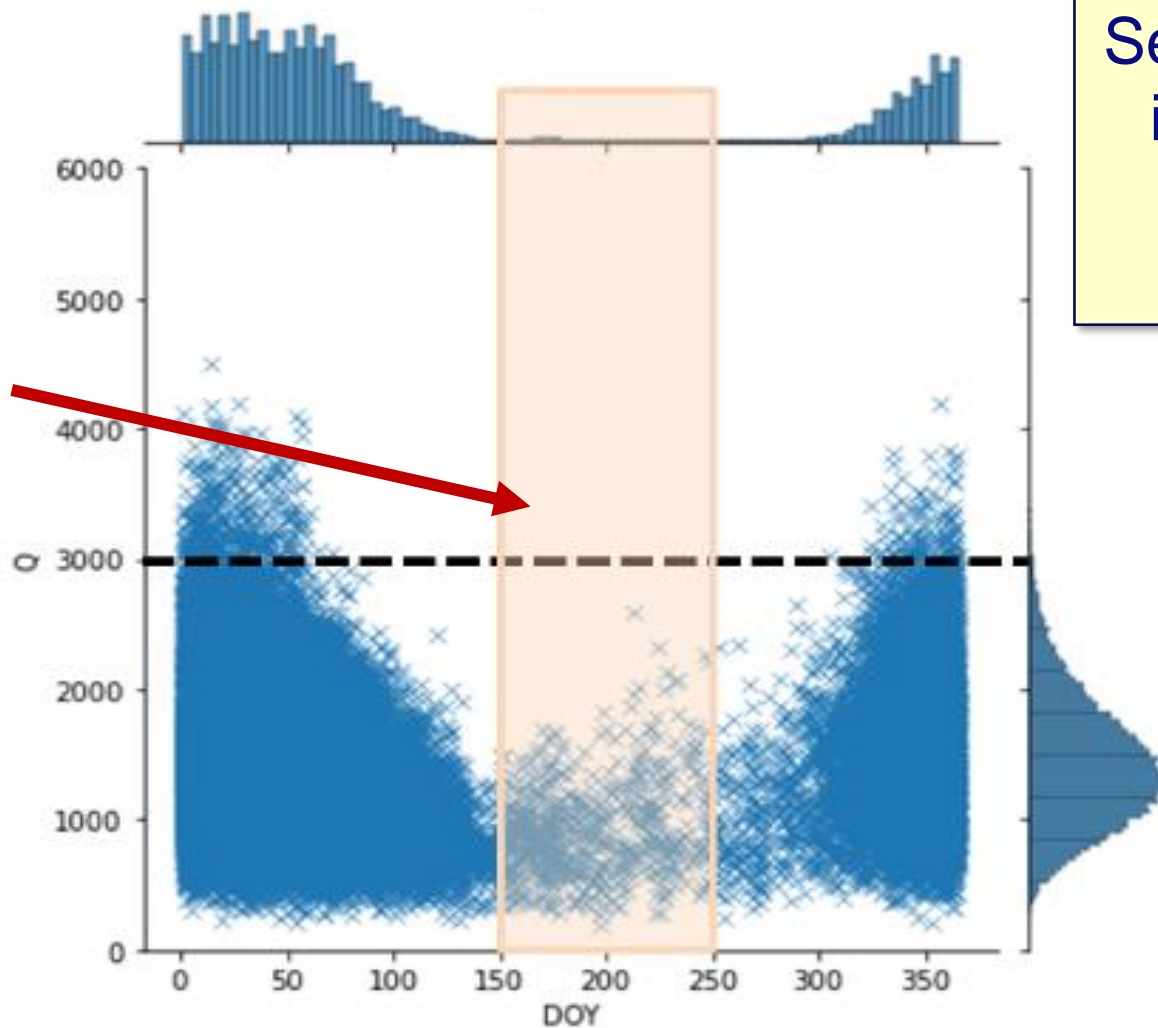


Precipitation 14 juli



Evaluation with GRADE

No
comparable
values in
summer



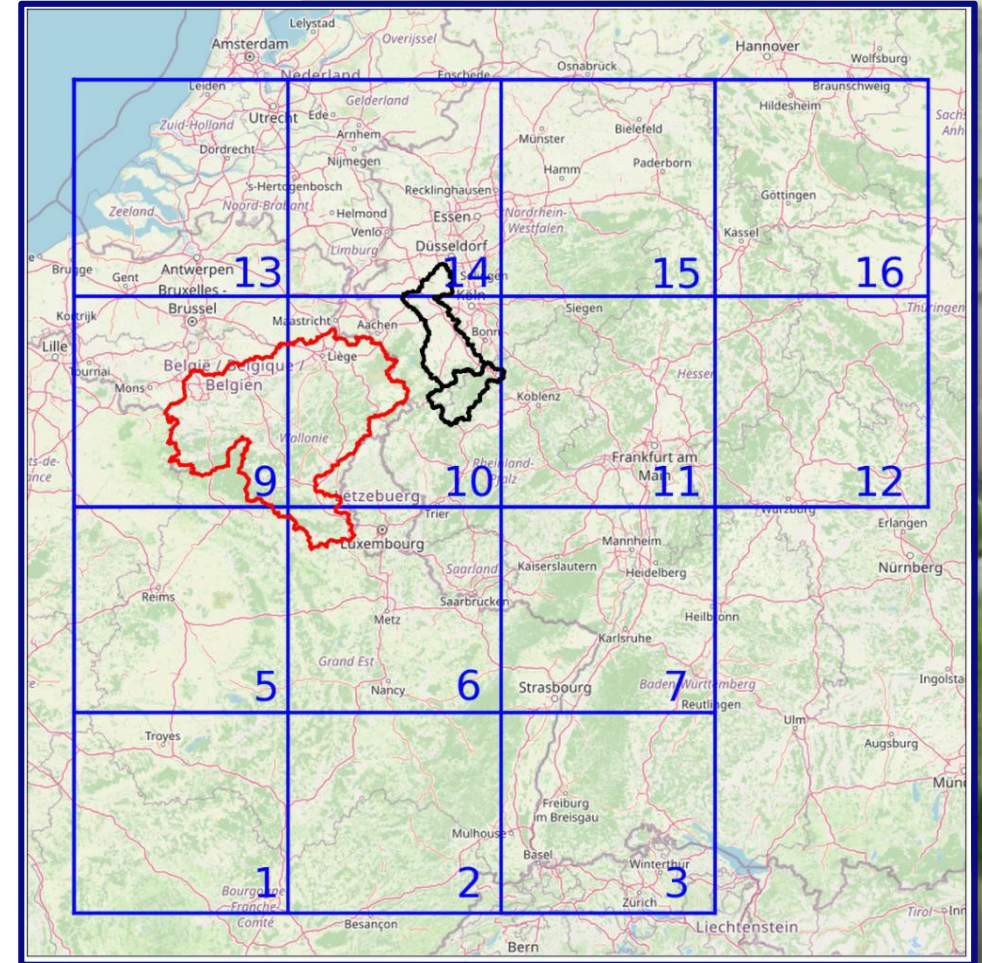
Sensitive to extremes
in the precipitation
database

Deltares



Climate change attribution

- No trend in observed precipitation prior to the July 2021 event
- Averaged over this domain: 24h sum in summer ~1:400 event
- Historical climate change: increased probability with factor 1.2 – 9
- Climate impact on circulation unknown



A satellite image of Europe and the surrounding oceans, overlaid with a blue grid pattern. The grid is denser over the Atlantic Ocean and sparser over landmasses. The title 'The hydrological research agenda' is displayed in a red box in the bottom-left corner.

The hydrological research agenda

The background image shows several young corn plants with green leaves growing out of parched, light-brown soil. The soil is covered in a network of deep, irregular cracks, indicating severe drought conditions. The plants are small and appear to be struggling for water.

The future is becoming unpredictable

Extremes intensify, freak events become normal,
seasons on the run. We need to be prepared

The hydrological research agenda

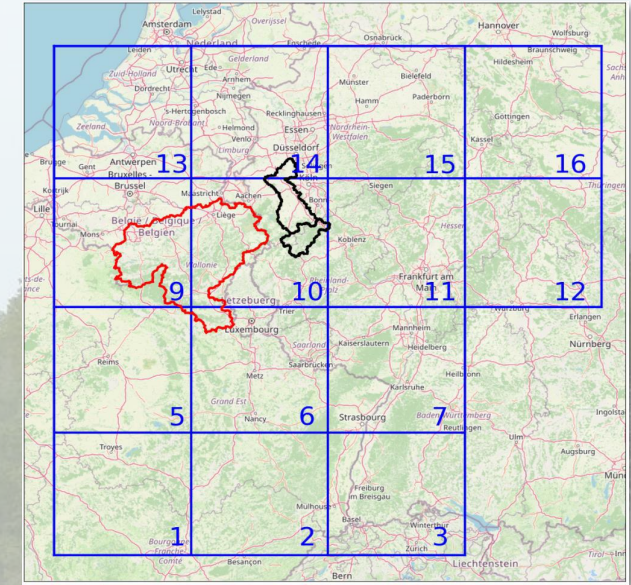
For CHR this has implications

Climate statistics are on the move

- Assessment of likelihood of extremes is increasingly challenging
- Pooling of information may improve signal/noise

Assessment of impacts and solutions increasingly important

- **Digital Twins** could help mapping e.g.
 - Flood early warning
 - Navigation
 - Plastics
 - Water quality and biodiversity
 - Sediment





The future is becoming unpredictable

Extremes intensify, freak events become normal,
seasons on the run. We need to be prepared

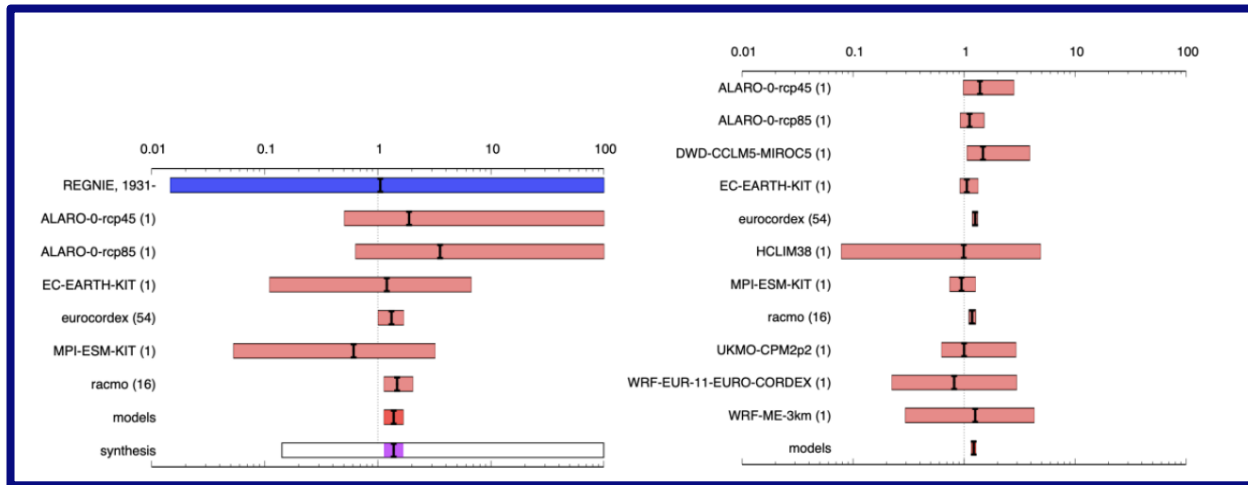
Weather and climate are strongly connected

Setting events central in the analysis

The hydrological research agenda

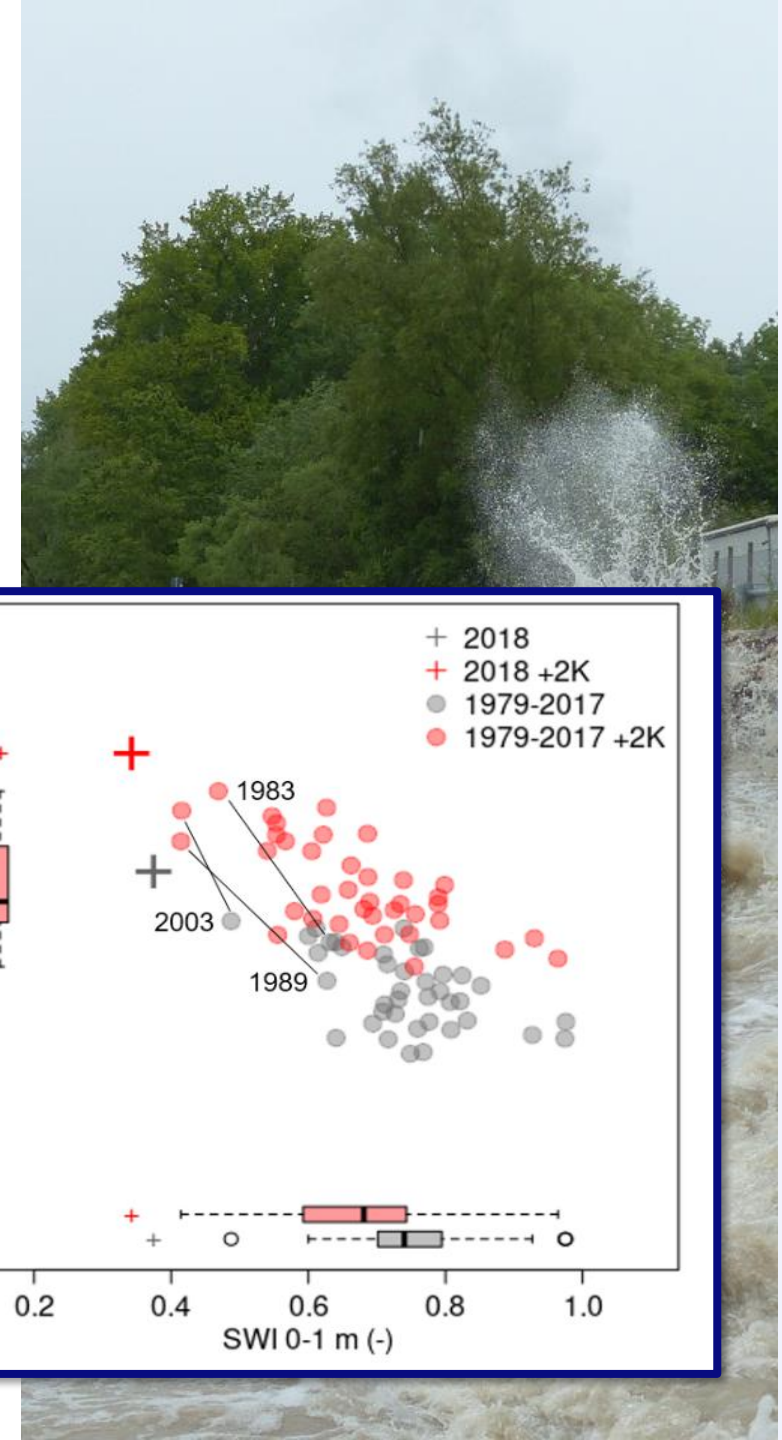
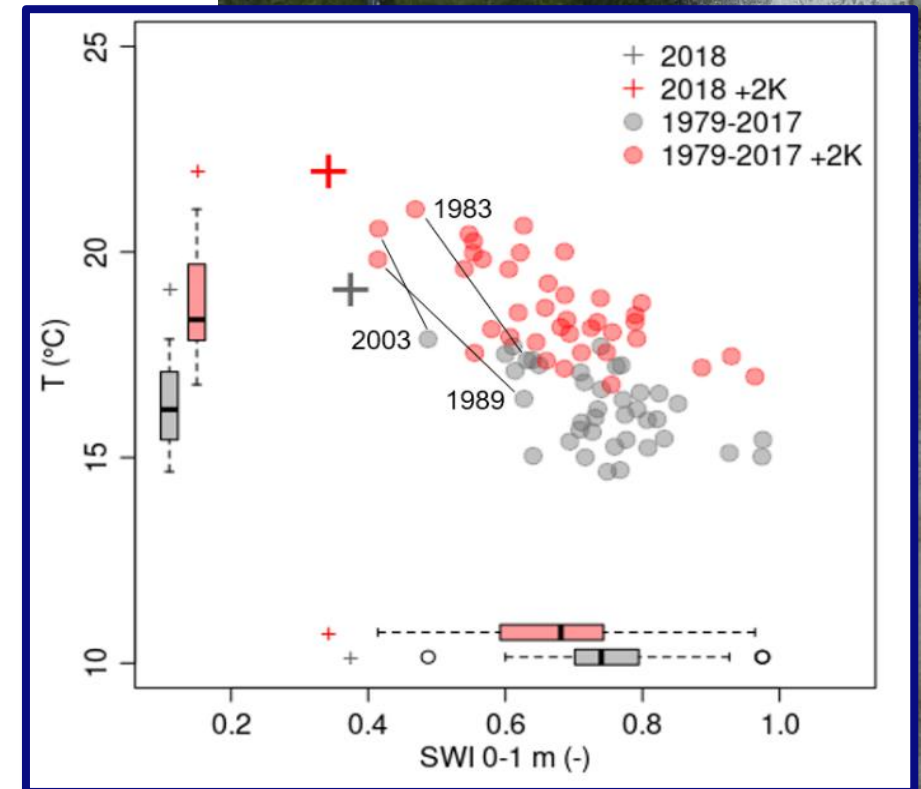
Connect weather and climate

- Attribution of extreme events



- Future climate analogues of past extreme events

Deltares





The future is becoming unpredictable

Extremes intensify, freak events become normal,
seasons on the run. We need to be prepared

Weather and climate are strongly connected

Setting events central in the analysis

We need to

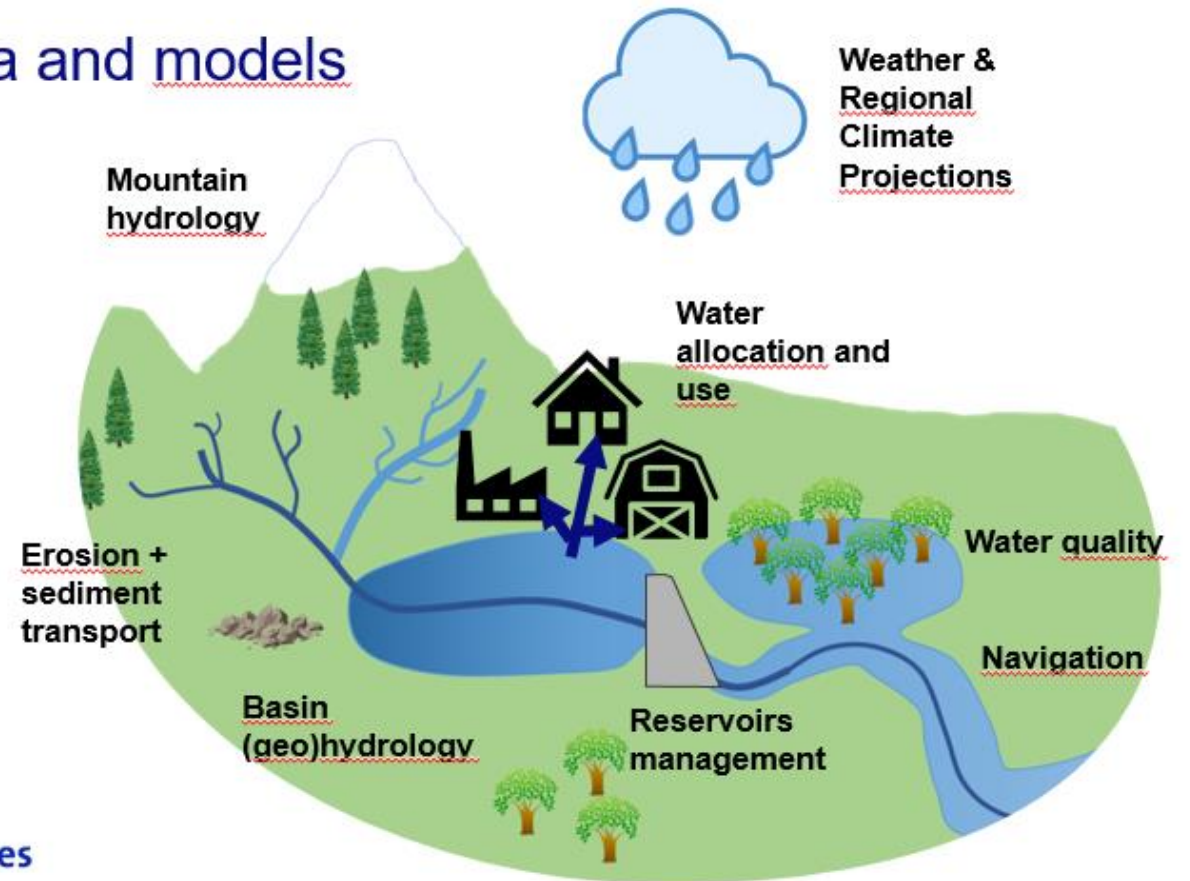
Integrate the multiple drivers, impacts and options of
the river system

The hydrological research agenda

Shared Water Information System

- Integrated modelling
- Sharing data and knowledge
- Framework for continuous model development
- Shared and maintained by the countries in the basin

Data and models



More information

- 7 take-aways Deltares:
<https://www.deltares.nl/en/news/seven-take-aways-from-the-ipcc-wg-i-report-on-global-climate-change/>
- Regional Factsheets:
<https://www.ipcc.ch/report/ar6/wg1/#Regional>
- Interactive Atlas:
<https://interactive-atlas.ipcc.ch/>
- Bart.vandenHurk@deltares.nl

