Can we forecast the climate of the next decade?

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Key messages

- To generate the most accurate forecasts of climate for the next 5 to 20 years we need to take into account both the overall warming trend, and natural fluctuations.
- The latest science shows that some natural variations in climate may be predictable by including observations of the ocean state.

Economic and social benefits

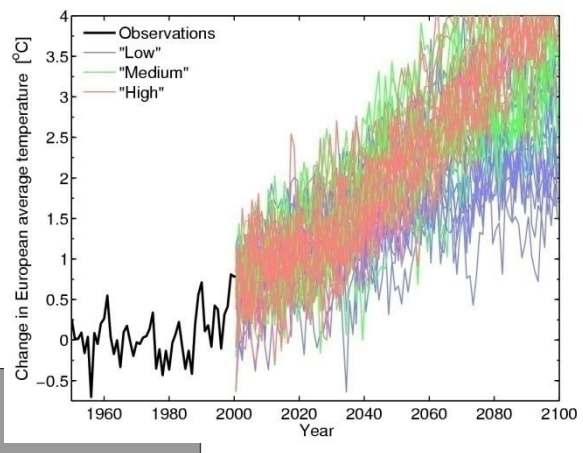
Imagine the applications of skilful forecasts of climate for next 5 to 20 years:

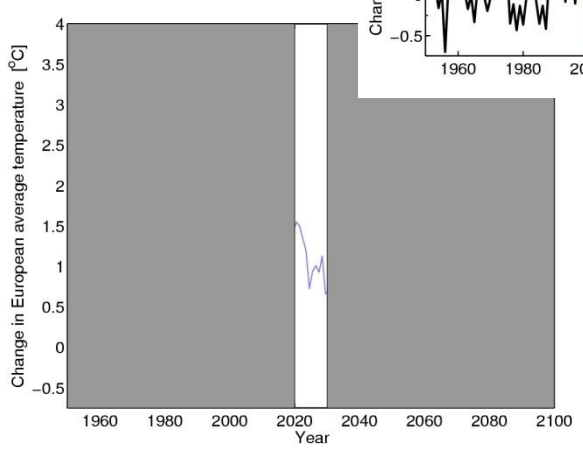
- water companies need to decide how many new reservoirs to build
- train companies need to decide whether to replace track to avoid rail buckling in hot weather
- farmers might plant different crop types to maintain production
- insurance sector would gain valuable information about weather and climate risks

Climate varies from year to year

The climate we experience is a combination of the long term warming trend due to increasing greenhouse gases, plus natural year to year variations.

Predictions of European temperature (right) show a range of possible futures which all show long term warming with year to year variability.

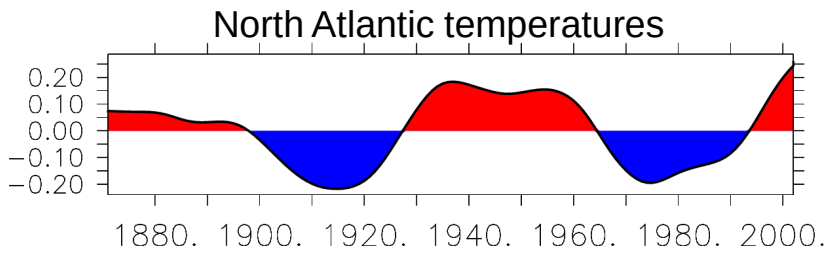




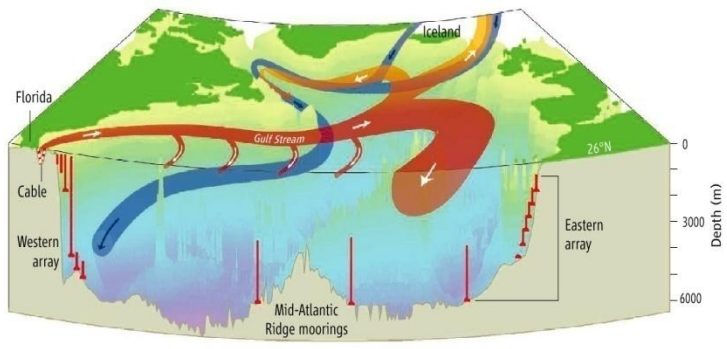
The possible futures above can show periods of cooling superimposed on the long term warming trend. One example is picked out (left) and shows a period of cooling during the 2030s.

Some natural climate variations may be predictable

The temperature of the sea surface in the North Atlantic over the last 130 yrs has varied slowly between warm and cold phases – causing changes in climate over the U.S., Europe and Africa.



These natural swings between warm and cold are linked to a huge overturning circulation known as the thermohaline circulation or Atlantic conveyor belt.



The Atlantic thermohaline circulation (THC)

Warmer/colder periods in the North Atlantic are linked to fluctuations in the Atlantic thermohaline circulation (THC).

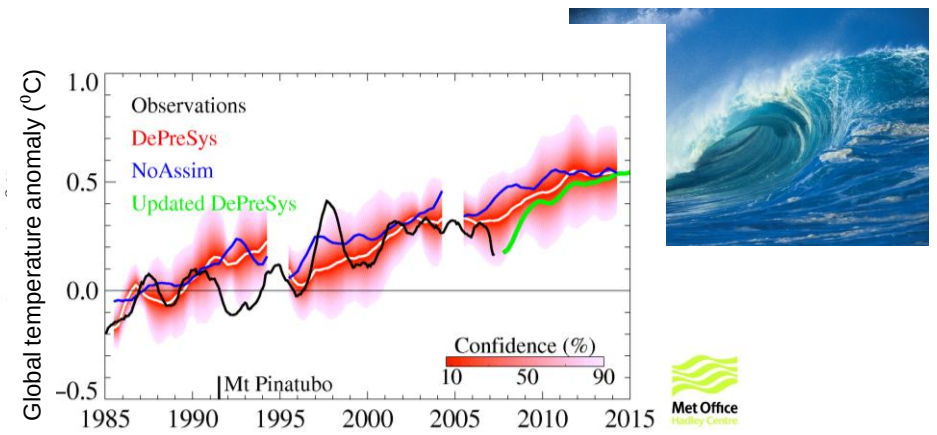
The UK has invested in extensive monitoring of the Atlantic THC.

Such natural variations exist in other ocean basins.

Decadal climate forecasts

We are working with the Met Office to improve decadal prediction capabilities.

Observations of the ocean and other aspects of climate (such as the land surface), coupled with better understanding of the processes involved, hold the key to improved decadal forecasts.



This is a forecast of global temperature out to 2015 produced by the UK Met Office, with whom we collaborate closely. The red band and green line incorporate observations of the ocean state, while the blue line does not. Retrospective test forecasts show that including observed data increases skill.

Find out more…..
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