Improving predictions of extreme events

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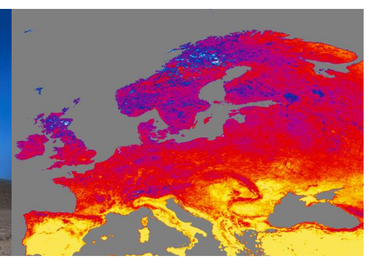
Key messages

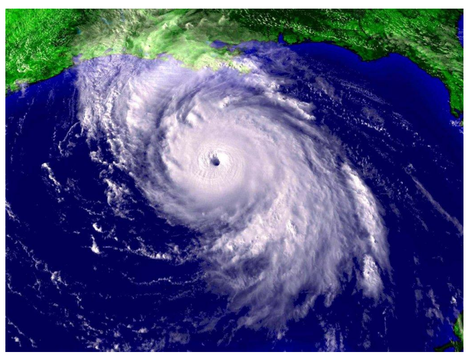
- Some of the most significant impacts of climate are felt through extreme events like droughts, floods and storms.
- Such extreme events remain a challenge for climate models to predict.
- Through improved understanding of the processes that cause them, we can improve prediction of extreme events.





Hurricanes

At the Walker Institute we are developing new global climate models, with a resolution similar to that of operational weather forecasting models.



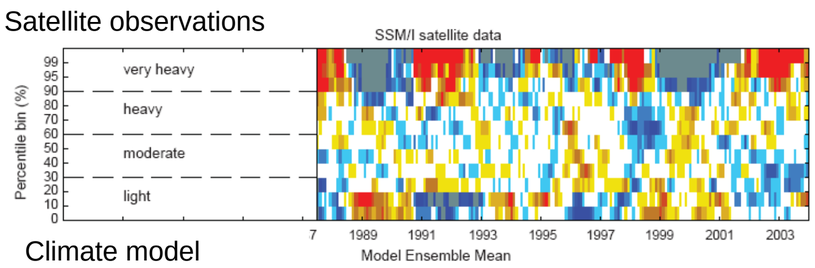
These new “weather-resolving” climate models can simulate tropical cyclones more realistically, including the more violent and damaging storms. We are working with Willis Reinsurance to use these models to assess weather and climate related risk.

Rainfall extremes

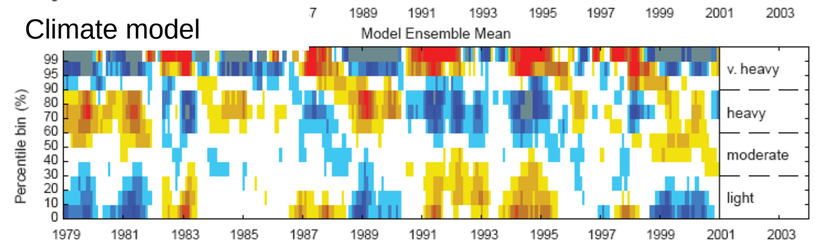
Satellite observations confirm the link between a warmer climate and more intense rainfall. Climate models reproduce this increase, but appear to underestimate the response compared with satellite observations.

Climate models may be underestimating responses of precipitation and its intensity to warming, although we need to establish the reliability of the satellite datasets.

Satellite observations



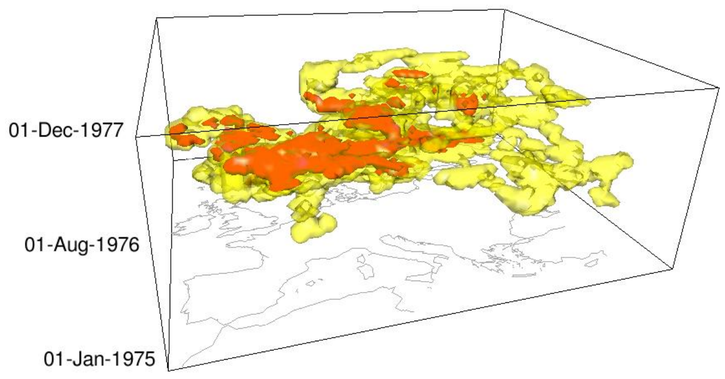
Climate model



Rainfall is more intense (red areas) during warm El Niño years, like 1998. Climate models reproduce this, but give a weaker response to warming.

Drought

Drought accounts for 75% of all European natural catastrophe losses (EC, 2007; SwissRe, 2008). Modern water supply infrastructure has reduced direct mortalities yet the societal impacts of water scarcity remain.



Space-time evolution of the 1975-77 European drought. Yellow/red indicates severe/extreme drought.

The main core of the 1975-77 European drought was centred over mid-western Europe around the summer of 1976, with links from the main drought to earlier events in the south and later events over Scandinavia.

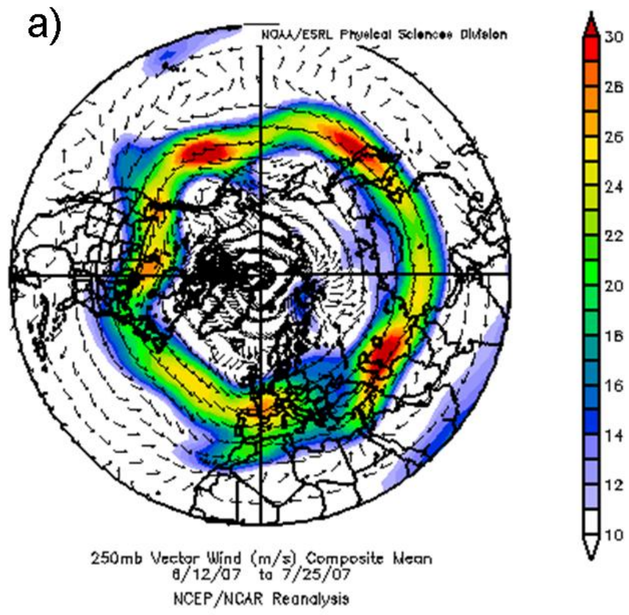
A better understanding of the space-time structure of drought will lead to improved methods for diagnosing and validating drought within our climate models.

Extreme seasons

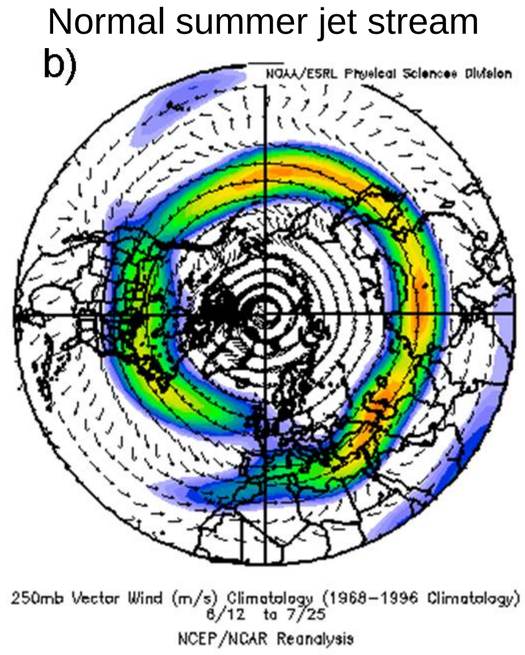
In recent years Northern Europe has experienced several extreme seasons, such as the heat wave of 2003 and the UK summer flooding of 2007. These seasons are often the result of unusual but persistent atmospheric flow patterns on very large scales.

During the summer of 2007 the high level jet stream over the Atlantic was displaced south of its usual position and the storms which normally pass north of Scotland were instead directed straight at Southern England.

Jet stream - summer 2007



Normal summer jet stream



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