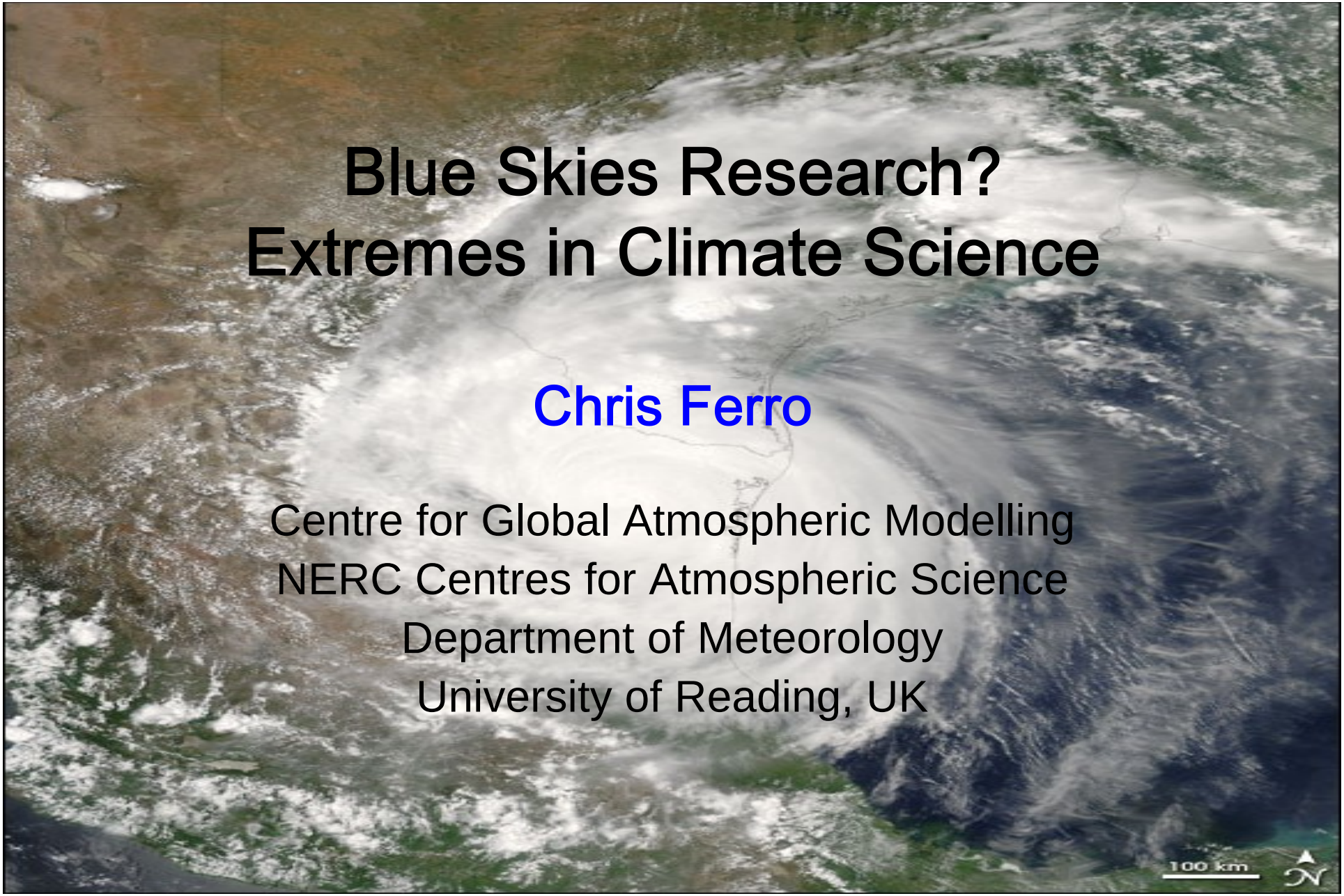

Blue Skies Research?
Extremes in Climate Science

Chris Ferro

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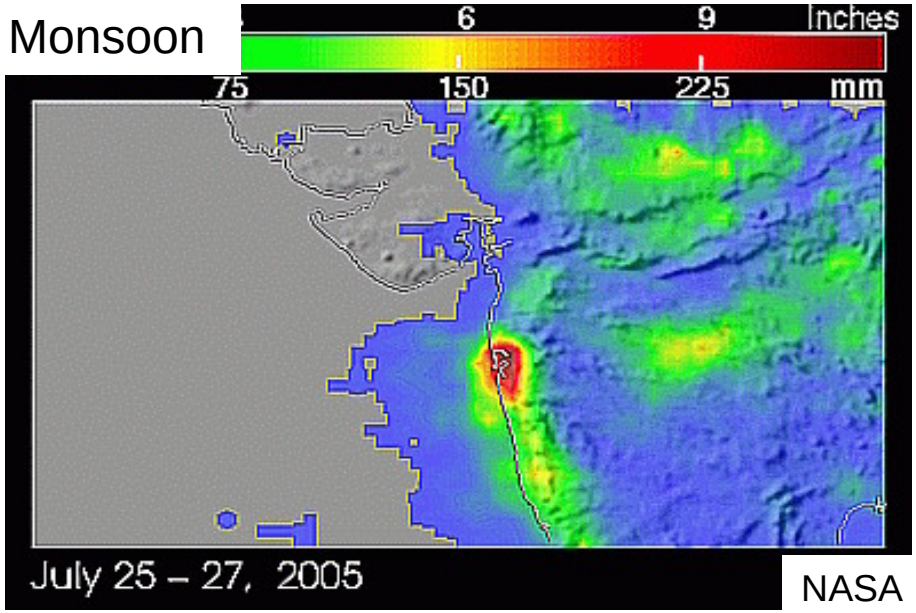
Drought

BBC

Monsoon

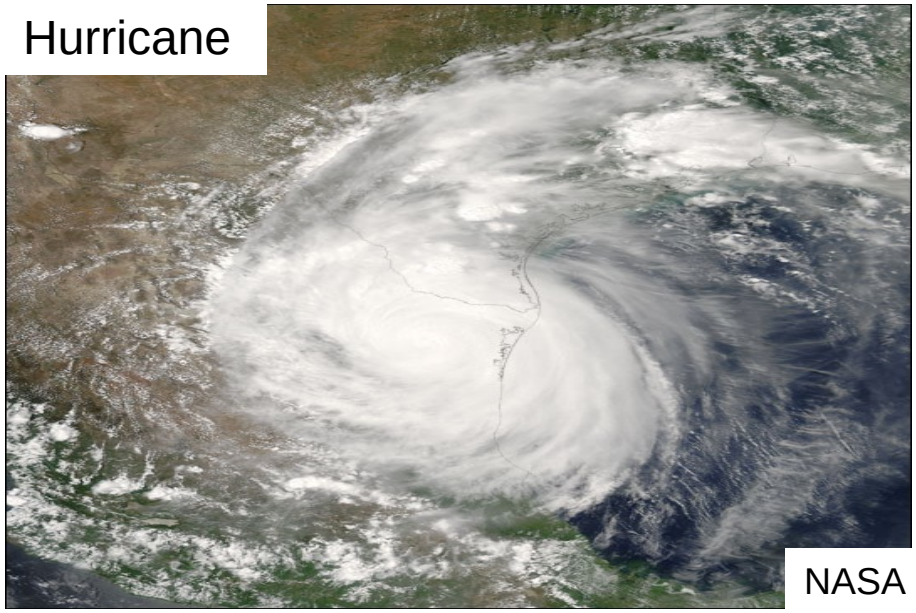


NASA

Tornado

BBC

Hurricane



NASA

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General Issues

Dependent on many space and time scales

Nonstationary on many space and time scales

Large but limited datasets from many sources

Computer models provide experimental tools

Some Research Aims

Describe risks of extreme events and their changes

Understand processes related to extreme events

Simulate extreme events in computer models

Predict risks of future extreme events

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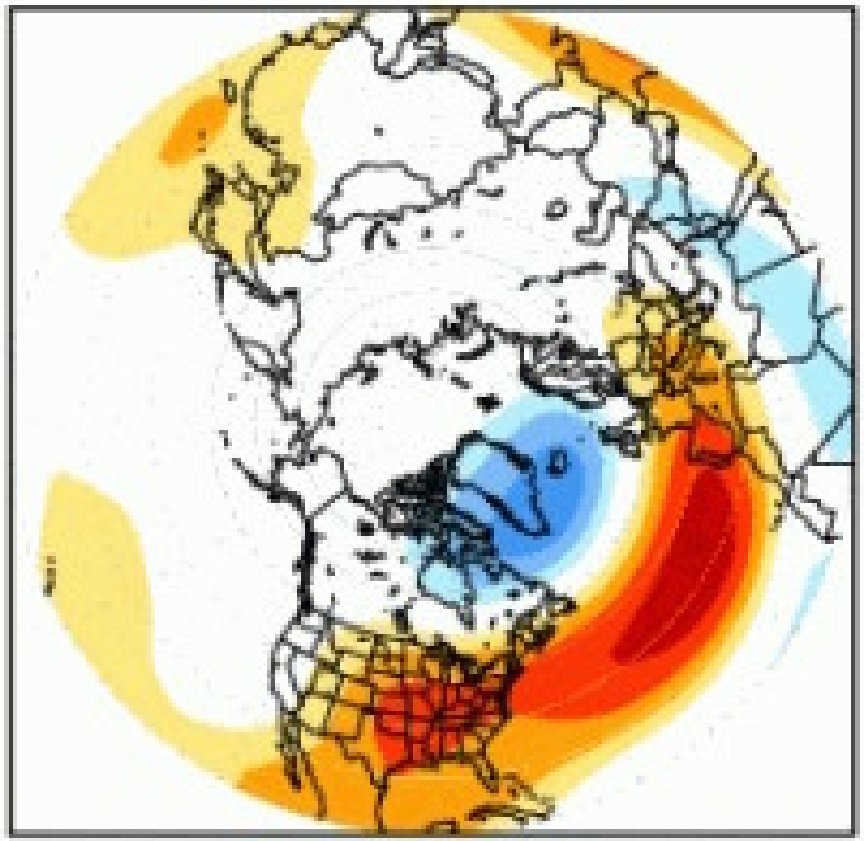
Description

Frequency, magnitude, location, timing, space-time evolution and extent

Robust estimation, model diagnostics

Exploit spatial dependence

Explore high-dimensional dependence



North Atlantic Oscillation Pattern (NOAA)

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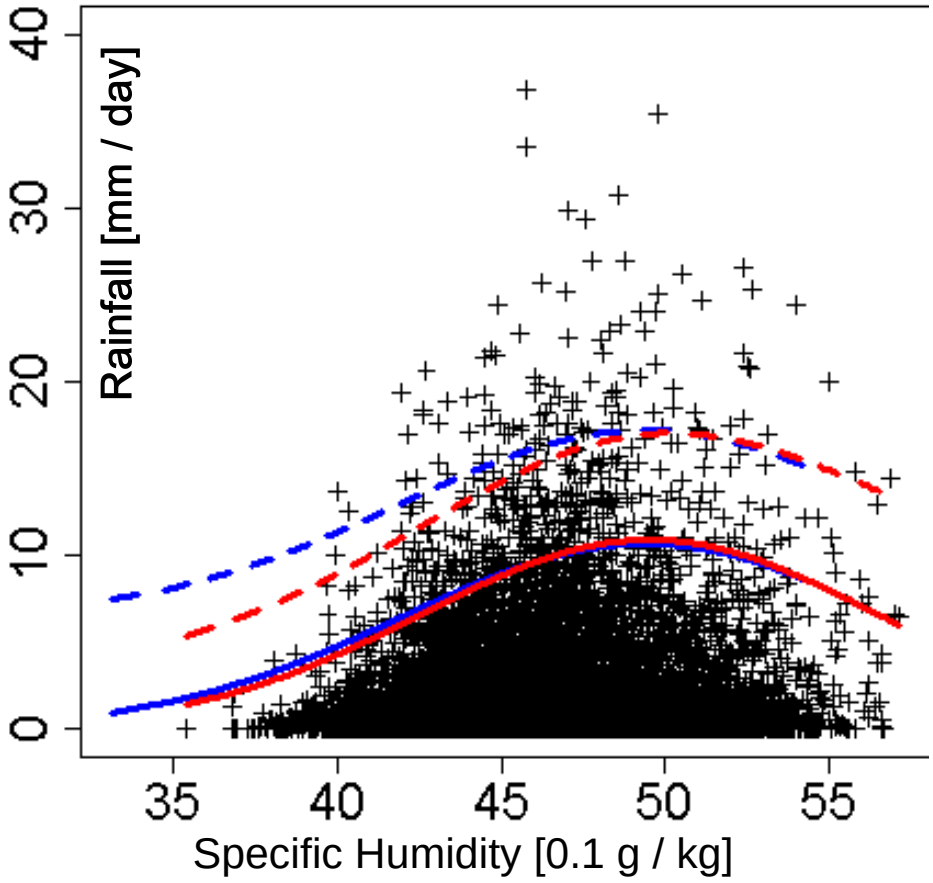
Understanding

Small- and large-scale processes governing short- and long-term changes

Improve predictability and climate models

Derive extremes from well-simulated processes

Statistical modelling tests theories and constraints



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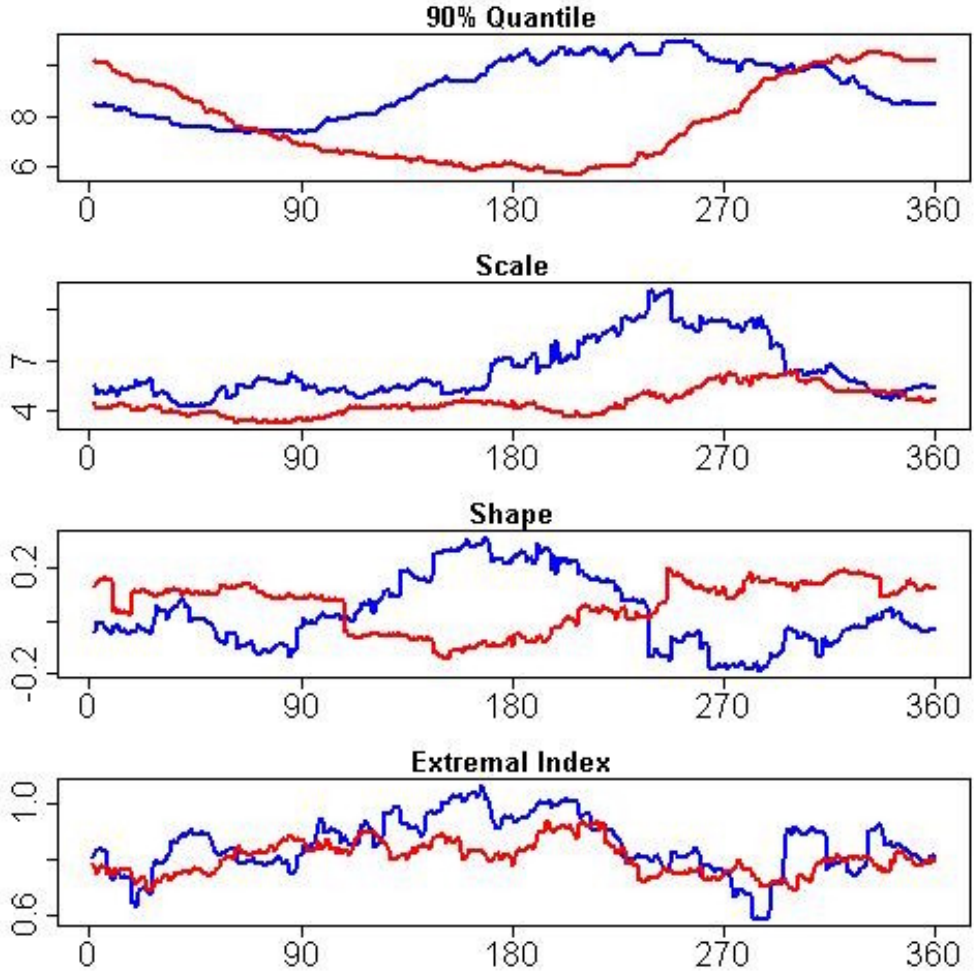
Simulation

Compare simulated and observed extremes

Downscale simulations

Effects of model resolution

Model differences



Extremal properties of observed and simulated daily rainfall through year

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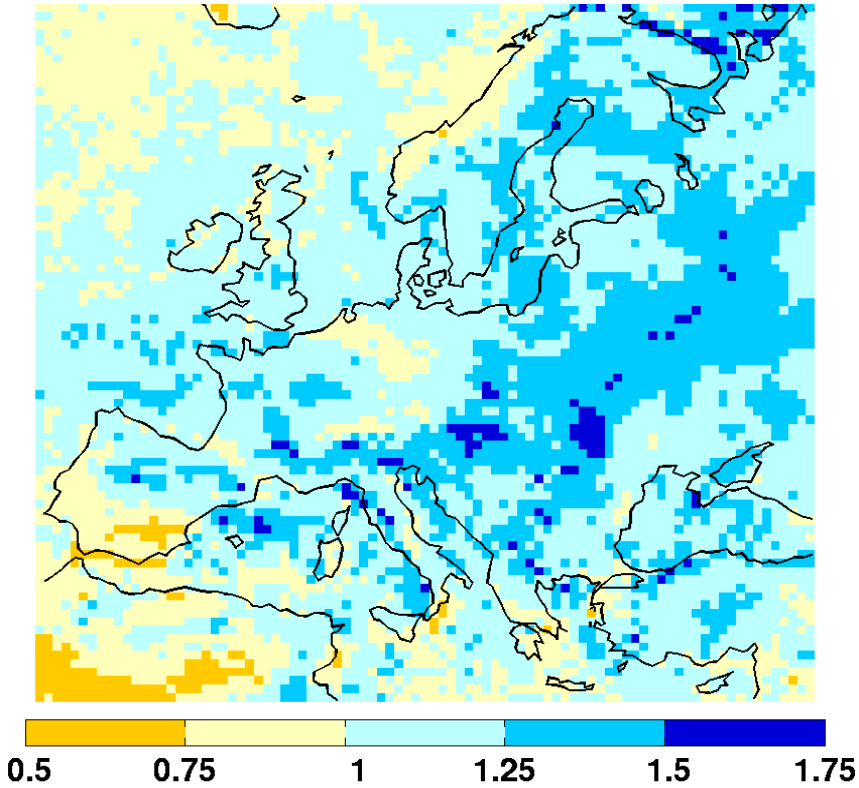
Prediction

Global and regional effects of climate change

Attribute changes to causes

Combine information from multi-model ensembles

Verify predictions



Proportional increases in 10-winter return levels of daily rainfall from 1960 to 2070 assuming A2 emissions scenario

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Concluding Remarks

Important and challenging field

Growing demand for statistical methods

Need for new methods, software and collaboration

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