Emerging research findings:
Extreme events

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UNFCCC-SBSTA meeting Bonn
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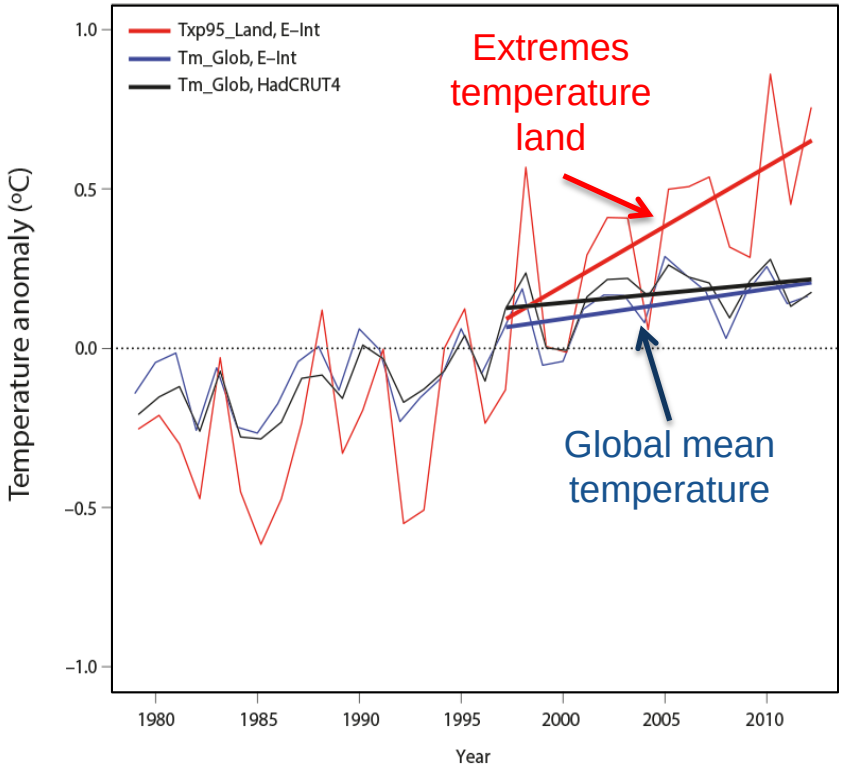
Climate extremes: patterns and attribution

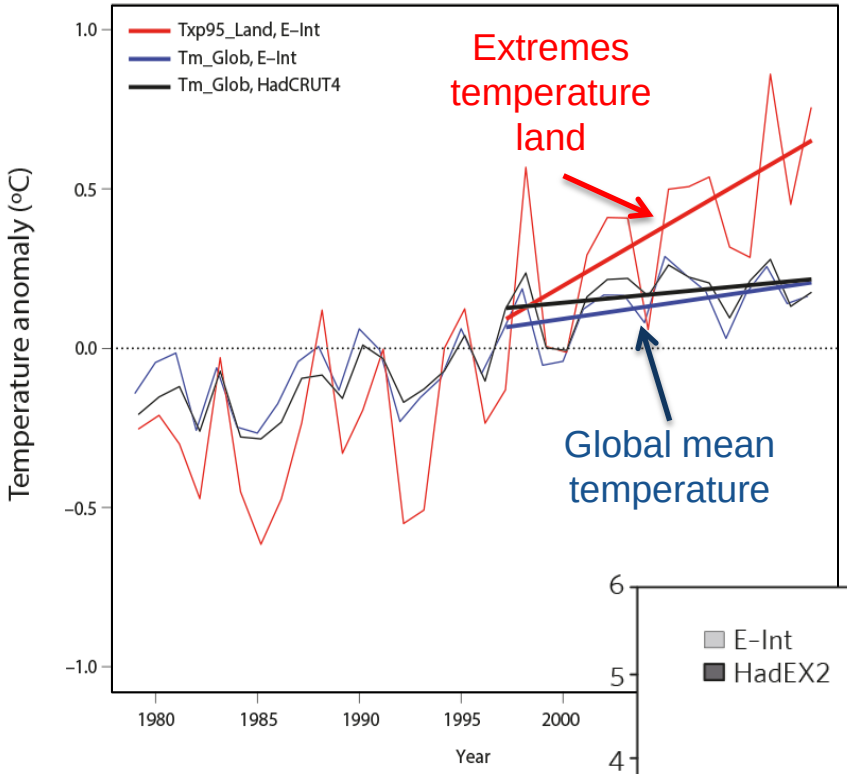
Maximum temperatures continue to rise



Maximum land temperatures increase

Seneviratne *et al.* 2014 *Nature*

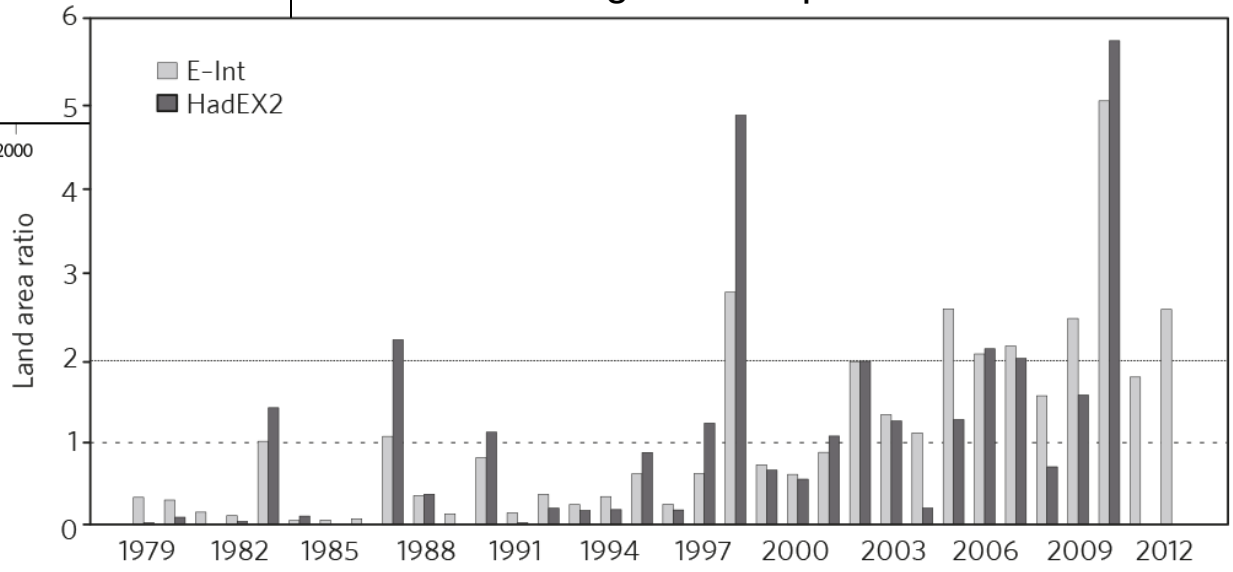
Maximum temperatures continue to rise



Maximum land temperatures increase

Land area

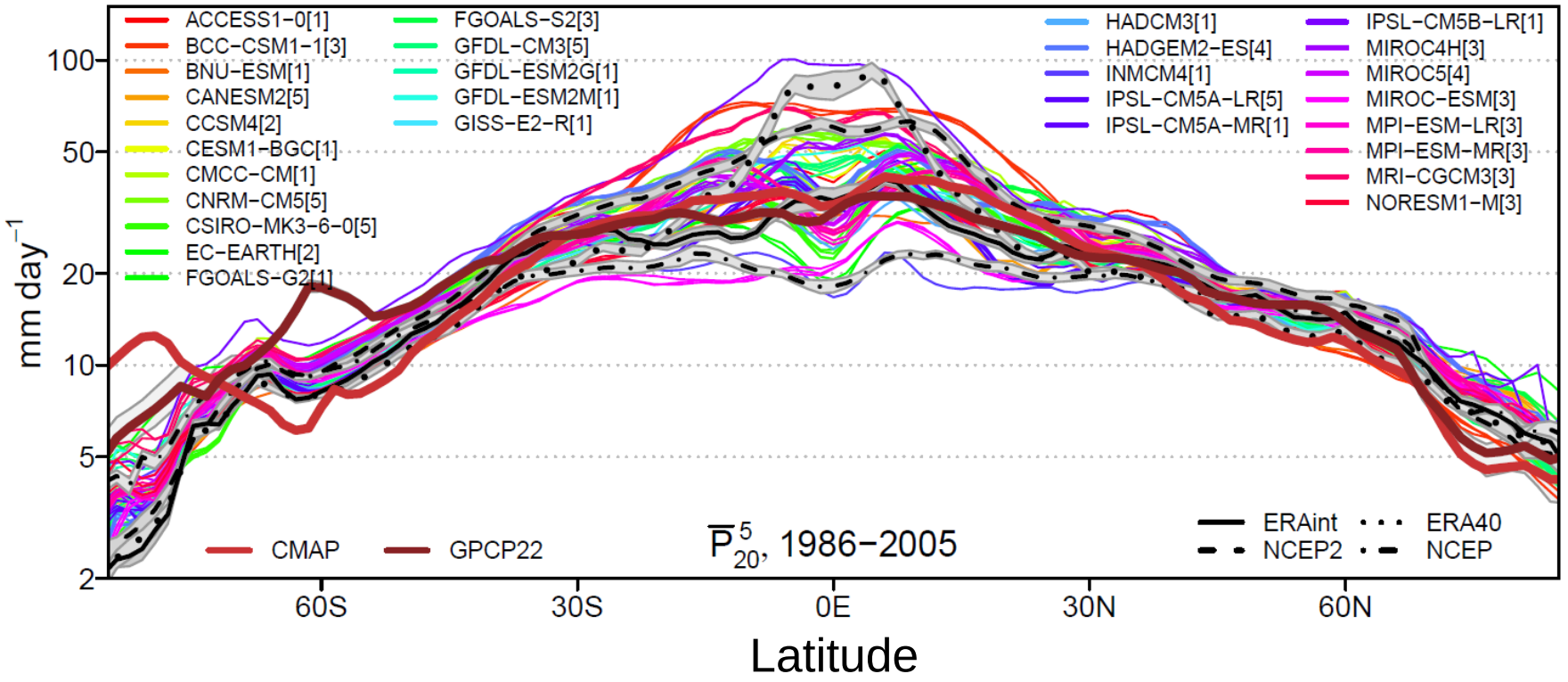
>30 extreme warm days : average global temperature



Seneviratne *et al.* 2014 *Nature*

5-day precipitation events

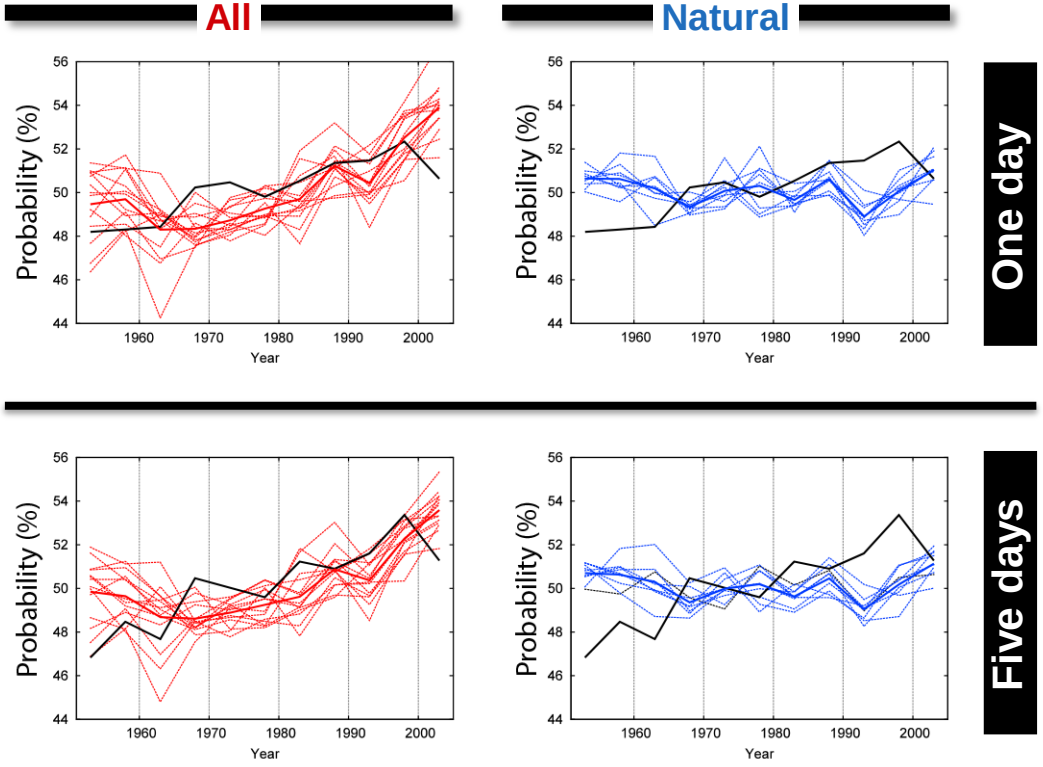
zonal means, 20-yr



- Model precipitation compares better with reanalyses at mid-latitudes (CMIP5)
- Question of whether models reproduce precipitation correctly on resolved scales remains open

Kharin *et al.* 2013 *Climatic Change*

Attributing intensification of precipitation extremes to human influence



Northern Hemisphere land

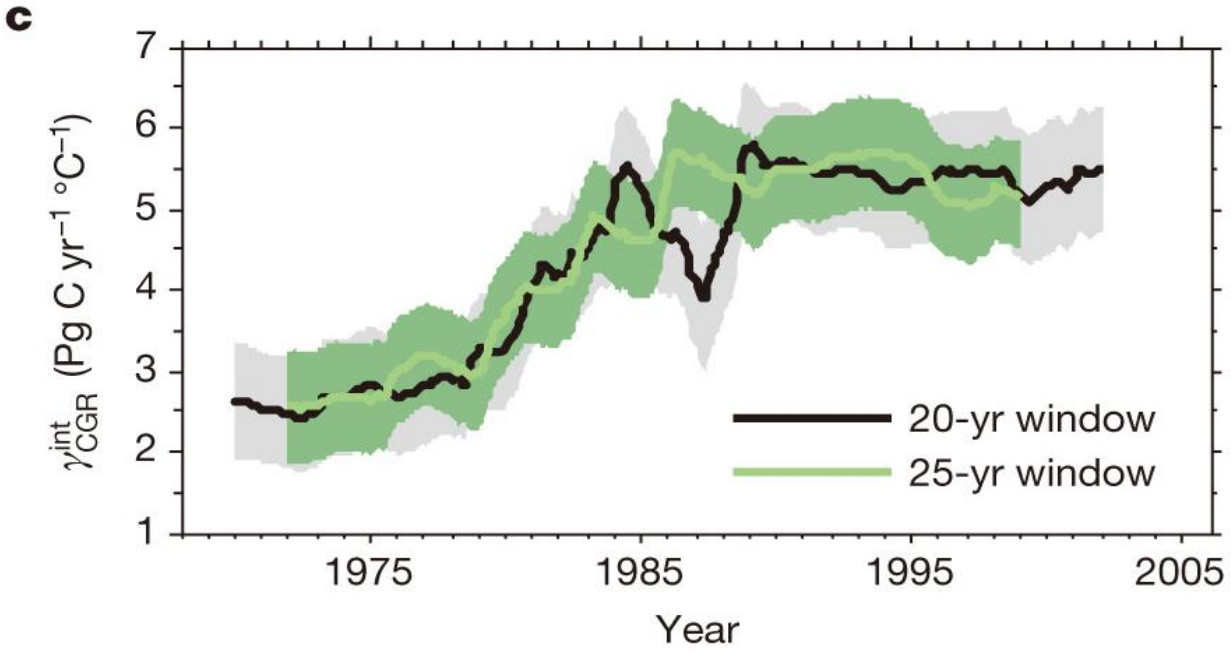
Human influence increases
Effect in many world regions

Zhang *et al.* 2013 *Geophysical Research Letters*

What effect do climate extremes have on C cycle?

2X increase in C cycle sensitivity to tropical temperature variation

Pg C yr^{-1} $^{o}C^{-1}$



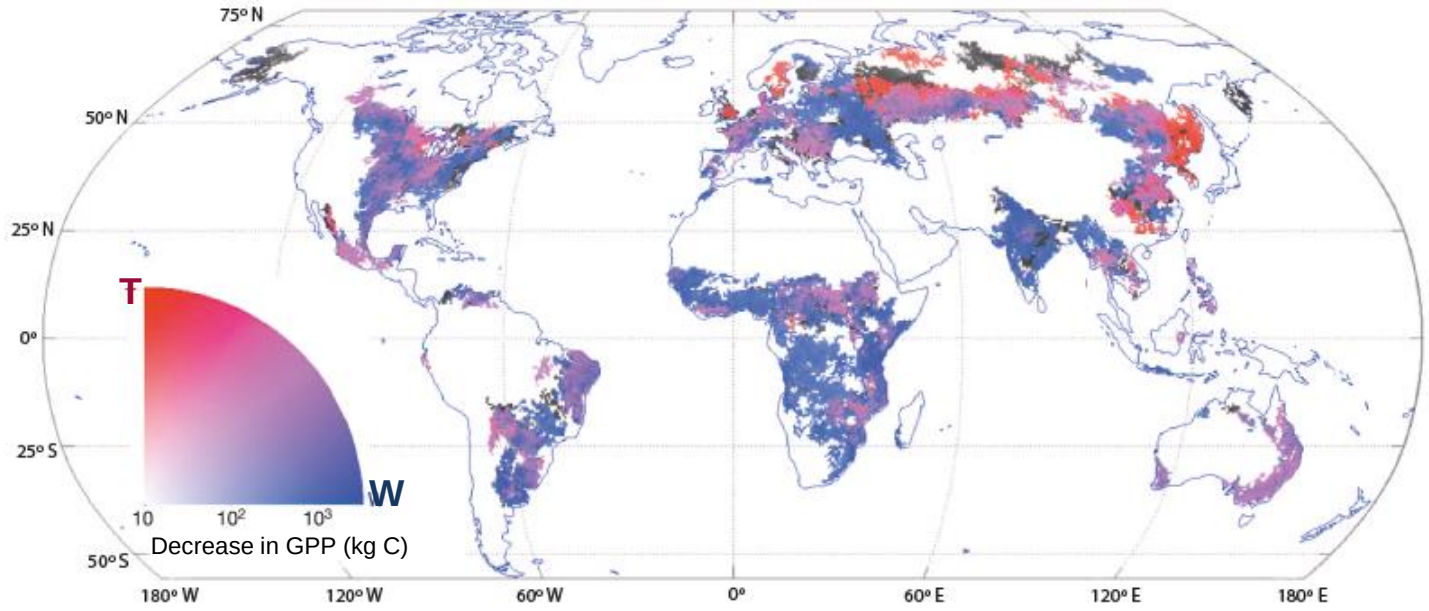
Droughts (soil moisture) suggested

Wang *et al. Nature* 2014

Decreasing land C sink with climate extremes

gross primary production (GPP)

3 Pg C/yr less GPP = approx. net land C uptake/yr



Droughts most important
Implies positive feedback

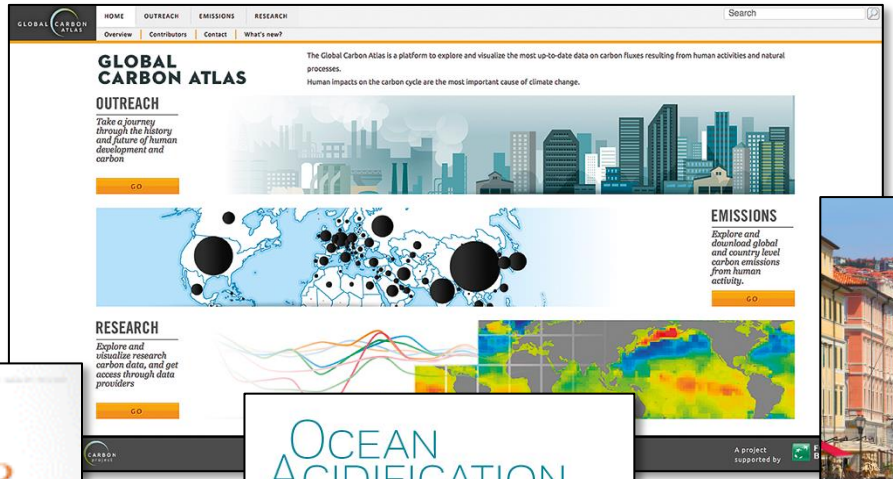
Reichstein *et al. Nature* 2013; Zscheischler *et al. Nature* 2014

Main points - Extreme events

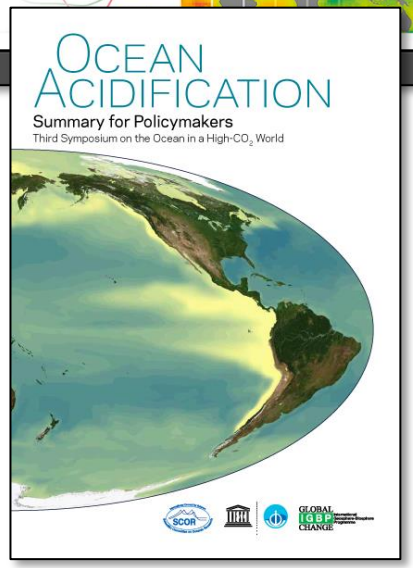
- Maximum land temperatures and area affected continue to increase
- Anthropogenic attribution of intense precipitation
- Land C sink decreasing - tropics

Publications, outreach and education

www.globalcarbonatlas.org



New Open Access Science Journal



http://ocean-acidification.net

Science Underpinning the Prediction and Attribution of Extreme Events: a WCRP Grand Challenge and a Summer School (Trieste, July 21 – August 4, 2014)