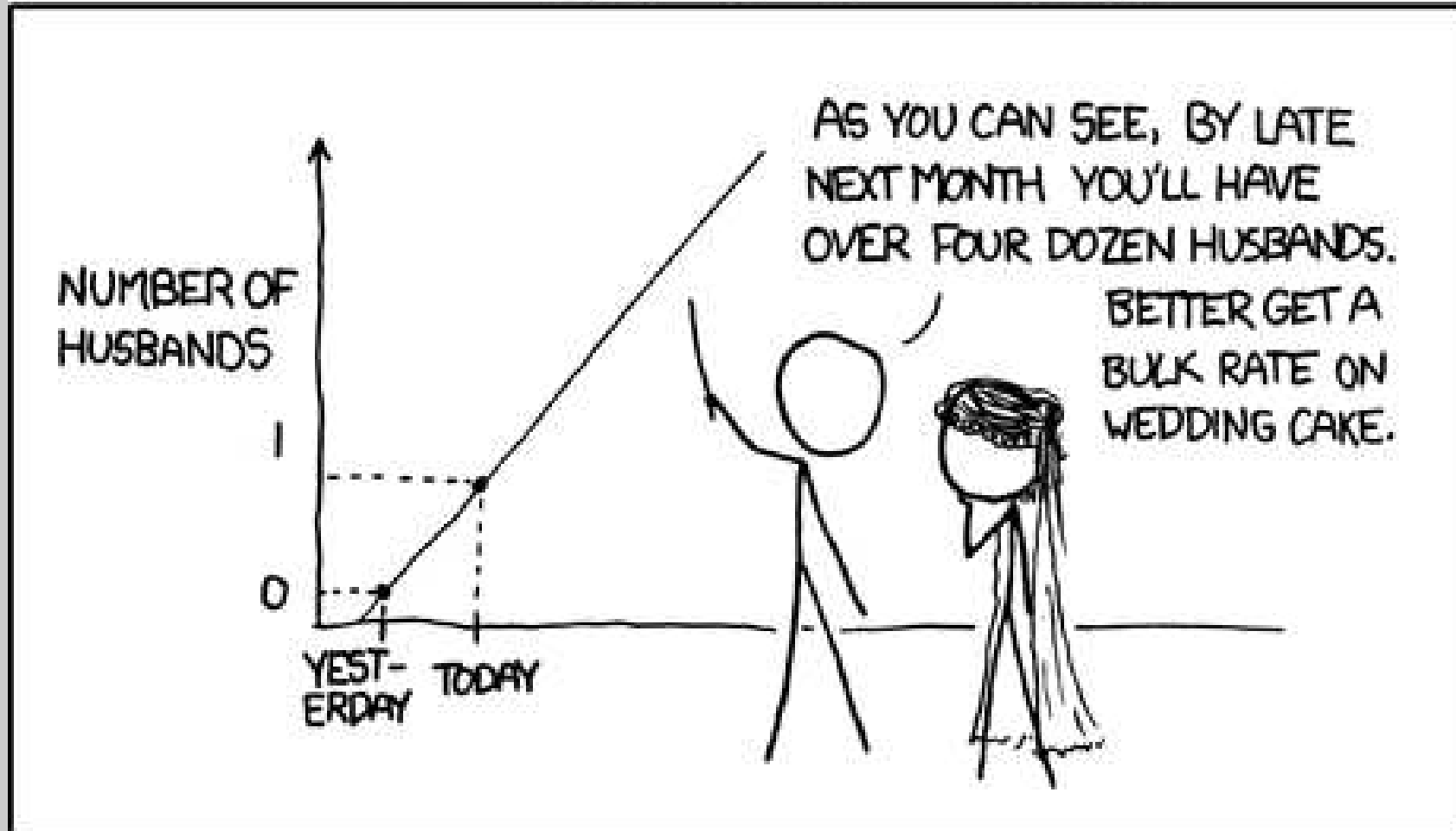


MY HOBBY: EXTRAPOLATING



Courtesy xkcd.com

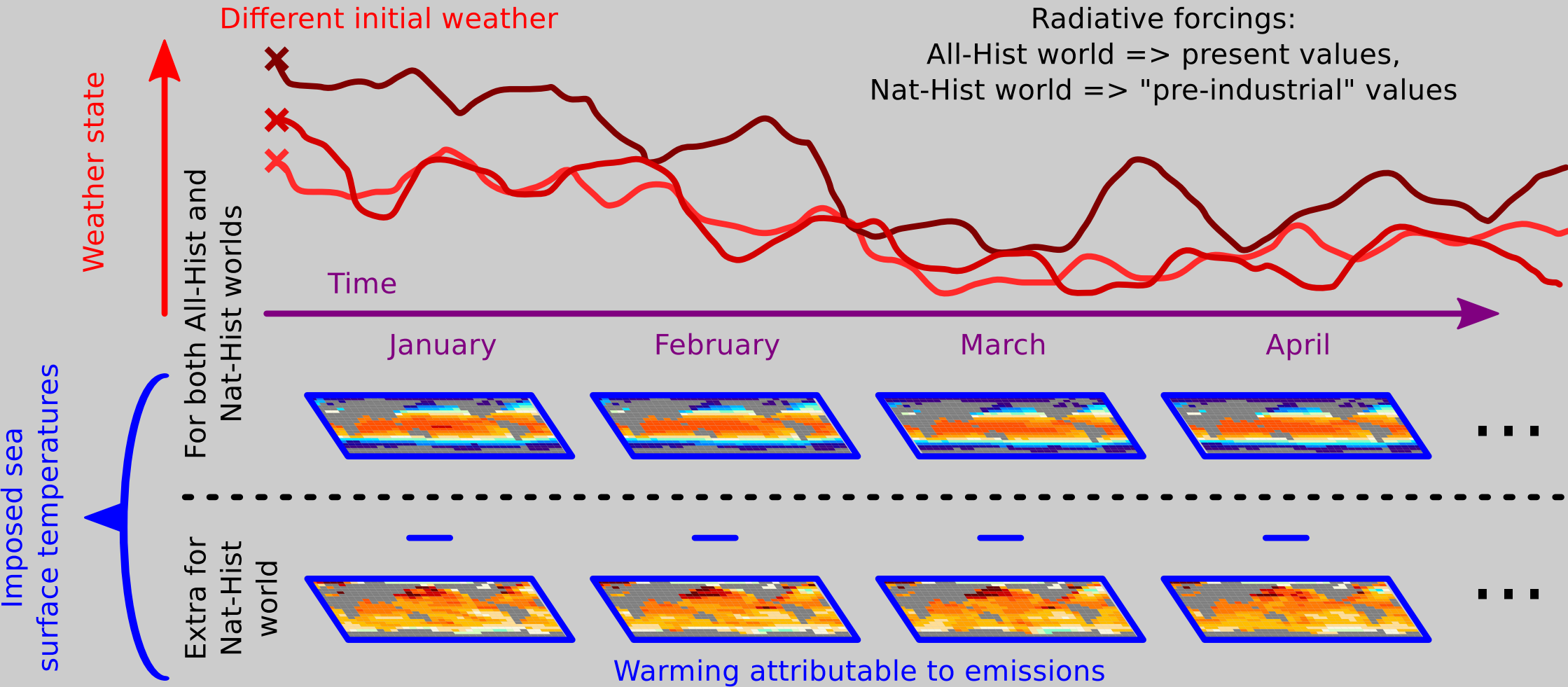
Understanding spatial dependence of event attribution estimates

Oliver Angéllil (molofishy@gmail.com), Dáithí Stone (dstone@lbl.gov),

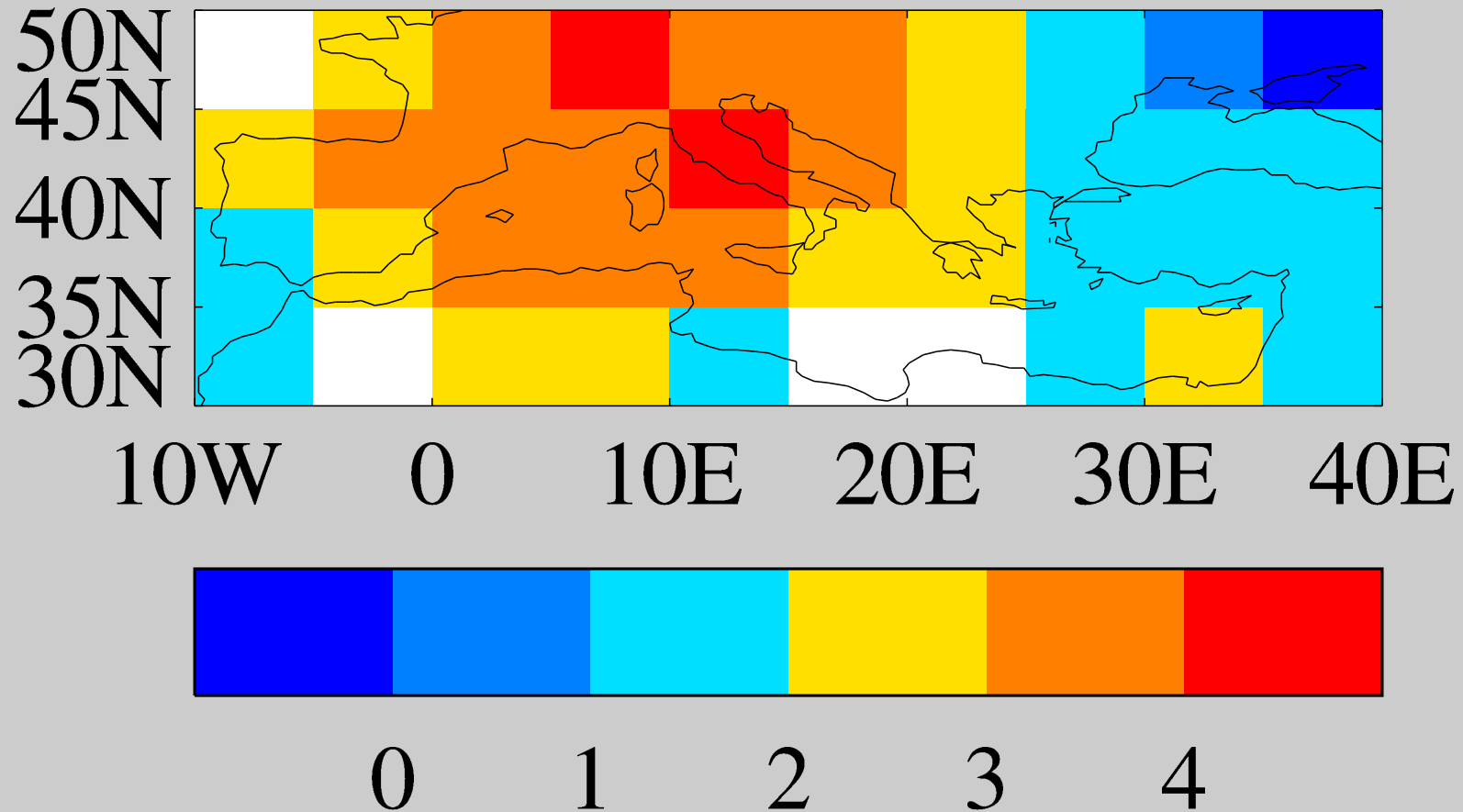
Pardeep Pall

Lawrence Berkeley National Laboratory, University of Cape Town, ETH Zurich

The "Pall Method"



Long, long ago in a continent far, far away...



- Was the selection of region important?
- Was the selection of JJA season important?

Helen Hanlon's analysis

- Examined the importance of various feedbacks and other factors in the European Summer 2003, including spatial and temporal scale.

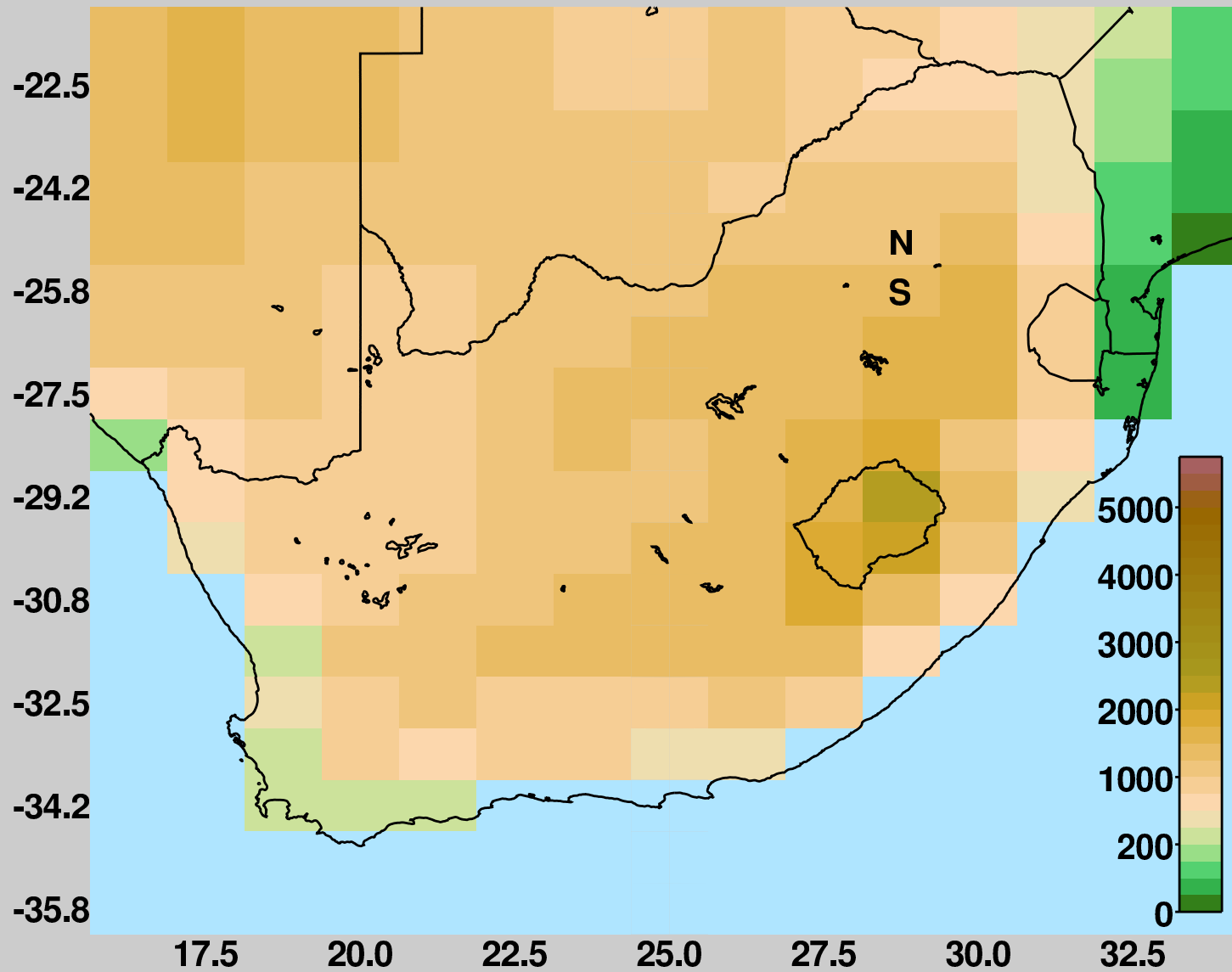
- Concluded:

“The results support the theory that a feedback between soil moisture and temperature acted to amplify the already excessive temperatures in Summer 2003. Also, the relationship between the variables involved in this feedback are sensitive to certain land-surface properties, which implies that if the same factors that caused the 2003 event occurred in a different location a rather different event could have been realised.”

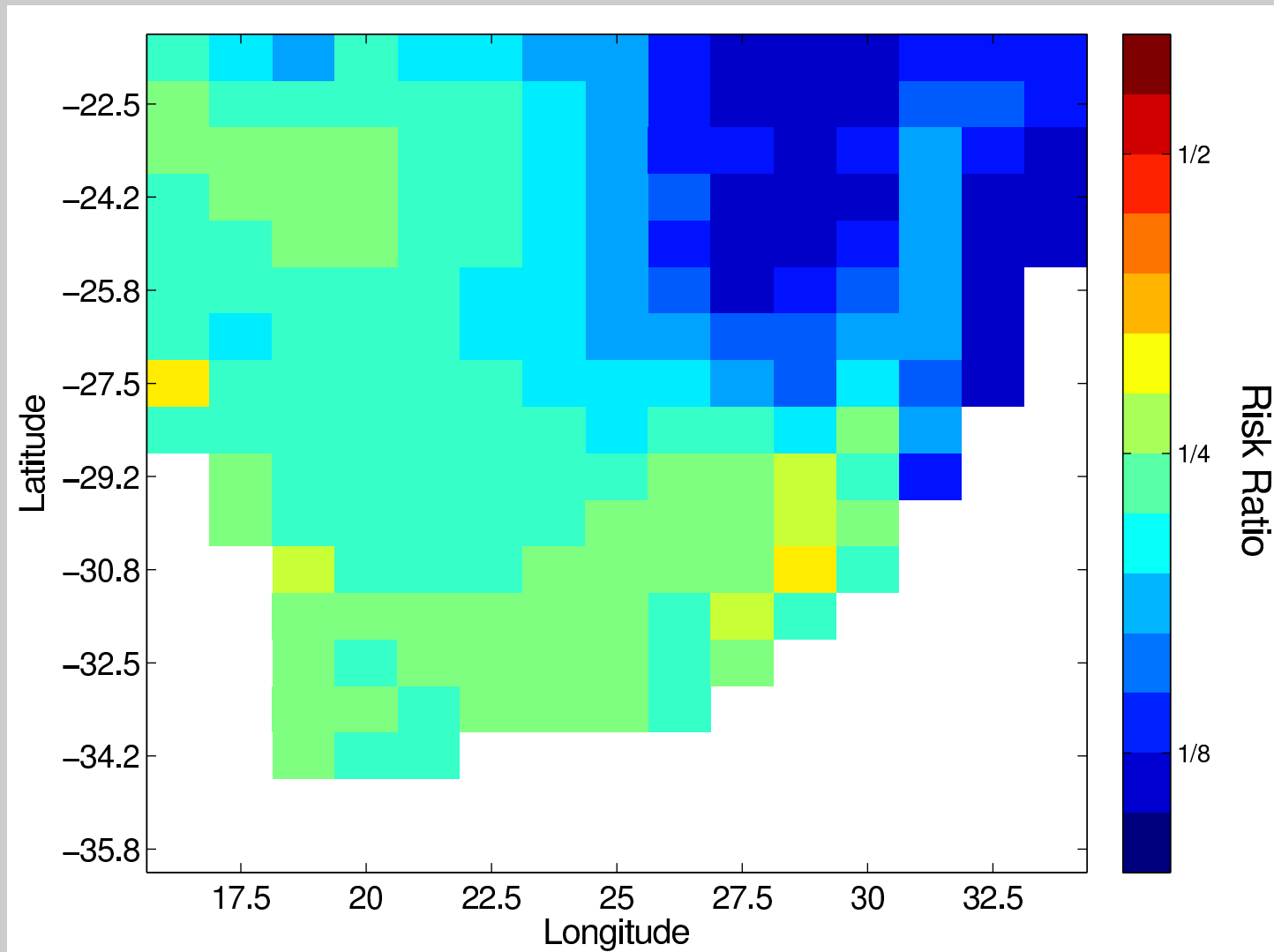
One day someone knocks on my door...

- I throw him data from Pardeep's simulations:
 - From a $\sim 1^\circ$ atmospheric model
 - 868 simulations of 2000/2001 under observed conditions
 - 868 simulations each under 20 conditions that might have been observed had we never emitted anything
 - Daily temperature and precipitation over South Africa
- He decides to calculate the Risk Ratio everywhere that he can

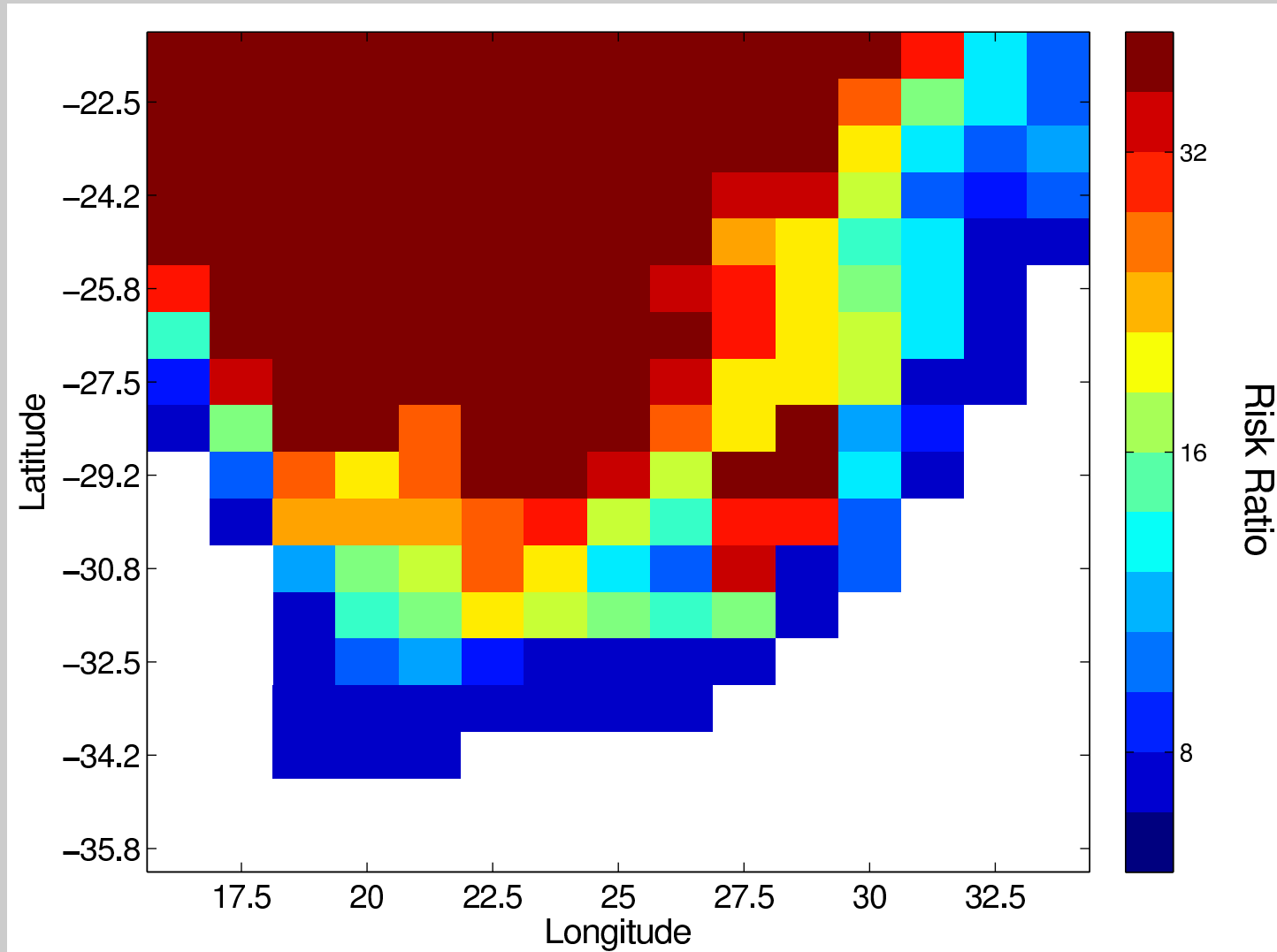
South Africa



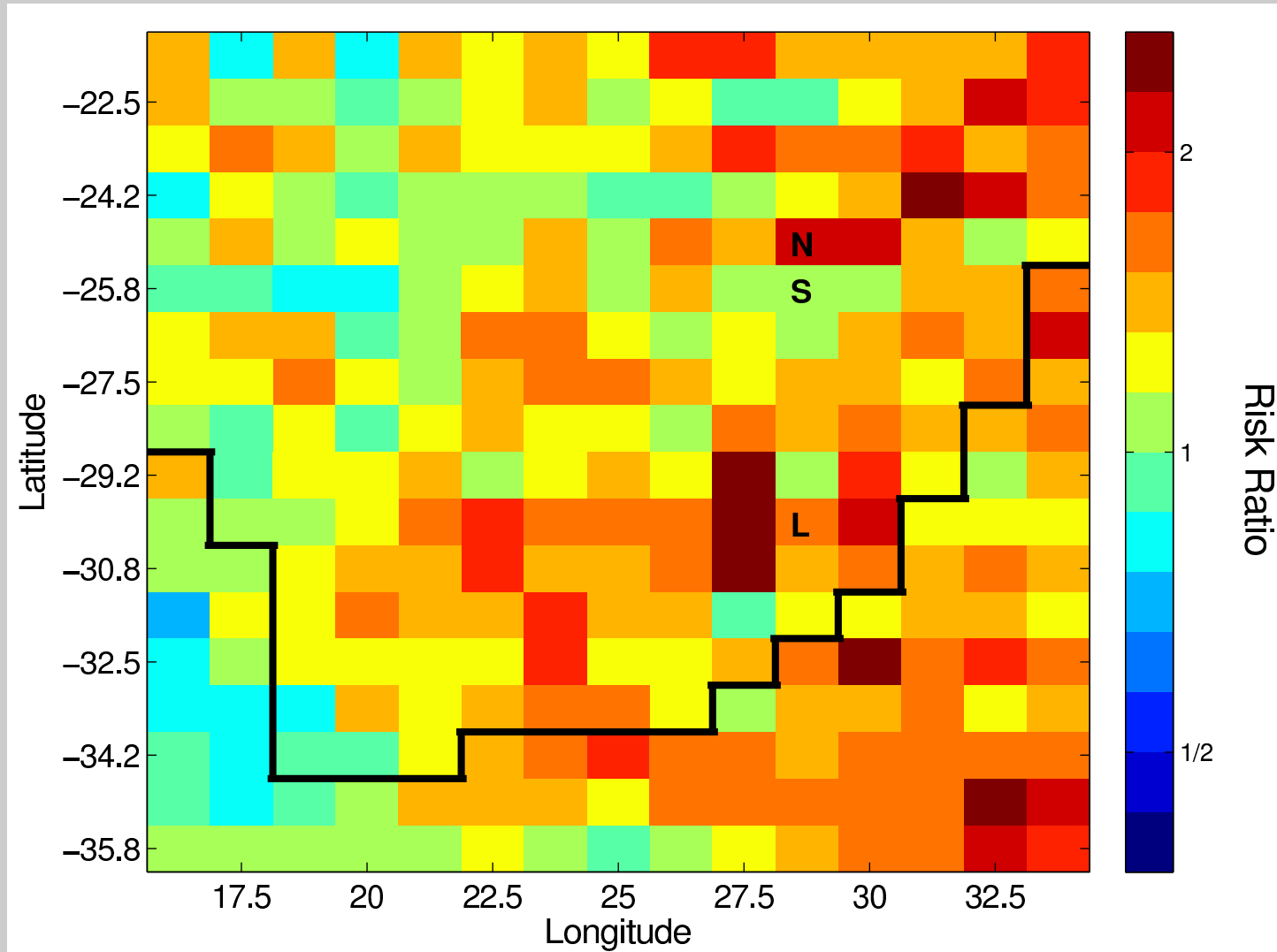
What Oliver did: Risk Ratio for 1-in-1-year cold day



And then: Risk Ratio for 1-in-1-year hot day

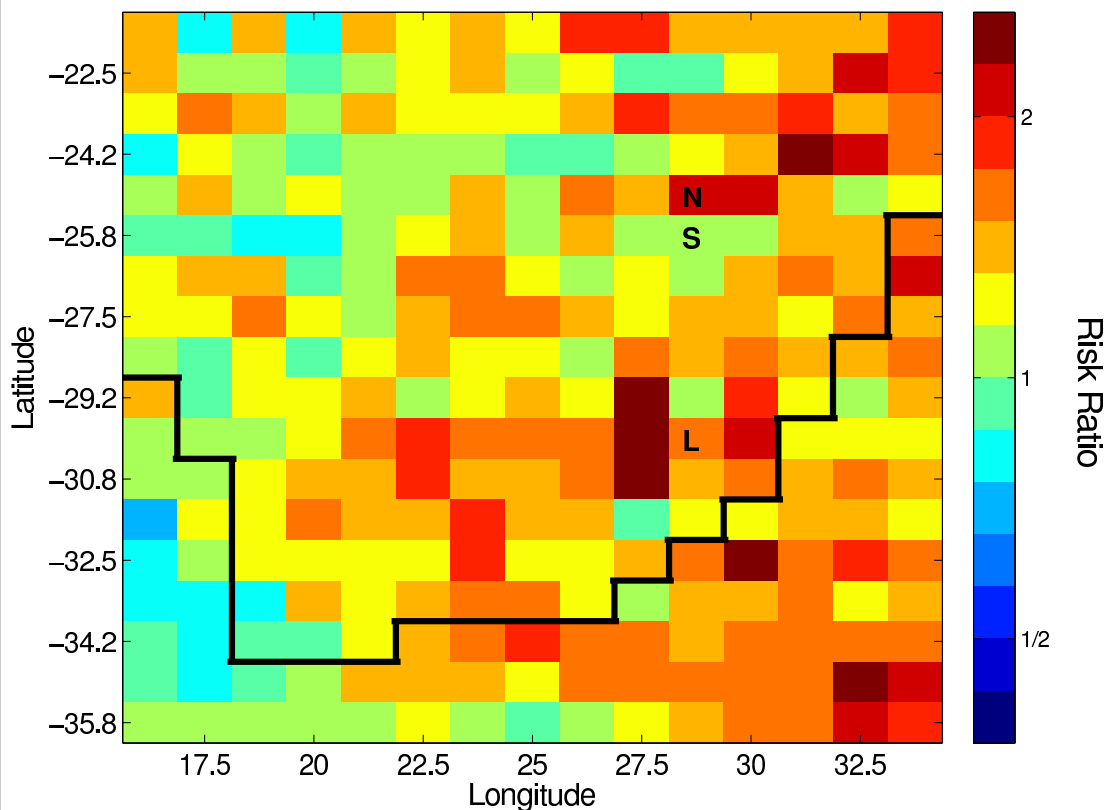


And then: Risk Ratio for 1-in-10-year wet day

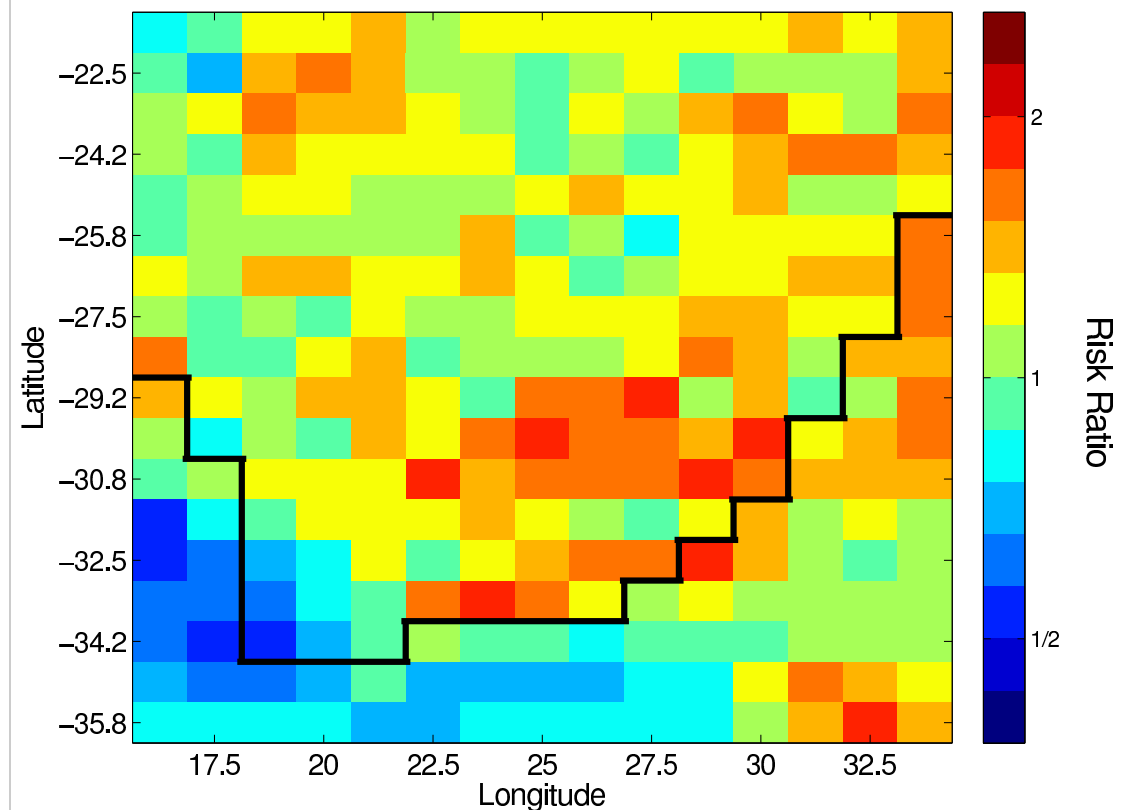


Does event duration matter?

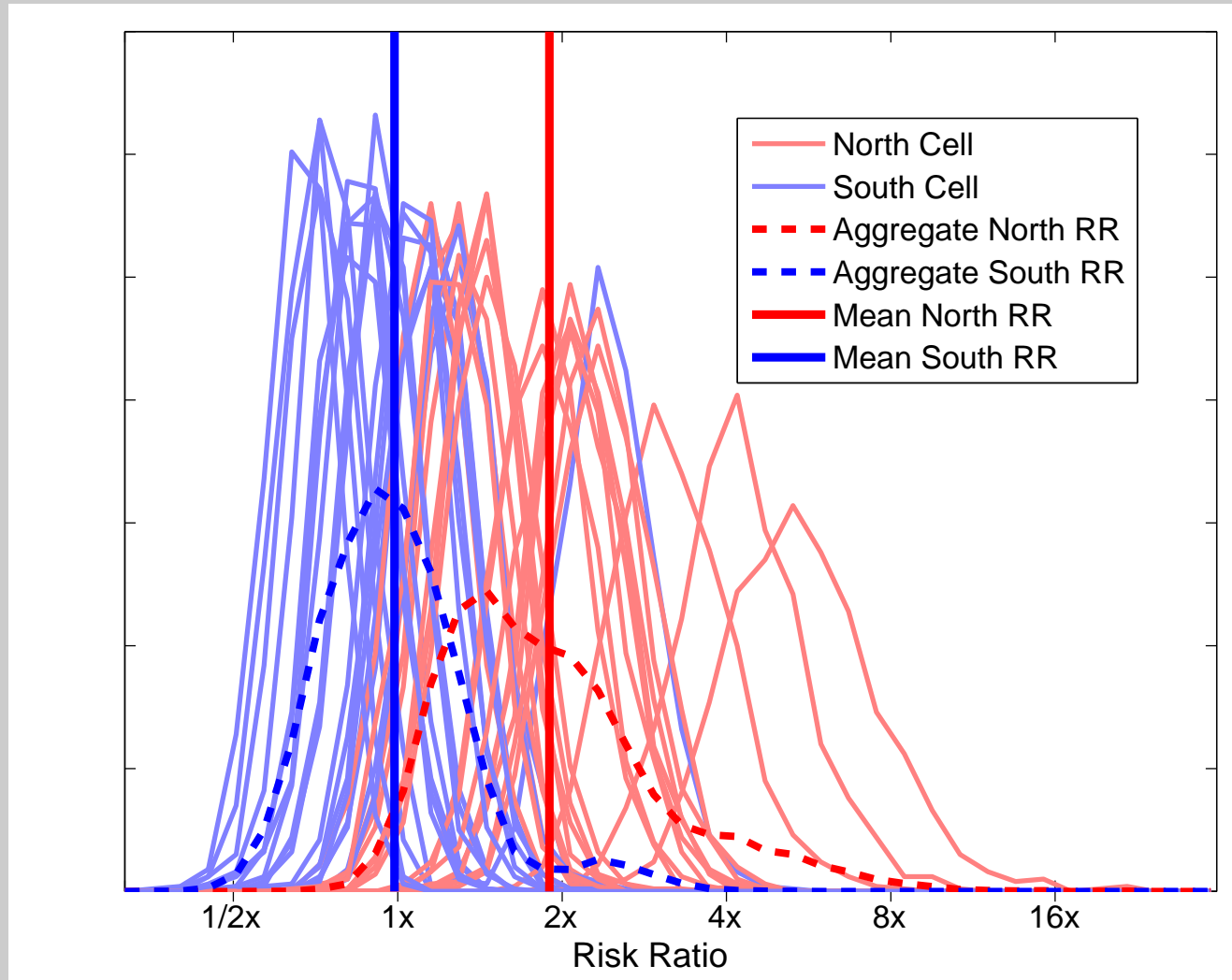
1-in-10 year wet day



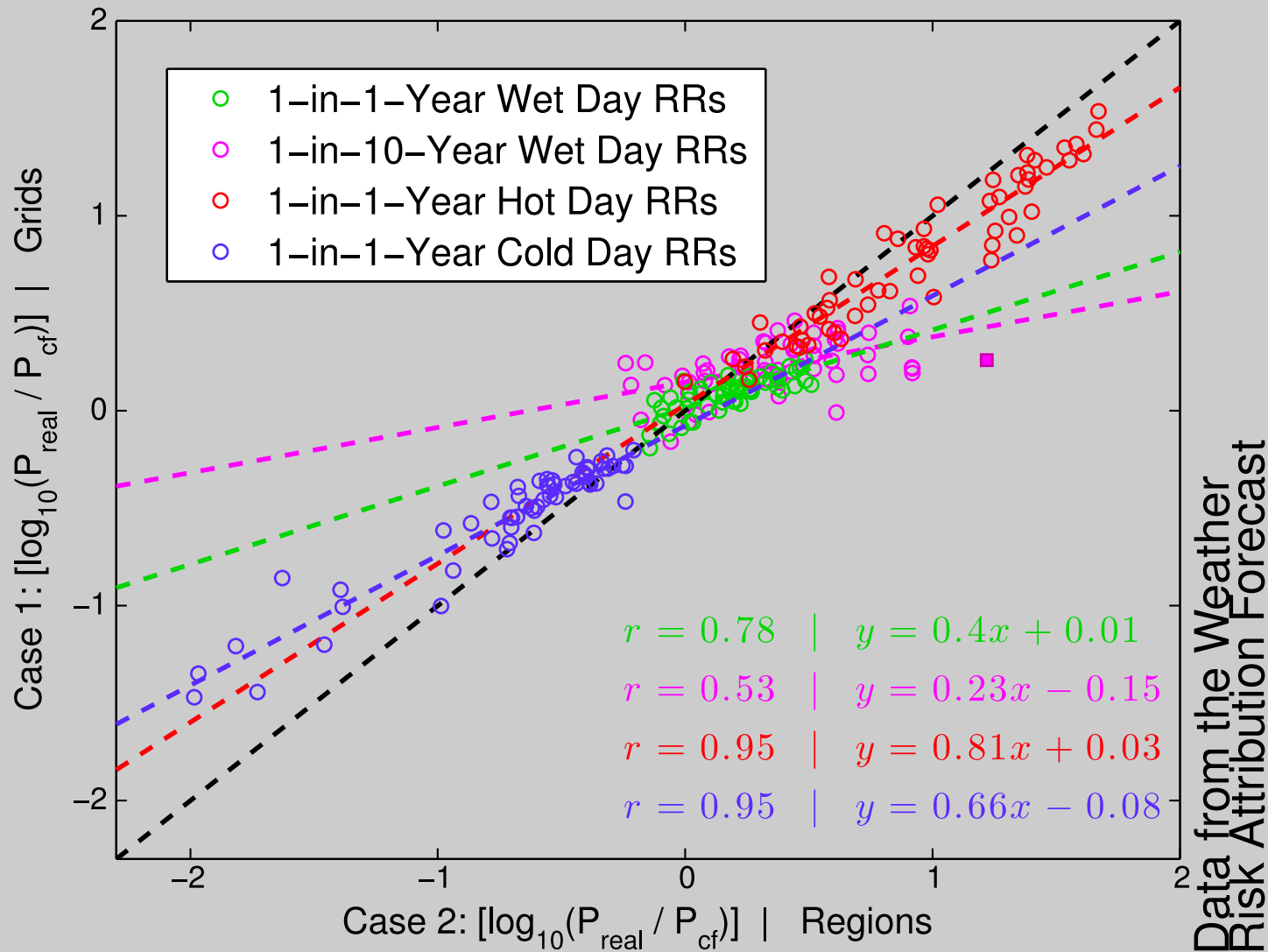
1-in-10 year wet month



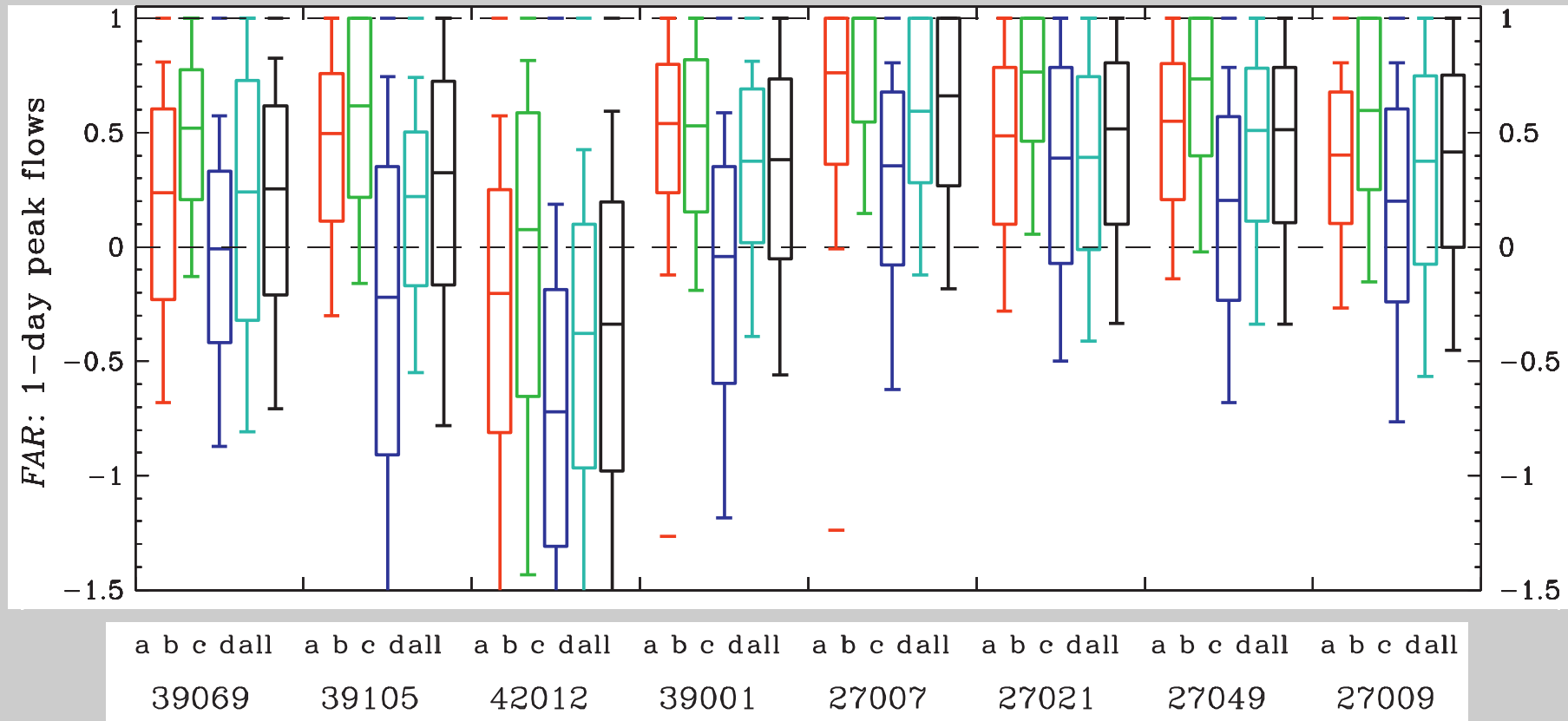
This is real (within atmospheric model context)



Now to brave the world: local versus regional RR estimates



And then impacts? The autumn 2000 UK flooding



- Alison Kay looked at the FAR for one-day peak flooding in various English catchments.
- Rainfall FAR seemed stable, but flooding FAR depended on catchment properties.

What does this mean?

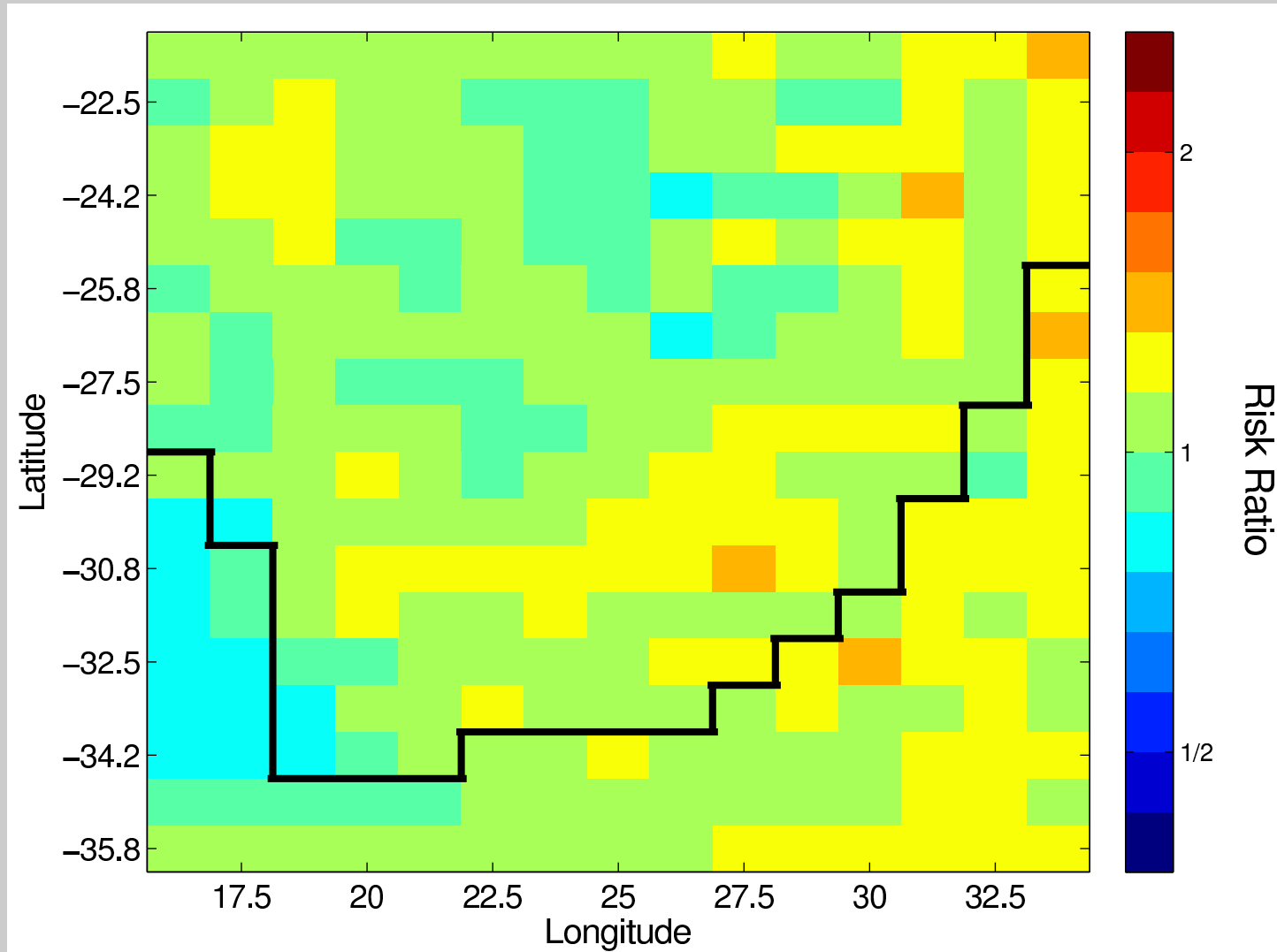
- Estimates of the degree to which anthropogenic emissions have contributed to the occurrence of an extreme event may be substantially sensitive to the context
- Estimates of the degree to which anthropogenic emissions have contributed to the occurrence of damage related to an extreme weather event may be quite sensitive to non-climate factors as well
- So... how can we deal with this?

Starting the how:

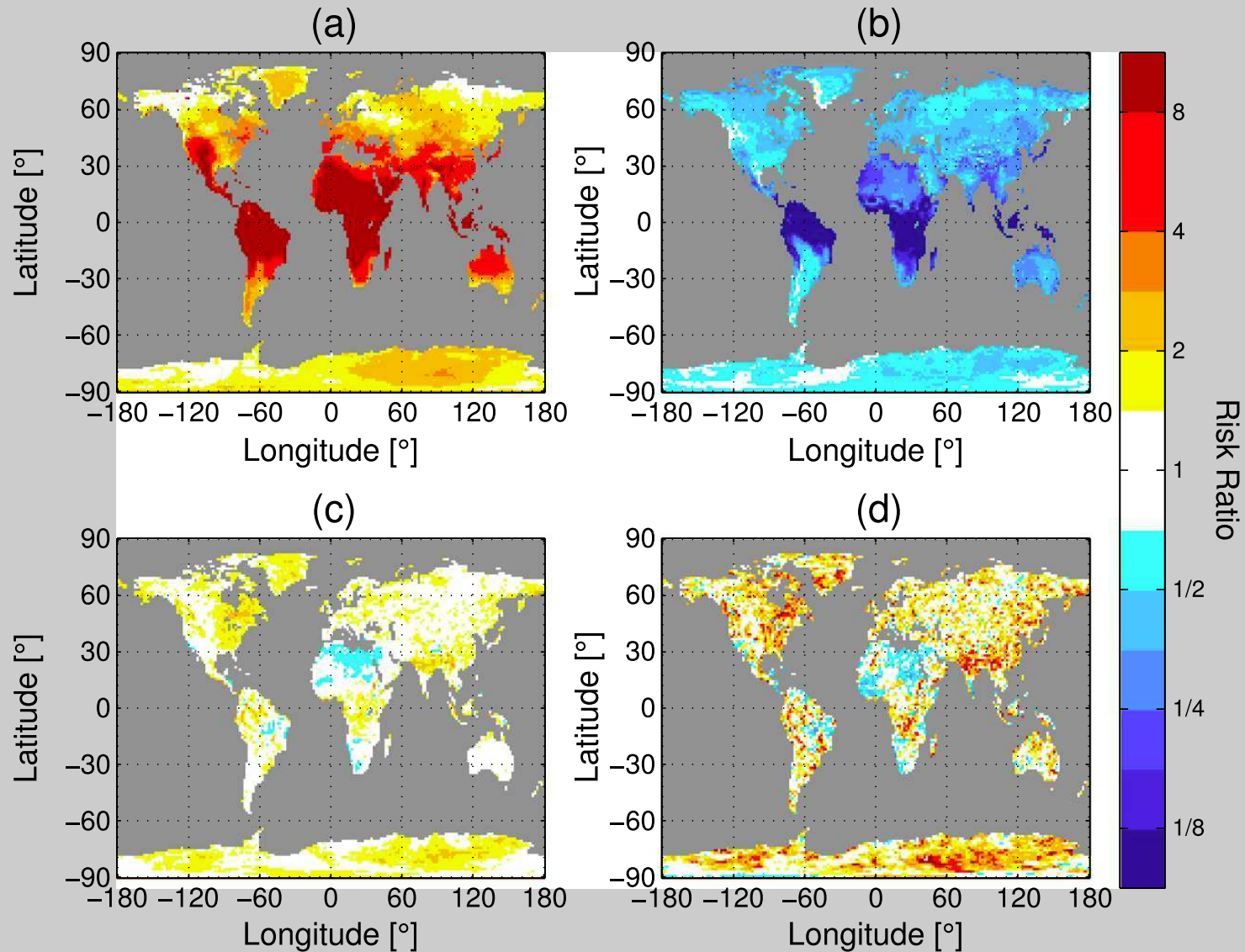
The C20C+ Detection and Attribution Project

- An international collaboration to produce a multi-model product to support investigation of extremes under a changing climate
- Generating large ensembles of simulations under historical climate conditions
- Generating large ensembles of simulations under various estimates of what historical climate simulations might have been without anthropogenic emissions
- Currently 12TB of output on ESGF from two atmospheric models (CAM5.1-1degree, MIROC5). Two more AGCMs expected in 2014, expected doubling in 2015 plus regional downscaling and hydrological modelling.

Risk Ratio of 1-in-10-year wet days



Global Risk Ratios at grid resolution



Global Risk Ratios: spatial and temporal scales

