

# Scaling Issues:

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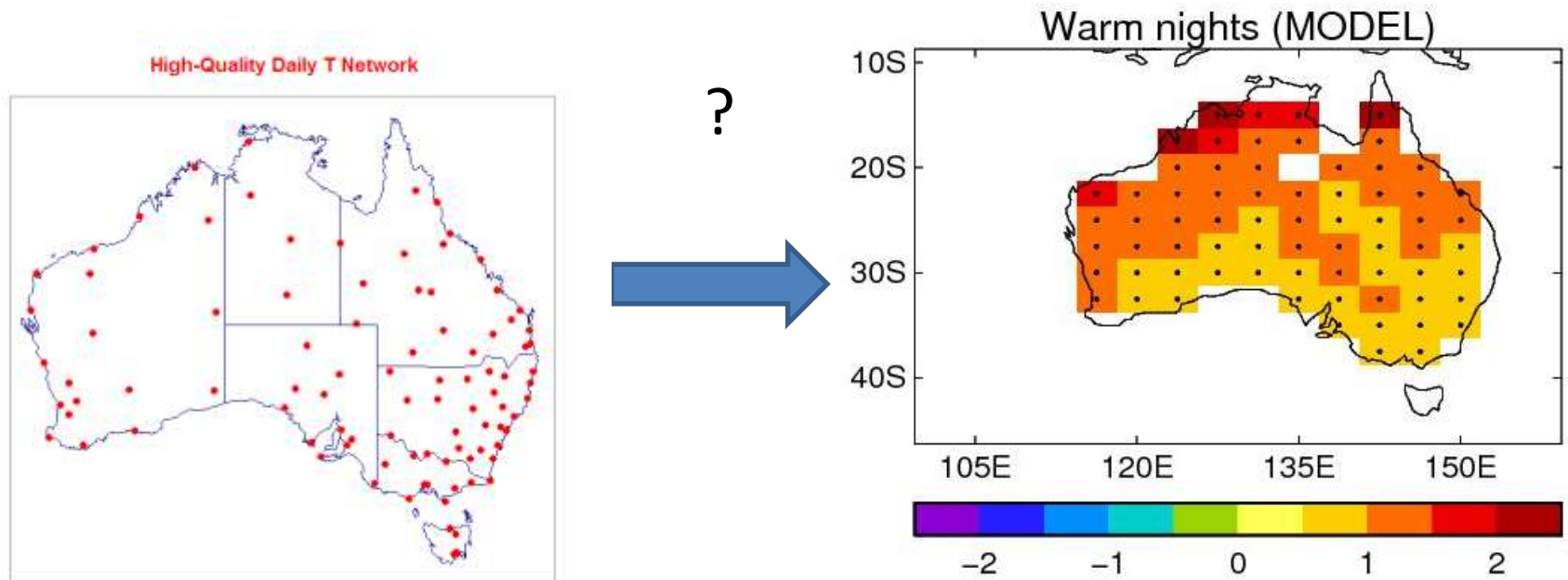
# Fundamental mismatch?

- The spatial representativeness of in situ observations which are gridded using interpolation techniques may not 'mean' the same as climate model output of extremes
- Scale mismatch (or 'problem of change in support') more importantly affects phenomena whose spatial features are discontinuous or have short temporal scales
  - e.g. sub-daily precipitation, extreme events
- Alternative data sets are available (e.g. reanalyses) but come with their own problems



# Points versus grids

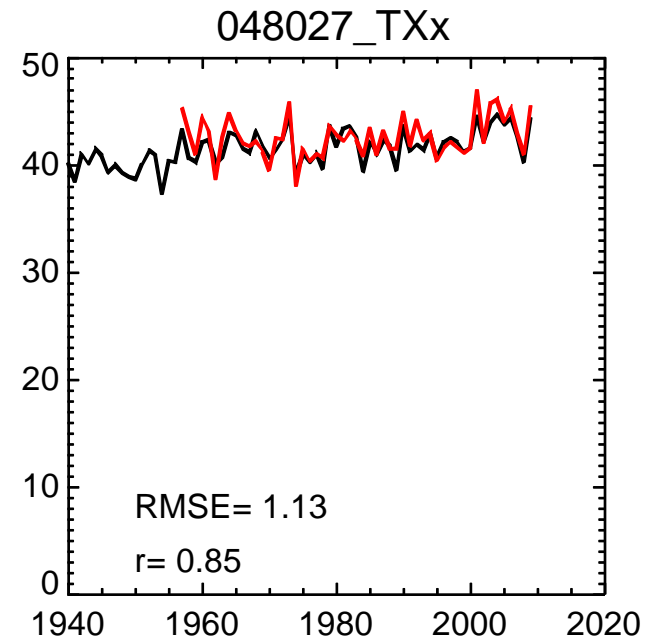
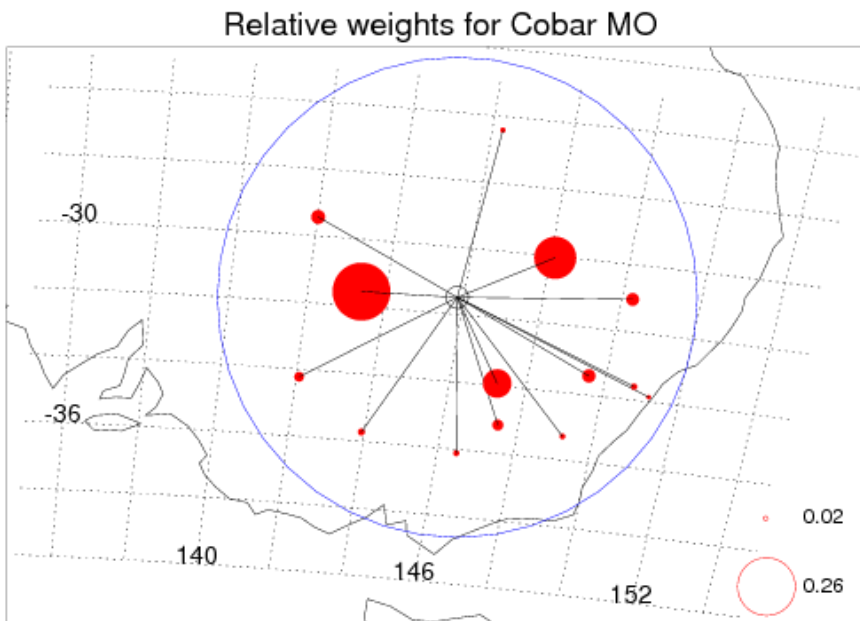
1. Observations are taken at points locations
2. Climate model output represents an areal average



How can we compare 1. and 2.?

# Testing the 'goodness of fit' of the chosen method

- The method can be tested by trying to simulate the station data rather than an unknown grid point location

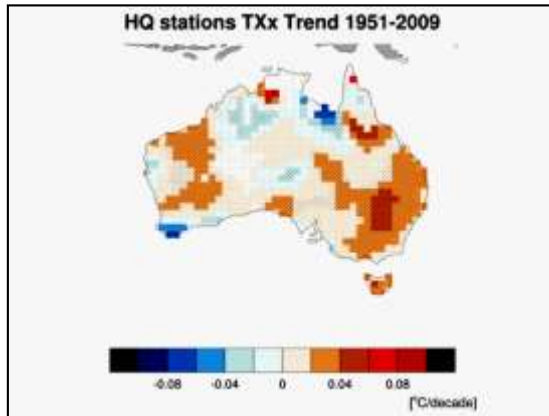


# Uncertainties and scaling issues

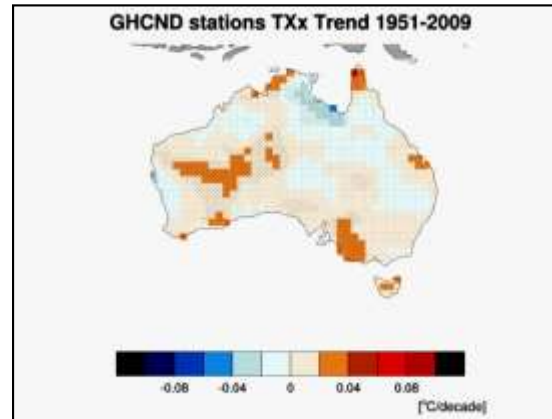
Hottest day of the year

(1° grid, fixed parameters)

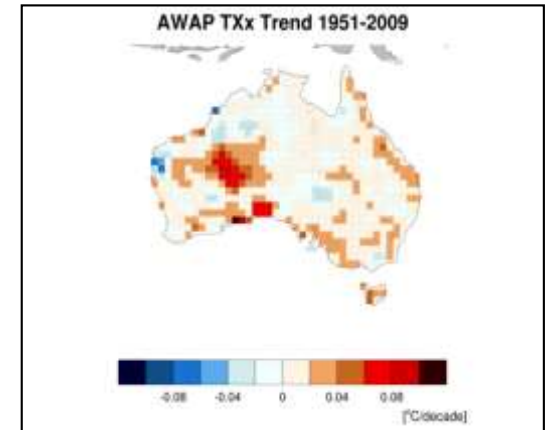
HQ stations



ALL stations



AWAP

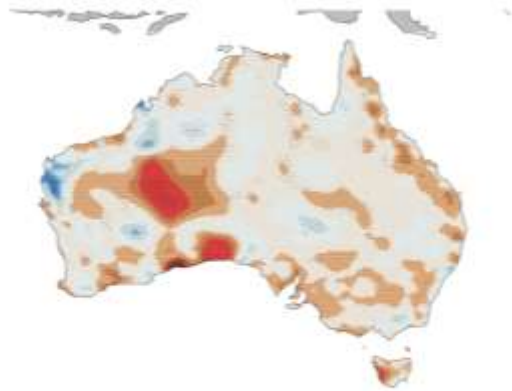


Same gridding method  
Different input data

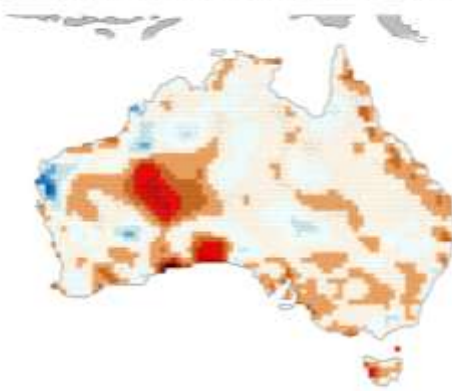
Same input data  
Different gridding method

# Also does grid size matter...?

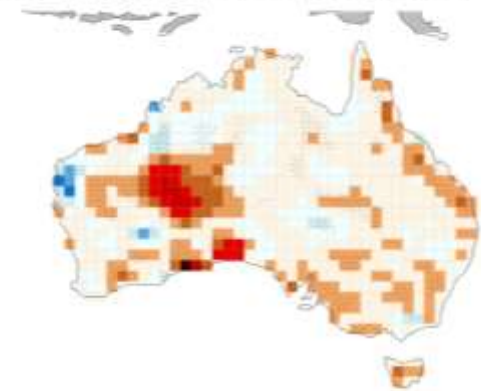
AWAP TXx Trend 1950-2008, 0.05deg



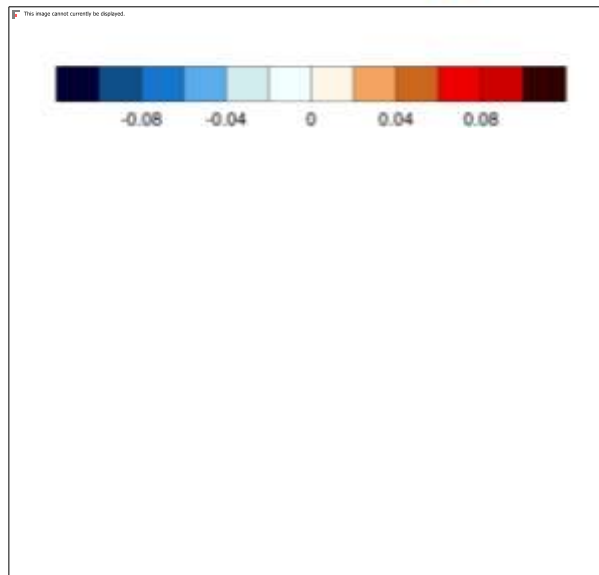
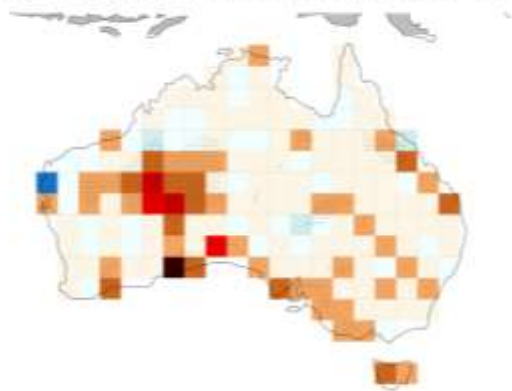
AWAP TXx Trend 1950-2008, remap 0.5deg



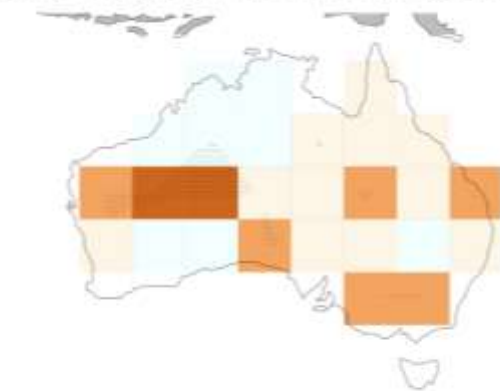
AWAP TXx Trend 1950-2008, remap 1deg



AWAP TXx Trend 1950-2008, remap 2deg

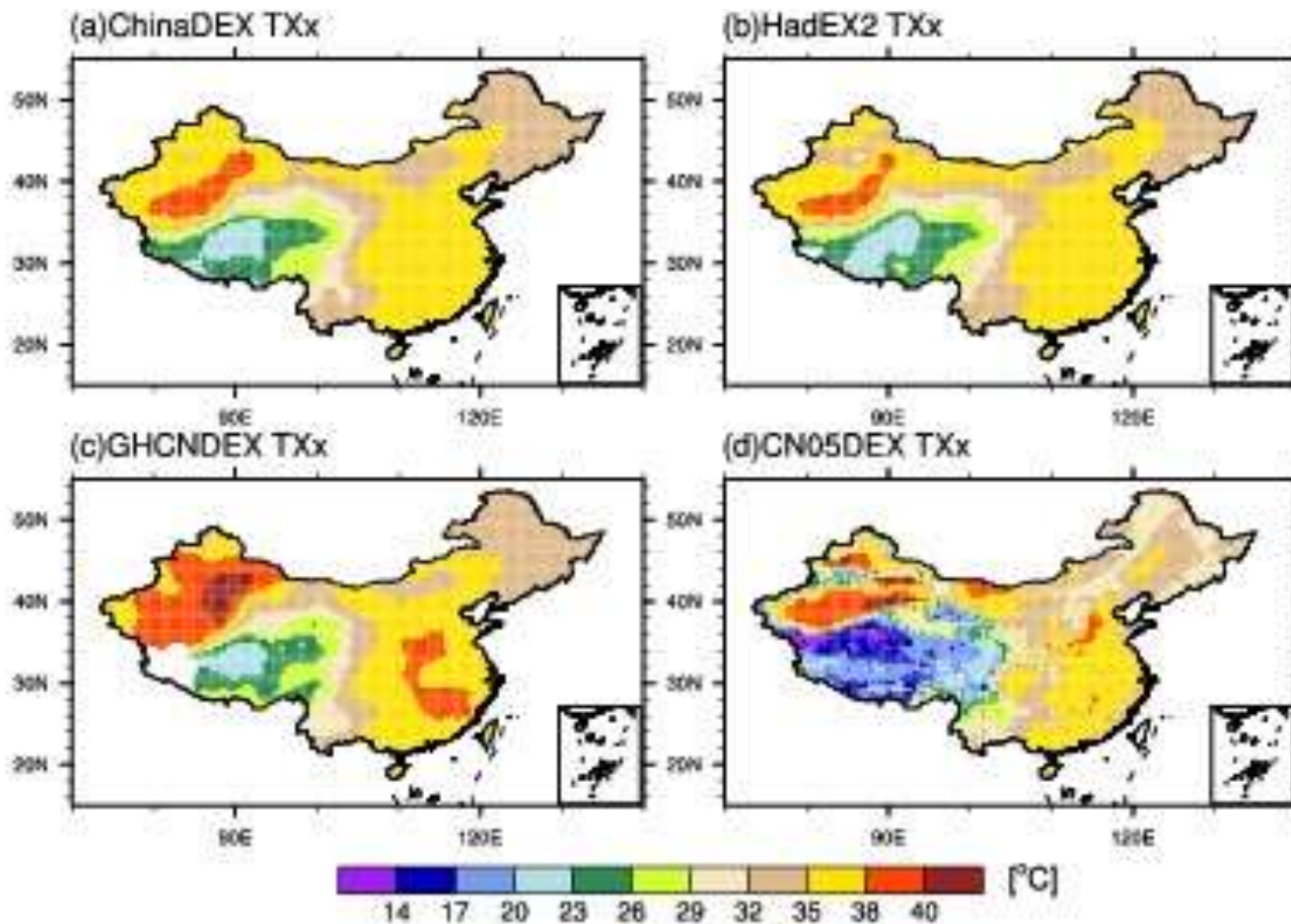


AWAP TXx Trend 1950-2008, remap 5deg

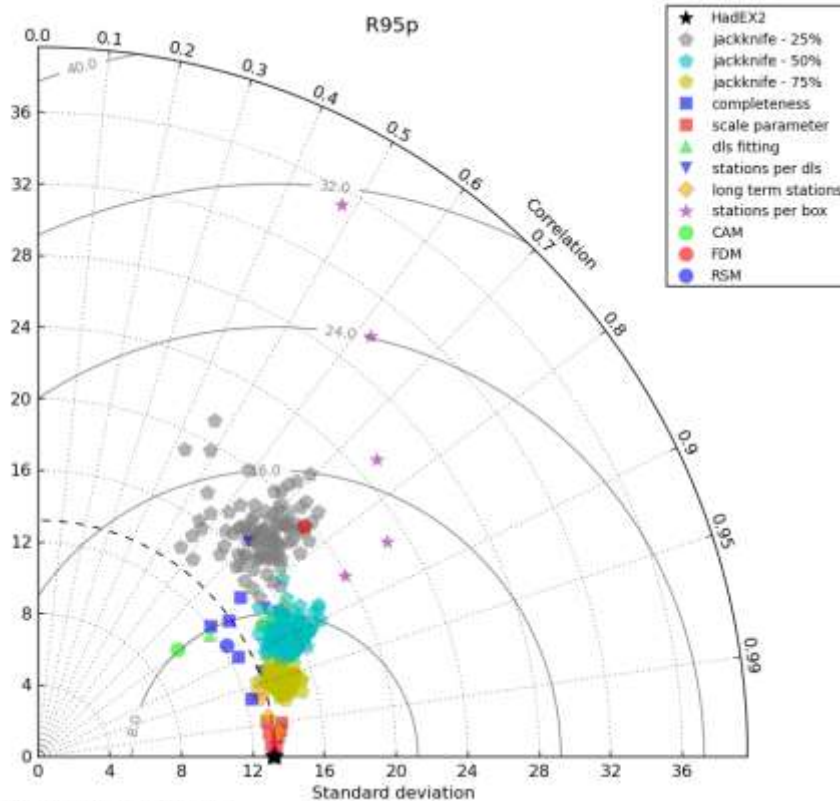




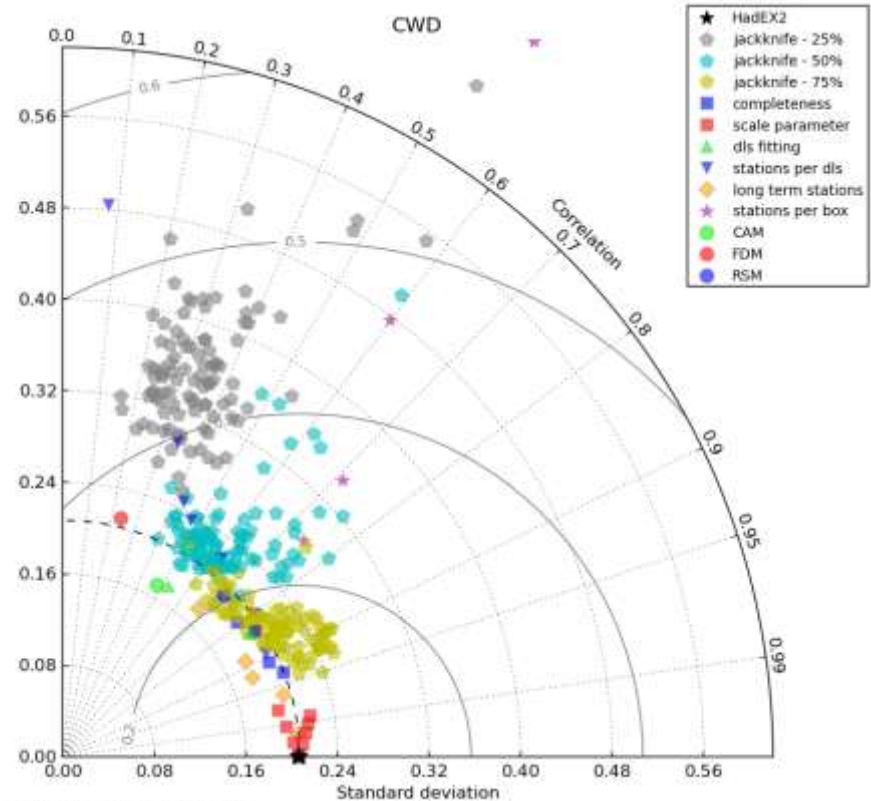
# Can test multiple methods and regions



# Calculating uncertainties for global datasets of extremes



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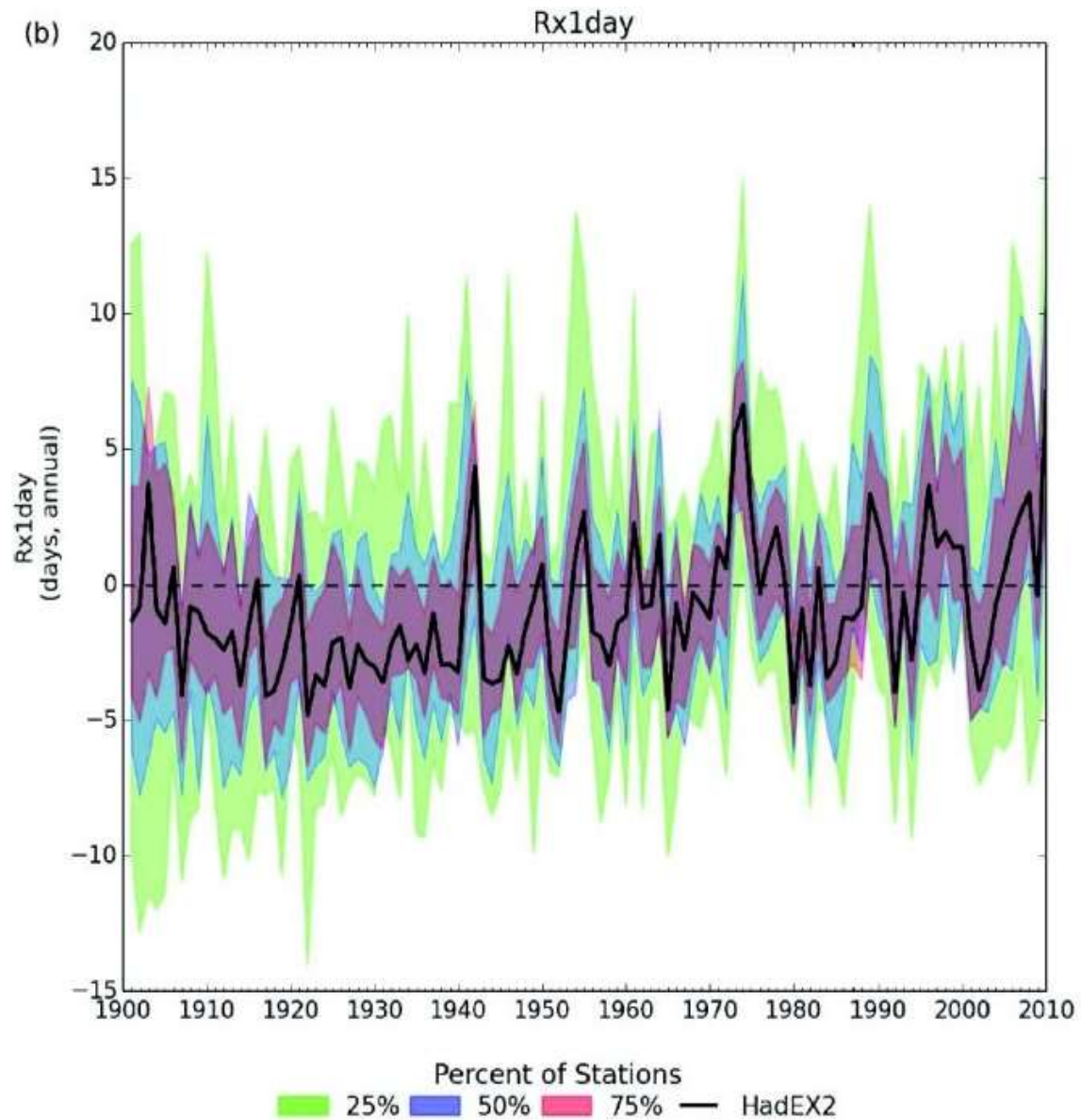


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Structural uncertainties are larger than parametric uncertainties  
Some indices have larger uncertainties than others



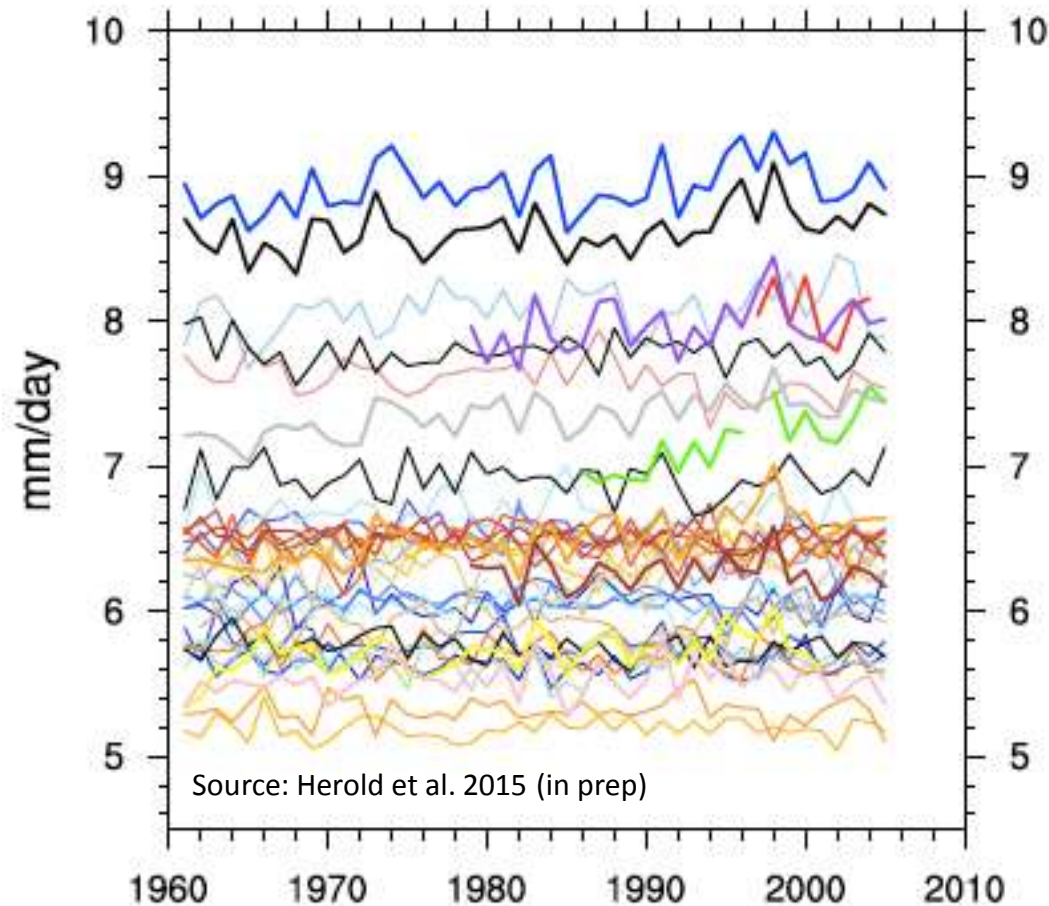
# Adding uncertainties to observed datasets



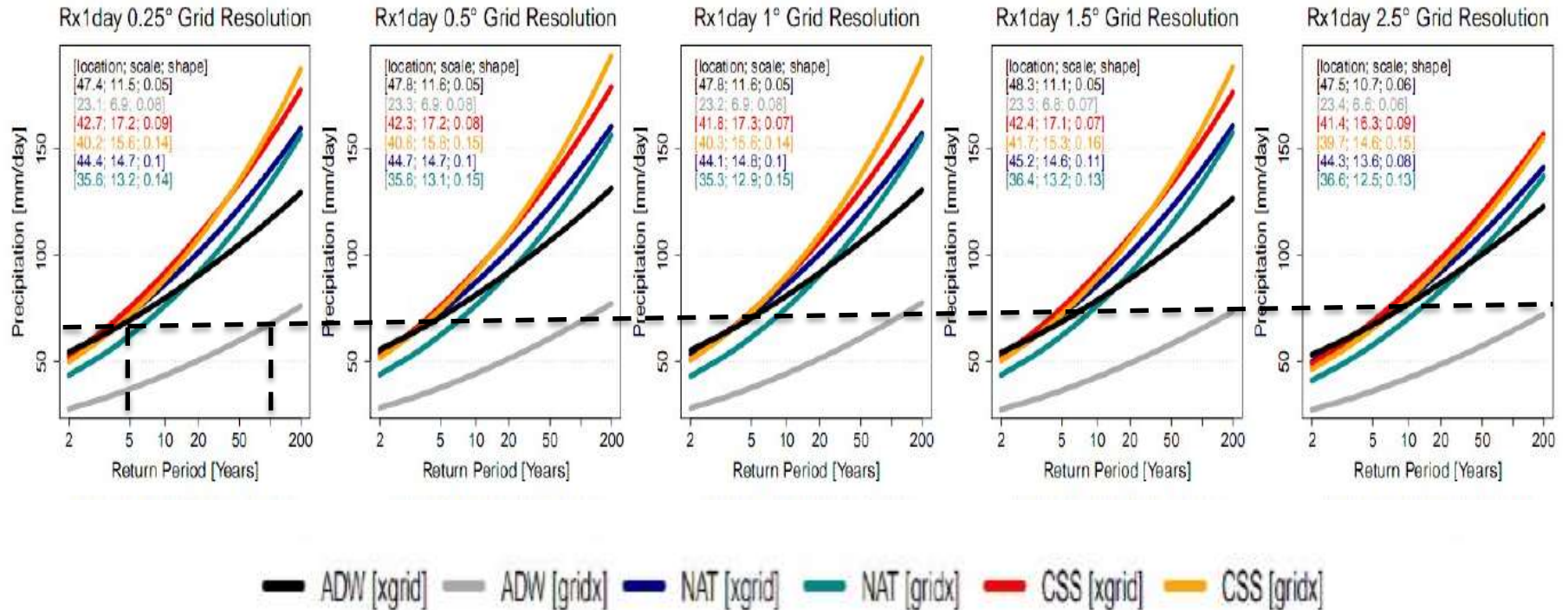
# But structural uncertainties are a huge problem

## Global (masked) land mean sdi (mm/day)

Years with < 95% of the total in-situ masked area are removed  
minlat: -90 maxlat: 90 minlon: 0 maxlon: 360



# Scaling matters for extremes



Source: Avila et al. 2015 (submitted)

Depending on method or order of operation in which extremes are calculated a given return value might have a 1 in 100 year return period using one method but a 1 in 5 year return period using another