



# The Need For Reliable Gridded Daily Precipitation Observations For The Investigation Of Precipitation Extremes

Presenter: Steefan Contractor

Authors: S Contractor, N Herold, L V Alexander,  
M G Donat, A Becker

E: s.contractor@unsw.edu.au



# Why?

## Why Gridded?

- Spatially coherent analyses
- Comparison with physical models

## Why daily?

- Ability to detect smaller temporal scale changes
- Most extremes occur on small timescales, eg. flash floods

# Types of Gridded Observations



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# Types of Gridded Observations

## Gauge Based

- CPC
- GPCC
- ...

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## Satellite Based (gauge adjusted)

- TRMM
- GPCP
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## Gauge Based

- CPC
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## Satellite Based (gauge adjusted)

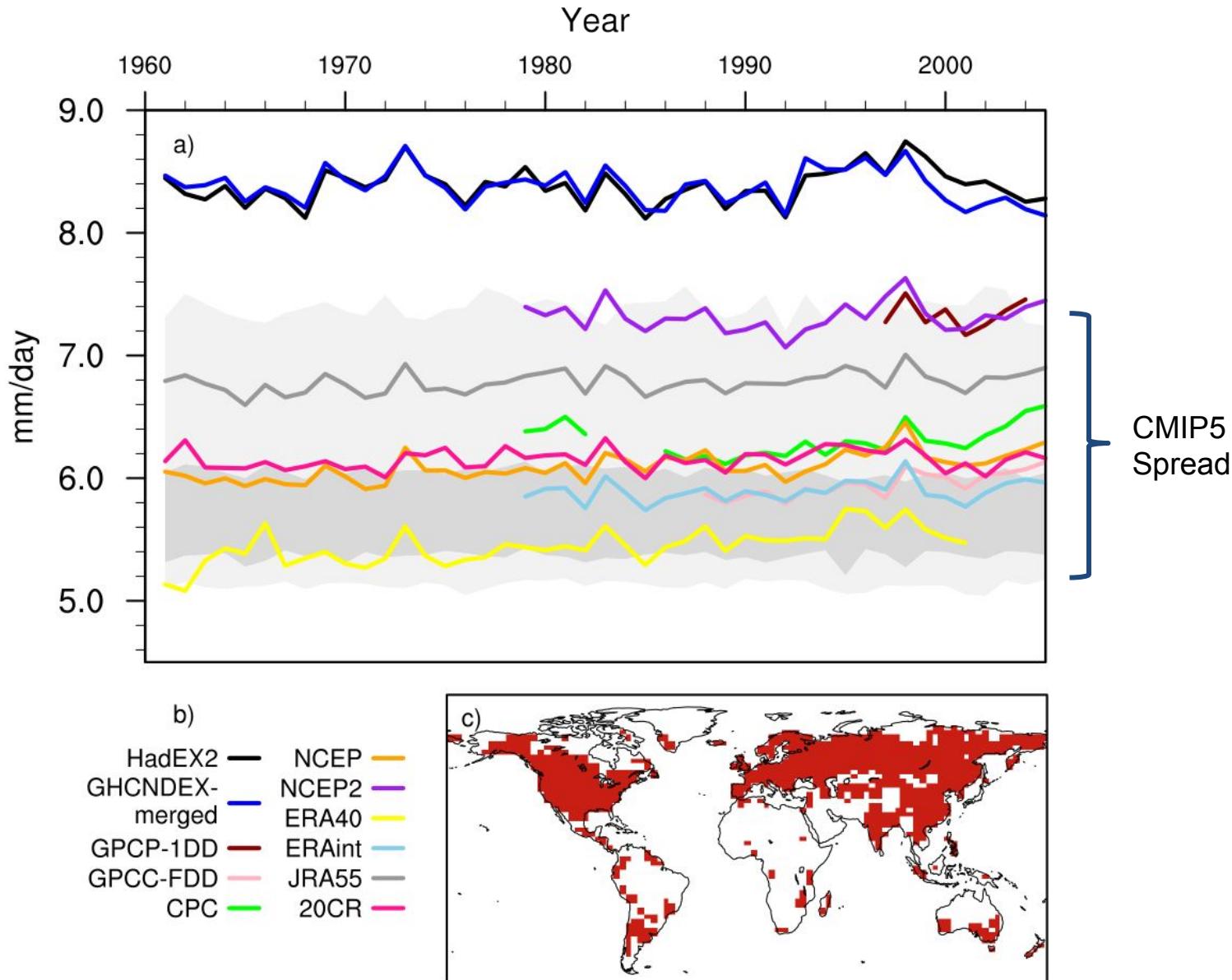
- TRMM
- GPCP
- ...

## Reanalysis

- NCEP
- NCEP2
- ERA-40
- ERA-interim
- JRA-55
- 20CR
- ...



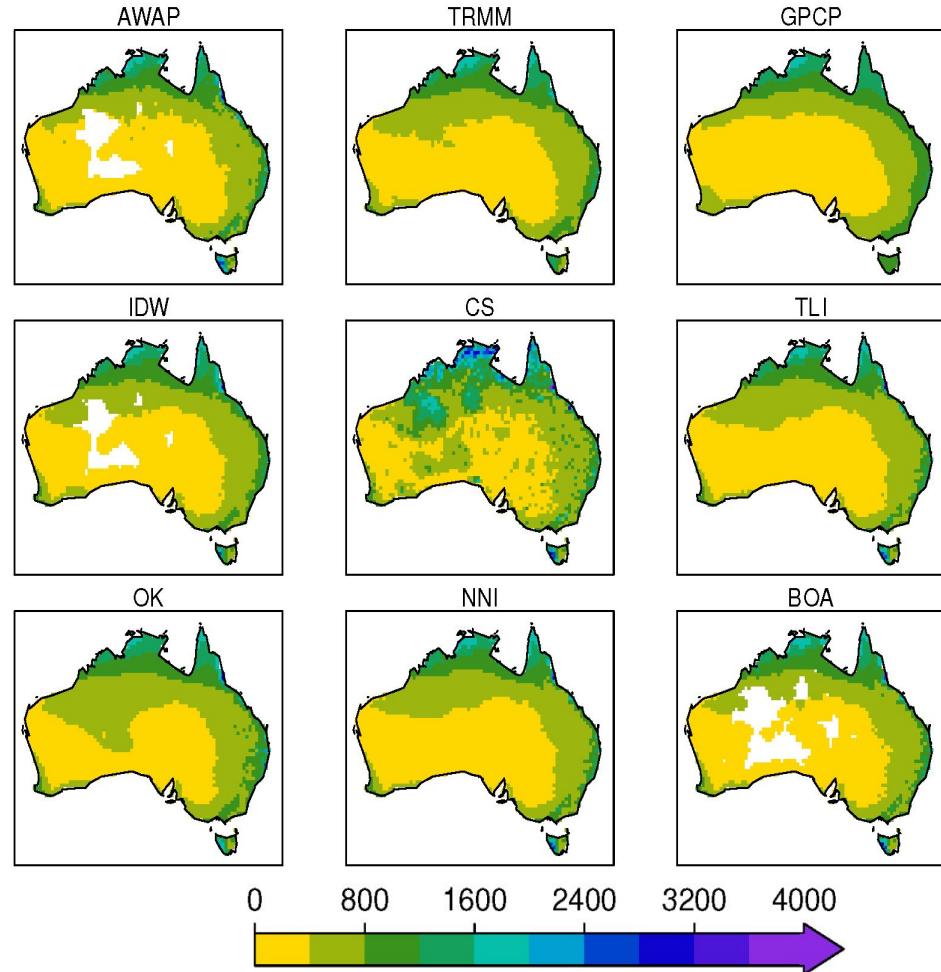
# How do these observations compare?



# How does the interpolation scheme affect the grids?

Datasets compared over Australia over 1998 - 2013:

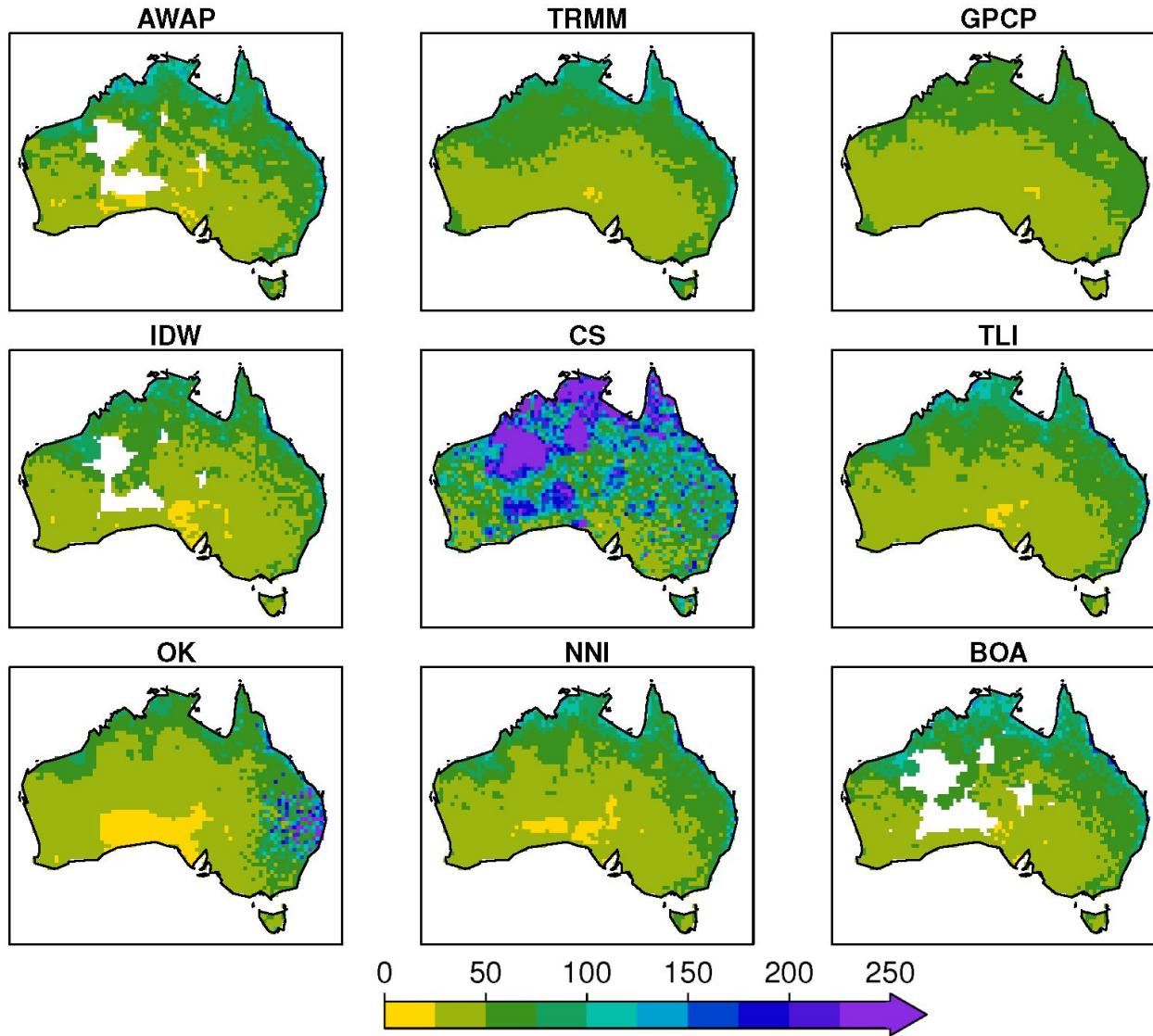
- Two satellite based: TRMM and GPCP
- Seven interpolated datasets

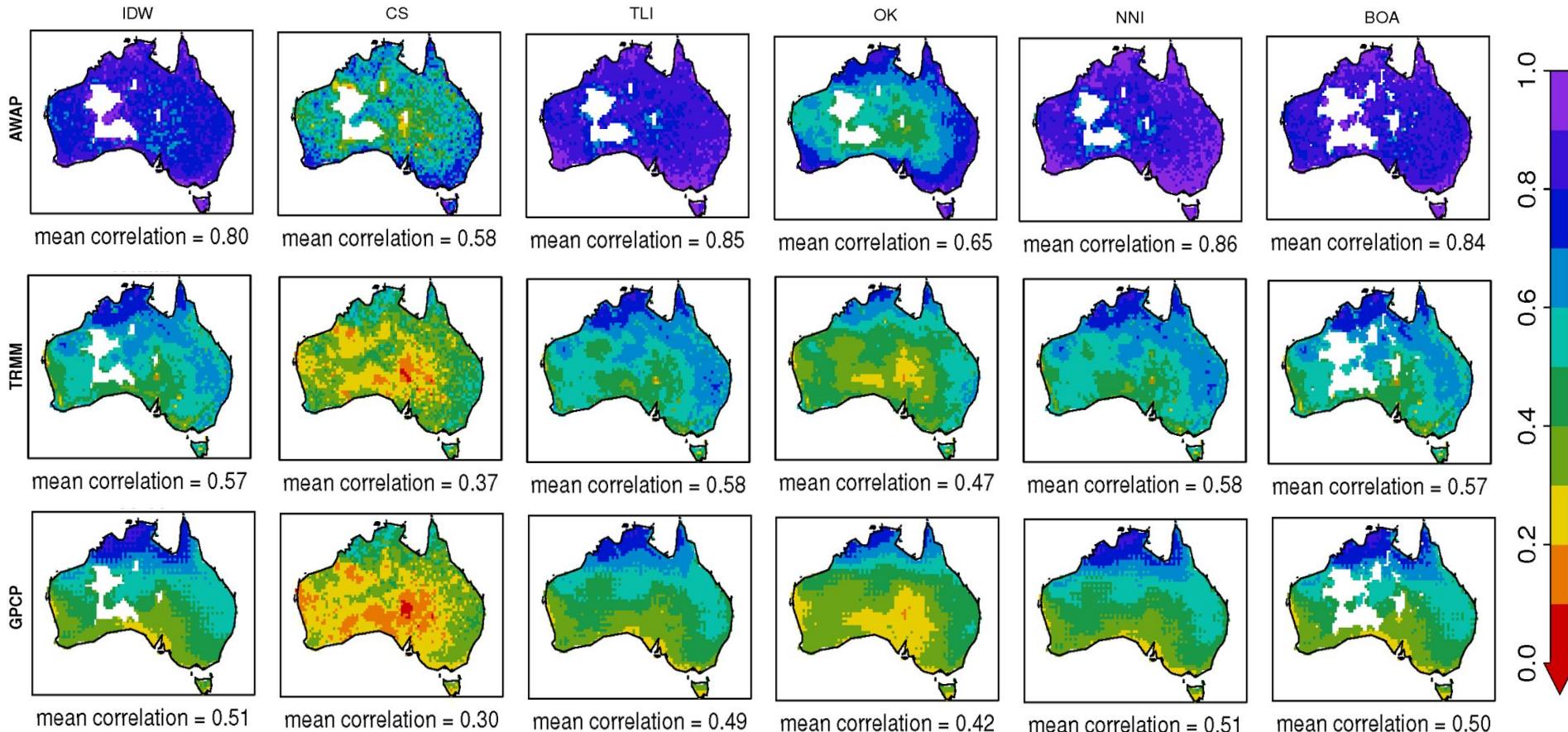


Above: Climatology based on various datasets compared, over 1998-2013. Units: mm

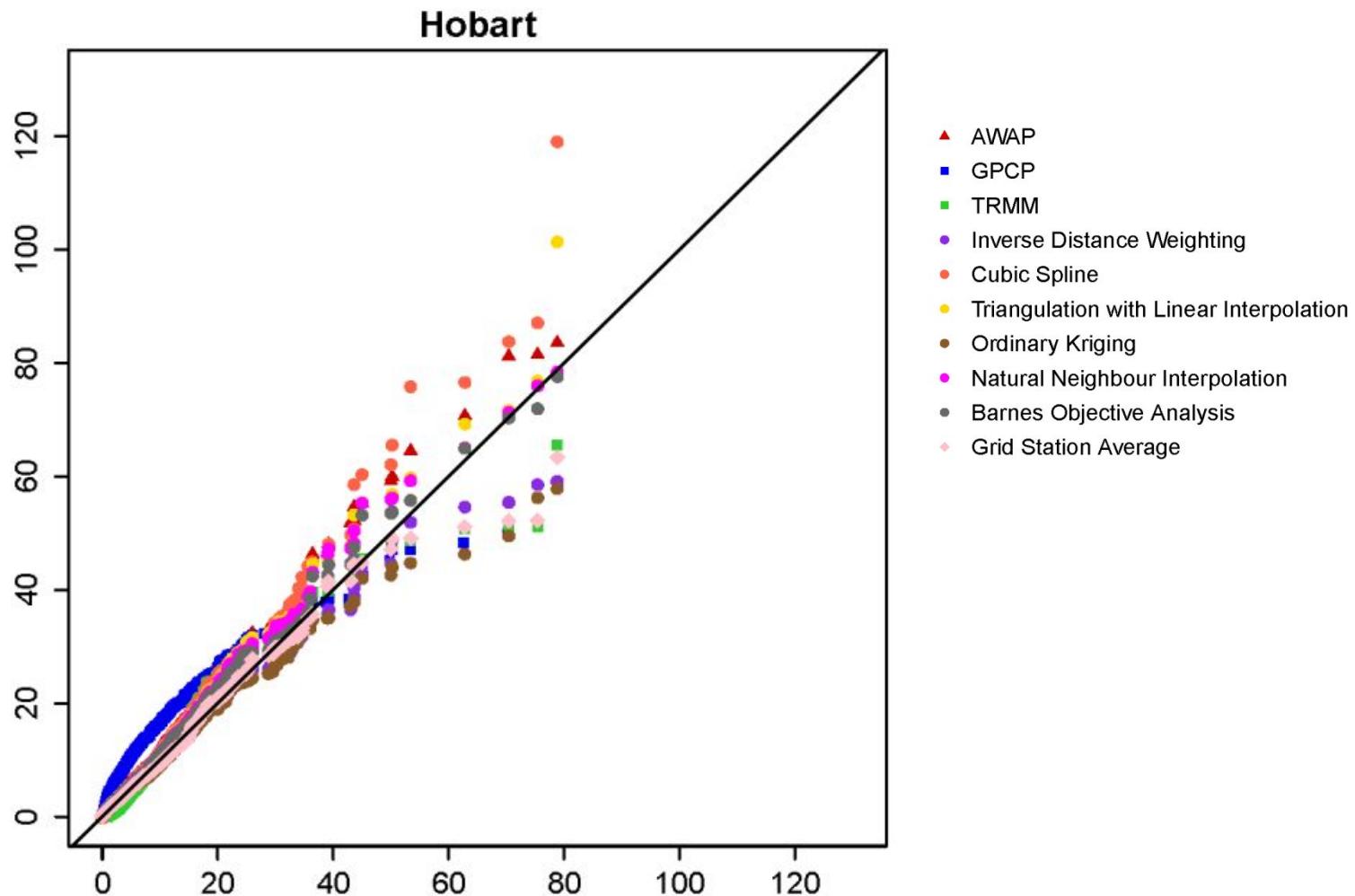
Source: Contractor S, Alexander L V, Donat MG, Herold N. How Well Do Gridded Datasets of Observed Daily Precipitation Compare over Australia? *Adv Meteorol* [Internet]. 2015;2015:1-15

# What about the extremes?



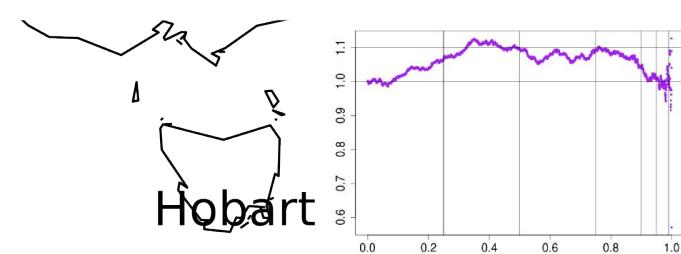
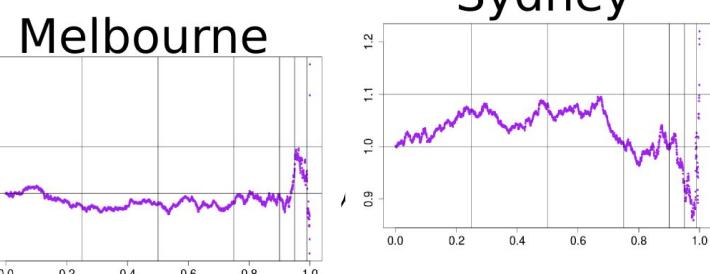
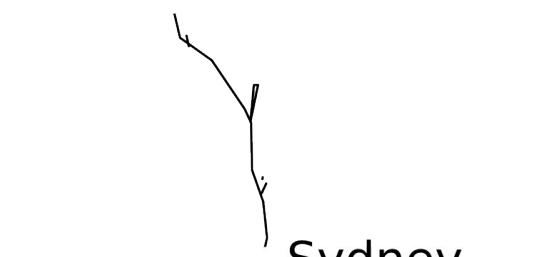
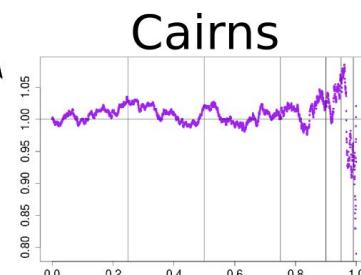
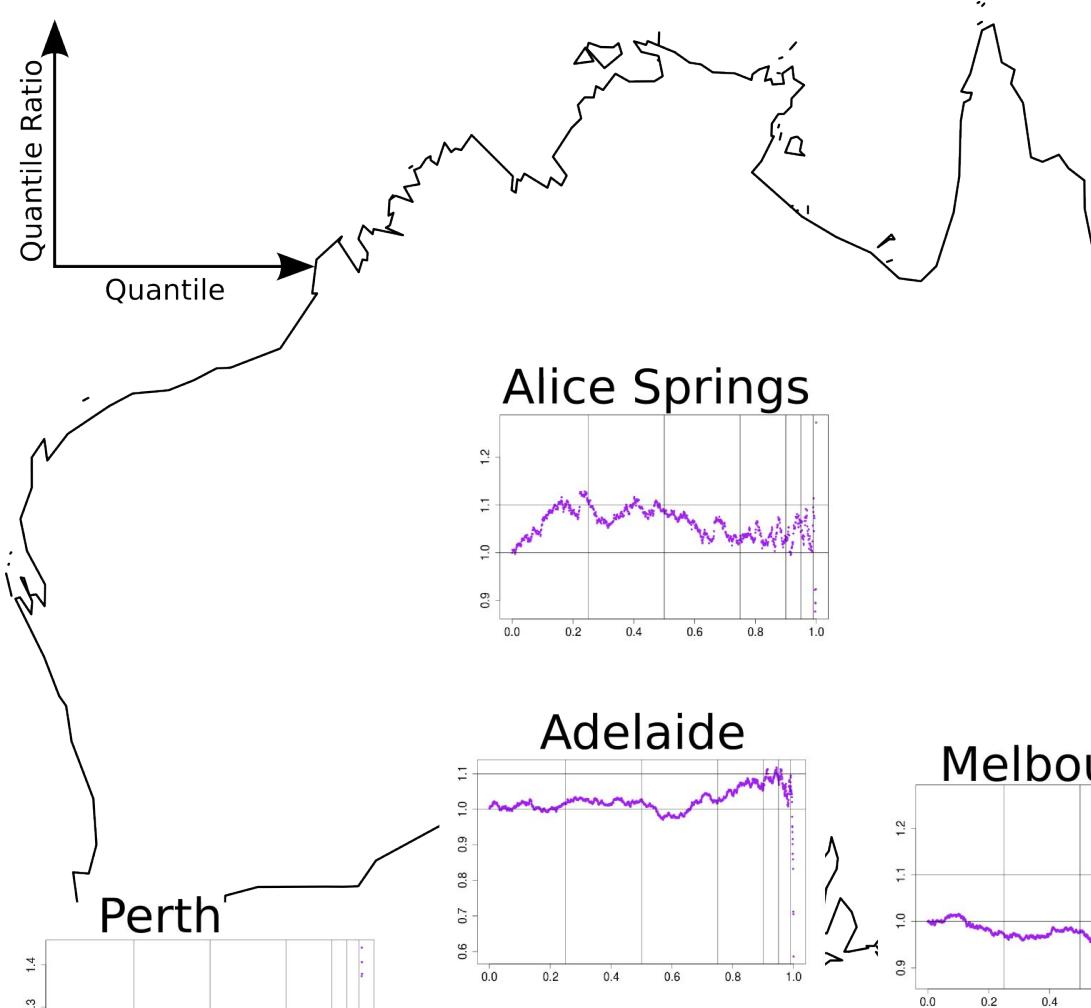


# Quantile-Quantile Plot

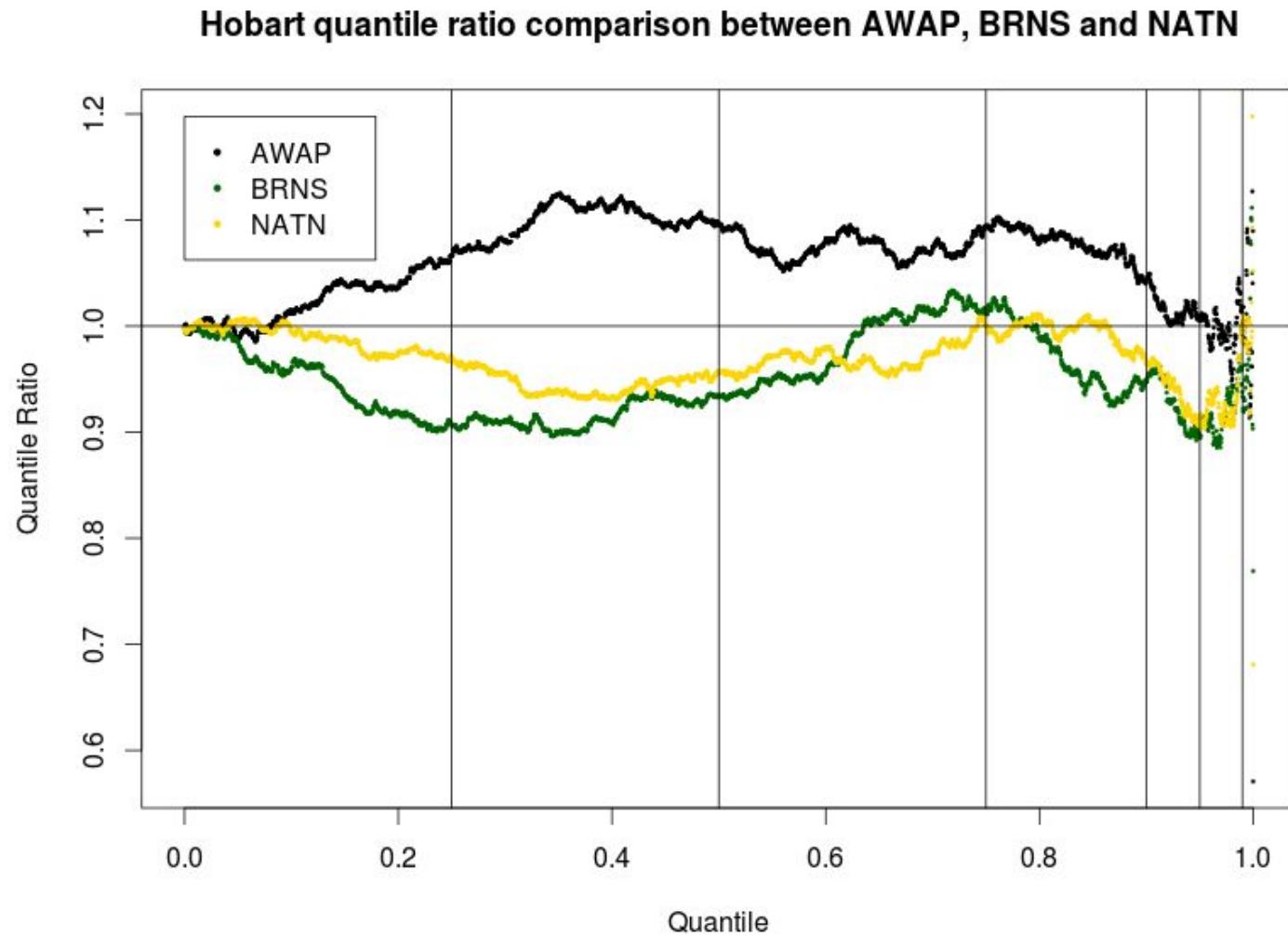


# Effect of underlying station network

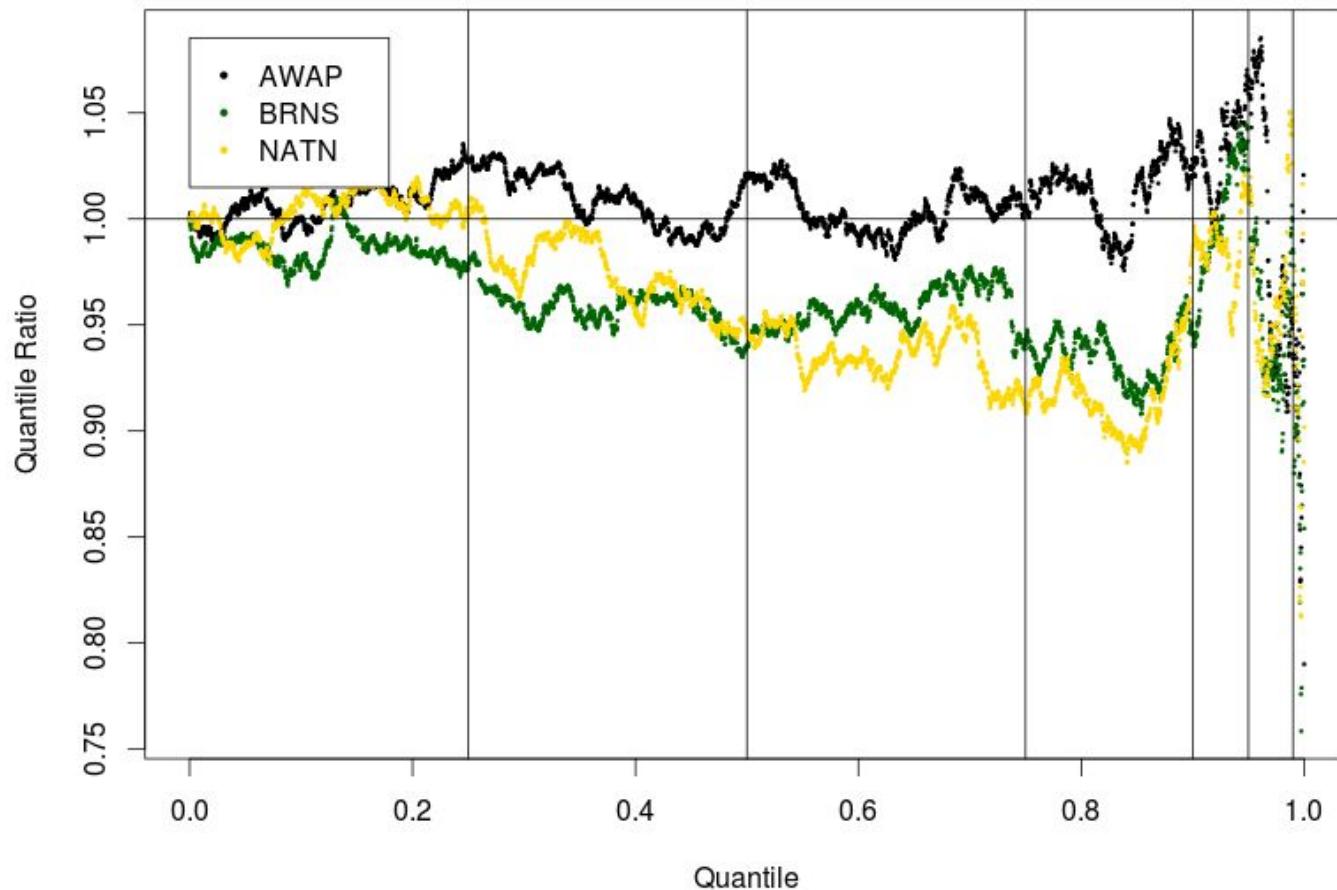
- Daily gridded precip:
  - AWAP (Bureau of Meteorology)
  - two others that
    - use different interpolation schemes and
    - based on long term station network
  - Resolution:  $0.5^\circ \times 0.5^\circ$
- Study Period: 1958 - 2013
  - compare first and second halves



# Changes are sensitive to station network

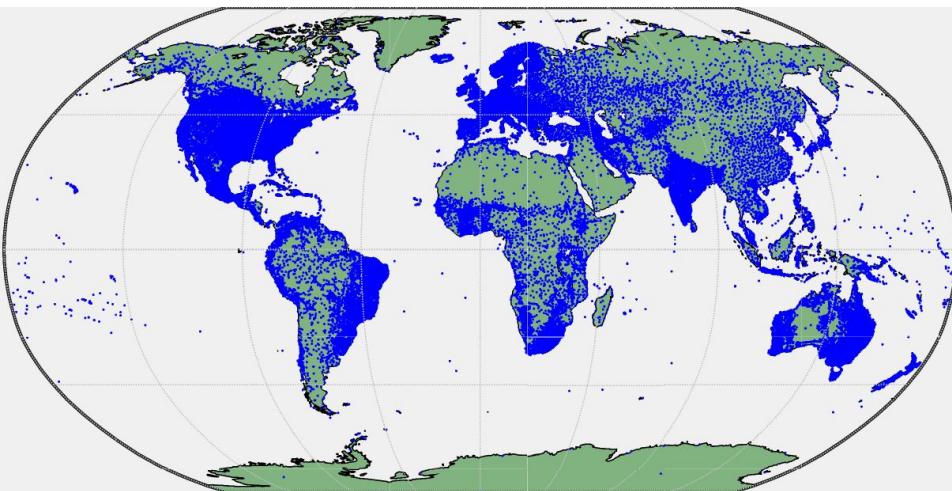


### Cairns quantile ratio comparison between AWAP, BRNS and NATN

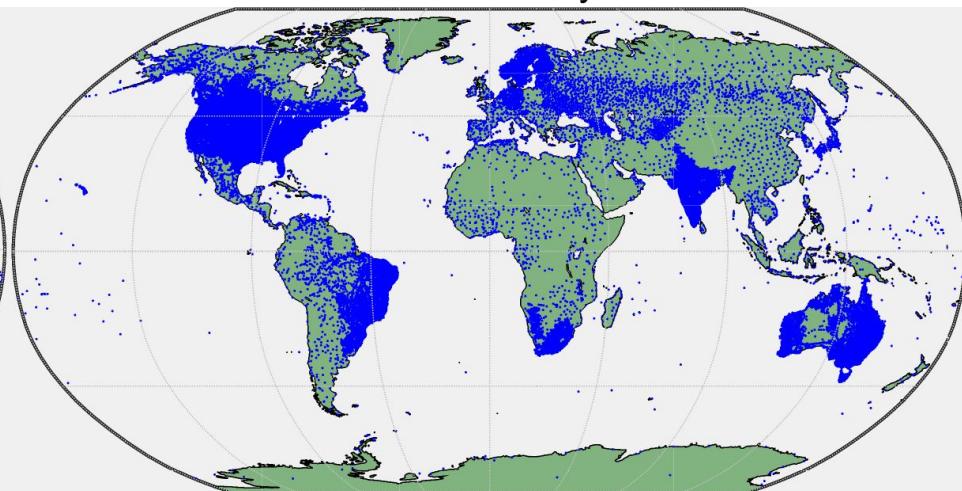


# Available stations in some data archives

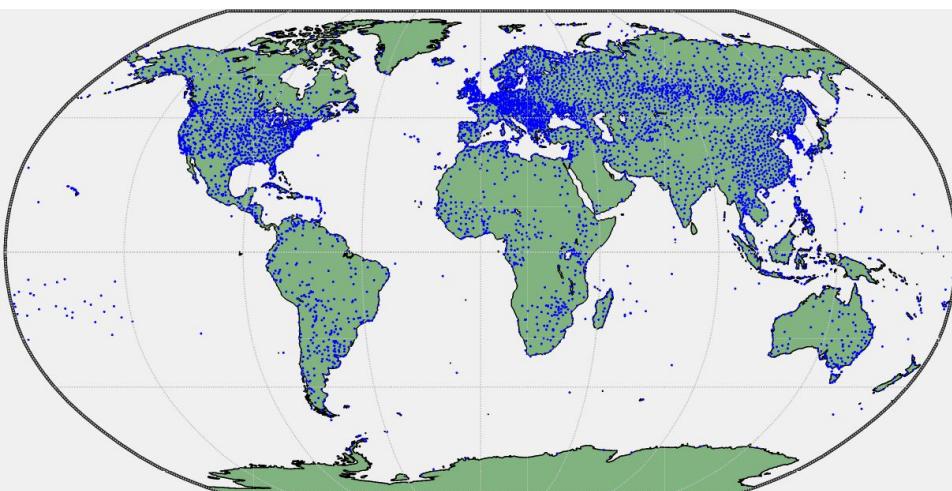
GPCC



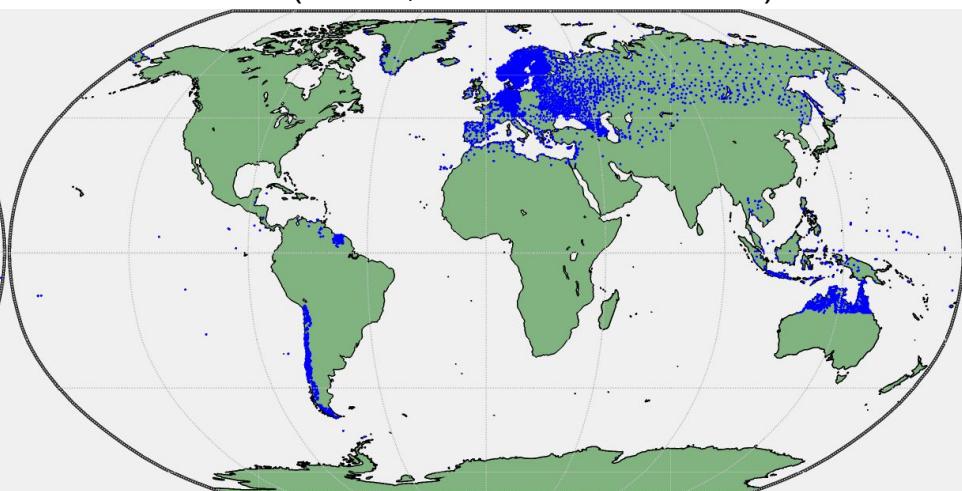
GHCN Daily



HADISD



ICAD (ECAD, LACAD and SACAD)



Figures thanks to Zak Baillie



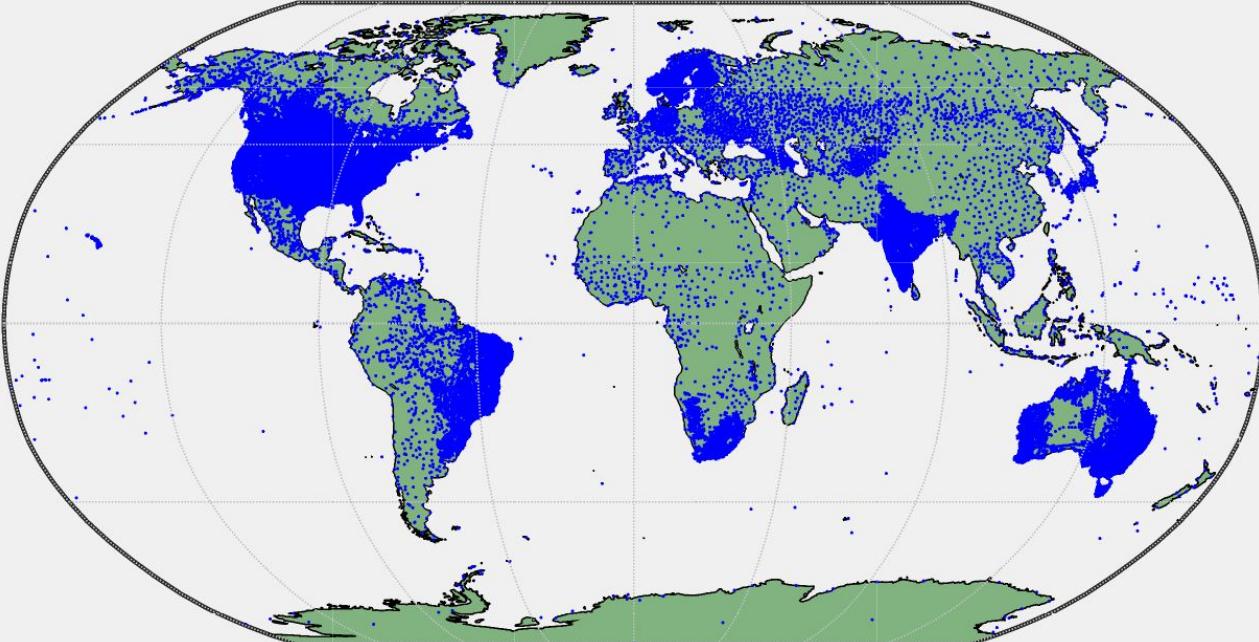
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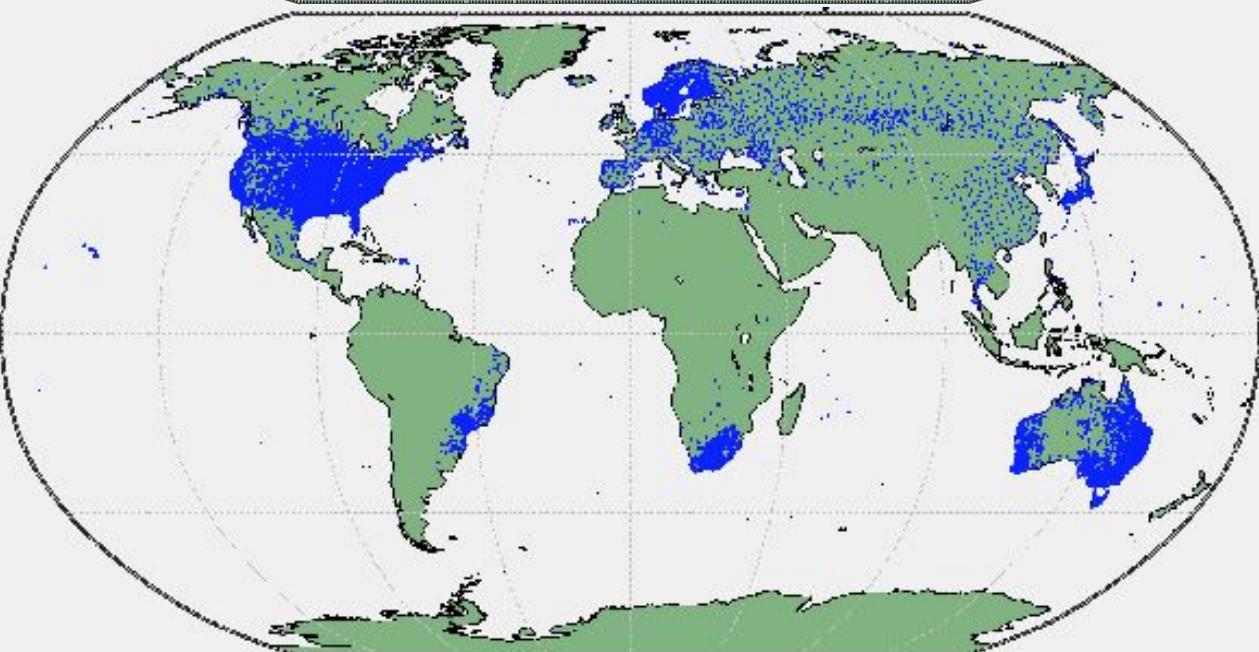
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Full Data Set



Long Term  
Stations Only



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# Current and Future Work

- Run automated QC programs from NCEI (NOAA) on GPCC data
- Add any observations from other data archives that are not in GPCC to increase density
- Interpolate using Ordinary block Kriging
- Provide robust uncertainty estimates



# Thank You



# Global daily precipitation data requirements

- Long term observations
- Gridded using a reliable interpolation scheme
- Based on a dense high quality station network



# Conclusions

- Changes in precipitation extremes limited by uncertainty and availability of observations
- Gridded daily precipitation data set with reliable uncertainty estimates would enable better understanding of past changes
- Better model evaluation leading to improved projections