Quantifying Weather & Climate Impacts on health in developing countries

Changes in precipitation over Ghana for last 50 years: Assessment of the ability of various dataset to reproduce the observed variability and changes

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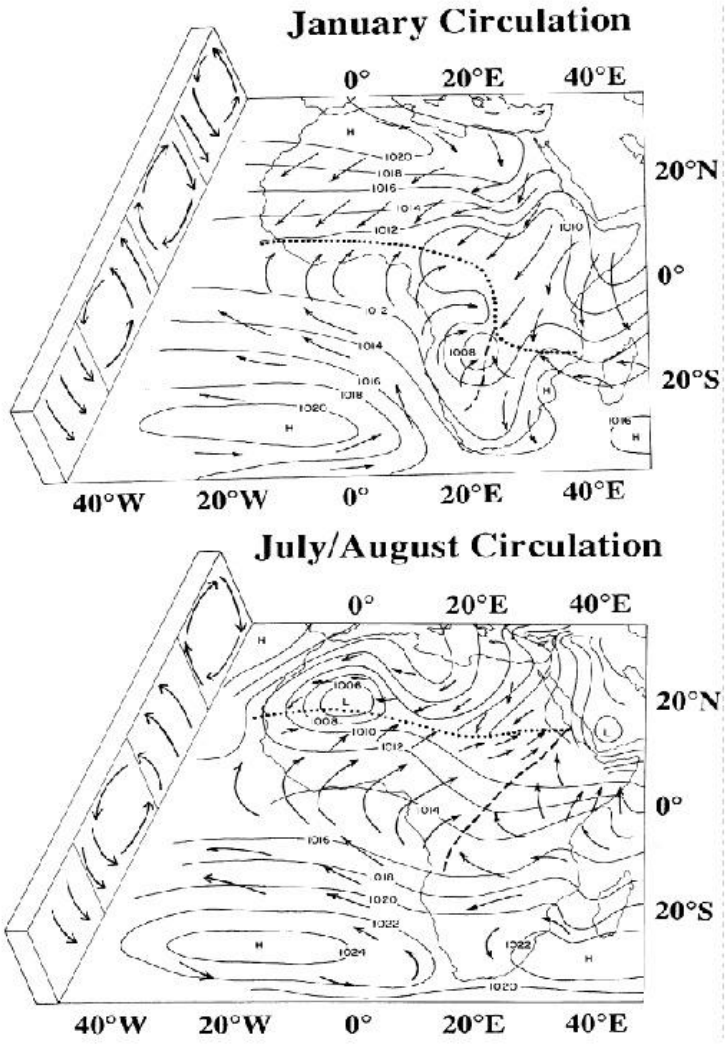
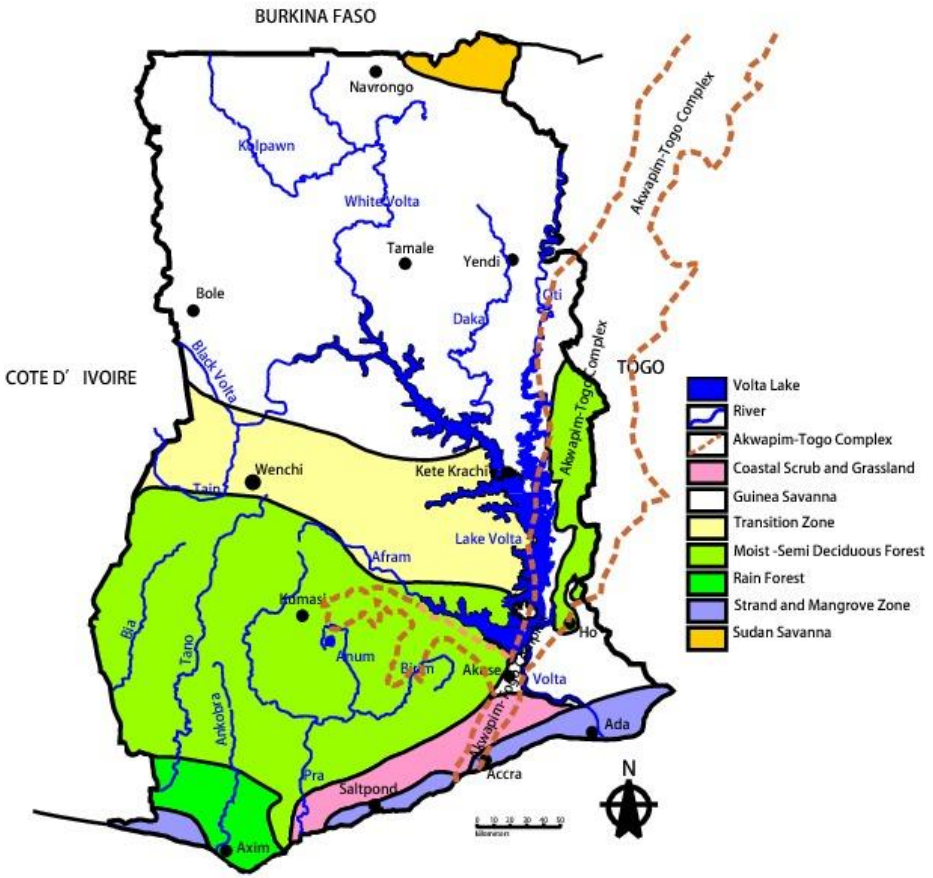
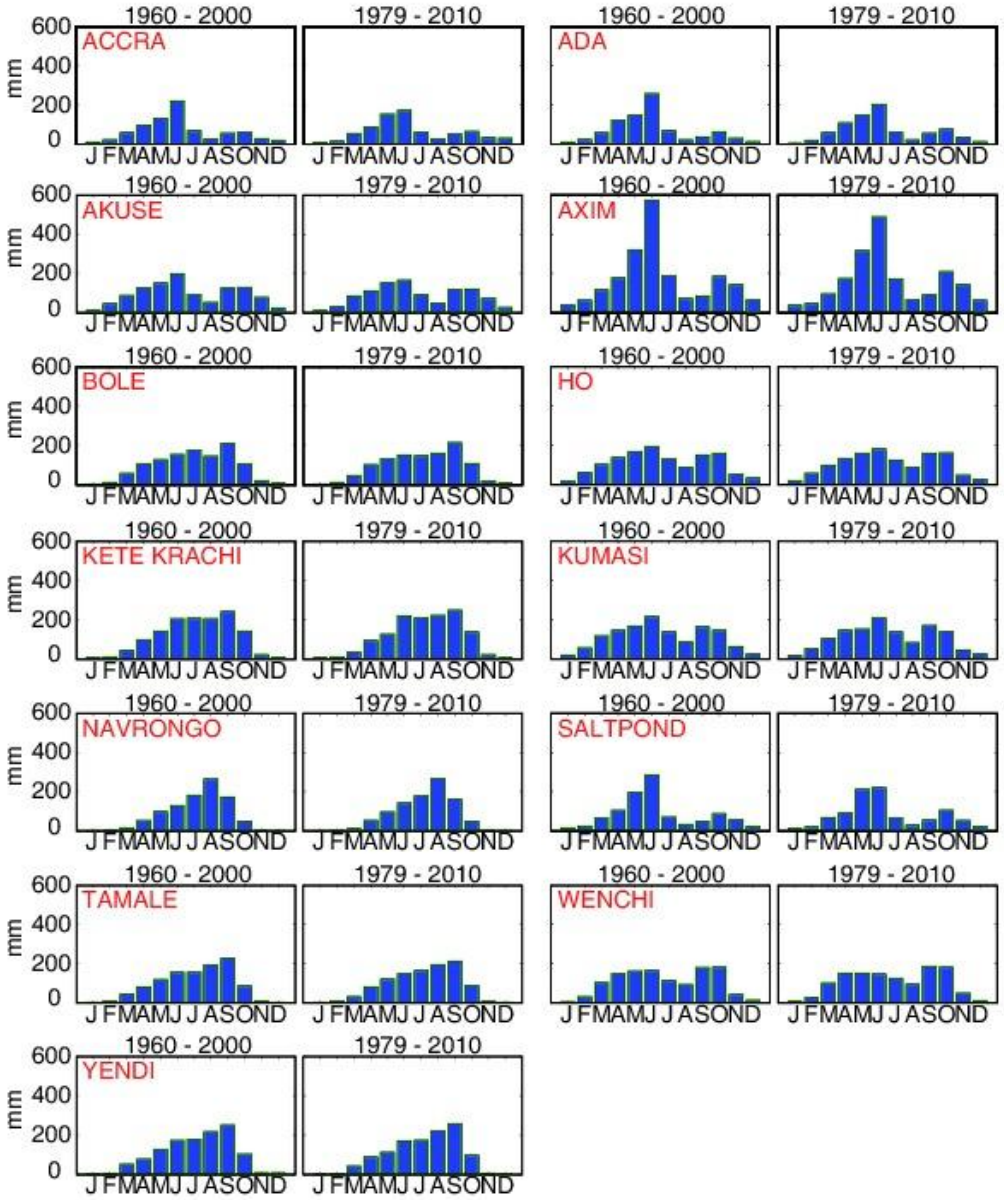
Introduction





An idealized general circulation patterns of winds, pressure and convergence over Africa, with focus on West Africa. Dotted lines indicate the ITCZ

Rainfall Climatology for Ghana



Data source and Methodology

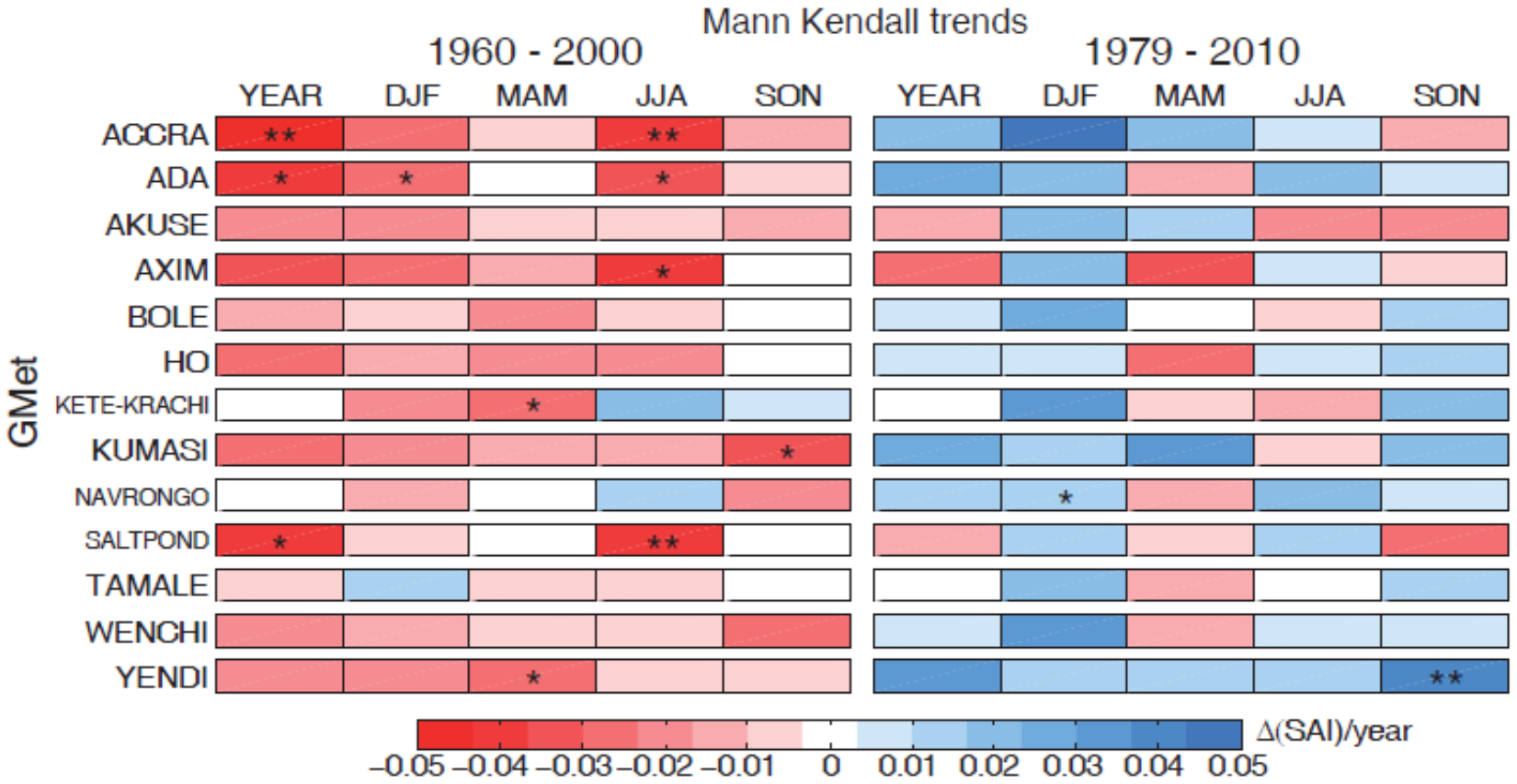
Data Source

- Gmet rain gauge data (1960-2010) for 13 stations
- Reanalysis data: ERA-40, ERA-interim, NCEP
- Gridded data: VASclimO and GPCP

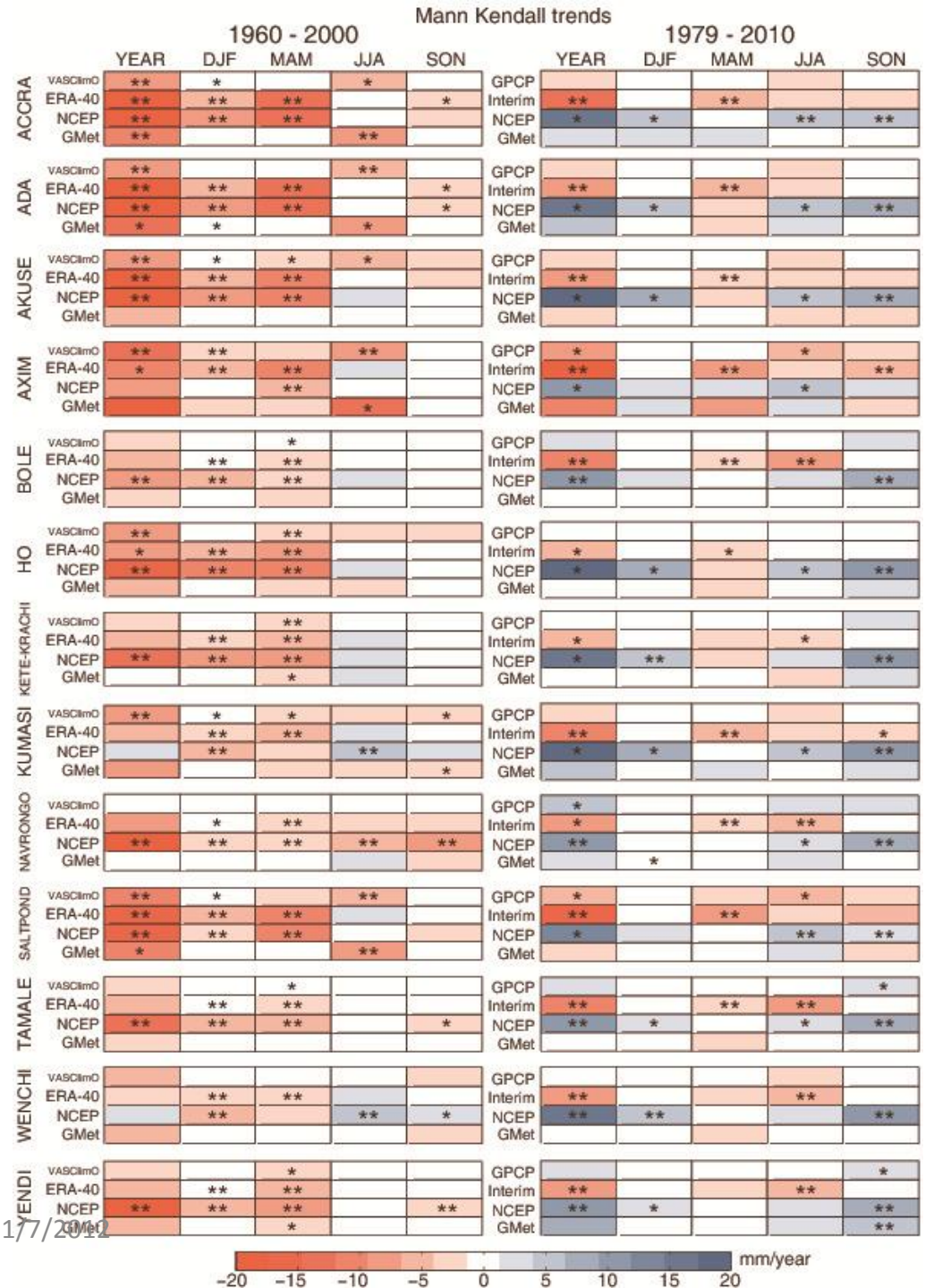
Methodology

- Mann Kendall trend analysis was carried out on each station data at 1% and 5% significant levels
- Reanalysis and grided datasets were bi-linearly
- interpolated to GMet guage sites
- The rainfall trend were calculated from monthly accumulated precipitation and anomaly index other datasets at 1% and 5% significant levels
- The correlation coefficient, the relative mean bias and RMSE of the biases determined.

Results

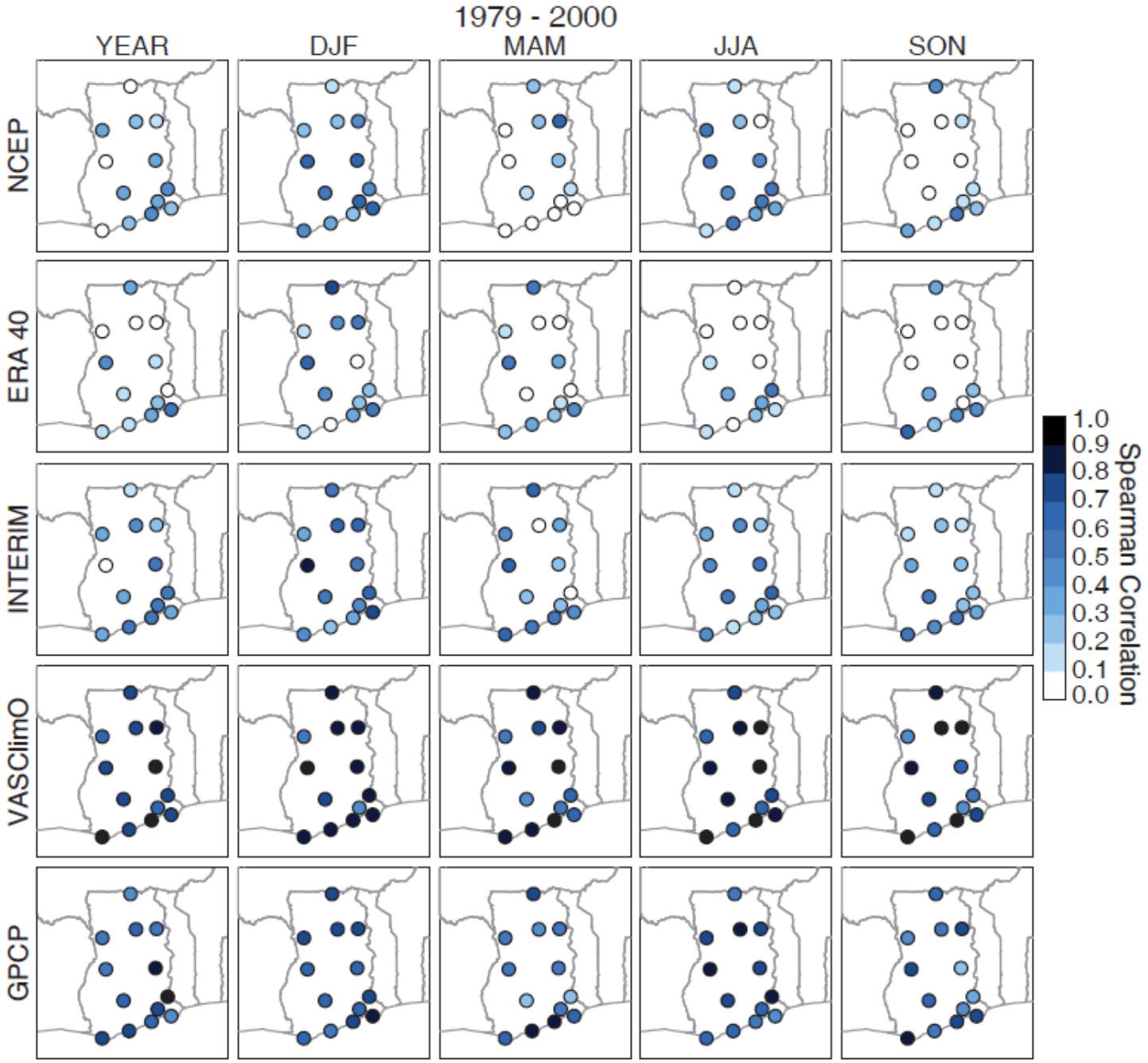


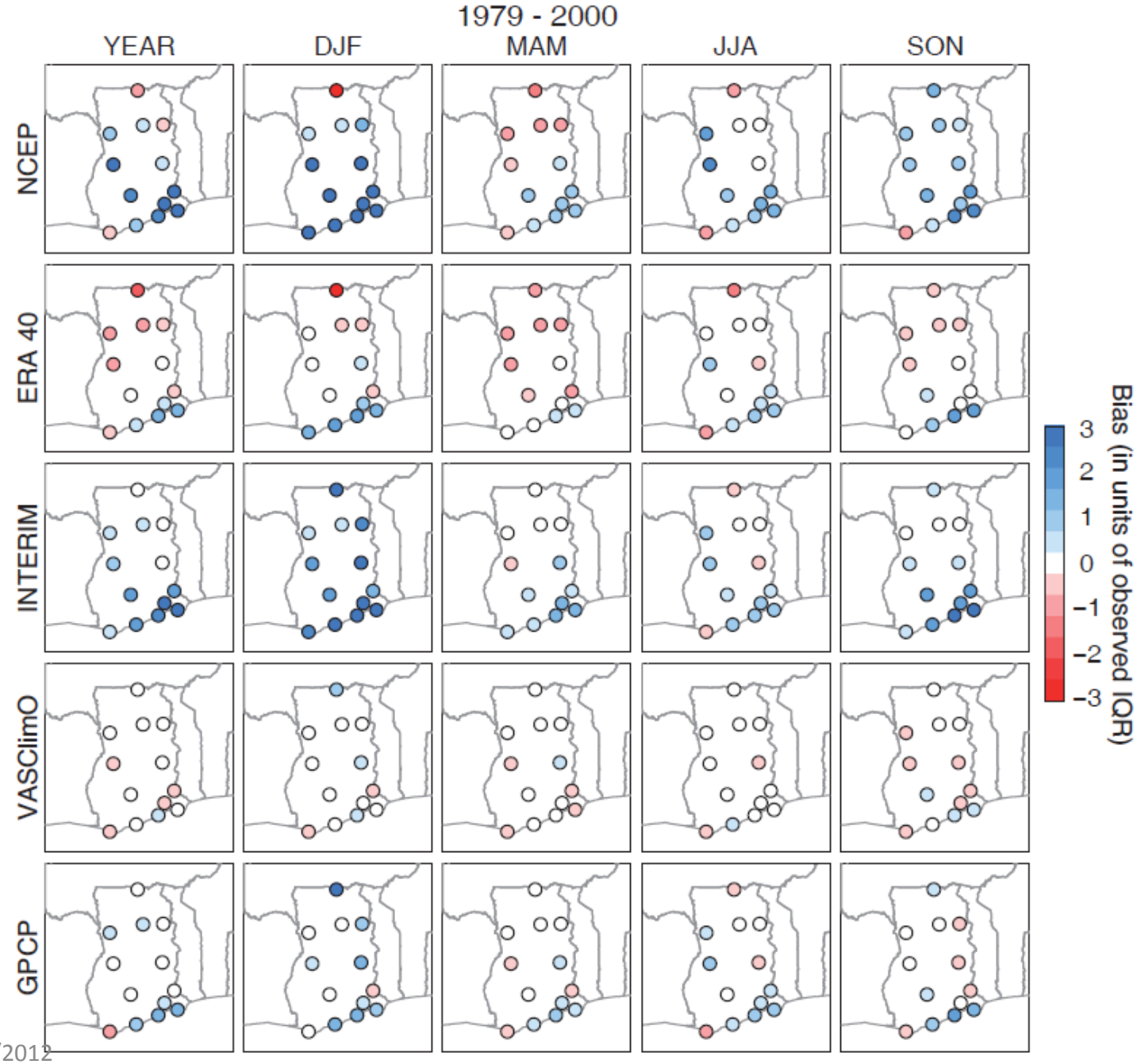
Mann Kendal trend analysis no standard anomaly index (SAI)
(*) trend at 95% confidence level and (**) trend at 99% confidence level

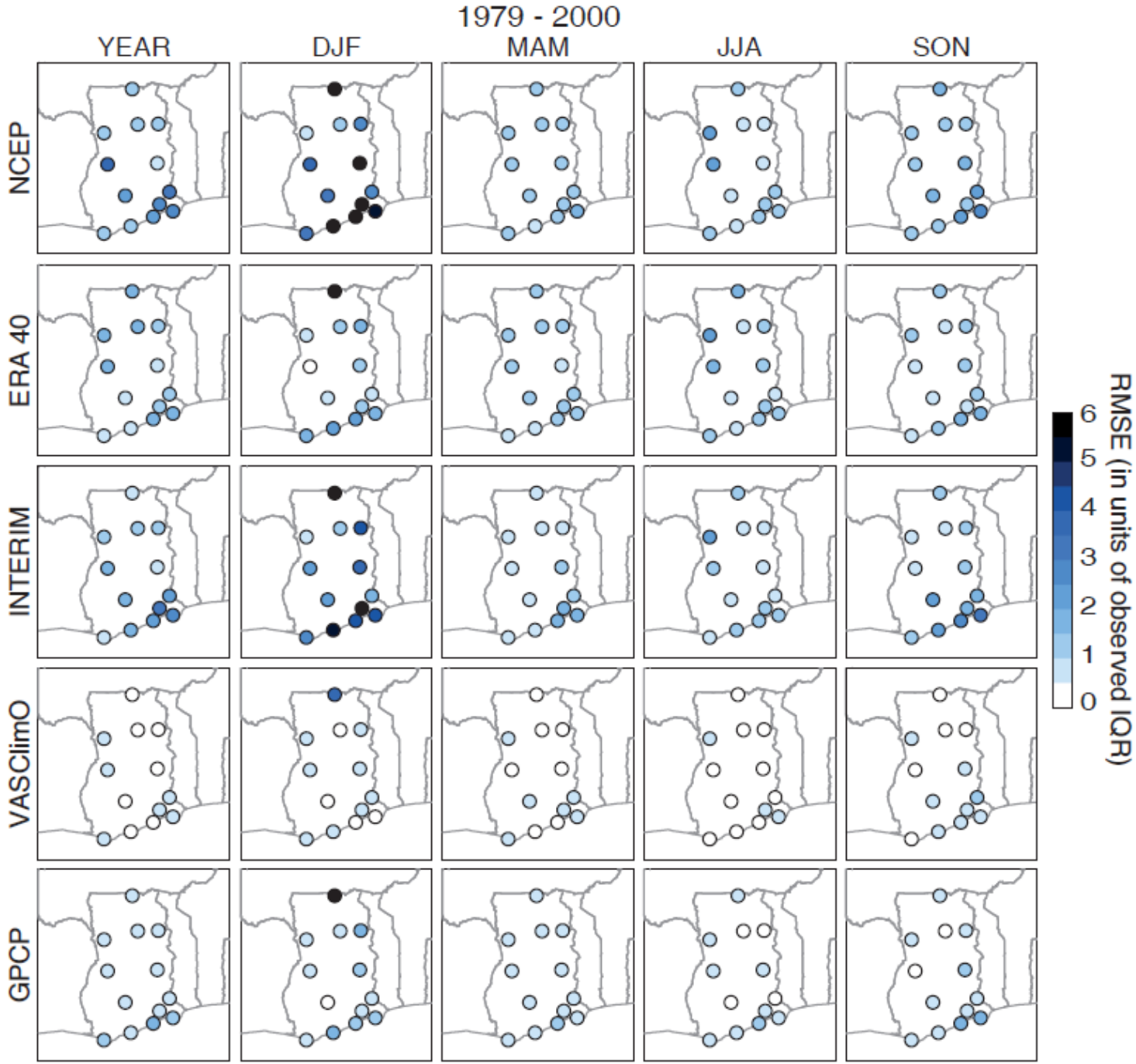


(*) trend at 95% confidence level

(**) trend at 99% confidence level


1979 - 2000
YEAR
DJF
MAM
JJA
SON
NCEP
ERA 40
INTERIM
VASClimO
GPCP
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
Spearman Correlation


1979 - 2000
YEAR
DJF
MAM
JJA
SON
NCEP
ERA 40
INTERIM
VASClimO
GPCP
Bias (in units of observed IQR)
3
2
1
0
−1
−2
−3


1979 - 2000
YEAR
DJF
MAM
JJA
SON
NCEP
ERA 40
INTERIM
VASClimO
GPCP
RMSE (in units of observed IQR)
6
5
4
3
2
1
0

Conclusions

- Generally, there is a decreasing trend in rainfall in the South of the country but weaker trend in the North over the period 1960 – 2000
- Reanalysis dataset mostly showed positive trend for the period 1979 – 2010
- VASClimO and GPCP dataset had very good and consistent agreement with GMet with Spearman correlation in the range of 0.7 - 1.0, bias in the range of -0.5 and +0.5
- Poor correlation, with larger bias and RMSE are observed for Reanalysis data (NCEP, ERA-40, and ERA-Interim) comparisons.
- Gridded datasets are more reliable for impact studies