climate

Supplementary Material:

Tanzania has 7 stations (Figure S1) distributed across 885,800 km² of its land area [Tanzania National Bureau of Statistics, 2018] with less than 365 observations/year recorded by each station (Figure S2). The number of observations for precipitation since the 1980s has declined dramatically (Figure S2). Stations and land-based measurements in Tanzania are disproportionately located in the northeast (Figure S1), placing more confidence in results for this region than other areas of the country. The more inhomogeneous the network, the harder it is to detect extreme climate events across the field of interest [Lovejoy et al., 1986; Guentchev et al., 2010; Hofstra et al., 2010]. Interpolation would be least reliable in southern and western Tanzania where stations and observations are minimum (Figure S1), contrary to the uniform model grids. However, comparison of various precipitation datasets and their ensemble mean produce a statistically significant decreasing MAM precipitation trend for Tanzania that is consistent with the observed decrease in East African long rains in recent years (Figure S3). This decline is stronger for CMAP and GPCP precipitation data that include various satellite estimates and gauge data (Figure S3).

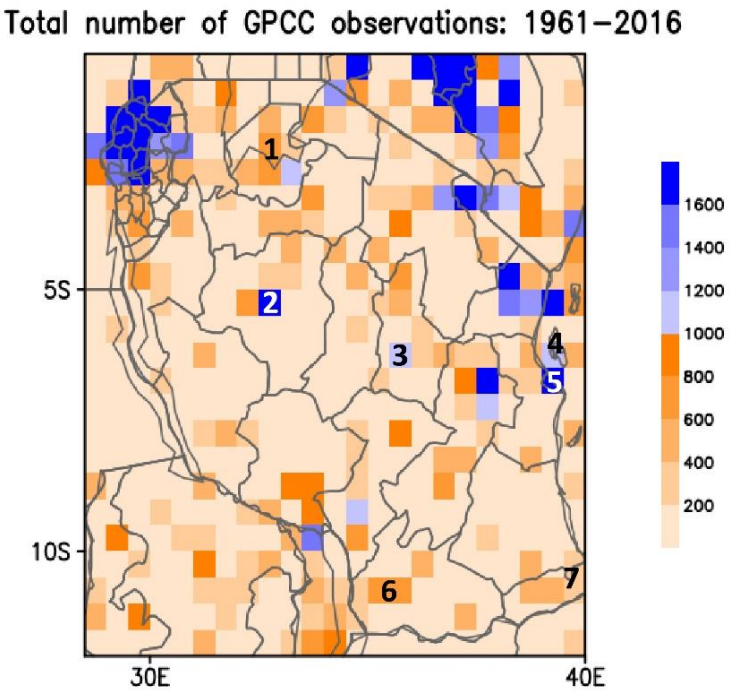

Figure S1. Map of Tanzania showing the number of stations and observations from 1961 to 2016.

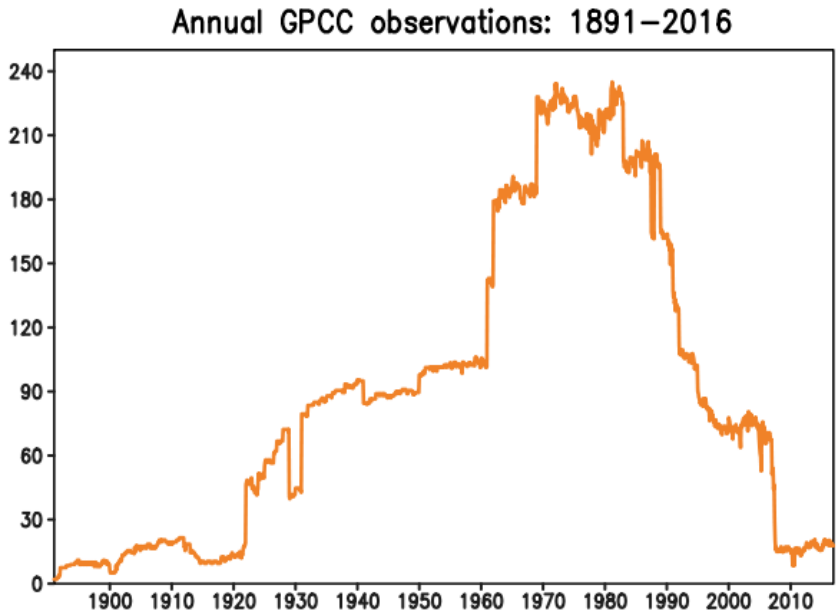

Figure S2. Graph showing the number of observations per year in Tanzania since 1891. A sharp decline in observations occurs after 1980.

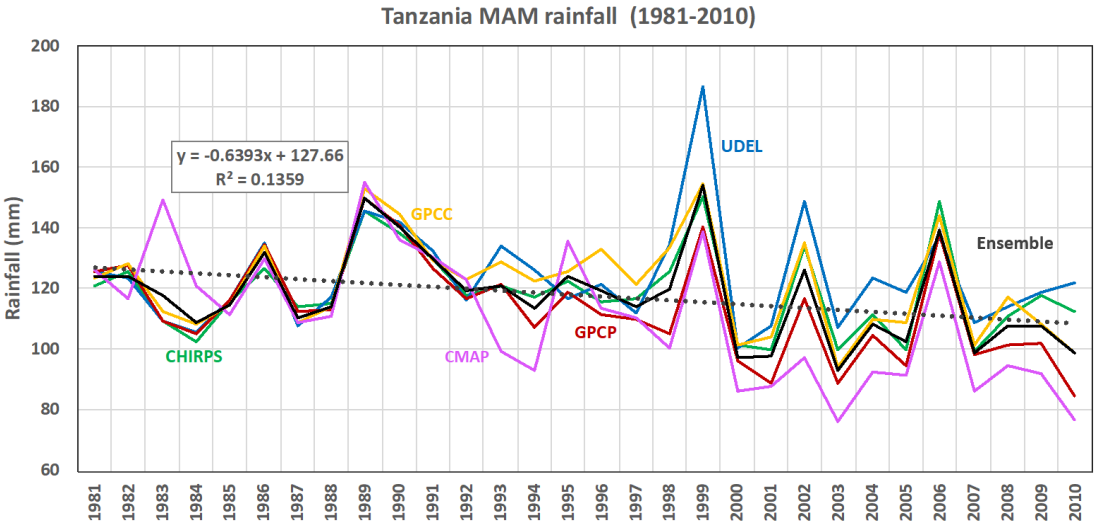

Figure S3. MAM precipitation series from different datasets and their ensemble mean averaged over Tanzania (2–12S, 30–40E). Trend formula was derived from the ensemble mean. Tanzania experiences maximum rainfall during the 'long rains' season in MAM. All datasets show a decreasing precipitation trend in recent decades. GPCP and CMAP data are obtained from satellite estimates and gauge data, and show a stronger declining trend.

References:

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2. Lovejoy, S.; Schertzer, D.; Ladoy, P. Fractal characterization of inhomogeneous geophysical measuring networks. *Nature* **1986**, *319*, 43–44, doi:10.1038/319043a0.
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