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Figures S1 to S4.

Introduction

This Supporting Information contains additional figures referred to in the body of the text. The methods used to generate them are the same as outlined in the paper.

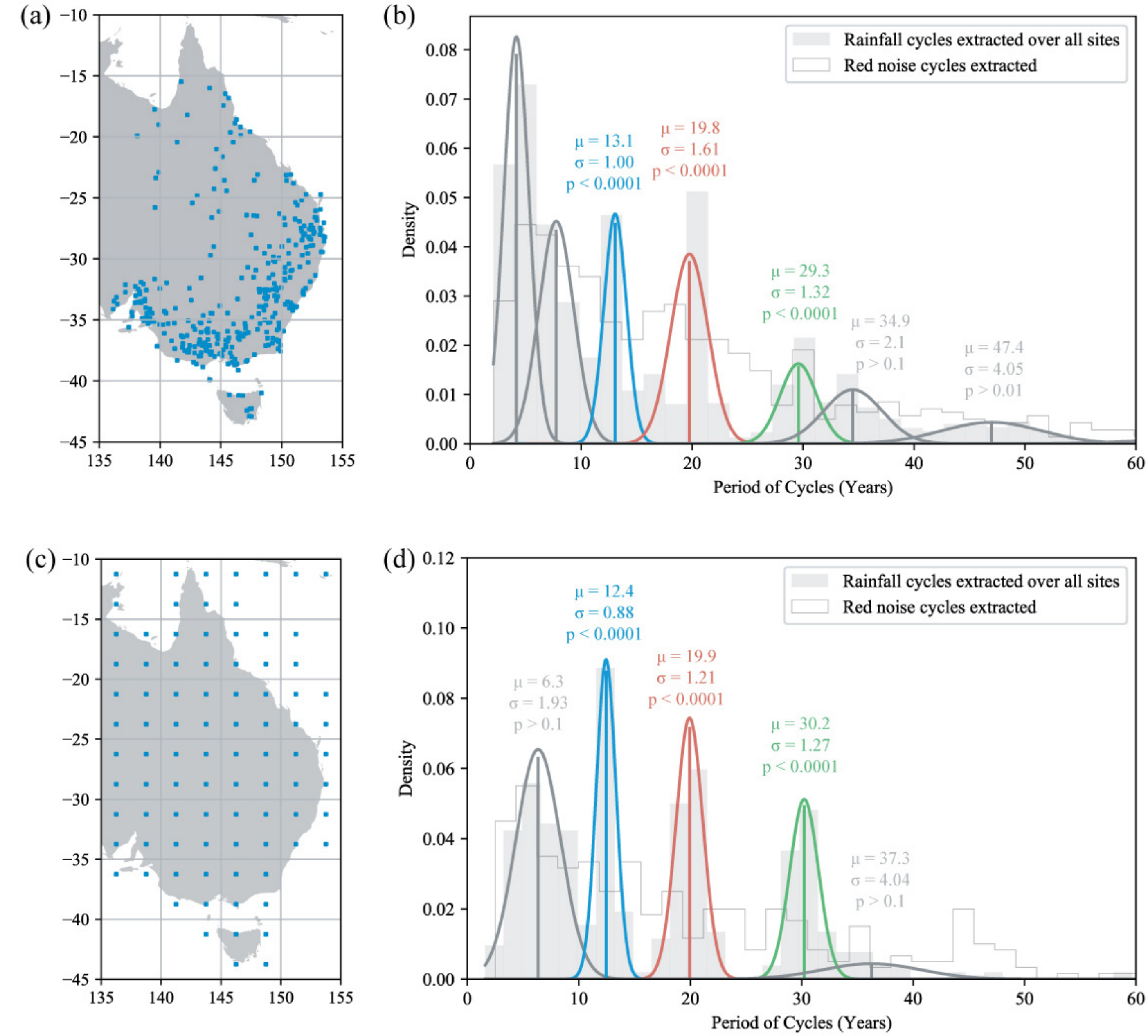

Figure S1. Comparison of the GCWAPS method using the SILO gauged station data and the GPCC2022 gridded dataset. (**a**) Gauge locations for 347 stations in the SILO dataset used in Selkirk et al (2025). (**b**) GMM clustering of cycles with significance over red noise by t-test using SILO data. (**c**) 89 grid points in the GPCC2022 dataset restricted to the area of eastern Australia. (**d**) GMM clustering cycles with significance over red noise for the gridded dataset. The comparison shows moving to the gridded dataset has enhanced the clarity of the cycles over eastern Australia rather than diluting them.

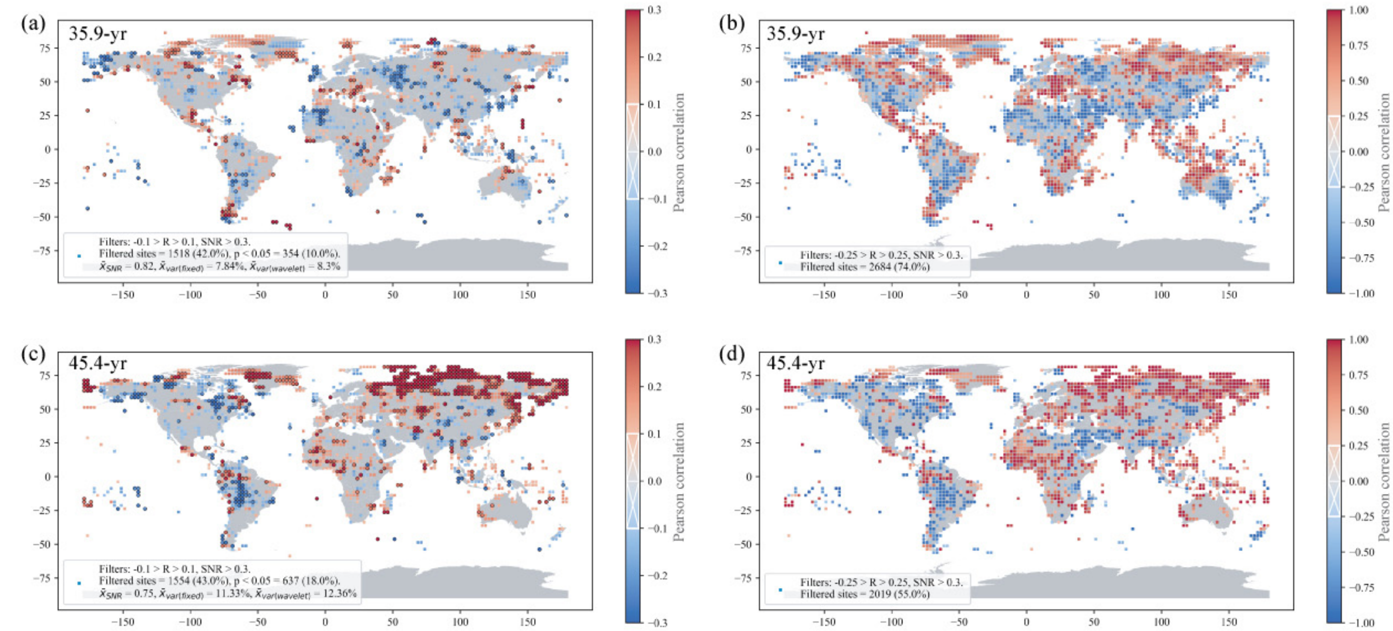

Figure S2. Global distributions of the 35.9-year and 45.4-year cycles. (**a**) The 35.9-year cycle shows a similar percentage of significant sites to the other cycles (~10%) though far less spatial coherence. (**b**) More clustering can be seen in phase alignment, particularly in Australia and the Arctic, though the signal is very weak. (**c**) The 45.4 year cycle shows a large area of significant clustering in the Arctic region of Russia with the highest percentage of significant sites of all the GRCs (18%). (**d**) More in-phase regions become apparent in the Americas and Africa.

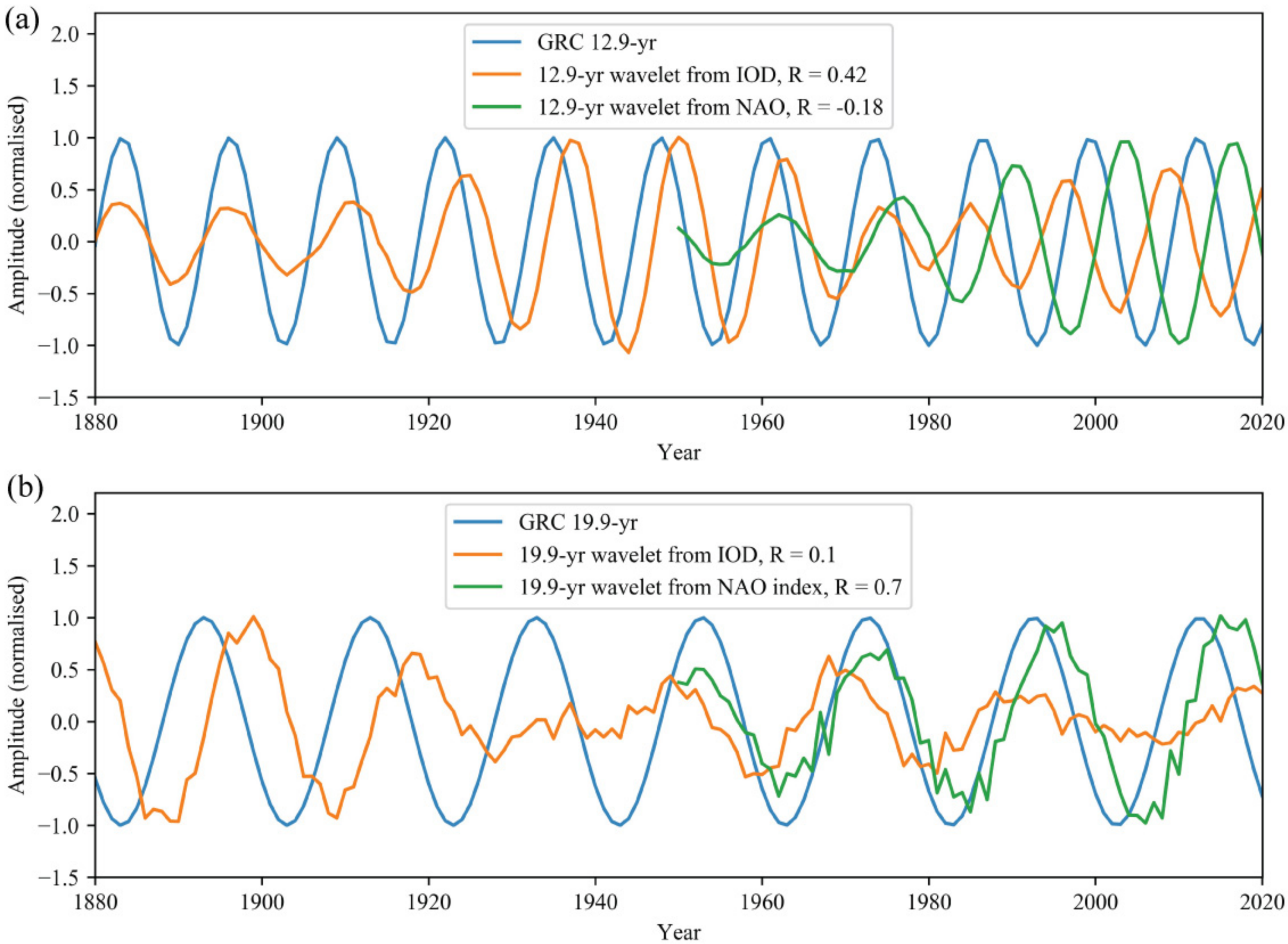

Figure S3. Comparison of the phase alignment of the 12.9- and 19.9-year GRCs (blue) to the IOD and NAO climate modes. (**a**) Neither the IOD or NAO show strong phase or period alignment to the 12.9-year GRC, though they both have cycles in that region (11.5-year and 13.3-year respectively). (**b**) The IOD has a 17.3-year cycle but it shows no relationship to the 19.9-year GRC, the 21.6-year cycle in NAO shows some potential, but the signal is very weak, and the data set only covers from 1950 onwards. and even in that limited window it appears to be shifting out of alignment.

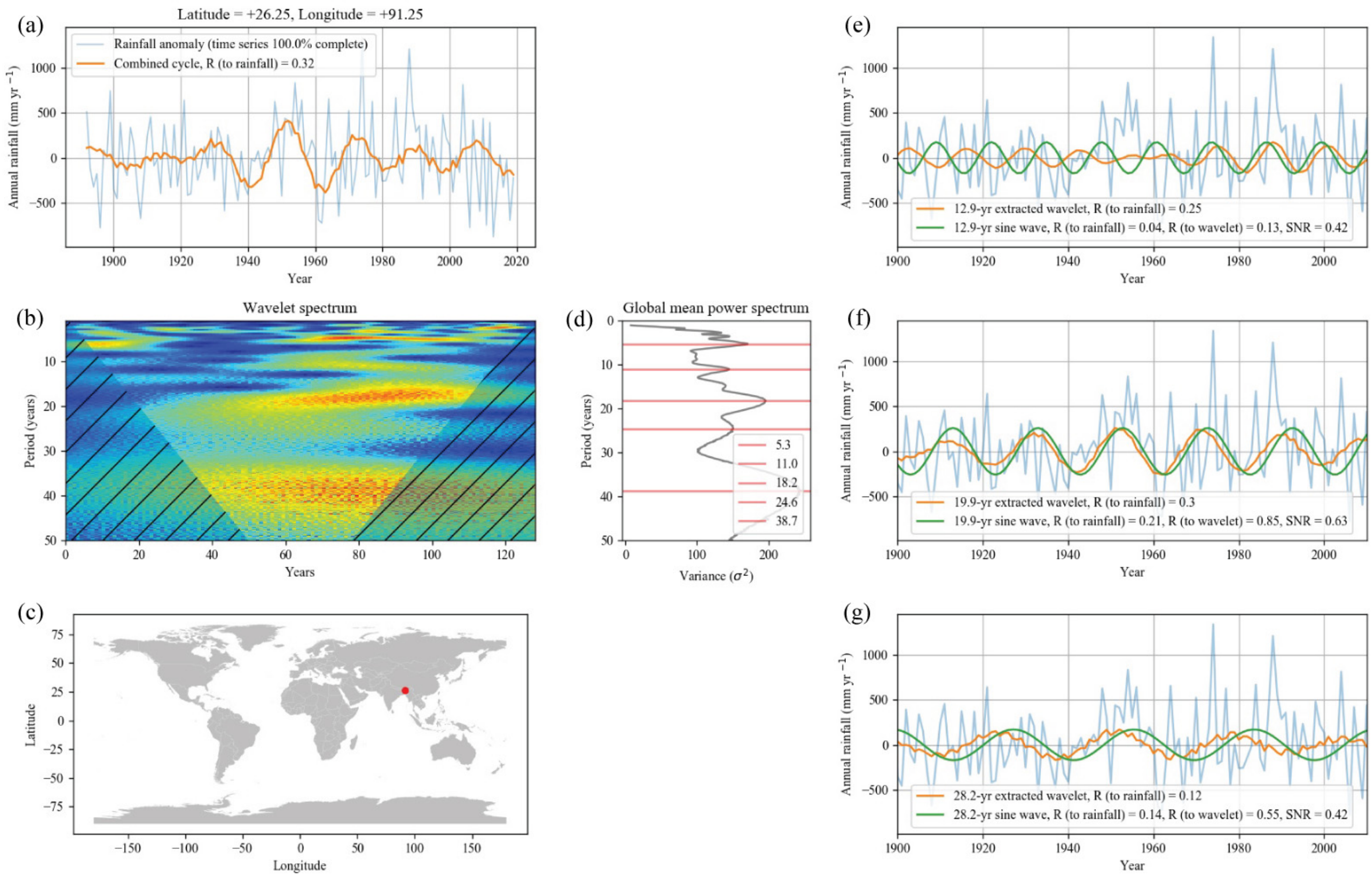

Figure S4. Individual site analysis of the closest data point to the study by Mirta and Dutta (1992) which found evidence of the 18.6-year LNC in the Assan macro region of India. (**a**) Combined reconstruction of the 12.9-, 19.9- and 28.2-year cycles showing marked constructive interference between 1940 and 1980. (**b**) The wavelet spectrum of annual rainfall. (**c**) The location of the grid point. (**d**) The GMPS shows a high baseline across the entire spectrum, indicating difficulty in isolating individual cycles due to noisy data. (**e**) The 12.9-year cycle falls out of alignment and is not significant at this site. (**f**) The 19.9-year wavelet shows a high correlation to the GRC (R=0.85), though a reasonably weak influence on rainfall (R=0.21, SNR=0.63), it remains in phase over the whole period, unlike the 18.6-year cycle which required a phase inversion.