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## Identification of a change in climate state using regional flood data

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**Abstract.** Flood frequency analysis typically assumes that annual floods arise from a single distribution and are independent. However, there is significant evidence for the existence of persistent climate modes.

Timescales associated with climate variability range from inter-annual through to longer, multi-decadal time scales. In the case of the Australian climate, previous studies of the Indian and Pacific Oceans have indicated marked multi-decadal variability in both mean Sea Surface Temperatures (SST) and typical circulation patterns. In this light, data from 40 stream gauges around New South Wales are examined to determine whether flood frequency data are indeed independent and distributed identically. Given likely correlation in flood records between gauges, an assessment of the regional significance of observed changes in flood frequency is required. To achieve this, flood observations are aggregated into a regional index. A simple non-parametric test is then employed to identify the timing and magnitude of any change in mean annual flood. Finally, it is shown that the identified change in flood frequency corresponds directly to an observed shift in SST and mean circulation. These results demonstrate the role of natural variability in climate parameters and the need for an improved conceptual framework for flood frequency estimation.

**Keywords:** Floods, flood frequency, climate variability, IPO, PDO, climate change

[Final Revised Paper](#) (PDF, 588 KB)

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