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# Early-nineteenth century southern African precipitation reconstructions from ships' logbooks

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The early nineteenth century in southern Africa represents a significant period from a climatological and societal perspective. Climatic reconstructions are needed both to enhance understanding of climate variability in the pre-instrumental period, and to deepen the discussion on its potential role in past societal dynamics. While the limited palaeoclimate data in the region presents problems, climatological information from ships' logbooks are a promising source for such reconstructions. Here, we present findings from a new methodology which uses the early marine instrumental pressure and wind observations in the logbooks of the English East India Company (1789-1834) to reconstruct land-based precipitation. To allow for statistical reconstruction using the logbooks, we first analyse the relationship between the oceanic surface pressure and wind predictor variables and southern African station precipitation in a calibration period of 1979-2008. For this we correlate reanalysis (from both the NOAA 20th-Century Reanalysis and NCEP-R2 datasets) seasonal mean surface pressure and wind data with seasonal mean station precipitation. Correlations show low sea-level pressure in the adjacent South Atlantic Ocean, an area which coincides with the ship's routes, to be particularly important for precipitation across the region during summer. We then use principal component analysis on the reanalysis data in these gridded areas of significant correlations to isolate specific oceanic areas on which to base the reconstructions. Subsequently, using multiple regression, we apply the statistical relationship derived from the calibration period to the reconstruction period to obtain summer rainfall season precipitation reconstructions for selected parts of southern Africa between 1800-1833. The outcomes of this research not only represent a semi-instrumental source to better understand the spatial and temporal nature of climate variability during those societally critical decades, but also provides an example of a new and potentially more widely applicable methodology in historical climatology.