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Pacific SST influence on spring precipitation in Addis Ababa, Ethiopia

J.M. Eden (1), M. Widmann (1), and G.R. Evans (2)

(1) University of Birmingham, School of Geography, Earth and Environmental Sciences, Birmingham, United Kingdom (j.m.eden@bham.ac.uk), (2) National Oceanography Centre, University of Southampton, Southampton, UK

Recent periods of drought in Ethiopia and other parts of East Africa have highlighted the growing importance of producing reliable forecasts of seasonal precipitation. Key in deriving such forecasts is a good understanding of the atmospheric and oceanic drivers of different precipitation regimes. In Ethiopia and other parts of East Africa, interannual variability of precipitation depends on variations in sea surface temperature (SST) and atmospheric circulation on both regional and global scales. Links between summer precipitation in Ethiopia and large-scale modes of climate variability such as ENSO have previously been established but the influence of global SST on spring precipitation has not yet been fully explored. Here, we analyse the links between Pacific SST and precipitation in Addis Ababa, Ethiopia for a century-long period (1900-2004). A tripole correlation pattern between spring precipitation and SST in the Pacific basin is found. We develop regression-based models to estimate spring precipitation from Pacific SST with a lead time of 2-3 months. When subject to cross-validation, models based on principal component multiple linear regression (PC-MLR) calibrated on Pacific SST during December show substantial skill in reproducing observed temporal variability in Addis Ababa precipitation during February (r = 0.48) and March (r = 0.40), and the period spanning February to April (r = 0.44). Our findings suggest that the inclusion of Pacific SST in predictive models may benefit drought forecasting across Ethiopia.