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Title: Predictability of December-April Rainfall in Coastal and Andean Ecuador
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Abstract:
In Ecuador, forecasts of seasonal total rainfall could mitigate both flooding and drought disasters through warning systems if issued at a useful lead time. Ecuador rainfall from December to April contributes most of the annual total, and it is crucial to agricultural and water storage operations. This study examines the predictive skill for the February-April (FMA) and December-February (DJF) seasonal rainfall total using statistical and dynamical approaches. Fields of preceding observed sea surface temperature (SST) are used as predictors for a purely statistical prediction, and predictions of an atmospheric general circulation model (AGCM) are used as predictors with a model output statistics (MOS) correction design using canonical correlation analysis.

For both periods, results indicate considerable predictive skill in some, but not all, portions of the Andean and coastal regions, with coastal areas showing higher average skill. The skill of the SST and AGCM predictor variables comes mainly through skillful seasonal rainfall anomaly forecasts during significant ENSO events. Atlantic SST plays an apparently weaker predictive role. For the simultaneous diagnostic, high skill is obtained using the eastern Pacific Ocean domain, while for time-lagged forecasts high scores are found using the global tropical ocean domain. This finding suggests that while eastern Pacific SST is what matters most to Ecuador rainfall, at sufficient lead time these local SSTs become most effectively predicted using basin-wide ENSO predictors.

In Ecuador’s coastal region, and to a lesser extent in the Andean highlands, skill levels are sufficient for warning systems to be able to reduce economic losses associated with flood and drought. Accordingly, INAMHI issues forecasts using methods described here each month, which are also being implemented by an increasing number of countries of the Latin American Observatory partnership, among other South American international organizations.

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