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10- Year Eta Model Seasonal Forecast Climatology over South America

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Seasonal forecast for South America using the Eta Model has been run monthly since 2002 at CPTEC. A new version of the Eta Model, including the introduction of piecewise-linear vertical advection of dynamic variables; vapor and hydrometeor loading in the hydrostatic equation, and changes aimed at refining the convection schemes available in the Eta, was developed to carried out seasonal forecast. At longer integration model tend to show some drifts and systematic errors. To identify these errors and evaluate model ability to capture inter-annual variability, model climatology was built based on 10-year seasonal runs. This climatology can be later used to extract the anomaly from the seasonal forecasts. Some users of these climate products tend to use the signal of the predicted anomaly.

An ensemble technique was used to construct this climatology. There are two major sources of uncertainties in numerical prediction: uncertainties in the initial conditions and in model equations. Ensemble approach incorporates these uncertainties in the forecasts in order to improve them. The Eta Model was configured, with 40-km horizontal resolution and 38 layers, to cover a domain which includes South America, most of Central America and South Atlantic Ocean. The model was carried out using 5 different initial and lateral conditions provided by CPTEC T062L28 GCM and updated every 6 hours. Anomaly persisted sea surface temperature was daily updated during the integration. Soil moisture was initialized from a monthly mean data and the seasonal climatology of albedo was used.

The model was run for the years 2001 until 2010. The forecast length time was 4.5 months. The monthly forecasts were evaluated. Results are shown for two seasons: December-January-February (DJF) and June-July-August (JJA), which are the rainy and dry seasons, respectively, over most of South America. The systematic errors of the regional Eta model were identified. The interanual variability was verified. In general, the pattern of the 10-year model climatology of precipitation compared reasonably well with surface observation.