



## **The onset of the rainy season in Western-Central Brazil simulated by Global Eta Framework model**

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The seasonal cycle of precipitation in tropical South America is determined by monsoon system present in this region. Well defined wet season during austral summer (December-February, DJF) and dry season during austral winter (June-August, JJA) represent the typical precipitation pattern. The period of transition from dry to wet season occurs in austral spring (September-November, SON) when intense convection from northwestern South America rapidly shifts southward to the southern Amazon Basin and Western-Central Brazil (WCB) in October and further to the southeast of Brazil in November. The objective of this study is to evaluate the skill of Global Eta Framework (GEF), a global atmospheric model at 25-km horizontal resolution, to simulate the onset of the rainy season in WCB region in a 5-member ensemble seasonal integration for the years 2011 and 2013. GEF is a global atmospheric model on cubed-sphere grid, constructed as a combination of the technique of quasi-uniform gridding of the sphere and the numerical structure of the regional Eta model. Six regional models, interconnected through the cubed-sphere framework are integrated simultaneously, one on each side of the cube, to provide a global coverage and to create unique “globalized” version of the regional Eta model. Comparative assessment of daily means of global predicted fields against appropriate reanalysis and observations for the period SON indicates high level of agreement, both in spatial distribution and intensity for most of the variables. The lowest skill is shown for precipitation, which is overestimated over some tropical oceanic regions and underestimated over tropical continental regions, including South America. Other fields, evaluated at different levels include 200-hPa wind from upper-troposphere, 500-hPa geopotential height from mid-troposphere, 850-hPa temperature and wind representing lower-troposphere and mean sea level pressure (MSLP) at the surface. The onset of the rainy season in observed data is determined using methods based on precipitation and outgoing longwave radiation (OLR). Comparison of 5-day averaged values (pentads) of precipitation and OLR of the members of ensemble and ensemble mean against corresponding observed data proves the ability of GEF model to successfully reproduce typical pattern of transition from dry to wet season in WCB region almost in the same pentad determined by both methods. However, most of ensemble members tend to underestimate precipitation and overestimate OLR. The computational efficiency of GEF model and the results presented in this study show that continuous efforts in the development of the model can give significant contribution to the improvement of seasonal forecasts at CPTEC/INPE.