INPE ETA CCS experiments: Preliminary results over South America

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INTRODUCTION

The INPE ETA model for Climate Change Simulations (CCS) is a climate version of the ETA model implemented at CPTEC (Fernandez et al., 2006; Pisnitchenko et al., 2006; Tarasova et al. 2006). However, to use this model to assess regional consequences of global climate change is necessary firstly analyzed their present climate simulations. In this study we analyze some characteristic of model performance, namely, correlation of climatological means and biases to identify systematic model errors.

METHODOLOGY

The model was continuously integrated for 5 years (1979-1984), from 00Z of 1 January 1979 till 00Z of 1 January 1984. The resolution of the model is 40 km approximately. Mercator rotated projection was used. The initial and boundary conditions for INPE ETA CCS was provided by NCEP/DOE reanalysis II. Sea surface temperature was obtained by interpolating the monthly averaged values of the Reynolds et al. The monthly climatology of air temperature and precipitation of RCM output was compared with the Climatic Research Unit (CRU) of the University of East Anglia and GPCP data. We have analyze as mean fields near earth surface as time series of averaged over 10 chosen regions which are showed in the Figure 1. The results of analysis is presented in Figures 2-3 and Table 1.

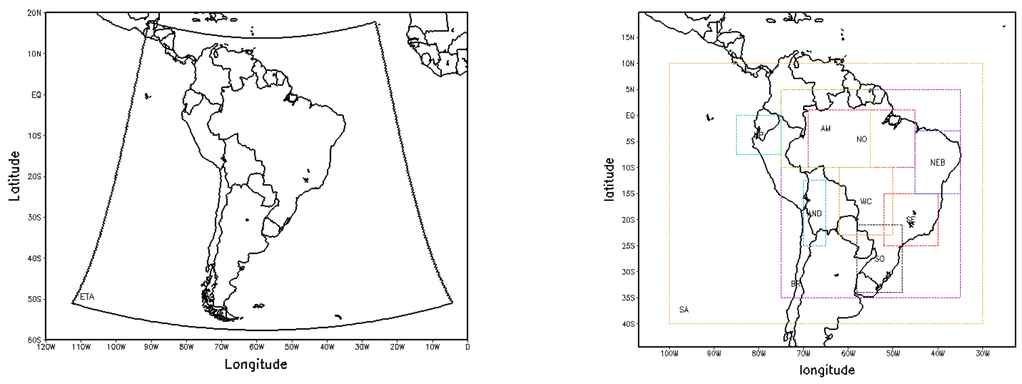

Figure 1 a) Domain of model and b) regions of the South America continent: AM = Amazonas, AND = Andes, NO = north Brazil, NEB = northeast Brazil, NP = north Peru, SE = southeast Brazil, SO = south Brazil, WC = west central Brazil, BR = Brazil, SA = South America.

RESULTS

In this preliminary paper we have analyzed means and interannual variability in a 5 years simulation fort the period 1979-1983 with the INPE ETA CCS drived with the reanalysis data. In general the model, simulates well the spatial patterns of monthly and seasonal rainfall and temperature when compared with observations (GPCP and CRU) (Figure 2 and 3).

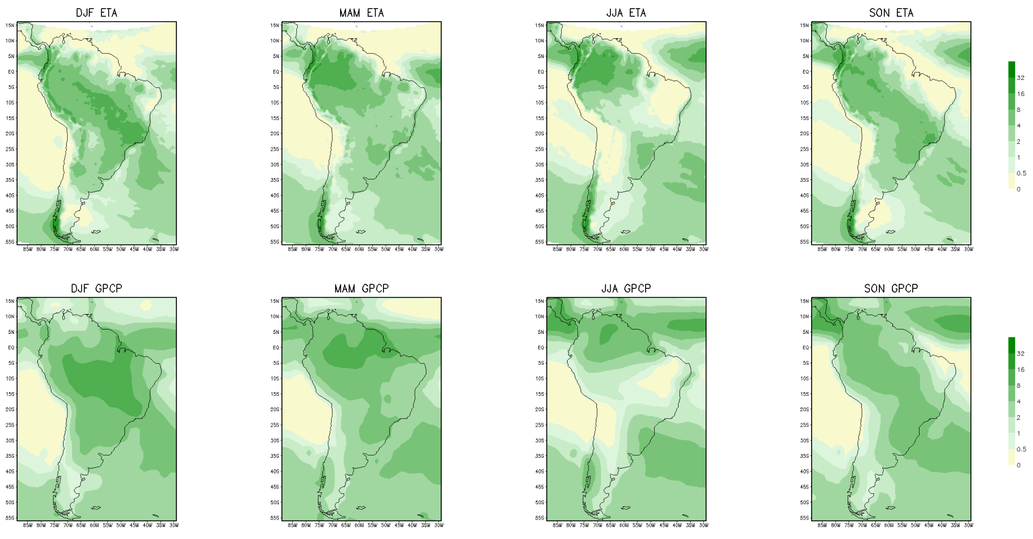

Figure 2 Simulated (ETA) and observed (GPCP) average precipitation for the period 1979-1983. Units: mm day^{-1}. Season are DJF, MAM, JJA and SON.

However, the eta shows a tendency to underestimate precipitation, mainly in the austral summer and transition seasons (DJF) with exception in winter (JJA). The regional seasonal temperature show a positive biases. Also the values of ρ between the simulated and observated data are in general high in almost all the regions (Table 1). Analysis of diurnal cycle of precipitation, energy and water budget will be performed.

Table 1 Correlation coefficient ρ, root mean square error (*rms*) and *bias* simulated by the INPE ETA model CCS

Season	Region	Precipitation (mm day^{-1})			Temperature (^{o}C)		
		ρ	*rms*	*bias*	ρ	*rms*	*bias*
DJF	SO	0.84	1.4	-0.6	0.92	2.8	2.3
	SE	0.72	2.1	0.3	0.71	1.4	0.3
	NEB	0.66	2.6	-2.3	0.66	1.2	0.1
	NO	0.47	4.3	-3.6	0.52	1.9	1.8
	WC	0.86	2.2	-1.8	0.86	2.7	2.4
	BR	0.68	2.8	-1.6	0.91	2.5	1.4
	AM	0.73	2.3	-1.3	0.67	1.8	1.1
	AND	0.67	2.6	-1.4	0.87	3.6	-0.05
	SA	0.73	2.4	-1.1	0.89	2.5	1.1
	NP	0.75	2.8	0.6	0.88	2.5	-1.0
MAM	SO	0.75	0.8	-0.5	0.91	1.9	1.3
	SE	0.42	0.9	-0.3	0.79	1.3	-0.01
	NEB	0.37	1.7	-1.0	0.84	1.0	0.2
	NO	0.20	3.8	-2.2	0.40	1.8	1.5
	WC	0.85	0.9	-0.9	0.57	2.2	1.9
	BR	0.53	2.7	-1.2	0.94	2.2	1.0
	AM	0.19	3.0	-0.7	0.58	1.8	1.0
	AND	0.78	1.5	-1.0	0.90	3.6	-0.3
	SA	0.57	2.6	-0.9	0.93	2.2	0.9
	NP	0.80	3.5	0.5	0.87	2.5	-0.9
JJA	SO	0.43	1.1	0.1	0.95	1.3	0.8
	SE	0.87	0.9	0.5	0.87	1.1	0.0
	NEB	0.78	0.6	-0.4	0.90	1.1	-0.4
	NO	0.73	2.2	0.4	0.42	2.0	1.8
	WC	0.91	0.5	0.4	0.89	2.0	1.8
	BR	0.75	1.8	0.1	0.96	2.2	0.9
	AM	0.68	3.3	1.9	0.69	1.9	1.4
	AND	0.86	0.5	0.1	0.91	3.8	-0.1
	SA	0.63	2.3	-0.1	0.96	2.3	0.8
	NP	0.81	3.9	1.9	0.88	2.6	-0.8
SON	SO	0.68	1.6	-0.9	0.94	2.4	1.9
	SE	0.53	2.1	1.2	0.87	1.6	0.7
	NEB	0.78	0.8	-0.6	0.83	1.3	-0.4
	NO	0.89	1.6	-0.5	0.20	2.7	2.5
	WC	0.72	1.0	0.5	0.78	3.2	3.0
	BR	0.83	1.4	-0.3	0.94	2.7	1.5
	AM	0.84	1.5	0.3	0.75	2.2	1.8
	AND	0.82	1.3	-0.1	0.89	3.9	-0.4
	SA	0.69	1.9	-0.5	0.93	2.6	1.3
	NP	0.78	2.4	0.9	0.88	2.4	-0.6

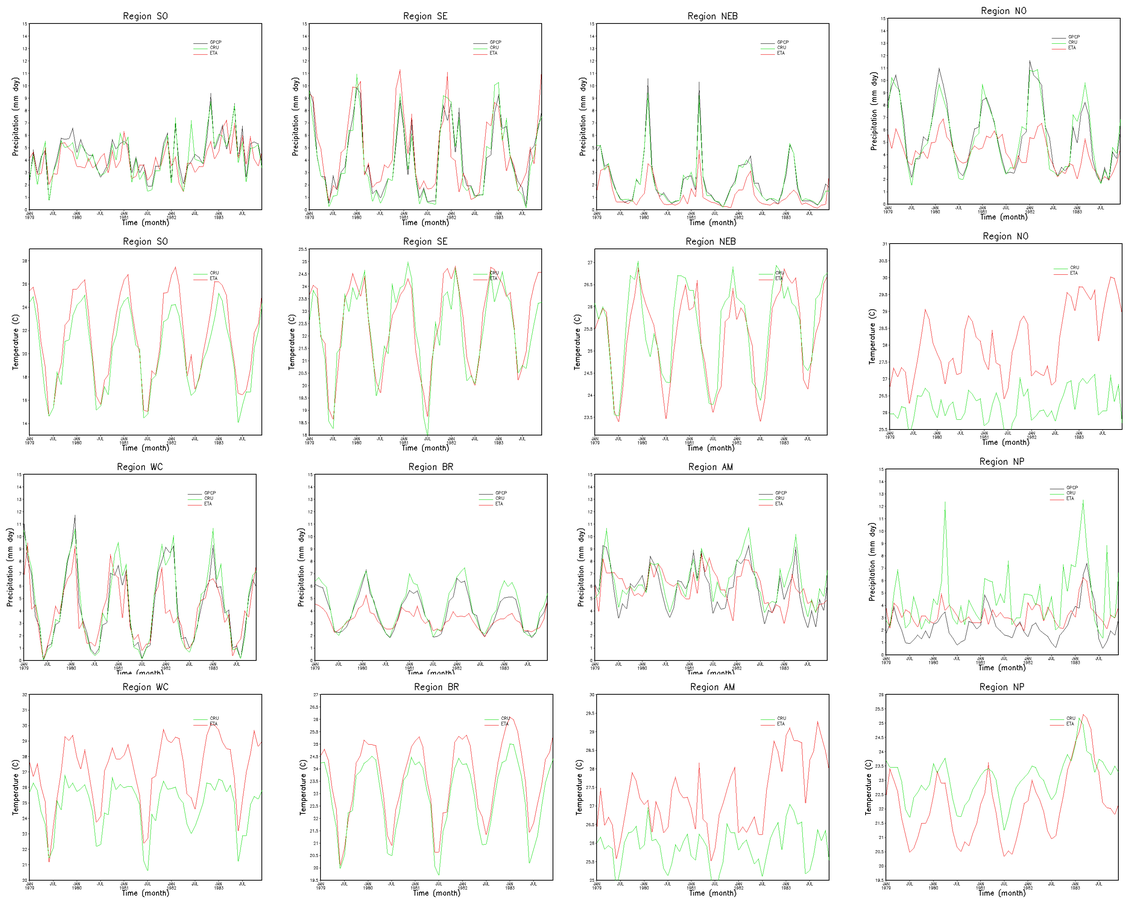

Figure 3 Weighted area averages of the variability of simulated and observed rainfall and temperature for the all regions, except AND and SA.

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