



Regional climate change projections in South America using the Eta CPTEC model driven by HadCM3 A1B scenario: Climatology and regional analyses for the Amazon, São Francisco and the Parana River Basins

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The objective of this study is to assess the climate projections over South America using the Eta-CPTEC regional model driven by four members of an ensemble of the Met Office Hadley Centre Global Coupled climate model HadCM3. The global model ensemble was run over the 21st century according to the SRES A1B emissions scenario, but with each member having a different climate sensitivity. The four members selected to drive the Eta-CPTEC model spanned the range in the global model ensemble. The Eta-CPTEC model nested in these lateral boundary conditions was configured with a 40-km grid size and was run over 1961-90 to represent baseline climate, and 2011-2100 to simulate possible future changes. Results presented here focus on austral summer and winter climate of 2011-40, 2041-70 and 2071-2100 periods, for South America and for three major river basins in Brazil. Projections of changes in upper and low-level circulation and the mean sea level pressure (SLP) fields simulate a pattern of weakening of the tropical circulation and strengthening of the subtropical circulation, marked by intensification at the surface of the Chaco Low and the subtropical highs. Strong warming (4-6 C) of continental South America increases the temperature gradient between continental South America and the South Atlantic. This leads to stronger SLP gradients between continent and oceans, and to changes in moisture transport and rainfall. Large rainfall reductions are simulated in Amazonia and Northeast Brazil (reaching up to 40%), and rainfall increases around the northern coast of Peru and Ecuador and in southeastern South America, reaching up to 30% in northern Argentina. All changes are more intense after 2040. The Precipitation-Evaporation (P-E) difference in the A1B downscaled scenario suggest water deficits and river runoff reductions in the eastern Amazon and Sao Francisco Basin, making these regions would be susceptible to drier conditions and droughts in the future.