



Precipitation variability, extremes and uncertainties over southeastern Brazil projected by the Eta regional model

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Southeastern Brazil is an area affected by extreme precipitation, mainly in the austral summer, associated with frontal systems or the South Atlantic Convergence Zone (SACZ). Flooding and landslides have occurred in the region with serious impact on society and economy. The region has many vulnerable areas, therefore, projections of precipitation and extremes in the future for the region are important to provide information that can be used in adaptations and management decisions. Results of regional models in South America have been analyzed to assess the future climate changes with higher resolution than global models. In this study the Regional Eta model is used with resolution of 40 and 20 Km to analyze the projections of precipitation changes and extremes over Brazil and mainly over the southeastern region. Simulations and projections obtained from four integrations of the Regional Eta model are analyzed to investigate the model behavior during the period of 1961-1990 and the projections in the near (2011 to 2040) and more distant future (2041 to 2100). Results from four integrations with resolution of 40 km with different lateral boundary conditions from the HadCM3 Global Model and one integration with resolution of 20 km are used to give a confidence interval and the related uncertainty. The first analysis was to verify changes in the main mode of precipitation variability in the future projections, compared to the base period. There is a change in the main centers of extremes variability over South America, which was comparable to changes projected in CMIP5 models. The second analysis was related to changes in the position and intensity of the SACZ. Specific locations in southeastern Brazil were analyzed regarding indices of extremes, such as SDII (mean precipitation of rainy days), SDII₁₀ (mean precipitation of rainy days ≥ 10 mm/day), R10mm (number of days with precipitation ≥ 10 mm/day), CDD (maximum number of consecutive dry days), CWD (maximum number of consecutive rainy days). The ensemble, minimum and maximum values are shown to assess the dispersion and the uncertainties.