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The influence of the changes in SST boundary conditions in Regional Climate Model simulations with RegCM4 in southeastern Brazil precipitation

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Analyzes were performed through simulations with the Regional Climate Model RegCM4 for the years 1989 (rainy) and 1996 (dry), where SST boundary conditions are modified in the model. The objective of this analysis is to numerically investigate the influence of South Atlantic Ocean (SAO) SST anomalies in the southeastern Brazil precipitation during winter months.
Ten simulations were performed with modified SST anomalies in certain regions of SAO that were chosen through analysis of SST anomaly fields in the 1989 and 1996 years. The SST anomalies of the dryer year were inserted in the wet year and vice-versa. Two additional simulations were performed, where observed SST (control simulation) was used. The technique of factor separation was applied to access the influence of these changes in the precipitation on southeastern Brazil.
It was verified that all SST changes clearly influenced the simulated precipitation, with the most significant impact during June and August 1996 and June and August 1989.
In June 1996 where an anomaly of +1.5º 55ºW-30ºW and 48ºS-55ºS and August 1996 with an anomaly of +1.0º between 50ºW-35ºW and 50ºS-60ºS , both months considered as dry, the changes increased rainfall in the state of São Paulo.
For June 1989 an anomaly of -1.5º C between 30º W - 10º W and 20º S - 40ºS and other of -1.5ºC between 58º W - 45º W and 45º S - 52 º S were added in the model and for August 1989 it was added an anomaly of -1.0ºC around 35ºW-10ºW and 22ºS-35ºS, both months considered as rainy, the changes indicated a decrease in rainfall across much of southeastern Brazil.
This last result in 1989 (placing negative anomalies between -1º and -1.5 º C) caused rainfall deficit, which is confirmed through the technique of composites during the dry months. These analyzes support the hypothesis that when the region between 20ºS-30ºS and 50ºW-20ºW shows negative anomalies an extreme dry event is observed in the southeast Brazil during winter.