



Projected changes in temperature and rainfall pattern over Jaffna peninsula in Sri Lanka

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Abstract

This study investigates the changes in future climate over Jaffna peninsula in Sri Lanka using data extracted from variable resolution Conformal Cubic Atmospheric Model (CCAM) simulations. CCAM is based on a quasi-uniform grid that is created by projecting the panels of a cube onto the Earth's surface and is performed in stretched-grid mode utilizing Schmidt transformation to achieve high resolution over specified regions. Bias corrected sea surface temperatures (SSTs) and sea ice concentration from a few global climate models (GCMs) such as CNRM-CM5, GFDL-CM3 and ACCESS1-0 from the CMIP5 simulations were used as boundary conditions for CCAM simulations at 8 km horizontal resolution. Ensemble mean of three CCAM simulations data were used to compare with observed meteorological data from Jaffna for the period 1970-2000 to validate the model and projected changes in mean temperature and rainfall also presented up to end this century under Representative Concentration Pathways (RCP 8.5 and 4.5) emission scenarios. Jaffna is located in northern part of Sri Lanka and receive rainfall predominantly during the northeast monsoon season. Annual cycles of observed mean temperature and rainfall shows good agreement with simulated data. Further the results show that the temperature biases range between 0 and 3°C and the model underestimates the observed values of mean temperature. Correlation coefficient between simulated and observed annual mean temperature is 0.951 and for rainfall it is 0.915. According to the current trend of the annual mean temperature is close to the projected temperature for the low-level emission scenario RCP4.5 and the projected temperature increase for emission scenario RCP 4.5 and RCP 8.5 is about 0.2°C and 0.3°C per decade in Jaffna. Projected ten years annual mean rainfall anomalies values are negative up to 2040. After 2040, values are positive for RCP 4.5 but fluctuate around zero for RCP 8.5 and the annual mean rainfall also shows decreasing trend for both emission scenario is about 25 mm/year.

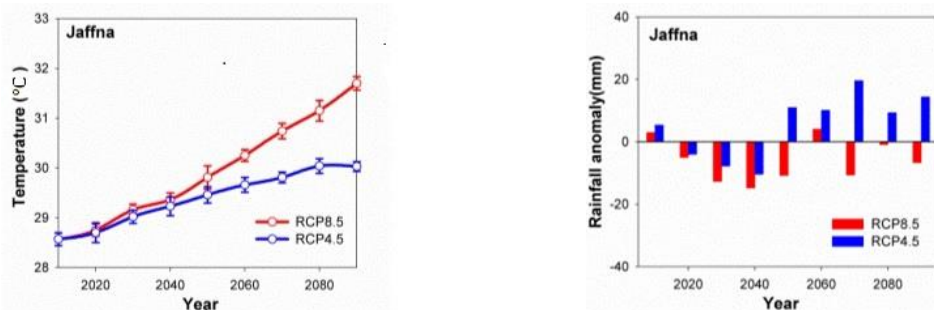


Figure: Projected changes in temperature and rainfall anomaly under emission scenarios RCP 4.5 and 8.5 in Jaffna.