CMIP5 multi-model ensemble-based future climate projection for the Odisha state of India

S. Vijayakumar[1,*] and A. P. Ramaraj[2]

[1]ICAR-Indian Institute of Rice Research, Hyderabad 500 030, India
[2]India Meteorological Department, Mausam Bhawan, Lodhi Road, New Delhi 110 003, India

Global climate models (GCMs) are vital for predicting future climate patterns and helping countries build resilience against climate change. The present study projected the future climate of Odisha under Representative Concentration Pathway (RCP) 4.5 and RCP 8.5 scenarios using Coupled Model Intercomparison Project Phase 5 (CMIP5) models due to the high vulnerability of the state to climate change in India. Results indicate that both minimum and maximum temperatures will rise in the near (2011–39), mid (2040–69) and late (2070–99) century under both RCP scenarios. Western Odisha (Sambalpur) will experience the most significant warming, with minimum temperatures rising more than maximum temperatures, a trend consistent in seasonal comparisons. Mean annual rainfall is projected to increase, driven primarily by the southwest monsoon (SWM). Western Odisha is expected to see the largest increase in annual precipitation and SWM, while southeastern Odisha (Khordha) will see the smallest increase under both RCP scenarios. Under RCP 4.5, annual rainfall is projected to increase by 0.8–4.0%, 0.4–3.6% and 3.0–6.0% during the near, mid and late centuries respectively. Under RCP 8.5, the increases are 4.0–8.8%, 6.3–8.7% and 8.4–17.5% for the same periods. Consequently, government policies must bolster resilience to withstand these escalating temperatures and rainfall patterns.

Keywords: CMIP5 ensemble, rainfall, RCP, statistical downscaling, temperature.