ASSESSMENT OF CMIP-6 BASED CLIMATIC MODELS FOR SIMULATION OF PRECIPITATION IN PAKISTAN

by

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ABSTRACT

Comparison of Coupled Model Intercomparison Project Phase 6 (CMIP6) General Circulation Models (GCMs) with precipitation observations under different climatic conditions is necessary to determine their respective strengths of future precipitation projection. Therefore, the selection of the appropriate GCM was carried out by evaluating the performance of four General Circulation Models (GCMs) at eleven (11) stations across diverse region of Pakistan. For this purpose, the entropy based Symmetrical Uncertainty (SU) approach along with statistical indices (i.e., correlation Coefficient, Root Mean Square Error) were used to assess the performance of the selected sets of GCMs at monthly timescale and regional scale. In Symmetrical Uncertainty (SU) approach, the selected models were ranked based on the SU values at each station and the final ranking of the models was carried out using a criteria decision-making (CDM) method. Results show reasonable agreement between the CMIP6-GCMs with measured data in capturing monthly precipitation. Based on correlation analysis, it was observed that all General circulation models showed better agreement in case of Region B as compared to other regions (i.e., A, C, D, and E). Moreover, using SU value, it was resulted that CESM2, CESM-WCC and FIO-ESM-2-0 models were the most frequent in first three ranks at individual station based analysis and final ranking of GCMs by DCM showed that CESM2 model was suitable for projection of precipitation over Pakistan. Furthermore, effect of climate change on precipitation under different climate change scenarios for SSP 3.7 SSP 4.5 SSP 8.5 was analyzed. Future data set of CESM2 shows that there is decreasing trend of precipitation in monsoon season as the radioactive forcing into atmosphere increases.