**Future risk assessment by estimating historical heat wave using SimCLIM climate model in Pakistan**

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**Abstract**

Climate change has adverse effects at global, regional and local level. Heat wave events have serious contribution for global warming and natural hazards in Pakistan. Historical (1997–2015) heat wave were analyzed over different provinces (Punjab, Sindh and Baluchistan) of Pakistan to identify the maximum temperature trend. Heat accumulation in Pakistan were simulated by the General Circulation Model (GCM) combined with 3 GHG (Green House Gases) Representative Concentration Pathways (RCPs) (RCP-4.5, 6.0, and 8.5) by using SimCLIM model (statistical downscaling model for future trend projections). Heat accumulation was projected for year 2030, 2060, and 2090 for seasonal and annual analysis in Pakistan. Heat accumulation were projected to increase by the baseline year (1995) was represented in percentage change. Projection shows that Sindh and southern Punjab was mostly affected by heat accumulation. This study identified the rising trend of heat wave over the period (1997–2015) for Punjab, Sindh and Baluchistan (provinces of Pakistan), which identified that most of the meteorological stations in Punjab and Sindh are highly prone to heat waves. According to model projection; future trend of annual heat accumulation, in 2030 was increased 17%, 26%, and 32% but for 2060 the trends were reported by 54%, 49%, and 86% for 2090 showed highest upto 62%, 75%, and 140% for RCP-4.5, RCP-6.0, and RCP-8.5, respectively. While seasonal trends of heat accumulation were projected to maximum values for monsoon and followed by pre-monsoon and post monsoon. Heat accumulation in monsoon may affect the agricultural activities in the region under study.

**Keywords:** Climate Change Impact Assessment, South Asia Climate Modeling.