

## Abstract

ET<sub>0</sub> is an important hydro-meteorological phenomenon, which is influenced by changing climate like other climatic parameters. This study investigates the present and future trends of ET<sub>0</sub> in Bangladesh using 39 years' historical and downscaled CMIP5 daily climatic data for the twenty-first century. Statistical Downscaling Model (SDSM) was used to downscale the climate data required to calculate ET<sub>0</sub>. Penman–Monteith formula was applied in ET<sub>0</sub> calculation for both the historical and modelled data. To analyse ET<sub>0</sub> trends and trend changing patterns, modified Mann–Kendall and Sequential Mann–Kendall tests were, respectively, done. Spatial variations of ET<sub>0</sub> trends are presented by inverse distance weighting interpolation using ArcGIS 10.2.2. Results show that RCP8.5 (2061–2099) will experience the highest amount of ET<sub>0</sub> totals in comparison to the historical and all other scenarios in the same time span of 39 years. Though significant positive trends were observed in the mid and last months of year from month-wise trend analysis of representative concentration pathways, significant negative trends were also found for some months using historical data in similar analysis. From long-term annual trend analysis, it was found that major part of the country represents decreasing trends using historical data, but increasing trends were observed for modelled data. Theil–Sen estimations of ET<sub>0</sub> trends in the study depict a good consistency with the Mann–Kendall test results. The findings of the study would contribute in irrigation water management and planning of the country and also in furthering the climate change study using modelled data in the context of Bangladesh.