**INVESTIGATION OF EXTREME CLIMATE INDICES OVER ÇANKIRI WITH CMIP6 CLIMATE MODELS**

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| **ABSTRACT**  This study investigated the anticipated changes in extreme temperature and precipitation indices in the Çankırı province due to climate change over the course of the 21st century. Utilizing a three-tiered future framework (near [2015-2040], middle [2041-2070], and far [2071-2100]), the analysis was conducted using Coupled Model Intercomparison Project Phase 6 (CMIP6) models under the Shared Socio-Economic Pathways (SSP) 5-8.5 and SSP-2-4.5 [1-2]. The Quantile Delta Mapping (QDM) method served as the statistical downscaling approach to enhance the resolution of low-resolution global climate models (GCMs) [3]. The European Centre for Medium-Range Weather Forecasts (ECMWF)’s fifth generation reanalysis (ERA5-Land) dataset with a spatial resolution of 0.1° × 0.1° (approximately 9km) was employed for this purpose [4]. Upon evaluation of the results, it was observed that there is no significant change in total precipitation throughout the century under the SSP 2-4.5 scenario in the study region. However, under the SSP 5-8.5 scenario, decreases of up to 10% by the end of the century were projected. With regard to extreme precipitation, both scenarios indicate that heavy precipitation events will become more severe. It is projected that total precipitation from the heaviest 1% will increase from 32 mm to 57 mm by the end of the century under the SSP 5-8.5 scenario. When compared to the decrease in total precipitation, it is anticipated that the proportion of extreme precipitation in total precipitation will rise from 5% to 10%.  Regarding extreme temperature indices, both scenarios predict continuous warming until the end of the century. It is estimated that the annual average of daily maximum temperatures may increase up to 6 °C by the end of the century, while the increase in minimum daily temperatures stands at 5.3 °C. The number of days when the minimum temperature fell below 0 °C during the year was found to be 124 days on average in the historical period; however, in the future period, this value could decrease to 60 days. Overall, the findings suggest that the intensity and frequency of extreme climate events in Çankırı will increase as a result of climate change.  **References:**  [1] Gumus B, Oruc S, Yucel I, Yilmaz MT. (2023). Impacts of Climate Change on Extreme Climate Indices in Türkiye Driven by High-Resolution Downscaled CMIP6 Climate Models. *Sustainability.*15(9):7202.  [2] Eyring, V.; Bony, S.; Meehl, G.A.; Senior, C.A.; Stevens, B.; Stouffer, R.J.; Taylor, K.E. (2016). Overview of the Coupled Model Intercomparison Project Phase 6 (CMIP6) experimental design and organization. *Geosci. Model Dev.* 9, 1937–1958.  [3] Muñoz-Sabater, J., Dutra, E., Agustí-Panareda, A., Albergel, C., Arduini, G., Balsamo, G., Boussetta, S., Choulga, M., Harrigan, S., Hersbach, H., Martens, B., Miralles, D. G., Piles, M., Rodríguez-Fernández, N. J., Zsoter, E., Buontempo, C., and Thépaut, J.-N. (2021) ERA5-Land: a state-of-the-art global reanalysis dataset for land applications, *Earth Syst. Sci. Data*, 13, 4349–4383  [4] Cannon, A.J.; Sobie, S.R.; Murdock, T.Q. (2015). Bias Correction of GCM Precipitation by Quantile Mapping: How Well Do Methods Preserve Changes in Quantiles and Extremes? *J. Clim.* 2015, 28, 6938–6959. |

# Keywords: CMIP6, climate change, extreme climate indices, quantile mapping

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