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Water Resources Management • Volume 36, Issue 15, Pages 5931 - 5944 • December 2022

Document type

Article

Source type

Journal

ISSN

09204741

DOI

10.1007/s11269-022-03332-9

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Extreme Rainfall Variations Under Climate Change Scenarios. Case of Study in an Andean Tropical River Basin

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Abstract

Maximum rainfall events have triggered hazards that harm ecosystems and populations. Climate change could modify these extreme events, becoming more severe and frequent. Knowing the patterns of Spatio-temporal changes in the distribution of extreme rainfall in Andean regions represents a research challenge due to the complex climate behavior in the tropical mountain basins. The study aimed to analyze future Spatio-temporal changes in maximum daily rainfall patterns. The methods and analysis were performed in the Paute river basin in Ecuador through observed and simulated data from 1985 to 2005. The outputs of an ensemble regional climate model of Ecuador (RCM) based on CMIP5 models were used with two representative concentrations pathways (RCP), scenarios 4.5 and 8.5, in two future periods; future 1 from 2011 to 2040 and future 2 from 2041 to 2070. The General Extreme Value (GEV) distribution was used to fit the maximum annual daily rainfall. The maximum rainfall change factor between historical and future periods was calculated for 5,10,30, 60, and 100 years return periods. The results showed an increment of maximum rainfall spatial average in all return periods for RCP 4.5 and 8.5 in the future 1. Future 2 presented an increment of maximum rainfall spatial average in all return periods for RCP 4.5 and 8.5 scenarios except for the 30,60 and 100 years return periods of the RCP 4.5 scenario, displaying a decrease of maximum rainfall spatial average. Knowing rainfall pattern projections could help formulate actions to diminish the risks of extreme rainfall. © 2022, The Author(s), under exclusive licence to Springer Nature B.V.


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Andean tropical river basin ; Climate Change ; CMIP5; GEV; Maximum daily rainfall

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