

Changes in extreme rainfall in the Philippines for the 100-year period (1911-2010)

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Extreme rainfall values were examined to detect long-term changes in the Philippines and to investigate whether such changes are associated with the rising near-surface global mean temperature and the El Niño–Southern Oscillation (ENSO) for the 100-year period (1911–2010). The generalized extreme value distribution was formulated to its stationary and non-stationary forms, and then was fitted by the maximum likelihood method to the series of daily rainfall annual maxima (RX1 day) at 23 meteorological stations in the Philippines. Subsequently, statistically significant changes in extreme rainfall in the country were detected. Such changes were further linked to the near-surface global mean temperature and ENSO. Specifically, the study has revealed a country-averaged increase in the median intensity of extreme rainfall associated with the rise in the near-surface global mean temperature. Furthermore, a seasonal influence of ENSO on extreme rainfall in the Philippines has been shown. In particular, the stations located in the northwest section of the country, where 75–100% of the RX1 day occurred in the summer monsoon season (July–September) during the entire period of 1911–2010, showed an average increase in the median intensity of extreme rainfall associated with the ENSO index. These findings imply a potential intensification and increase in the occurrence of extreme rainfall into the future as the global mean temperature continues to rise, and such trends should be considered in adaptation strategies to minimize the disasters caused by extreme rainfall events in the Philippines. In order to minimize these disasters appropriate early detection system of heavy rainfall events are urgently needed in this country.

Keywords: climate change, extreme rainfall, global warming, generalized extreme value distribution