



An Investigation of Extreme Precipitation in Turkey

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Studies indicate that slight deviations in climate can affect the global hydrological variability which may also cause substantial variations in frequency and magnitude of floods. Therefore, as Intergovernmental Panel on Climate Change has mentioned, climate change alters vulnerability. Recent extreme precipitation events occurred in Turkey show that we are not well prepared for these events. Hence, the main goal of this study is to investigate the major mechanisms responsible in resulting extreme precipitation events in Turkey and to define their alteration with climate change in terms of frequency and magnitude changes of the extreme precipitation events.

15 major historical flood events occurred in Turkey are analyzed initially to establish the major synoptic patterns related to these extreme precipitation events. Thereafter, these systems are simulated by using the WRF model downscaling to 3 km horizontal resolution for the domains of the extreme precipitation events occurred. ECMWF Operational data were used for the initial and boundary conditions for 4-day WRF simulations. 9 combinations of microphysics, cumulus, and boundary layer parameterizations are verified with ERA Interim data. Possible shifts of these patterns are modeled in order to obtain the maximum events for these domains. Climate change effect in extreme precipitation events of Turkey is investigated by using Likelihood Ratio Test. The gamma distributions of historical events and events obtained from climate change simulations are compared to the gamma distribution of the all events.

Preliminary results of this study show that direction and magnitude of the extensive moisture penetration to Mediterranean, called Bermudan Express, may cause extreme precipitation in Turkey for specific events. Moreover, it is shown that precipitation increases highly linearly with increasing temperature. Exceedance probabilities of these historical extreme precipitation events and their comparisons with different climate change scenarios are going to be discussed in detail emphasizing the possible uncertainties.

Keywords: Extreme Precipitation, WRF Model, Climate Change in Turkey.