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Red Sea Trough occurrence and related extreme events under future climate conditions

M. Müller, G.C. Leckebusch, U. Ulbrich, K.M. Nissen

Institute for Meteorology, Freie Universität Berlin, Germany

(mandy.mueller@met.fu-berlin.de)

The Red Sea Trough (RST) is a tongue of low pressure at lower atmospheric levels, extending from the southern Red Sea to the Eastern Mediterranean. Most RST events are accompanied by very dry and hot weather conditions, due to a continental south easterly flow. However, in some cases the presence of an upper level trough extending from the north can lead to severe thunderstorms accompanied by flash floods in Israel and its vicinity, resulting in casualties and huge damages.

This work investigates possible changes in the frequency and intensity of these RST originated events under climate change conditions.

To identify RST events an objective algorithm based on the method suggested by Tsvieli and Zangvil (2005) was applied to the mean sea level pressure field of the ERA40 data set (1961-2000). The results indicate the highest frequency of RST events in November (about 11-12 RST days per month) and March (about 8 RST days per month), while the number of RST days during the summer months is negligible. Extreme RST events are detected by analyzing 500 hPa maps and precipitation data.

The ability of the ECHAM5-OM1 model to realistically simulate RST events is tested by applying the RST identification algorithm to an ensemble of simulations under present day climate conditions and comparing the results to those obtained from the ERA40 dataset.

Finally, possible future changes in the intensity and frequency of RST originated events are estimated by analyzing ECHAM5-OM1 climate scenario integrations.