



Analysis of extreme summer temperatures in Saudi Arabia and the association with large-scale atmospheric circulation

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Abstract:

Extreme temperature events (ETEs) over Saudi Arabia, have been receiving special attention in recent decades due to their impacts on water resources, the energy sector, human health and crop yields. In this study, maximum temperature (T_{max}) data for the summer season (June-Aug) obtained from 27 meteorological stations in Saudi Arabia have been analysed for the period 1981-2017. Frequency analysis revealed that stations located in the Central, Northern and Coastal regions have a relatively higher number of summer ETEs. A composite analysis has been performed to assess the association between global circulations and ETEs in Saudi Arabia using global reanalysis data. It is found that the summer ETEs in Saudi Arabia are associated with a mid-latitude circumglobal wave-like (CGT) pattern. The upper level circulations associated with the ETEs in various regions of Saudi Arabia display a weak (e.g., Coastal region) to well-developed (e.g., Central region) CGT wave pattern in the mid-latitudes. The upper level anomalous high (low) pressure over Eurasia (Central Asia) coupled with the surface anomalous low (high) pressure anomalies assists the hot dry air from desert regions that favor the occurrence of ETEs in different regions of Saudi Arabia. A lead-lag relationship between 200 hPa geopotential height and ETEs in the Central region of Saudi Arabia reveals a strong association between mid-latitude circulation and ETEs. Moreover, an inverse relationship between T_{max} over Saudi Arabia and the El Nino Southern Oscillation (ENSO) is found. The ENSO modulates the regional T_{max} anomalies over Saudi Arabia through the upper level mid-latitude circulation.

Biography:

Dr. Irfan Ur Rashid has completed his PhD in 2019 at the age of 34 years from King Abdulaziz University, Jeddah, Saudi Arabia. He is currently working as Meteorologist, Pakistan Meteorological Department, Islamabad, Pakistan. He has published more than 5 papers in reputed journals.



Publication of speakers:

- Irfan Ur Rashid et al; Analysis of extreme summer temperatures in Saudi Arabia and the association with large-scale atmospheric circulation, Jan 2020
- Irfan Ur Rashid et al; ENSO influence on summer temperature over Arabian Peninsula: role of mid-latitude circulation, Jan 2019
- Irfan Ur Rashid et al; Saudi-KAU coupled global climate model: description and performance. Earth Syst Environ, Jan 2017
- Irfan Ur Rashid et al; Saudi-KAU coupled global climate model: description and performance, Sep 2017
- Irfan Ur Rashid et al; Multidecadal changes in the relationship between ENSO and wet-season precipitation in the Arabian Peninsula, Jun 2015

2nd Edition of Challenges in Global Climate Change and Oceanography, Nov 17, 2021; Paris, France.

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