Geophysical Research Abstracts
Vol. 21, EGU2019-14538, 2019
EGU General Assembly 2019

A New and Flexible Rainy Season Definition: Validation for the Greater Horn of Africa and Application to Rainfall Trends

Larisa Seregina (1), Andreas H. Fink (1), Roderick van der Linden (1), Nadir A. Elagib (2), and Joaquim G. Pinto (1)

(1) Karlsruhe Institute of Technology, Institute for Meteorology and Climate Research, Karlsruhe, Germany (larisa.seregina@kit.edu), (2) Institute for Technology and Resources Management in the Tropics and Subtropics (ITT), Technische Hochschule Köln (University of Applied Sciences), Cologne, Germany

Previous studies on observed or projected rainfall trends for the Greater Horn of Africa (GHA) generally focus on calendric three-month periods and thus partly neglect the complexity of rainfall seasonality in this topographically heterogeneous region. This study introduces a novel and flexible methodology to identify the rainfall seasonality, the onset, cessation and duration of the rainy seasons, and the associated uncertainties from rainfall time series. The definition is applied to the Climate Hazards Group InfraRed Precipitation with Stations (CHIRPS) satellite product and an extensive rain gauge dataset. A strong agreement with known seasonal dynamics in the region and the commonly used calendric rainy seasons is demonstrated. Compared to the latter definition, a clear added value is found for the new approach as it captures the local rainfall features (associated with e.g. the sea breeze), thus facilitating evaluations across rainfall seasonality borders. While previously known trends are qualitatively confirmed, trends are amplified in some regions using the flexible definition method. Notably, a drying trend in Tanzania and Democratic Republic of Congo and a wetting trend in central Sudan and parts of eastern Ethiopia and Kenya can be detected. In the latter two regions that are characterized by two rainy seasons, wetting trends are detected for the Short Rains. The trends are regionally associated with changes in rainy season cessation. CHIRPS- and station-based trend patterns are consistent over larger regions of the GHA, but differ in regions with known rainfall contributions from warmer cloud tops. Discrepancies are found in coastal and topographically complex areas, and regions with an unstable seasonality of rainfall. As expected, CHIRPS shows spatially more homogeneous trends compared to station data. Our novel, more precise definition of the rainy season facilitates the assessment of rainfall characteristics, like intensity, rainfall amounts, or temporal shifts of rainy seasons. This novel methodology could also provide a more adequate calibration of climate model simulations thus potentially enabling more realistic climate change projections of rainfall for the GHA.