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How Does Hydrological Extremes Events over Greater Horn of Africa Occurs?

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Introduction

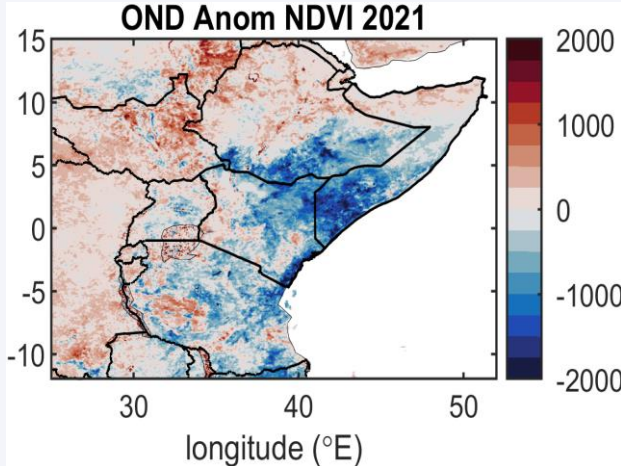
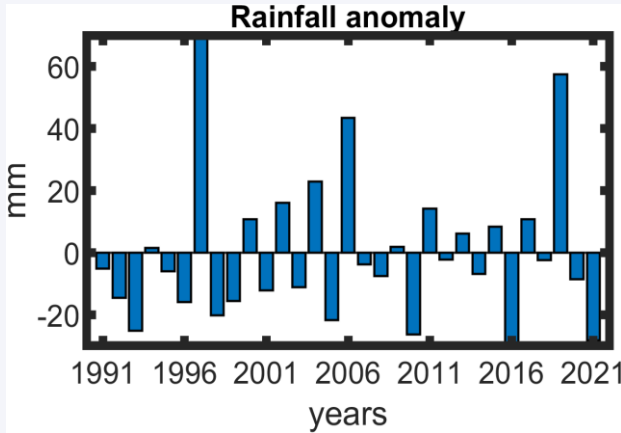
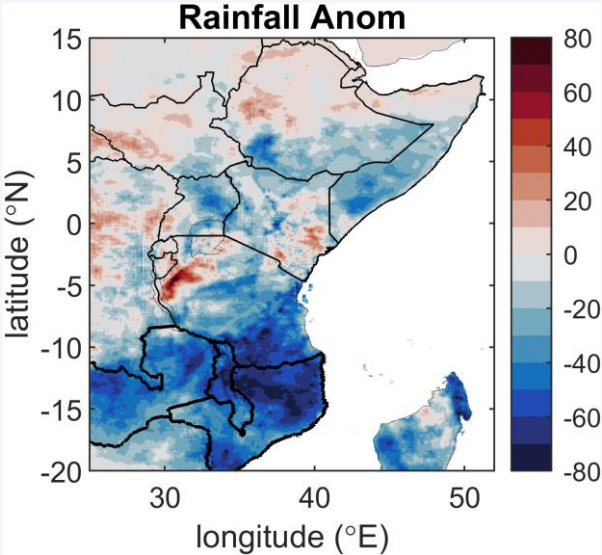
- Droughts and floods are two phenomena of the same water cycle, research customarily focuses on either of the two extremes due to their complexity and differences in temporal and spatial scales ([Ward et al., 2020](#))
- The rainfall climatology extremely heterogeneous; it varies immensely over short distances but has strong coherence in the interannual variability patterns
- Climate change is expected to increase the frequency and magnitude of extreme events in the future ([IPCC, 2012, 2014](#))
- East Africa's 2019 short rains (OND) were one of the driest in recent decades

Data and Methods

- The Climate Hazards Group Infrared Precipitation with Stations (CHIRPS-2.0.) in 0.05° grids
 - MODIS-NDVI in 0.05° grids
 - ECMWF data (SST, vertical velocity (Omega), MSLP, u and v wind at 850 and 200 GPH and Convective Inhibition (CIN)) in 0.5° grids
 - NOAA-Outgoing Longwave Radiation (OLR, v-2.7) in 2.5° grids
 - GODAS Potential Ocean Temperature (for 20° C isotherm) in 0.33° degree latitude x 1.0° degree longitude
 - ENSO and IOD time series
- ❑ To understand the underline physical mechanisms, a simple comparison has been made between our study focus (2021) and 1997 that show an extreme rainfall during (OND).

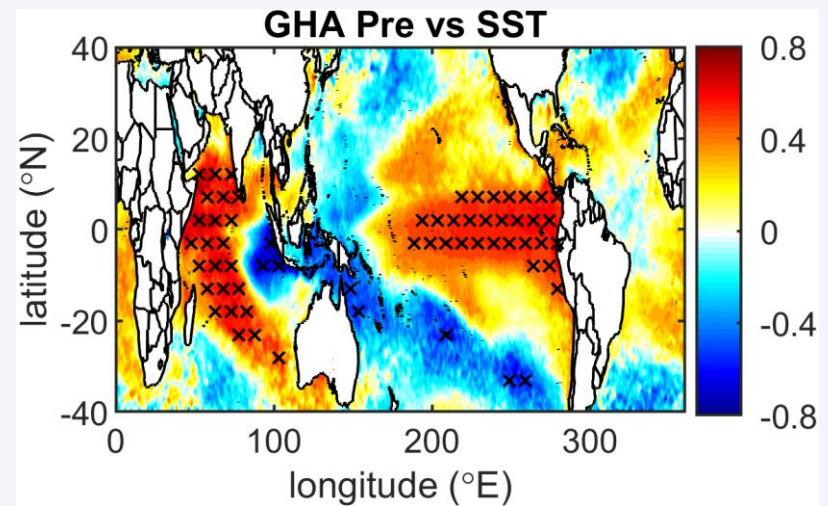
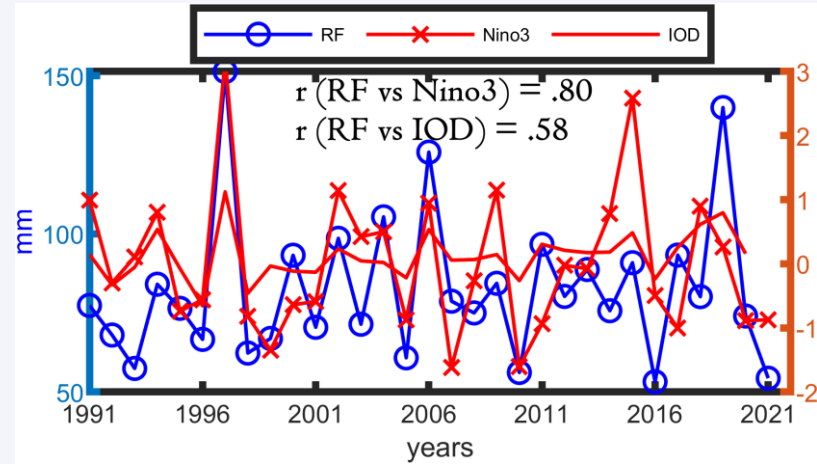
Results

1) Spatial and temporal characteristics



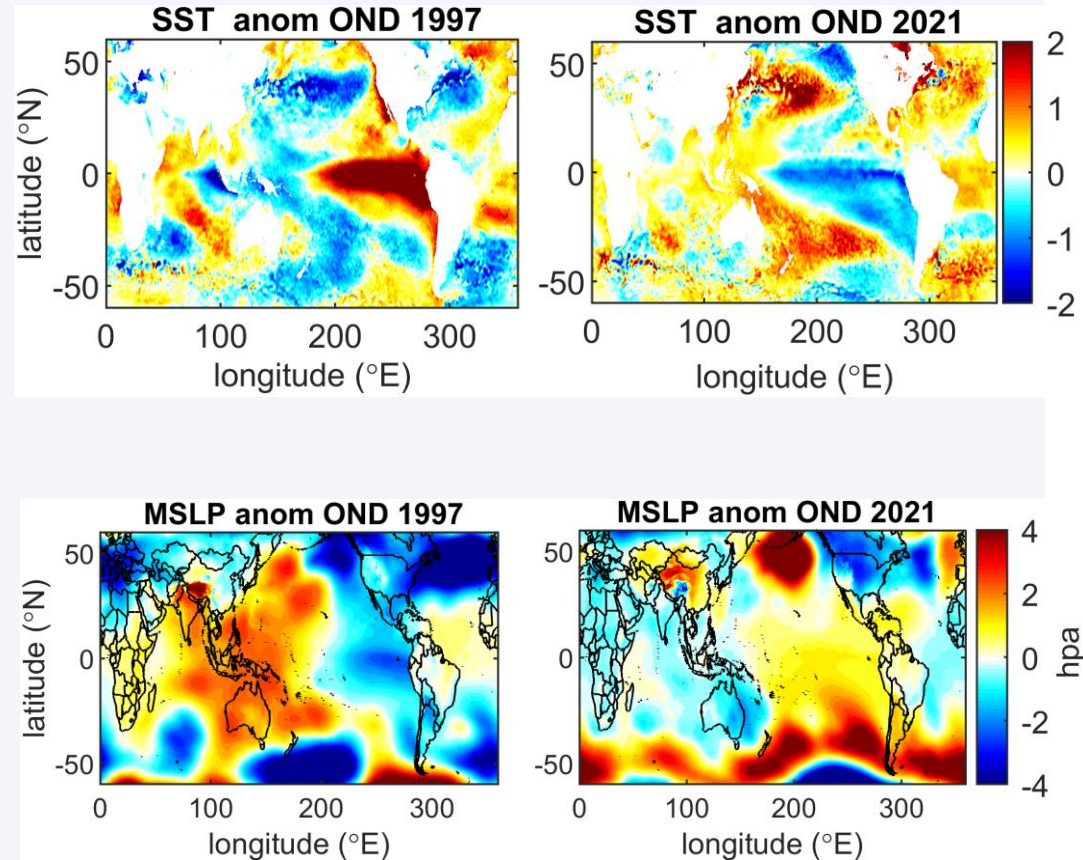
2) Drivers

Role of ENSO and IOD



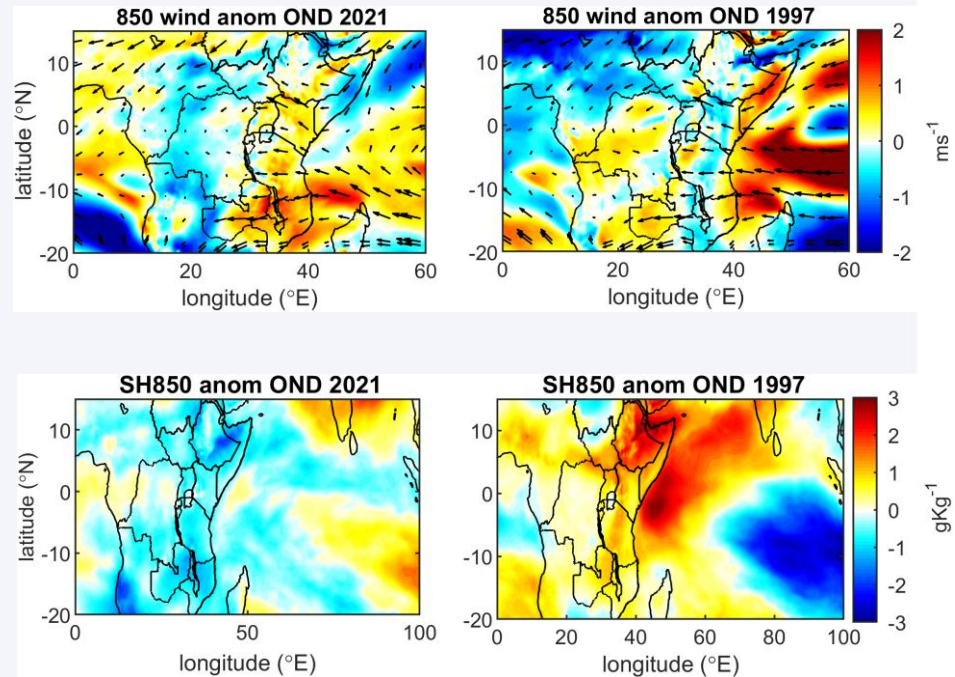
3) Physical Mechanisms

a) Global SST and MSLP



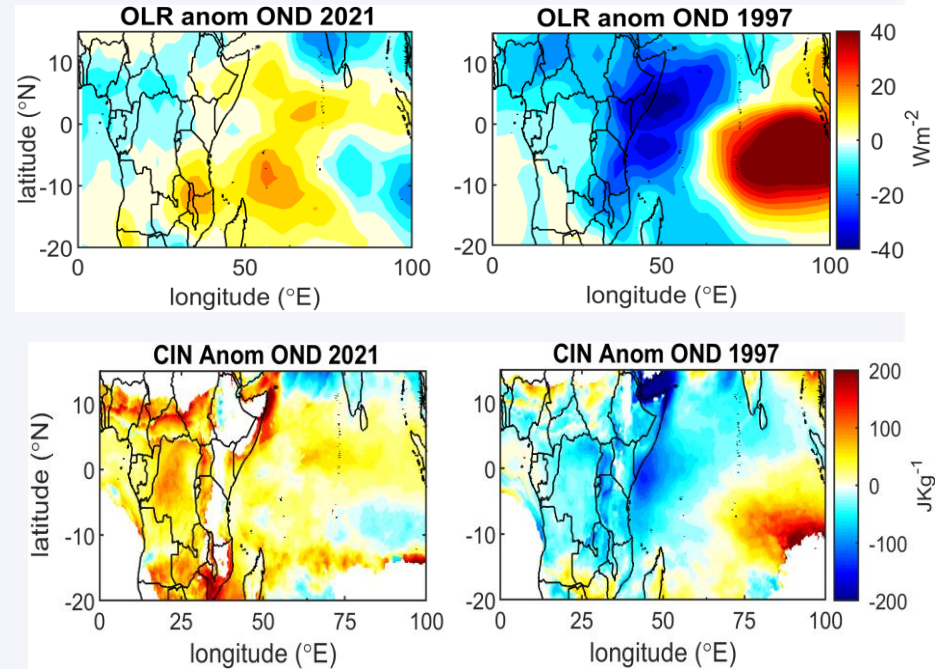
3) Physical Mechanisms

b) Wind and Humidity at 850 GPH



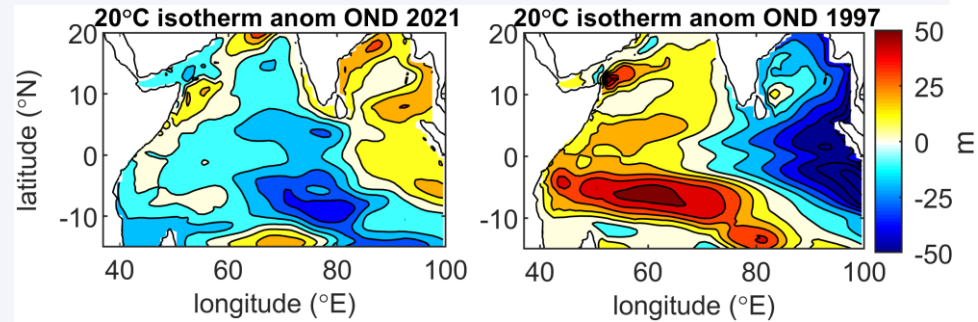
3) Physical Mechanisms

c) Wind and Humidity at 850 GPH



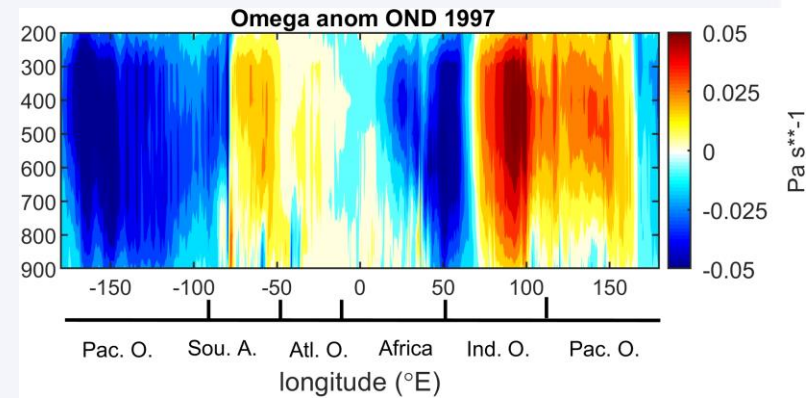
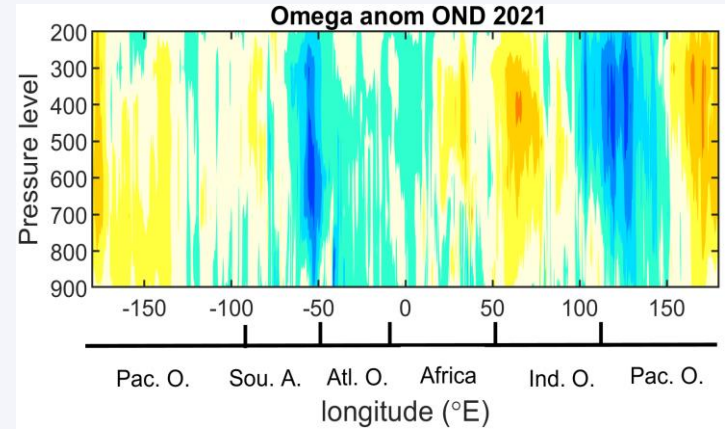
3) Physical Mechanisms

d) Ocean Subsurface



3) Physical Mechanisms

e) Ocean Subsurface



Way forward

- It seems that the region is suffer from frequent floods as it is prone to frequent droughts
- Changes in natural patterns of climate variability and rainfall intensity, human interference in the physical environment, soil characteristics, and poor urban planning and governance are key influential factors in the increase of drought and flood risks
- We provide a possible mechanism of 2021 and 1997, when an extremely dry and wet conduction occurs during the short rainy season
- Deep understanding of physical mechanism will give an advantage to use the dynamical approach of seasonal forecast technique
- It will be increasingly important to use Forecast-based Action into disaster risk management systems



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THANK YOU!