The Floods in Equatorial East Africa during MAM 2018 rainfall season

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NOAA's 43rd Climate Diagnostics & Prediction Workshop
Santa Barbara, California, 23 -25 October 2018

Deluge in East Africa during Spring 2018
Weeks of Heavy Rainfall

- **A major humanitarian crisis,**
- **An estimated 800,000 people affected by the floods with hundreds injuries and fatalities.**
- **Infectious disease outbreaks associated with the floods still lingering.**
- **Recovery from the floods still ongoing.**

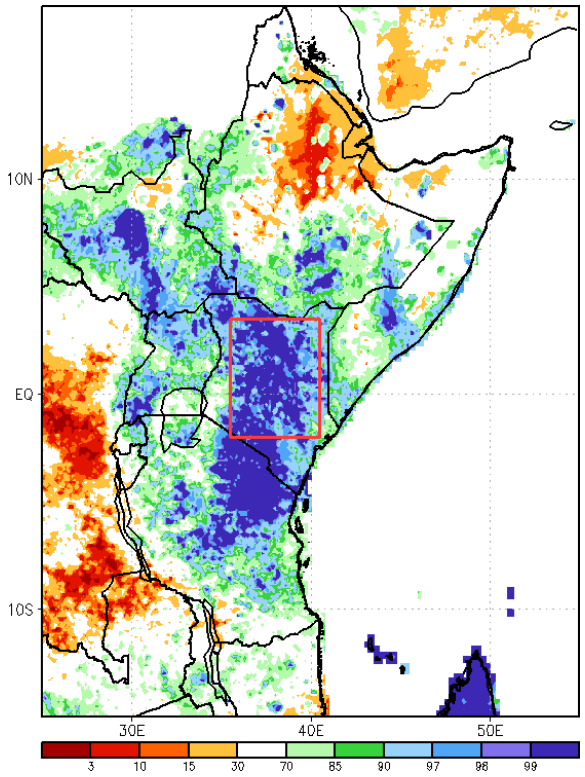
Objective

- The MAM 2018 floods were only comparable to the Oct-Dec floods of 1997 and 1961
- The floods occurred in the background of a weak La Nina episode
- Objective: To understand the mechanisms associated with these extremely heavy rainfall events

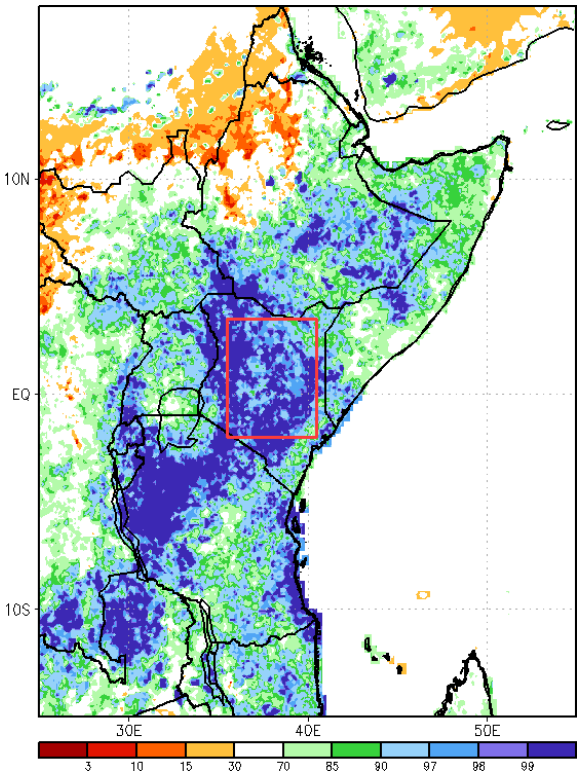
Spring 2018 Rainfall Ranking Percentile - ARC2

1983-2017

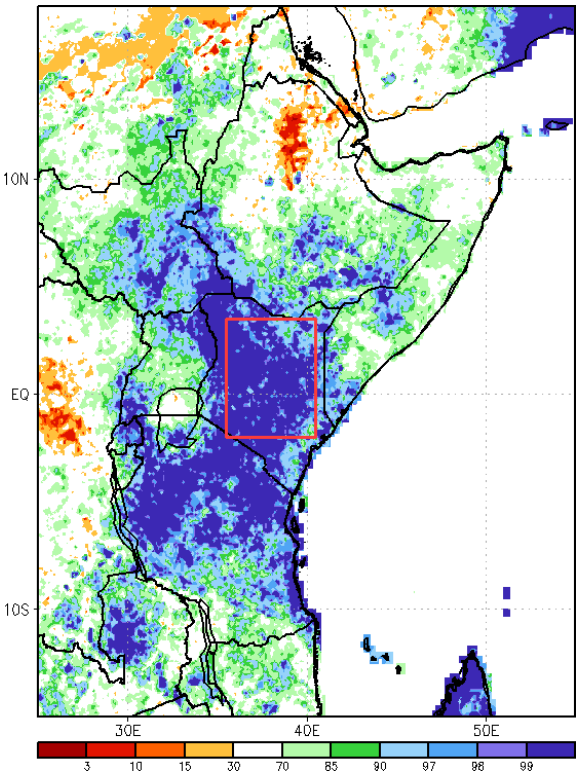
Mar 2018



Apr 2018

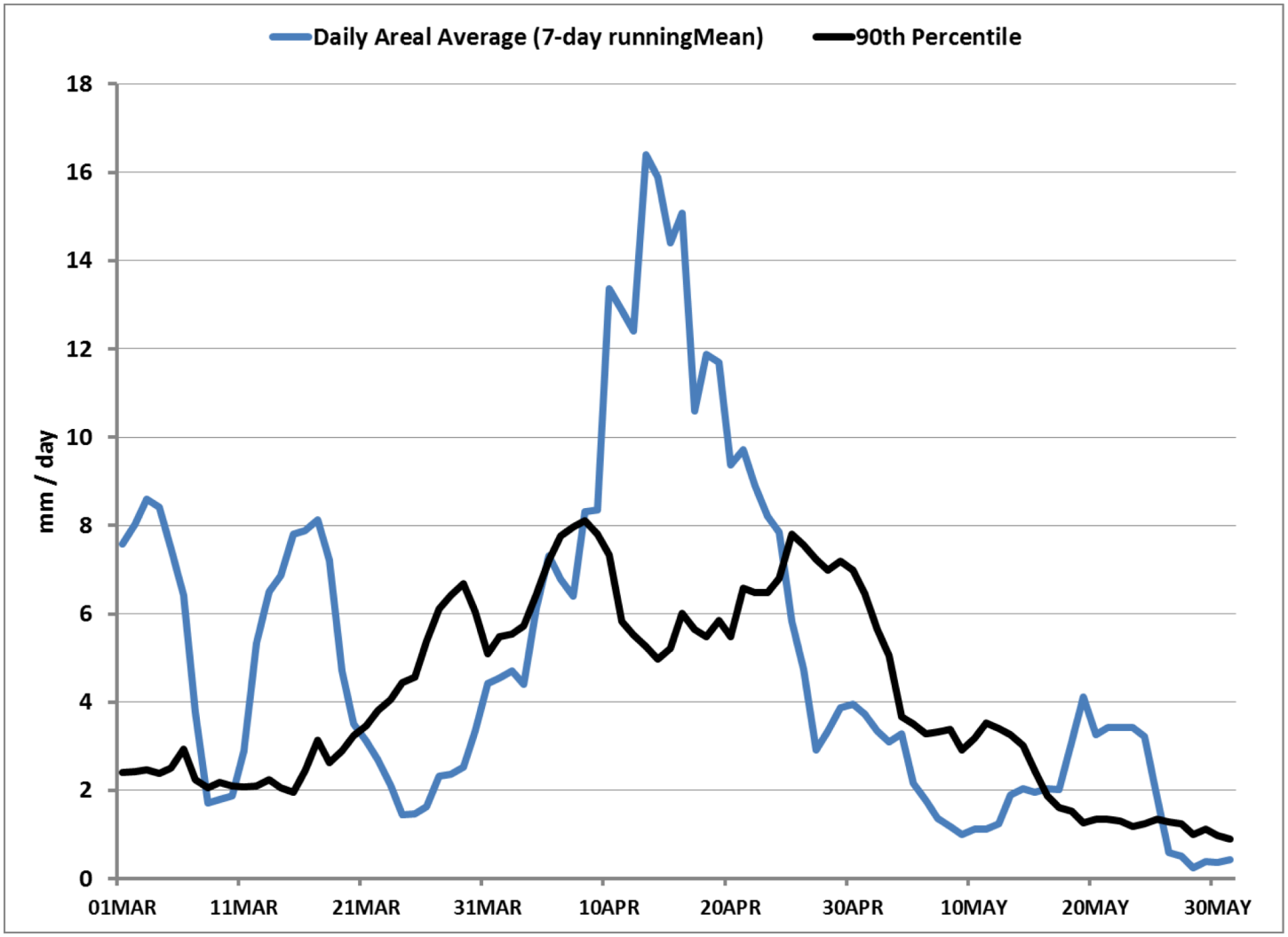


MAM 2018



Kenya Meteorological Department reported that areas in Kenya recorded **the highest rainfall amounts ever for MAM** since measurements began.

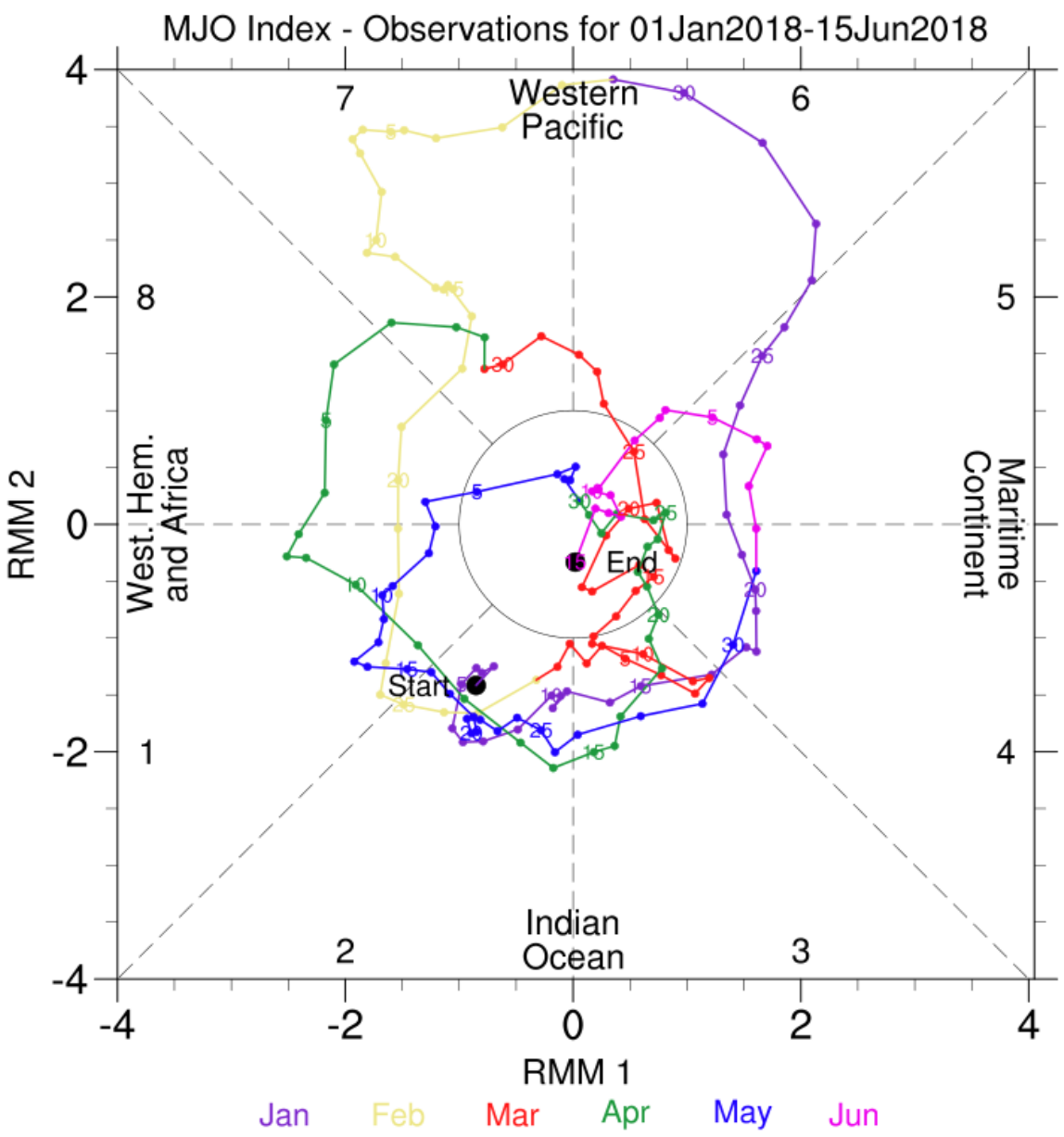
Spring 2018 Rainfall Evolution



7-day Running Mean

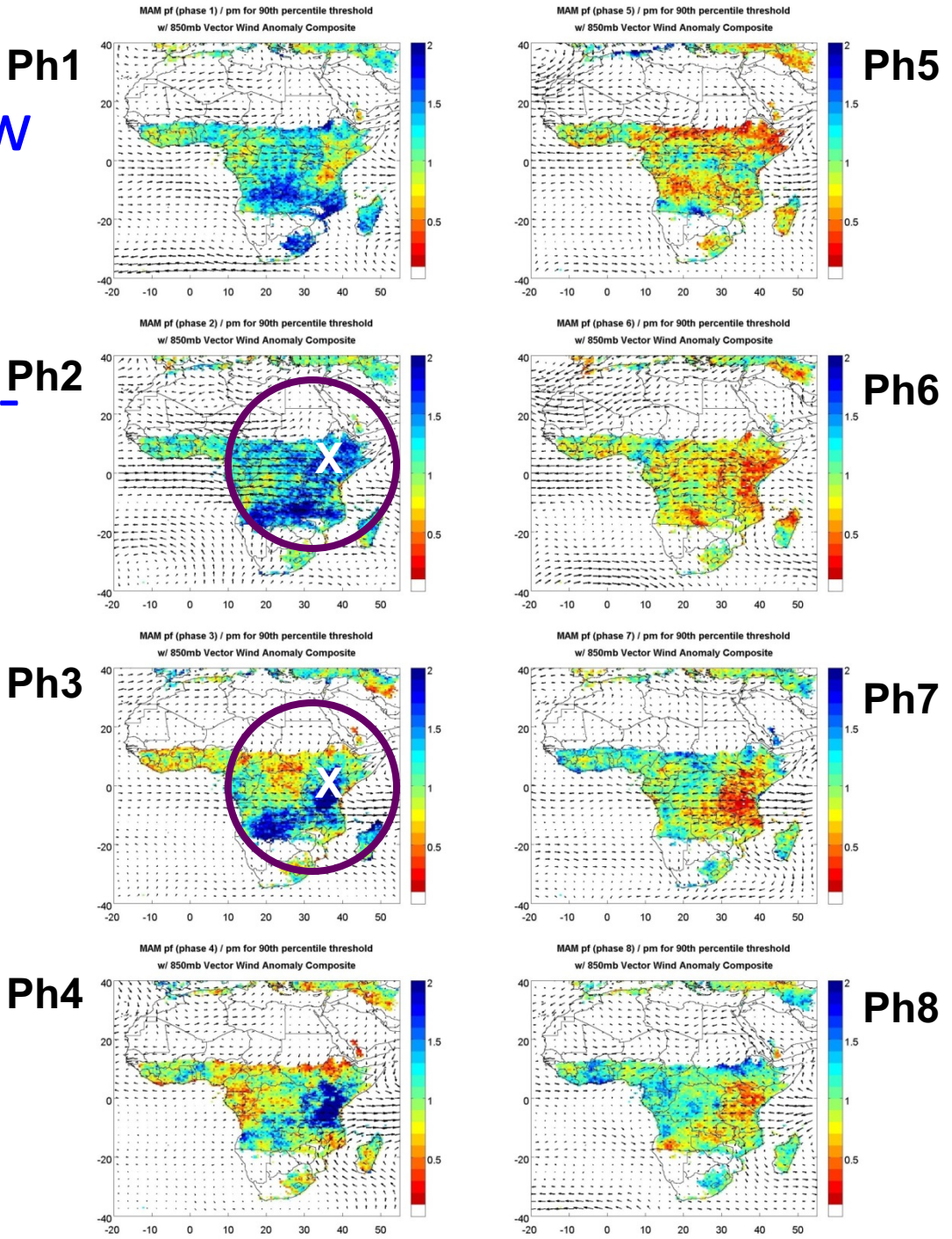
State of the MJO Jan-Jun 2018

- A prominent MJO event straddled the globe during the first half of the year with a very active period Jan – Feb.
- Overall weak in March, with a resurgence later in the month
- Continued activity in much of April through June.

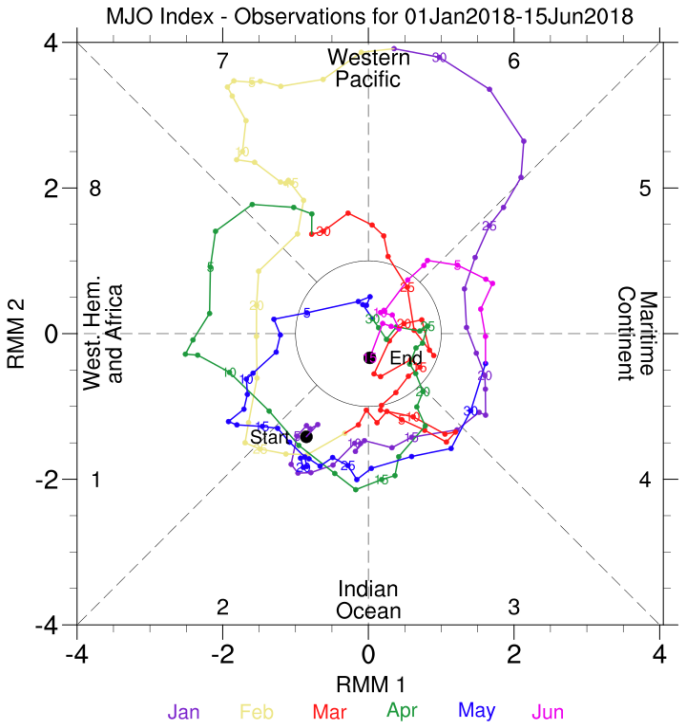


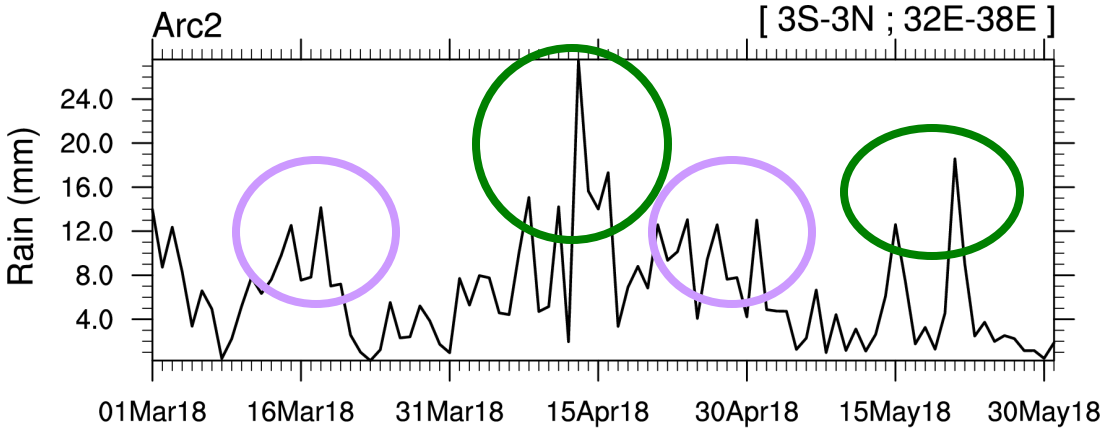
MJO Influence on African rainfall and low level winds during MAM, ARC2 and CDAS (1983-2010)

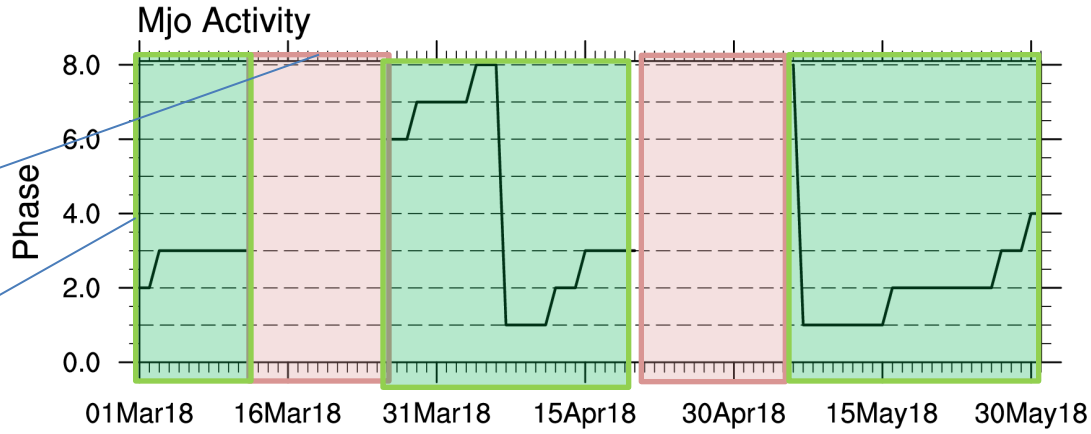
- Convection and low level westerly wind anomaly associated with phases 2 to 4 of the MJO
- Suppression occurs during phases 6 to 8 of the MJO



Spring 2018 Rainfall Evolution and MJO







Periods of inactive MJO : RMM < 1.

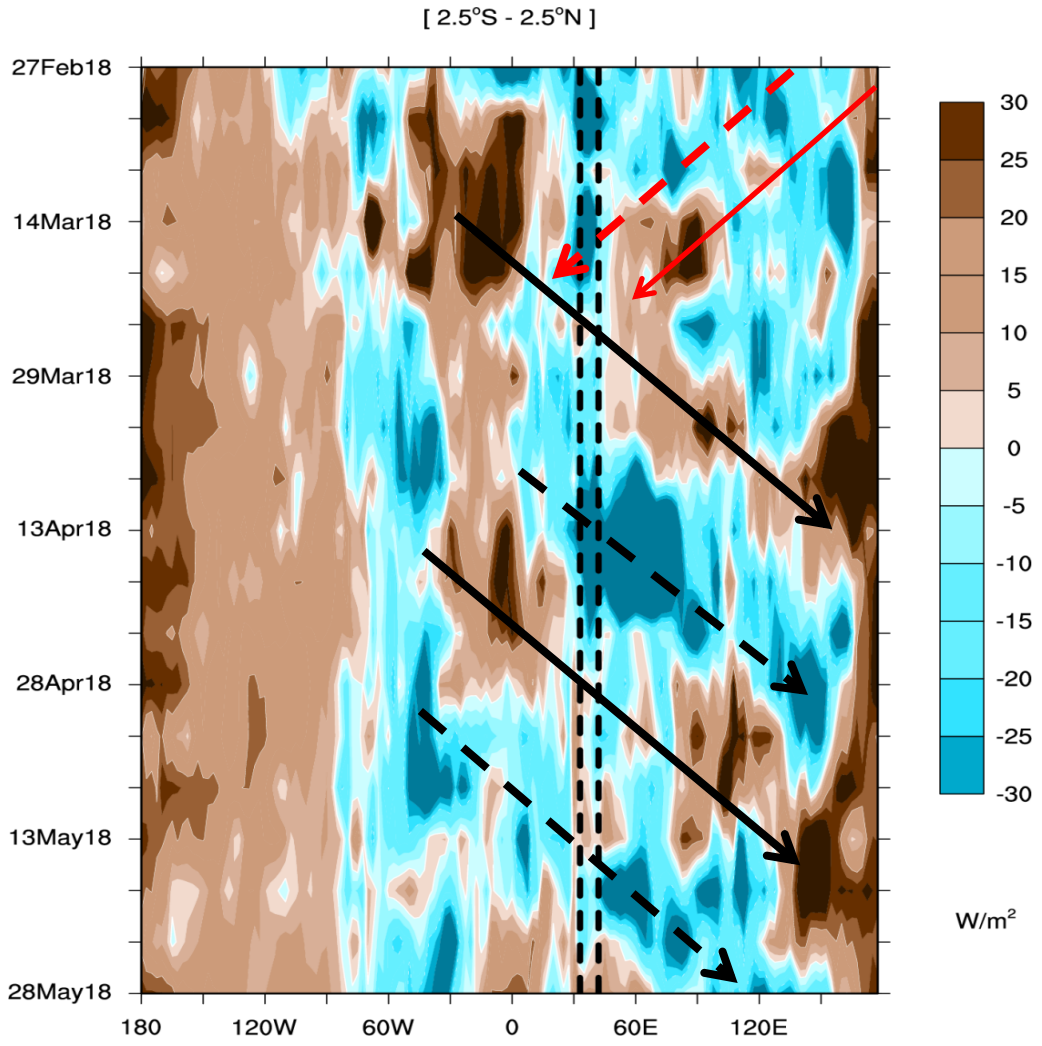
Periods of active MJO : RMM >= 1.

Spring 2018 Evolution of Convection – OLR anomalies

Anomalies are departures from 1981-2010 base period pentad means.

Blue (Brown) Shading : Negative (positive) OLR anomalies i.e enhanced (suppressed) convection and precipitation.

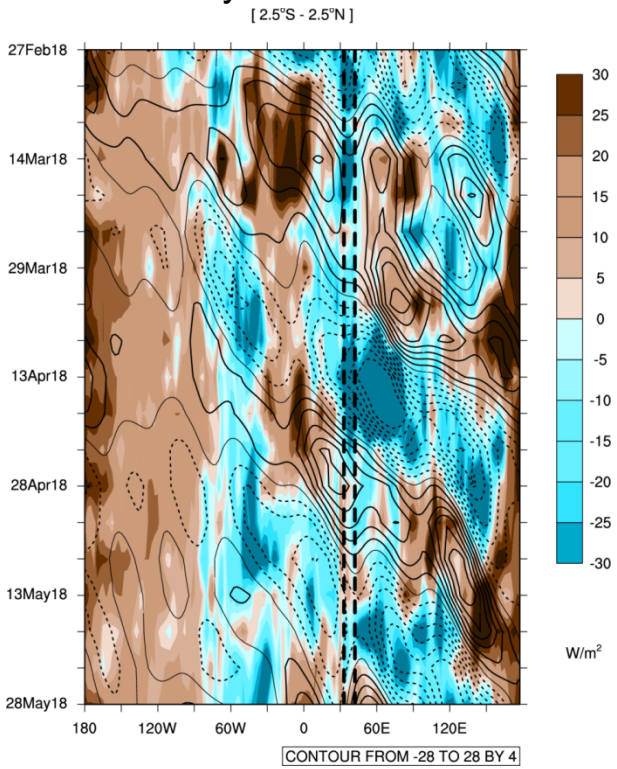
The dashed vertical lines delineated the position of the box over Kenya, 32 – 38 E.



Spring 2018 Equatorial wave activity

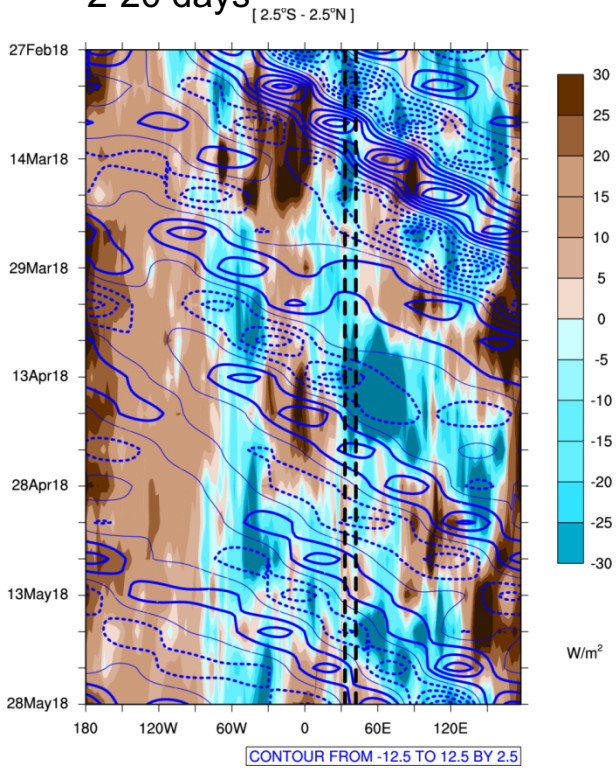
Contours are BP filtered OLR; broken: convection; solid: suppression

30-90 days



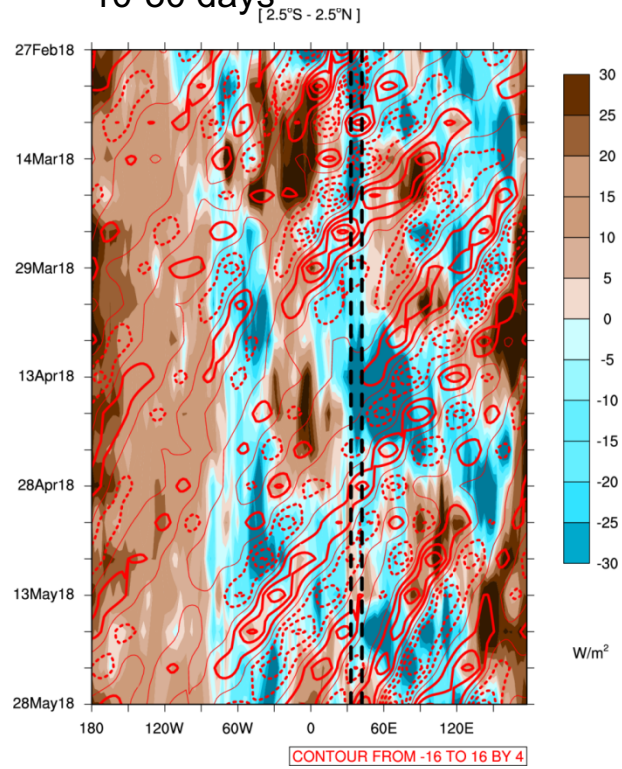
OLR related to MJO signal

2-20 days



OLR related to Kelvin wave

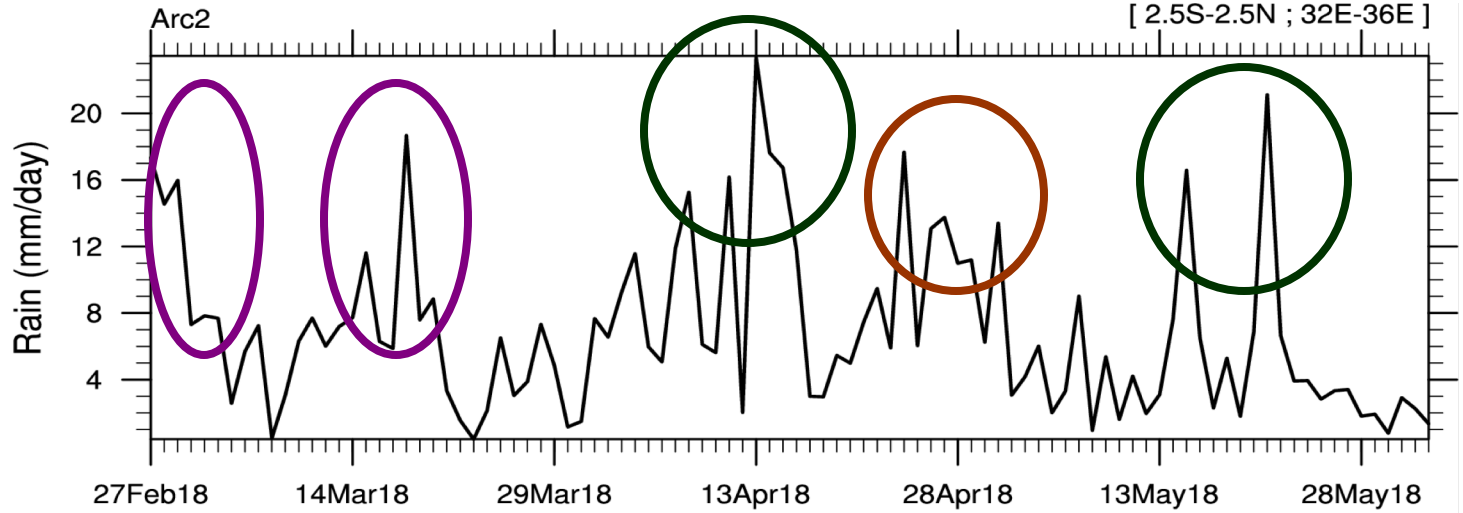
10-30 days

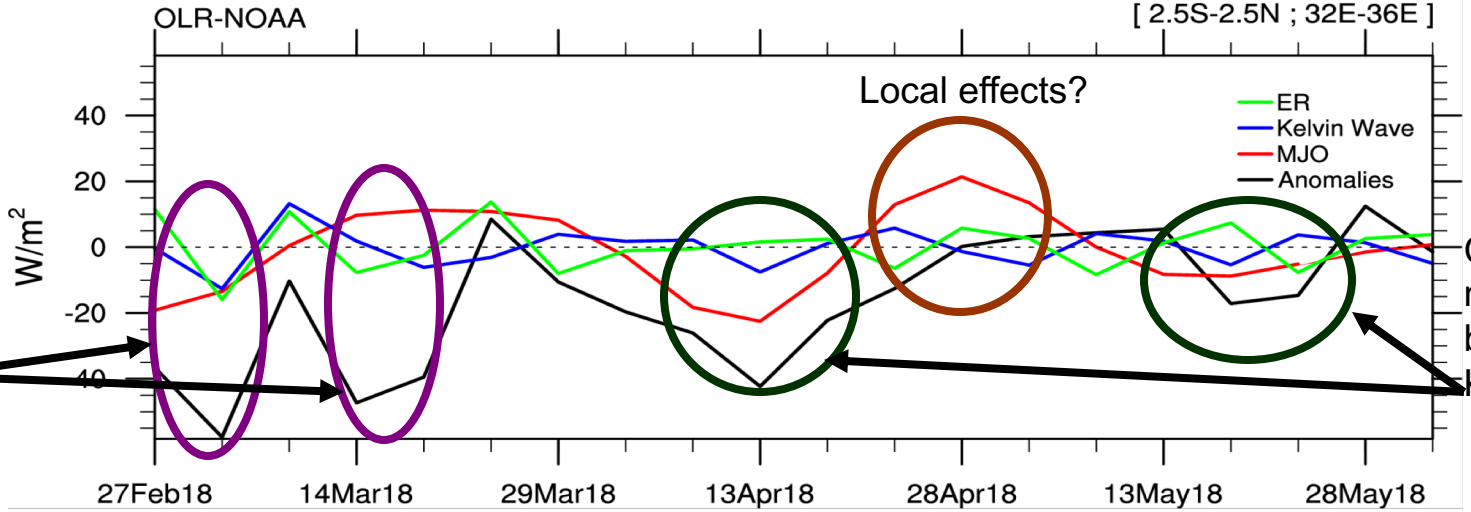


OLR related to E Rossby (ER) wave

ER seems to have played a key role in rainfall activity 8 – 23 March with possible interactions with Kelvin waves

Spring 2018 Rainfall Evolution and wave activity

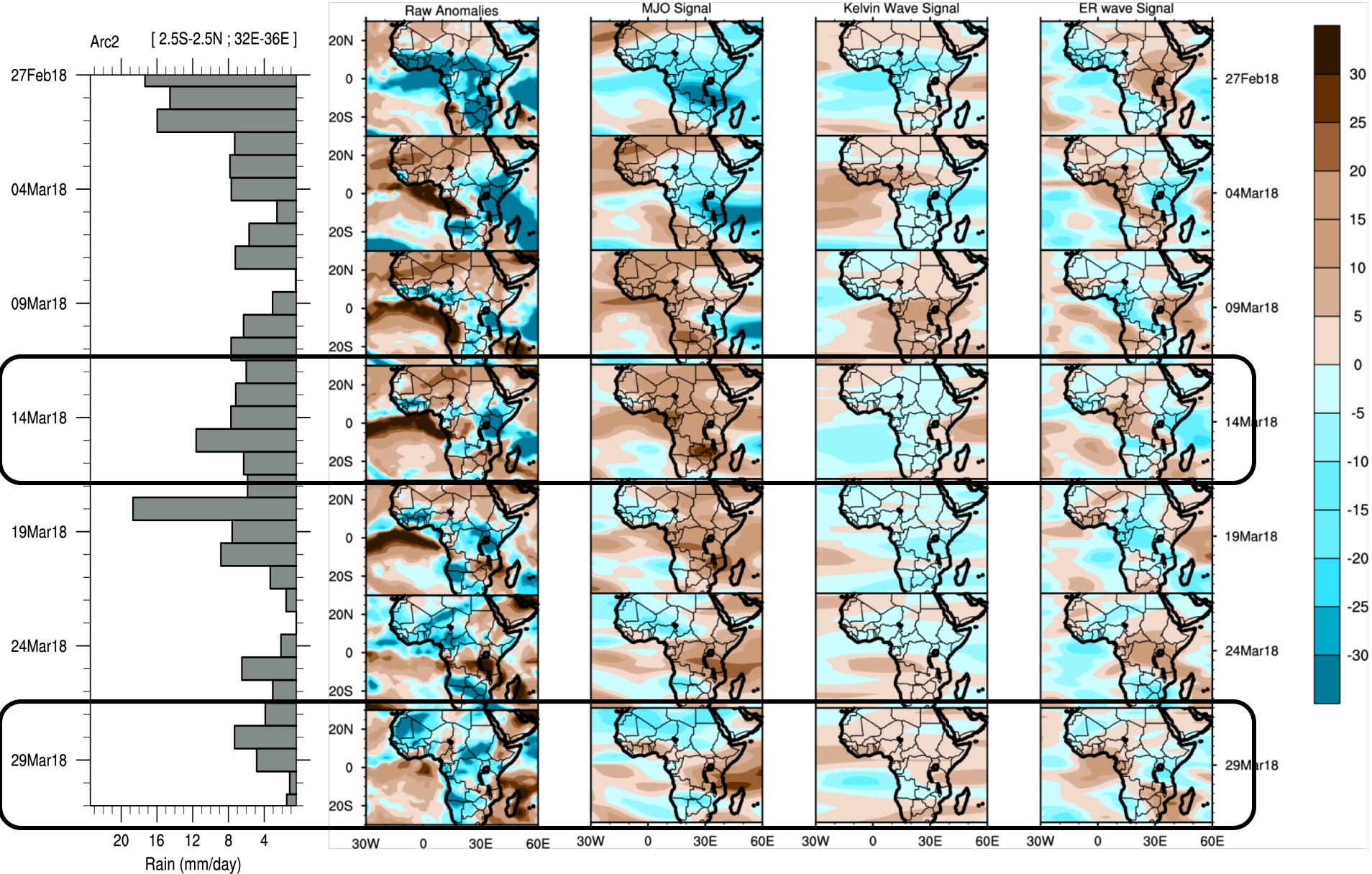




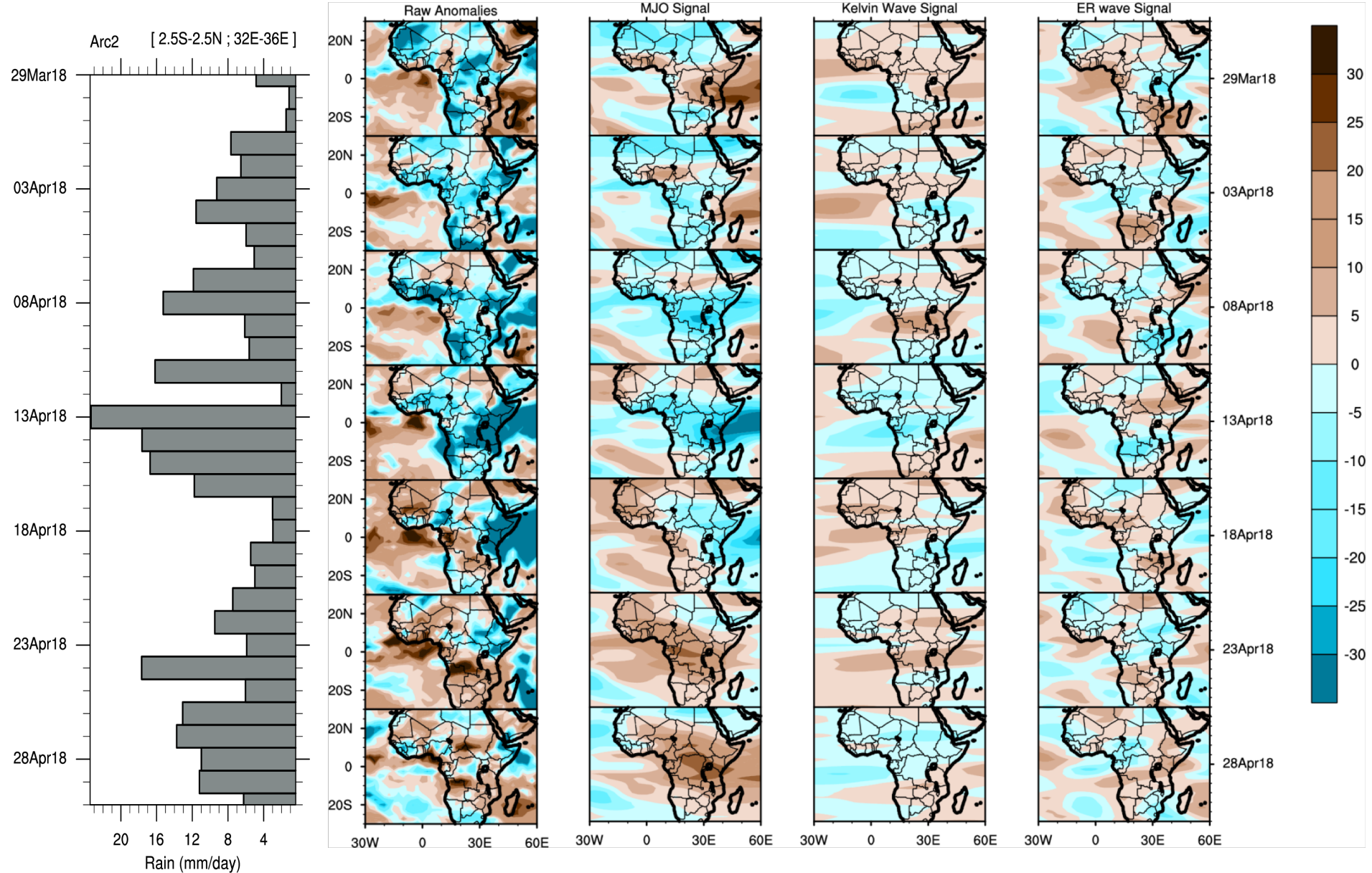
Convection modulated by ER and Kelvin

Convection modulated by MJO and Kelvin

March 2018 OLR Pentad Anomaly and wave activity



April 2018 OLR Pentad anomaly and wave activity



Summary

- The spring 2018 East Africa floods were some of the worst in history and caused a major humanitarian crisis. Hundreds of thousands people affected and the region still dealing with epidemic diseases and recovery.
- The heaviest rains were observed in April with secondary peaks in March and in May. Equatorial wave activity contributed significantly to the prominence of the rains.
- A prominent MJO activity straddled the globe during the first half of the year and accounted for the most extreme rainfall anomalies. However, the dynamics between March and April were quite different.
- The MJO clearly accounted for much of the extreme rainfall anomalies during April. Kelvin wave activity embedded within the MJO also played a role. In mid March however, when the MJO was weak, an equatorial Rossby wave seemed to have dominated.
- Factoring in the different intraseasonal modes will help improve predictions and early warning in this part of the world.

Thank you