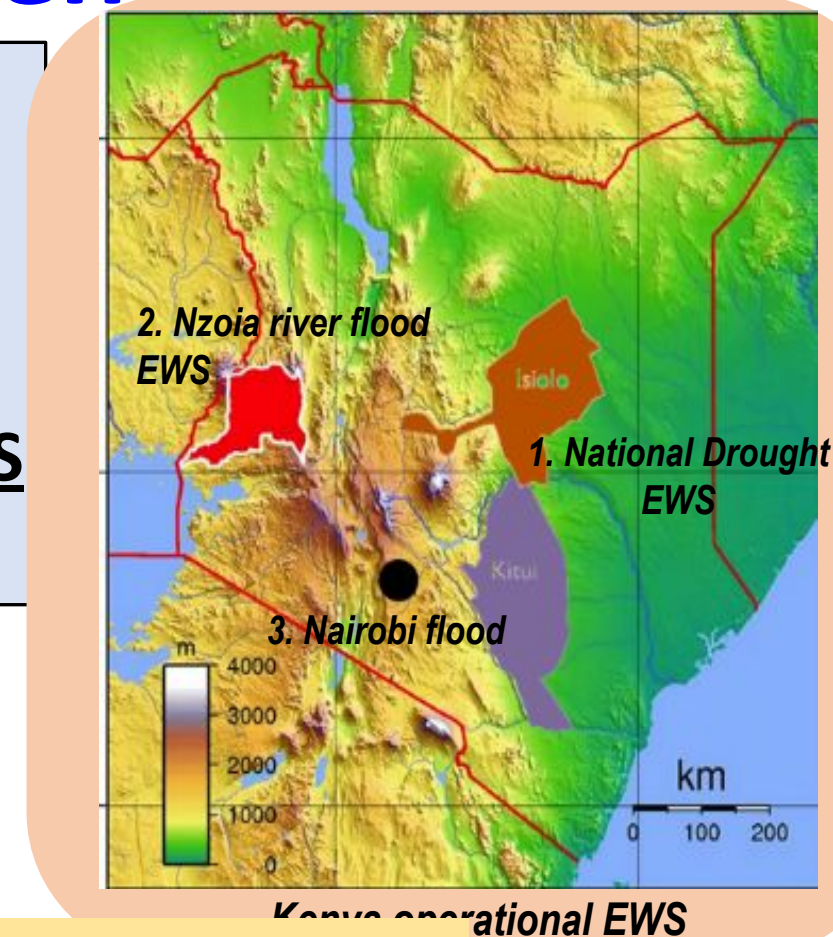


# Reflections on the S2S RTP from Kenya Met Department

## ForPac aims

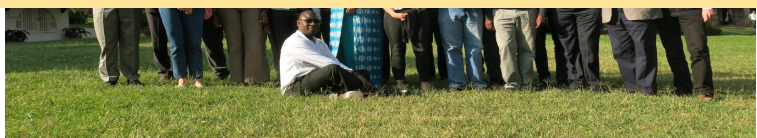
1. Improve forecasts of drought/flood
  - Seamless lead times over S2S
  - Co-production: credibility and salience
2. Improving the use of forecasts in flood/drought EWS
  - Systematic approach to FbA/AA



Mary Kilavi (KMD)  
Emmah Mwangi (KRCS, Sussex)  
Martin Todd (Sussex)  
Richard Graham (Met Office)  
Dave MacLeod (Oxford/Bristol)



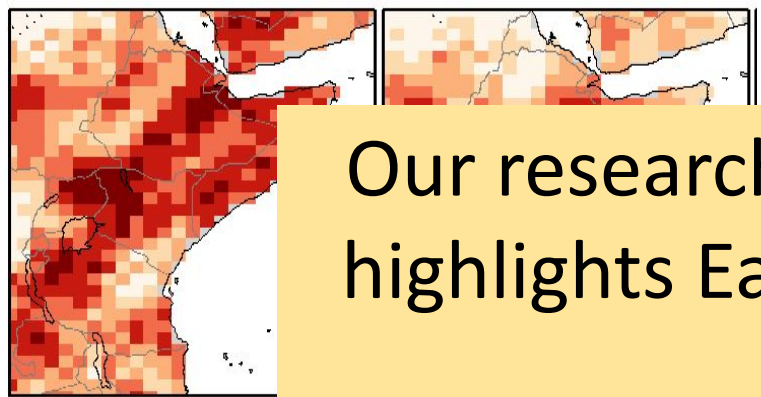
Presentation today focusses on heavy rain and flood



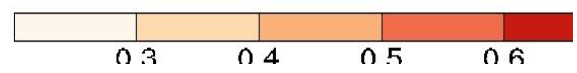
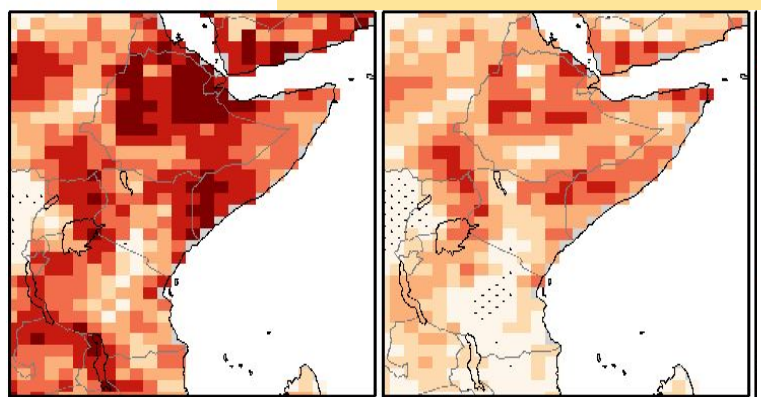


# ForPac S2S Prec'

1 week lead April 2 week lead April

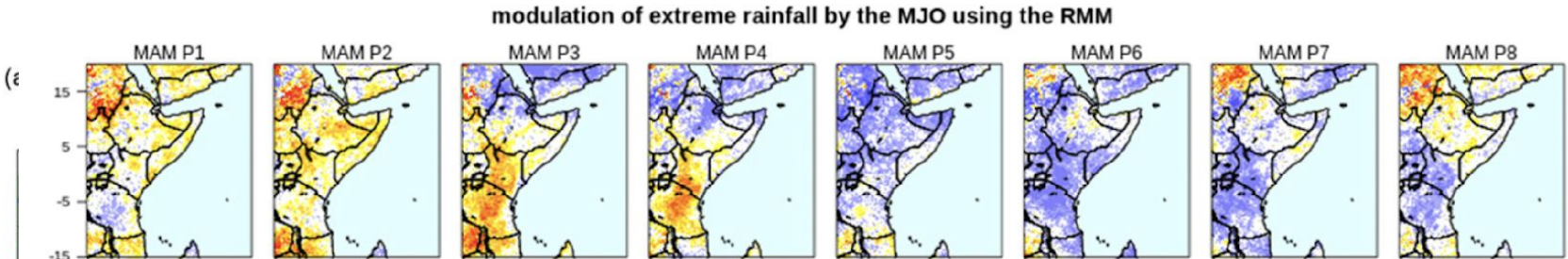


1 week lead

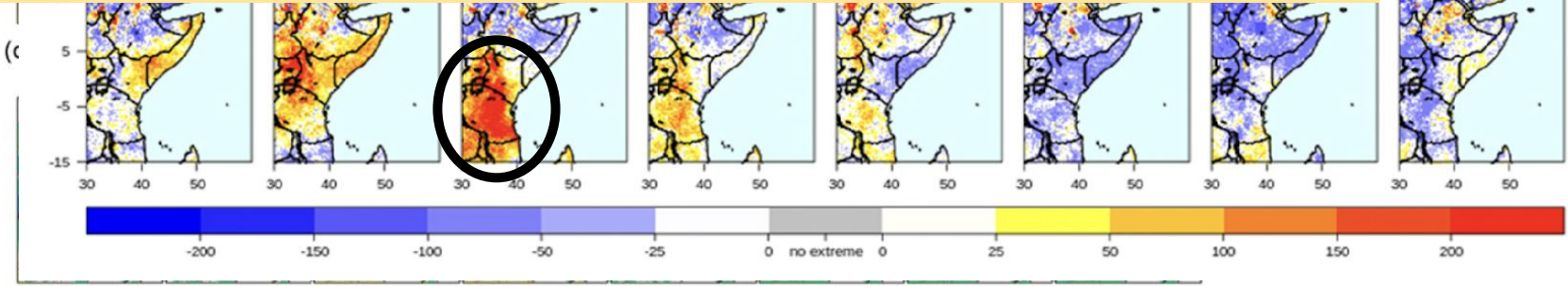


Reforecast skill of ECMWF forecasts at Sub-timesscales: Correlation of ensemble mean v rains (top) and short rains (bottom)

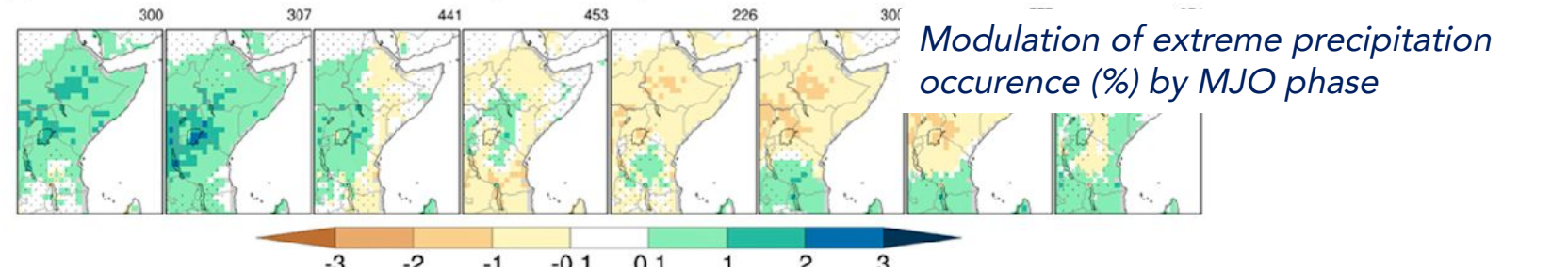
Macleod et al., J Hydromet 2021



Our research and others (e.g. de Andrade et al., 2021) highlights East Africa as a 'sweet spot' for subseasonal predictability



(d) Teleconnection in ENS-extended reforecast (six week lead)

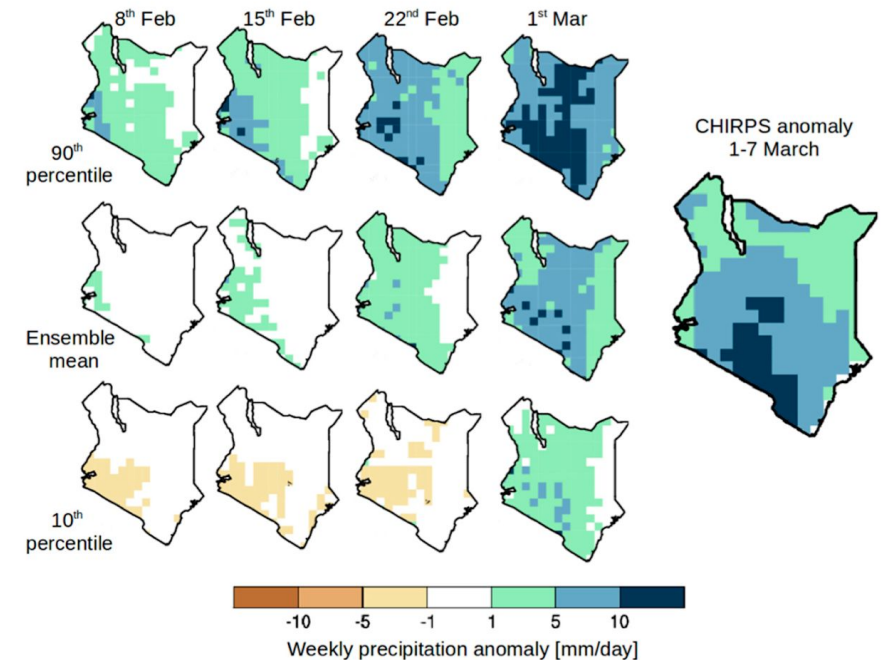


Modulation of extreme precipitation occurrence (%) by MJO phase

Teleconnection of MJO and EA rainfall well represented in model(s)

# S2S forecast demand

- All ForPac stakeholders in flood and drought management expressed strong interest in S2S forecast lead times
- e.g. Kenya Red Cross Society gearing up Anticipatory Action systems and activities
- e.g. County ministries for drought management
- Ready-Set-Go approach ripe for development
- But clear gap in existing forecast provision
- Hence, ForPac engaged with the S2S RTP.



Severe flooding in April 2018 driven by MJO  
*Kilavi et al., Atmosphere 2018*



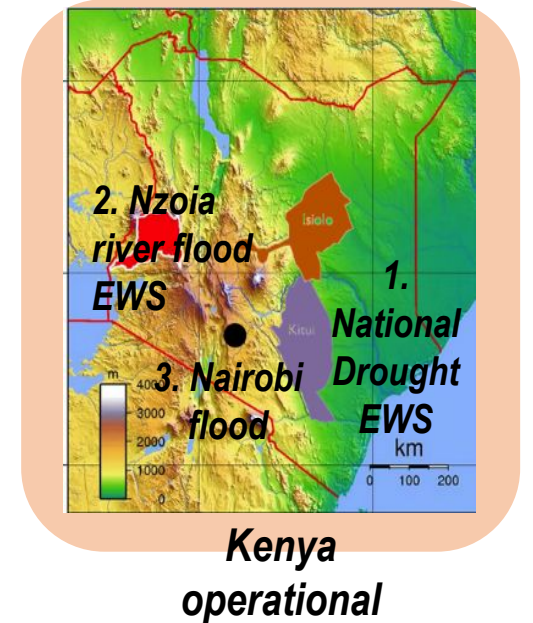
# S2S RTP activities in ForPac

Resources limited our S2S RTP activities to:

## 1. Heavy rain and flood risk management in Nairobi City.

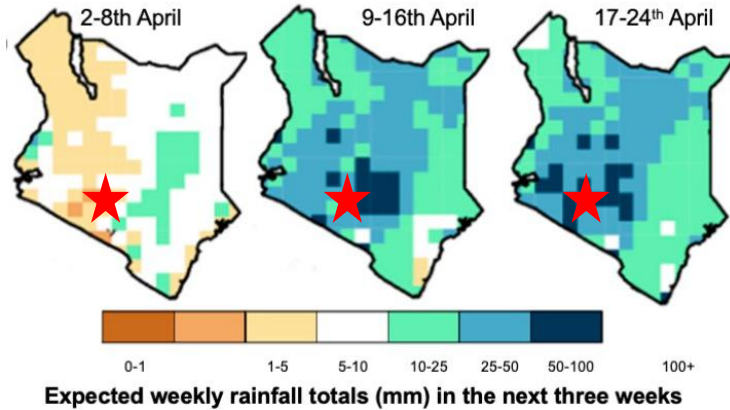
- KMD and stakeholders co-developed sub-seasonal heavy rainfall forecast products (from ECMWF ENS-extended), and actions that can be triggered at different lead times.
- (Note: For basin-scale riverine flooding the KMD flood EWS model not able to ingest forecasts at S2S lead times.)

## 2. SS wet season onset forecasts

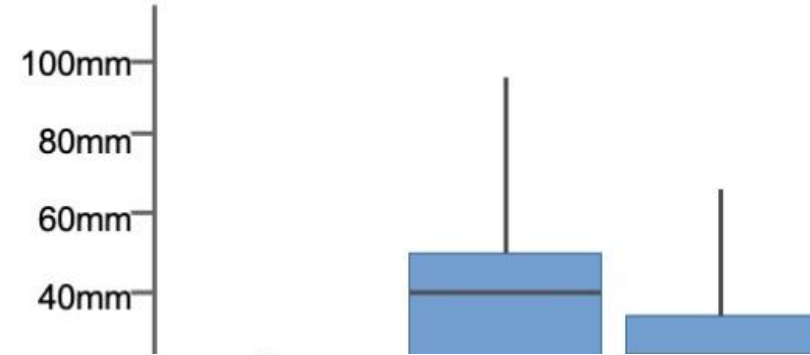


# 1. Co-production of S2S forecasts for Nairobi flood risk

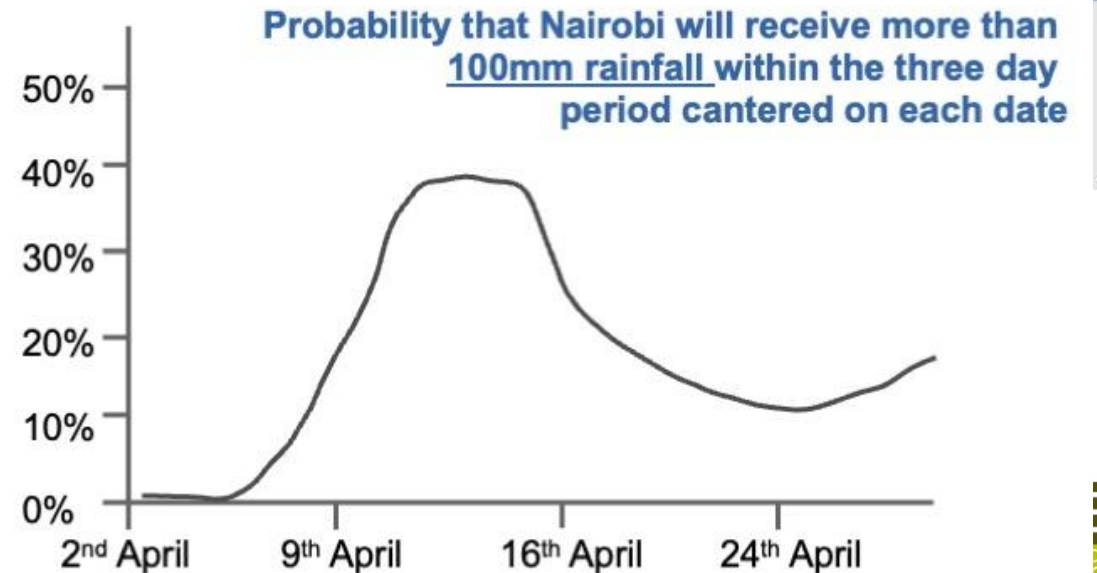
Forecast issued 2<sup>nd</sup> April



Forecast issued 2<sup>nd</sup> April



Forecast for **DAILY EXTREME RAINFALL**  
(Issued 2<sup>nd</sup> April)



Forecast issued 2<sup>nd</sup> April

The chance that Nairobi will receive heavy rainfall is:

**UNLIKELY** during the week 2-8<sup>th</sup> April

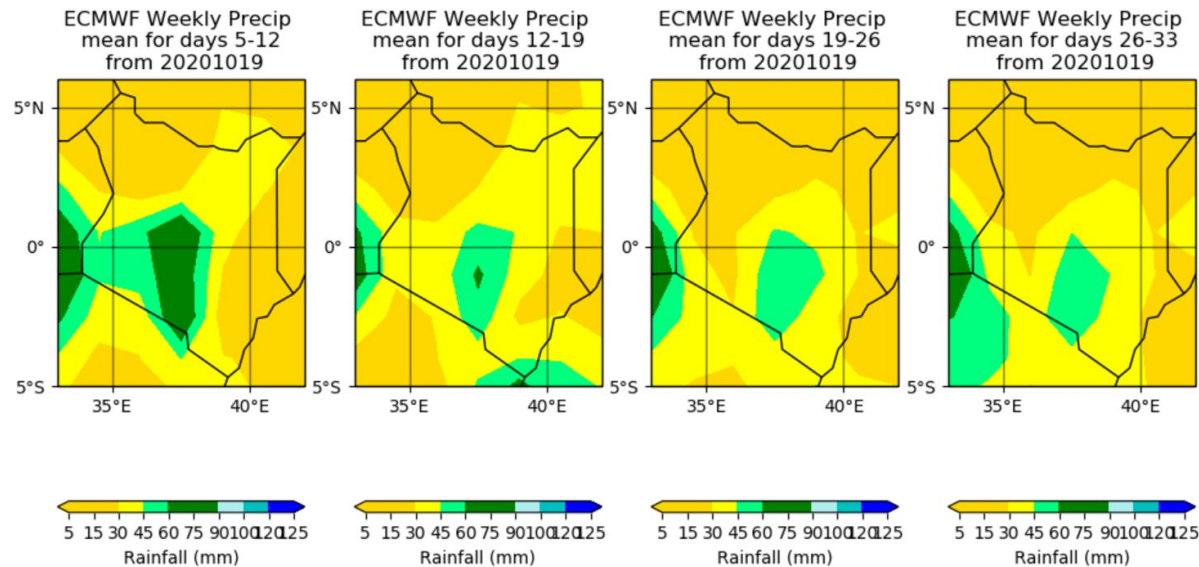
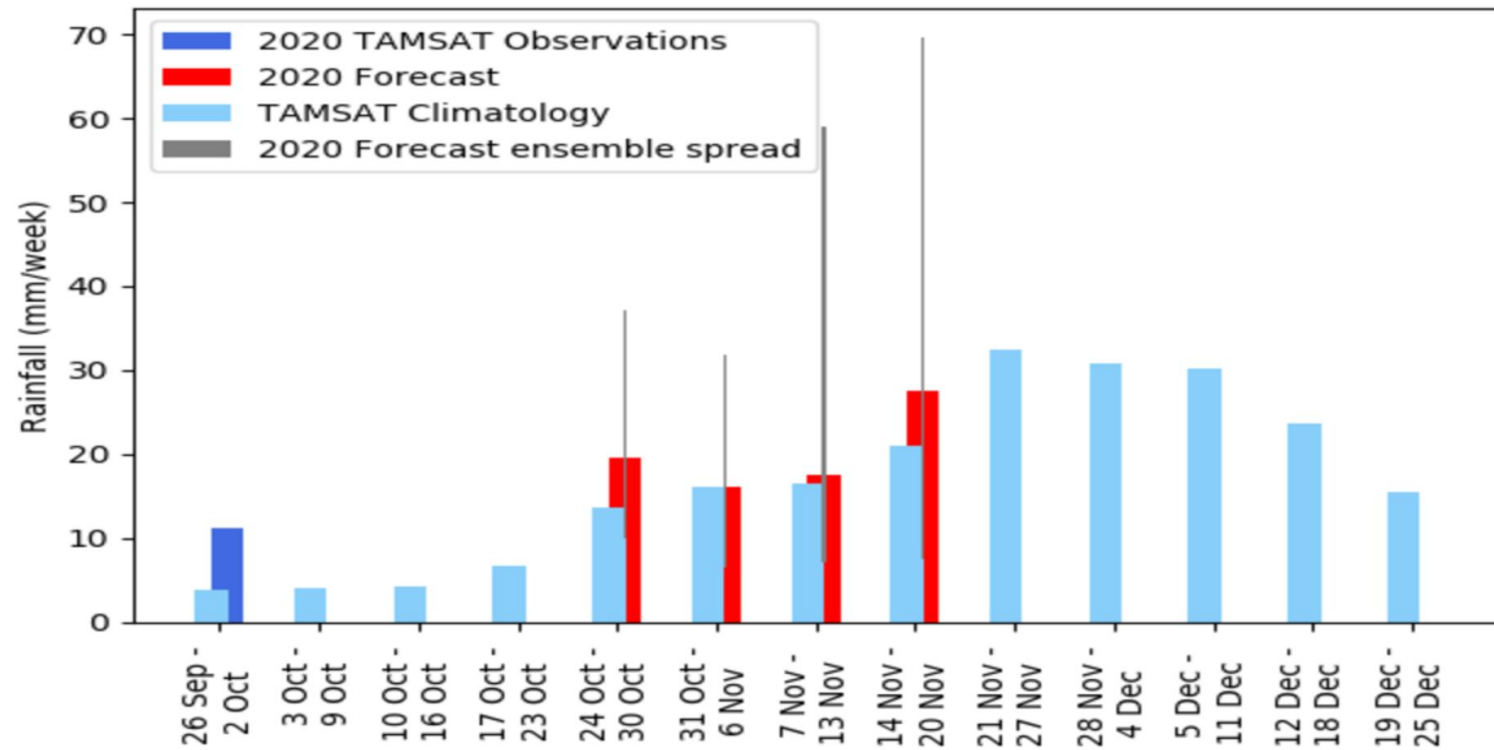
**VERY LIKELY** during the week 9-16<sup>th</sup> April

**LIKELY** during the week 17-24<sup>th</sup> April

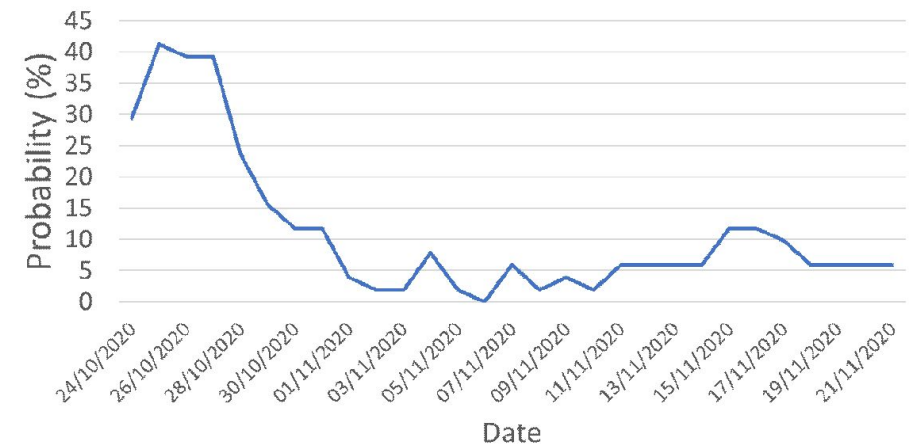
# Products co-developed for heavy rain and flood risk management in Nairobi City

Kenya Meteorological Department (KMD) and stakeholders co-developed sub-seasonal heavy rainfall forecast products (from ECMWF ENS-extended), and actions that can be triggered at different lead times.

ECMWF Forecast initialised on 19 Oct 2020



Probability that Nairobi will receive more than 30 mm rainfall within the three day period centred on each date





# Nairobi flood risk management actions

- The products were piloted through two wet seasons.
- Dissemination of these products informed implementation of flood mitigation measures in the city
  - Kenya Red Cross –Nairobi branch
  - Disaster Risk Management & Coordination , Road and Infrastructure sectors of the county government
  - Utility Companies
  - A community Based Organisation in an informal settlement
- Actions
  - e.g. unblocking drainages by county government and communities.







# Conclusions and recommendations 1

- Demand is clear
  - Strong demand for sub-seasonal forecasts exists from risk management agencies and community organisations
  - Latent demand across wider climate risk management actors
    - e.g. social enterprises involved in agriculture support
    - e.g. basin-scale flood risk (*see Kiptum et al., J. Flood Risk Man, in press*)
  - Co-production process is beneficial to all but resource intensive

**Growth in the Anticipatory Action agenda is clear.  
Can NMHSs meet this demand?**

# Conclusions and recommendations 2

- Capacities
  - Critical need to significantly enhance capacity in NHMS:
    - To develop, co-produce and disseminate tailor-made products
    - To sustainably embed this in operations.
    - NHMSs need access to the raw forecast data to meet these 'user' needs.
  - Capacity of risk management stakeholders to co-produce and then utilise forecasts is highly variable
- Verification
  - Sharing formal forecast verification information provides confidence to stakeholders
  - Need to evaluate the benefits of forecast based decisions

**Summary: Strong opportunity exists but major capacity and resource deficits!**