[Session AS1.16]
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Future change in precipitation seasonality over the Horn of Africa in high-resolution simulation

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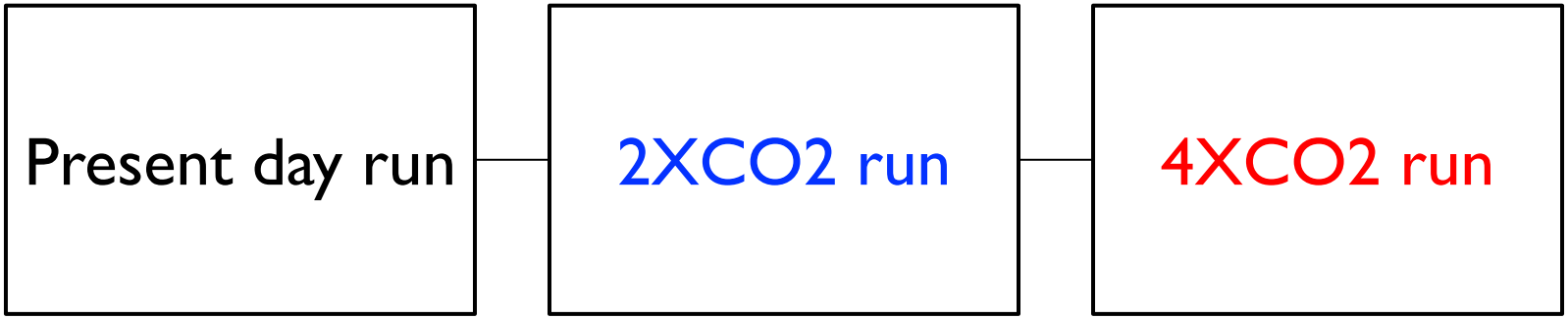
Question

How the precipitation seasonal cycle over HOA will responds to greenhouse warming.

Model (ultra high-resolution simulation)

- The Community Earth System Model (CESM 1.2) has been used; with horizontal resolution of 25 km in the atmosphere and 10 km in the ocean

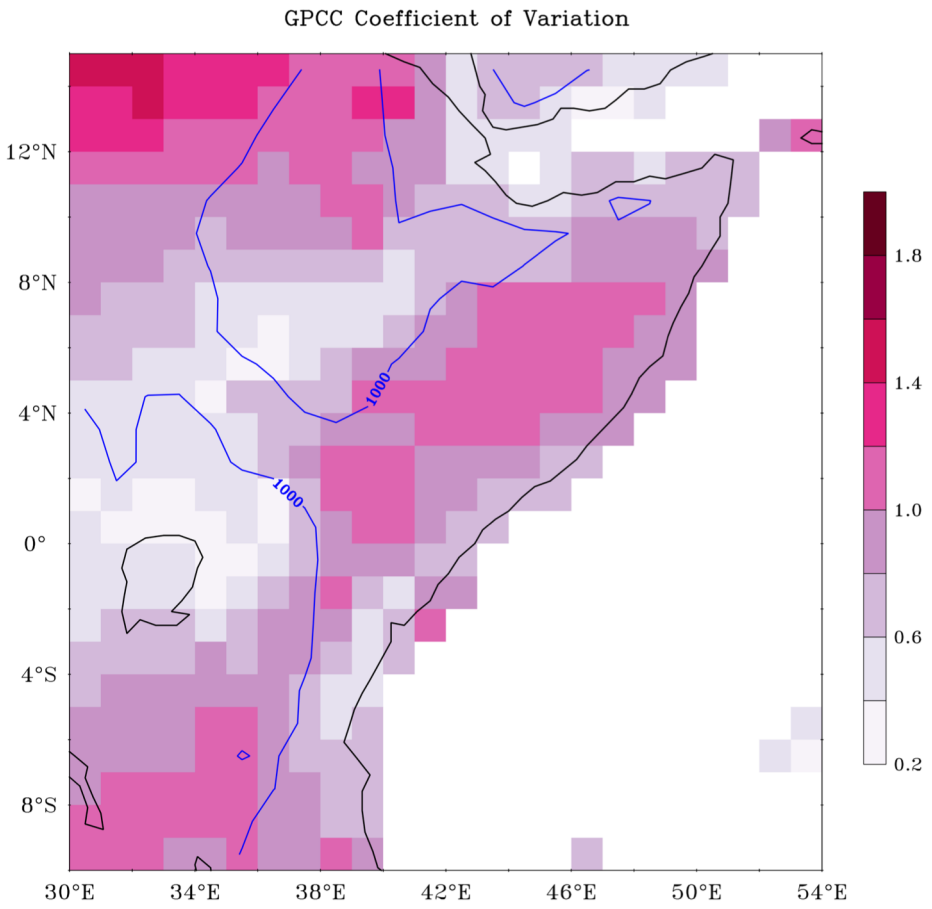


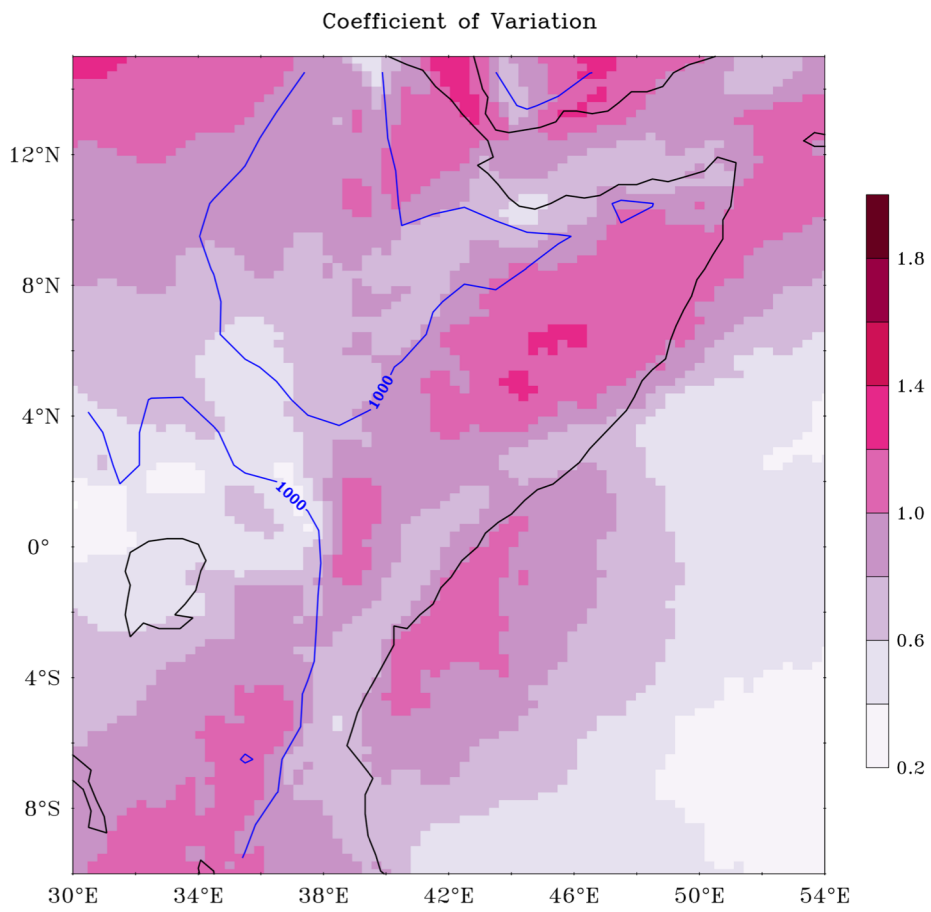
*Please attend Prof Axel Timmermann's talk for detail information about ultra high-resolution simulation on Thu (07 May) 08:30–10:15| **D3034** |*

- https://meetingorganizer.copernicus.org/EGU2020/EGU2020-1725.html

Mean state and variance

$$cv = \frac{\sigma}{\mu} \times 100$$

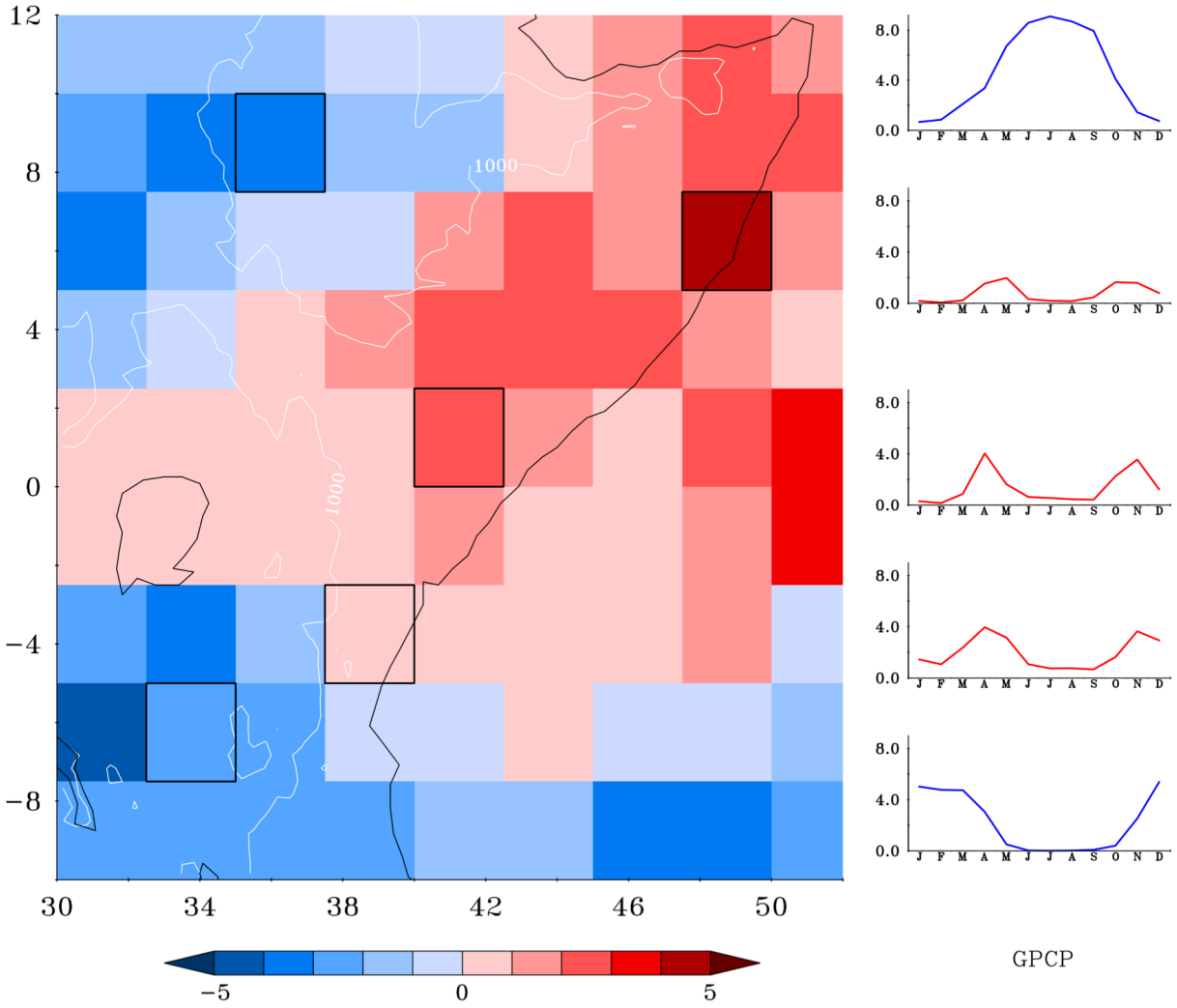




GPCC

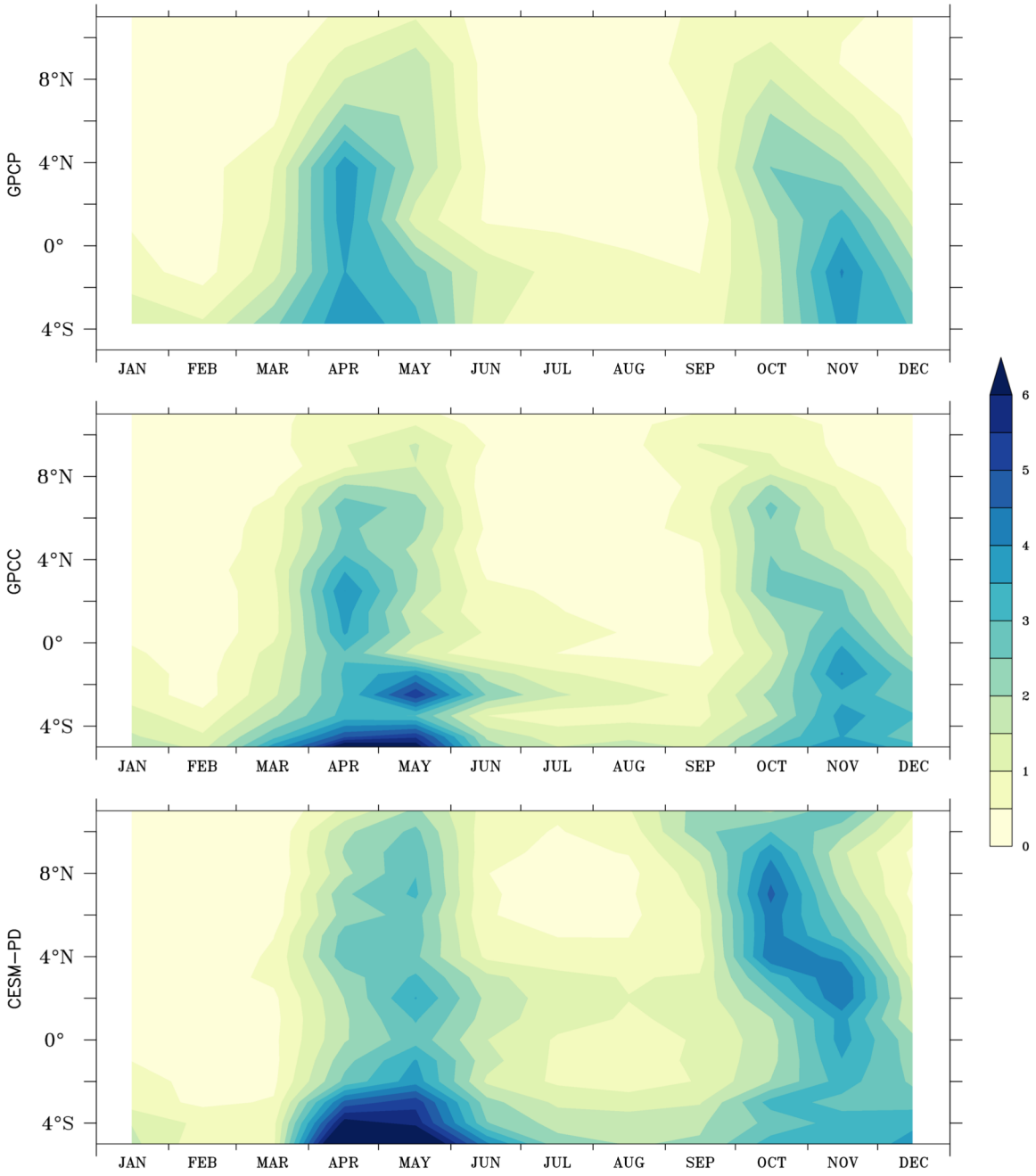
CESM-PD

Bimodal amplitude (GPCP)



White contours represents topography greater than 1Km

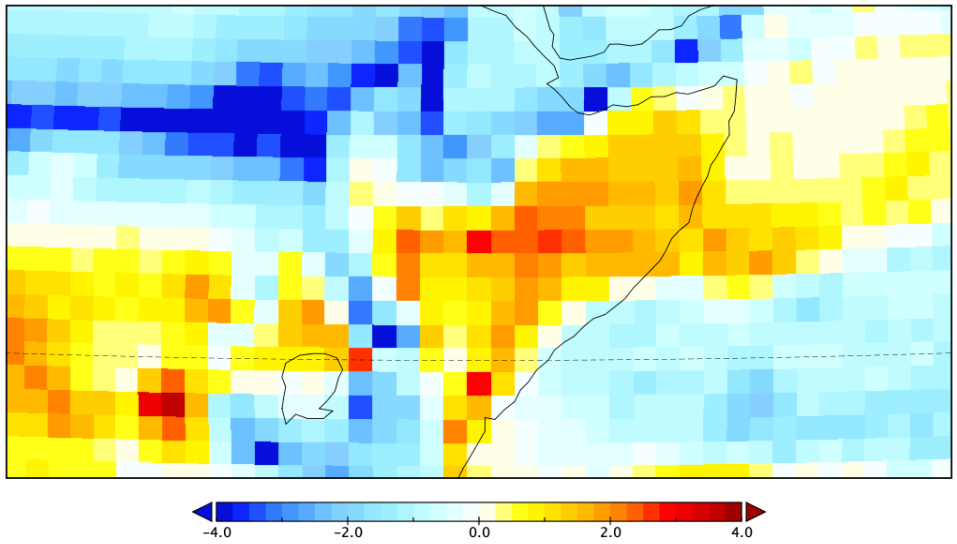
Hovmöller diagram



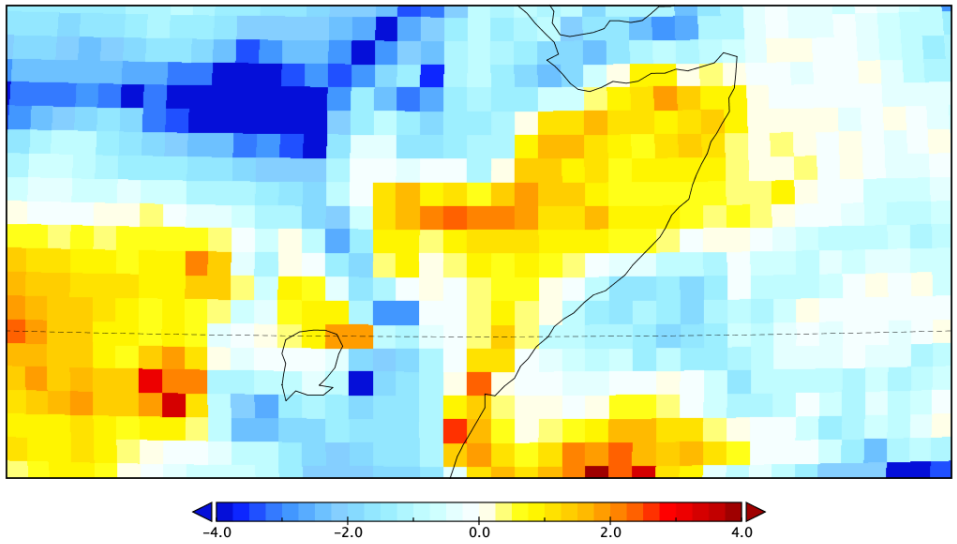
Resolution

Seasonality

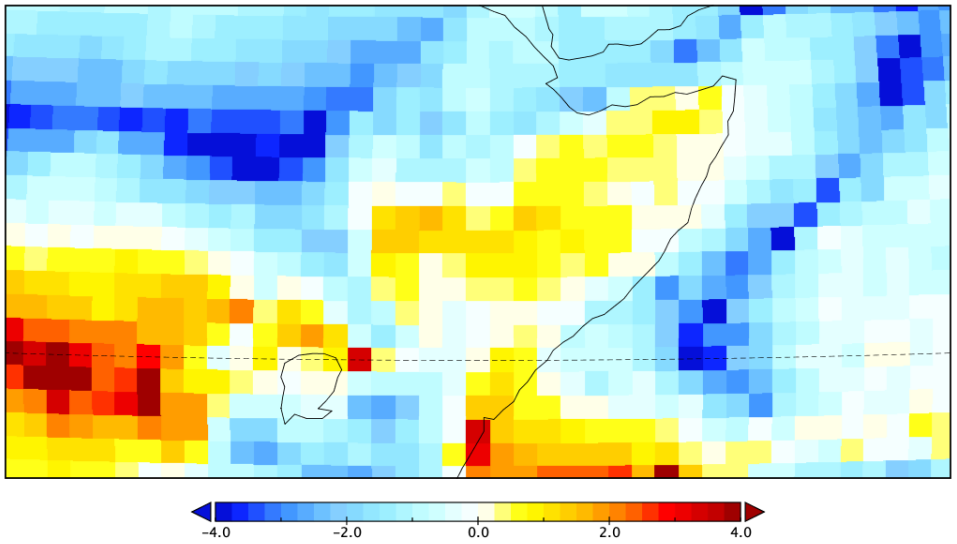
PD



2xCO2

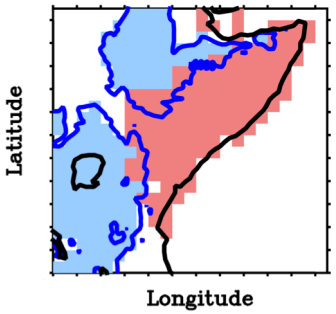


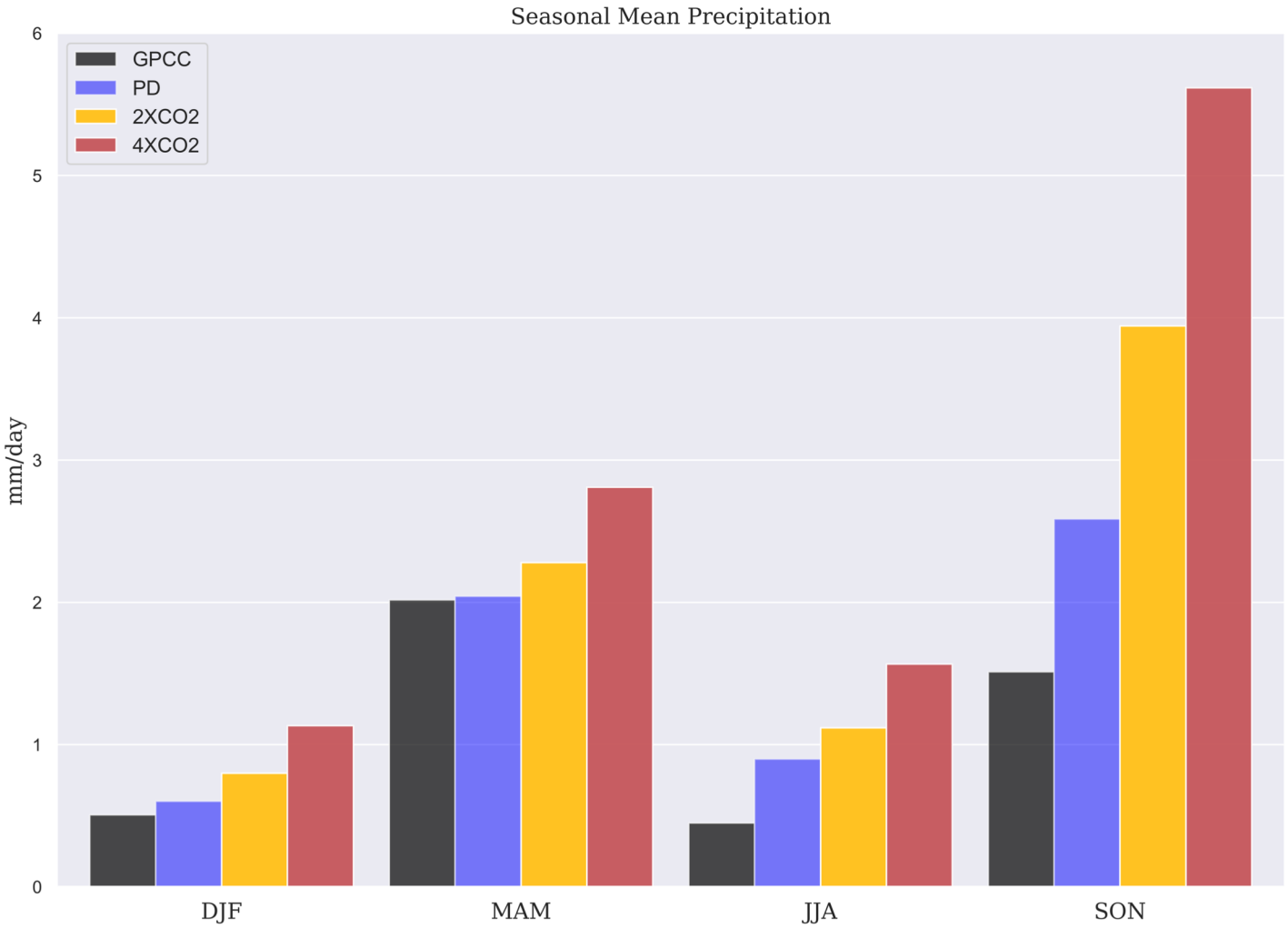
4xCO2



Seasonality amplitude ratio has been reduced over East Africa

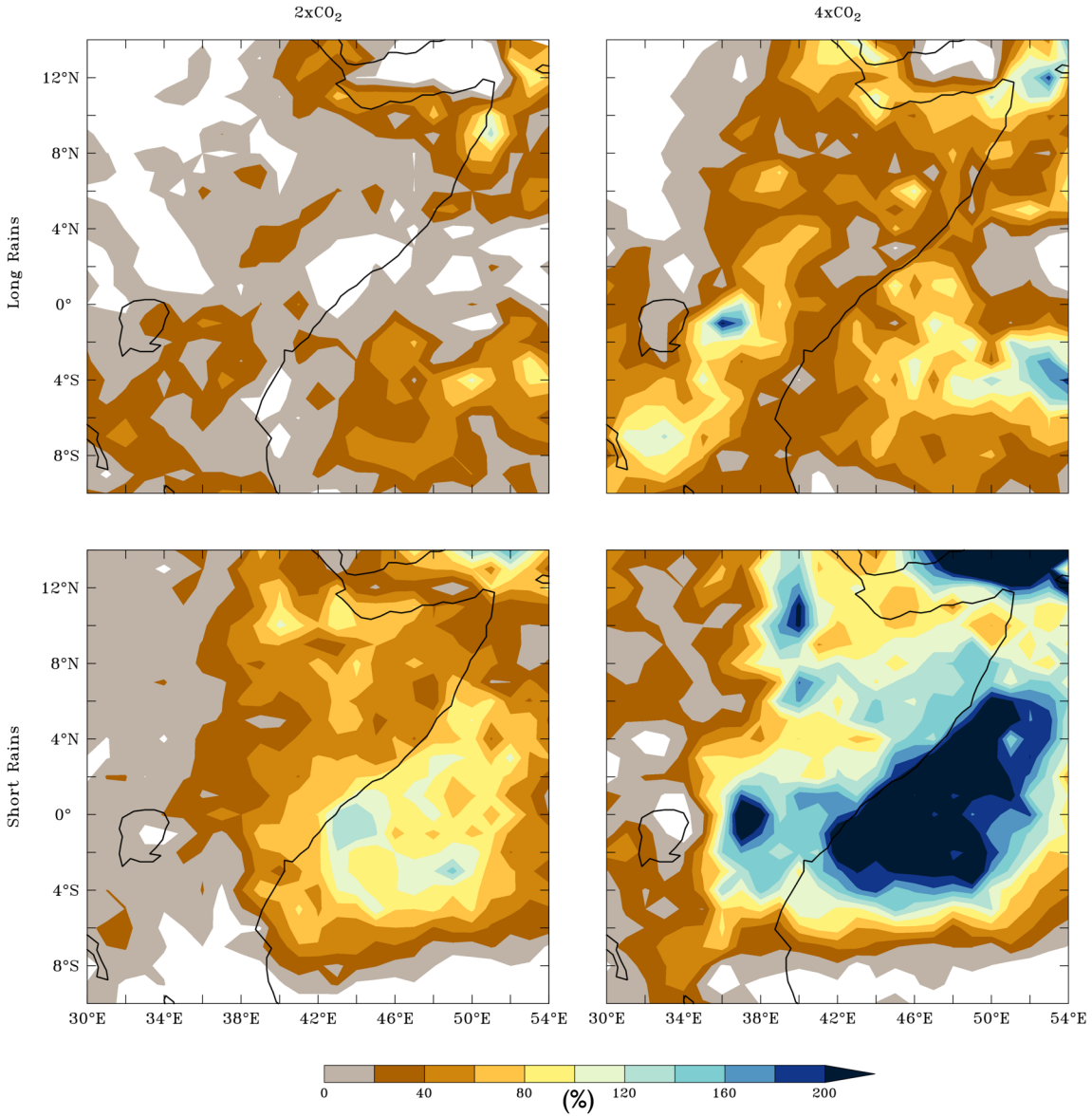
Seasonal precipitation



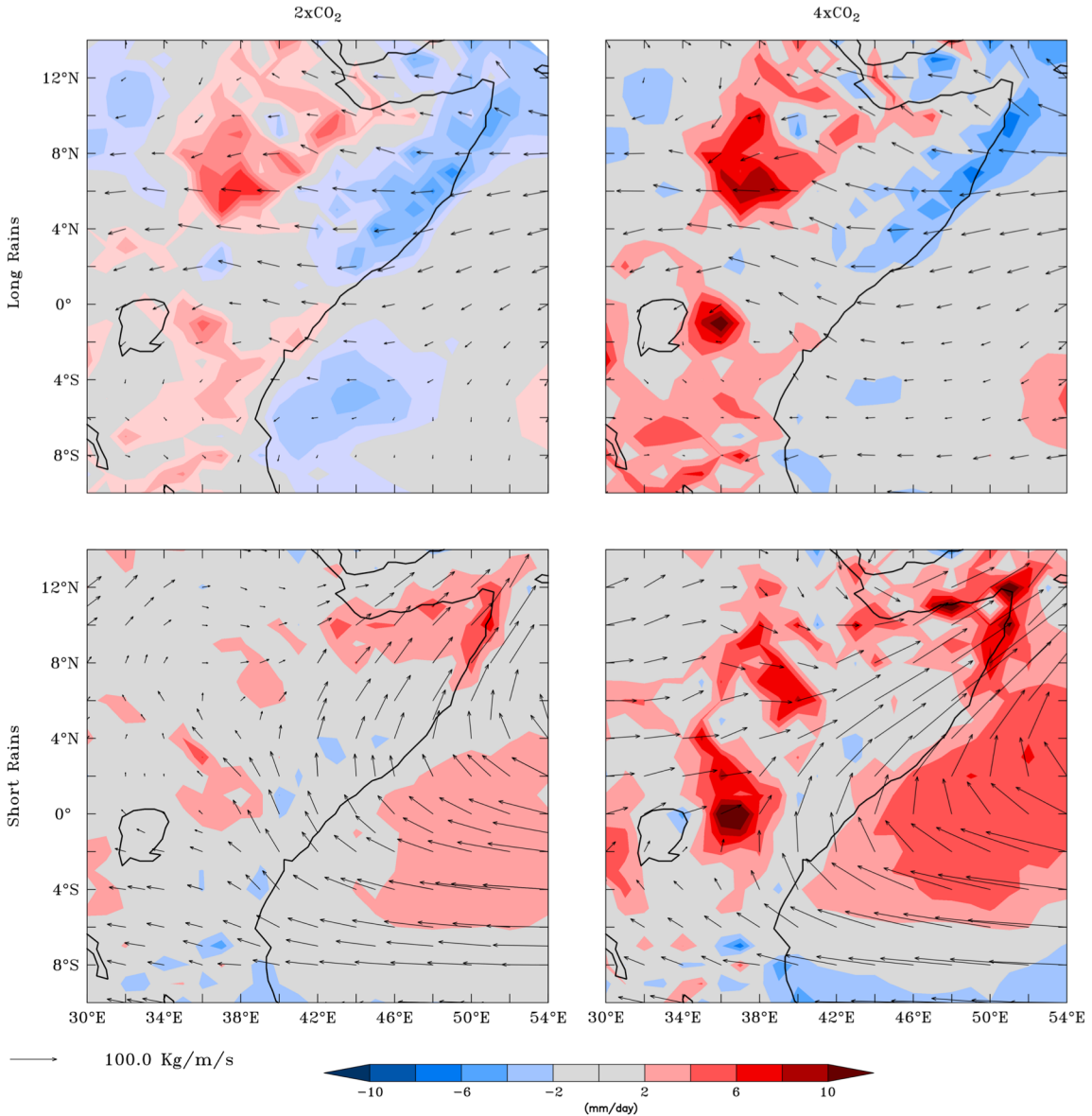


Almost doubled short rains under quadruple CO_2

Precipitation response to CO_2



Moisture transport change

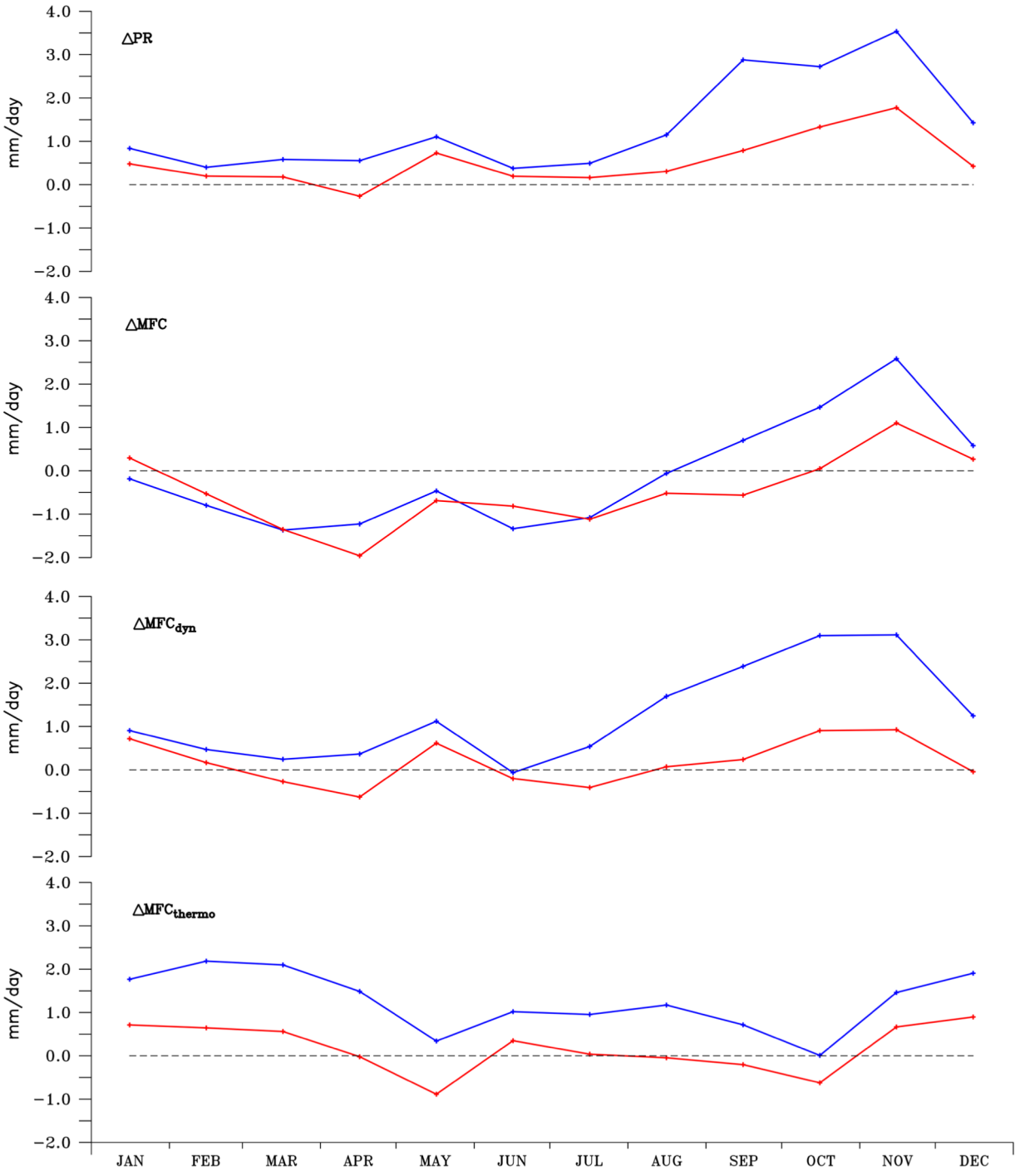


MFC-Shaded, MT- vectors

Changes

$$\Delta MFC = -\nabla.\left(\Delta\vec{V}\bar{q}\right) - \nabla.\left(\Delta q\bar{\vec{V}}\right)$$

$$\Delta MFC = dyn + Thermo$$



Conclusions

- ✓ Precise representation of precipitation seasonal cycle over HOA adds confidence for future projected changes in seasonality.
- ✓ Seasonality amplitude ratio has been shifted over East Africa under greenhouse warming
- ✓ Future greenhouse warming leads to the intensified seasonal cycle of precipitation with a projected increase in the short rain season