

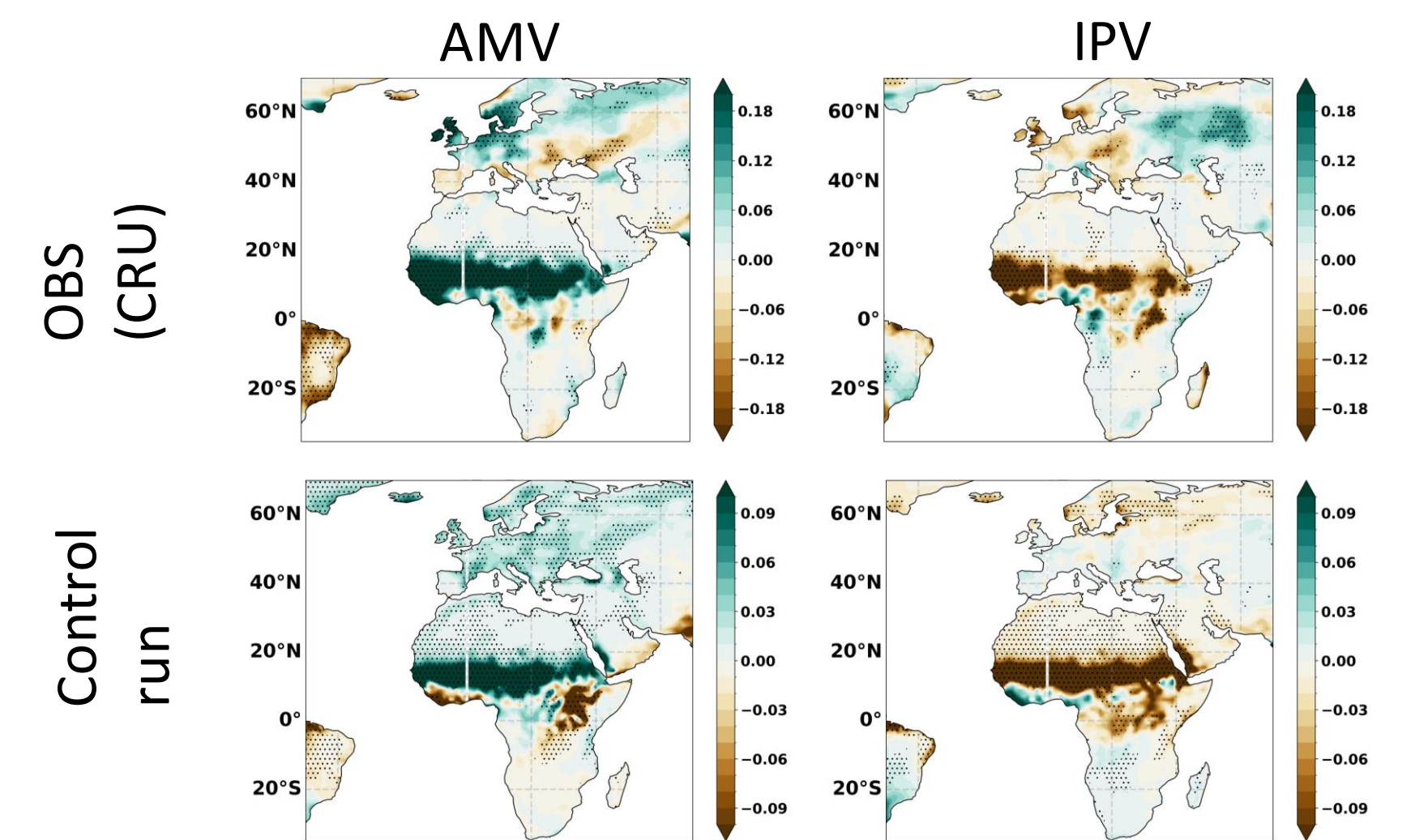
# Impact of Atlantic and Pacific Decadal Sea Surface Temperature on precipitation over the European and African continents

Yingxue Liu<sup>1,2</sup>, Joakim Kjellsson<sup>3</sup>, Abhishek Savita<sup>4</sup>, Hyacinth Nnamchi<sup>1</sup> and Wonsun Park<sup>5,6</sup>



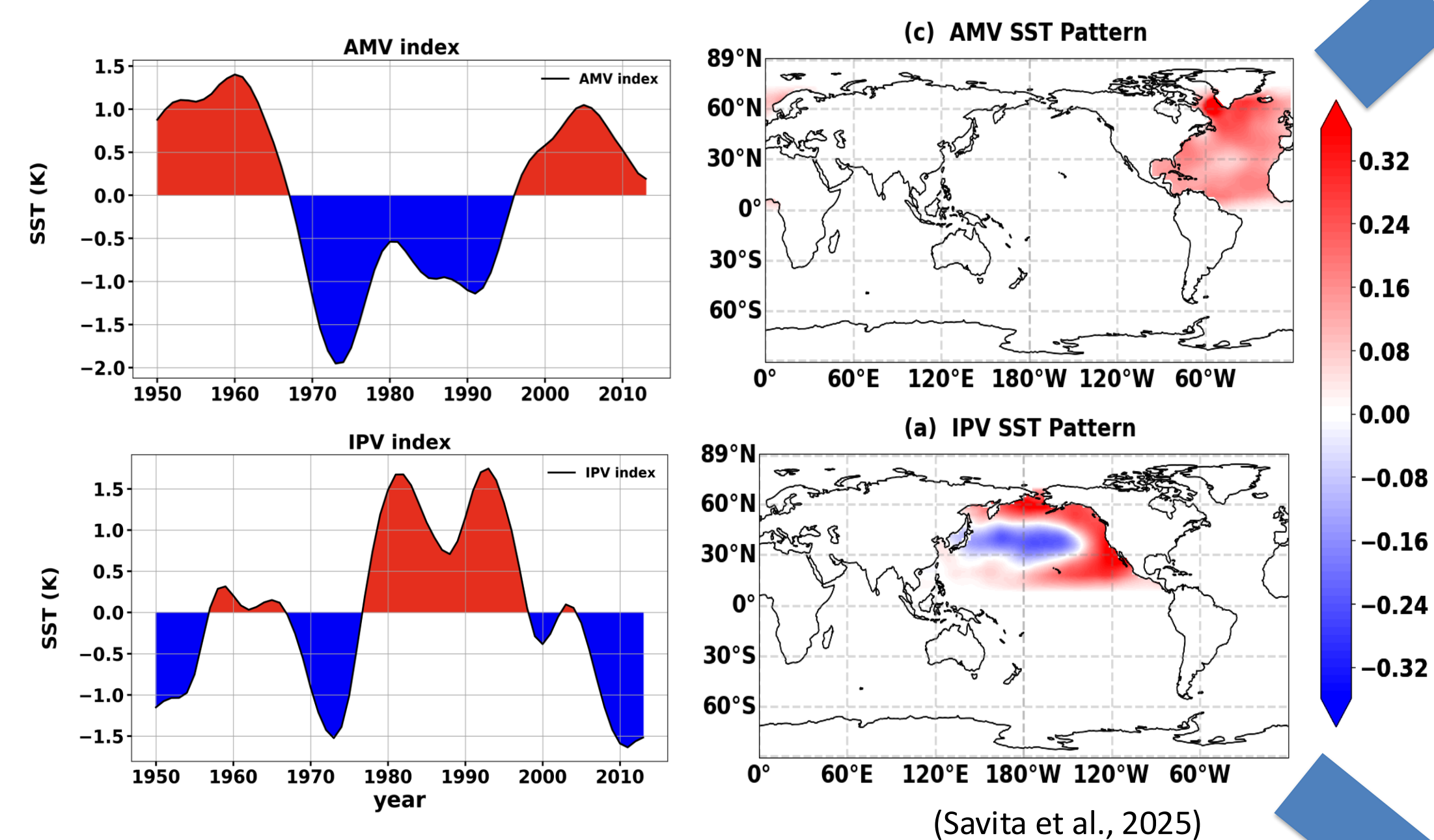
## 1. Motivation

- Atlantic Multi-decadal Variability (AMV) and Interdecadal Pacific Variability (IPV) play an important role in modulating European and African summer (JJAS) precipitation.
- In this study, we explored individual contribution of AMV and IPV by designing two sensitive experiments in OpenIFS atmosphere model.



Detrended summer (JJAS) precipitation regression on normalized AMV/IPV index during 1950-2013.

## 2. OpenIFS Experiments Design



### Experiments (45 ensemble members):

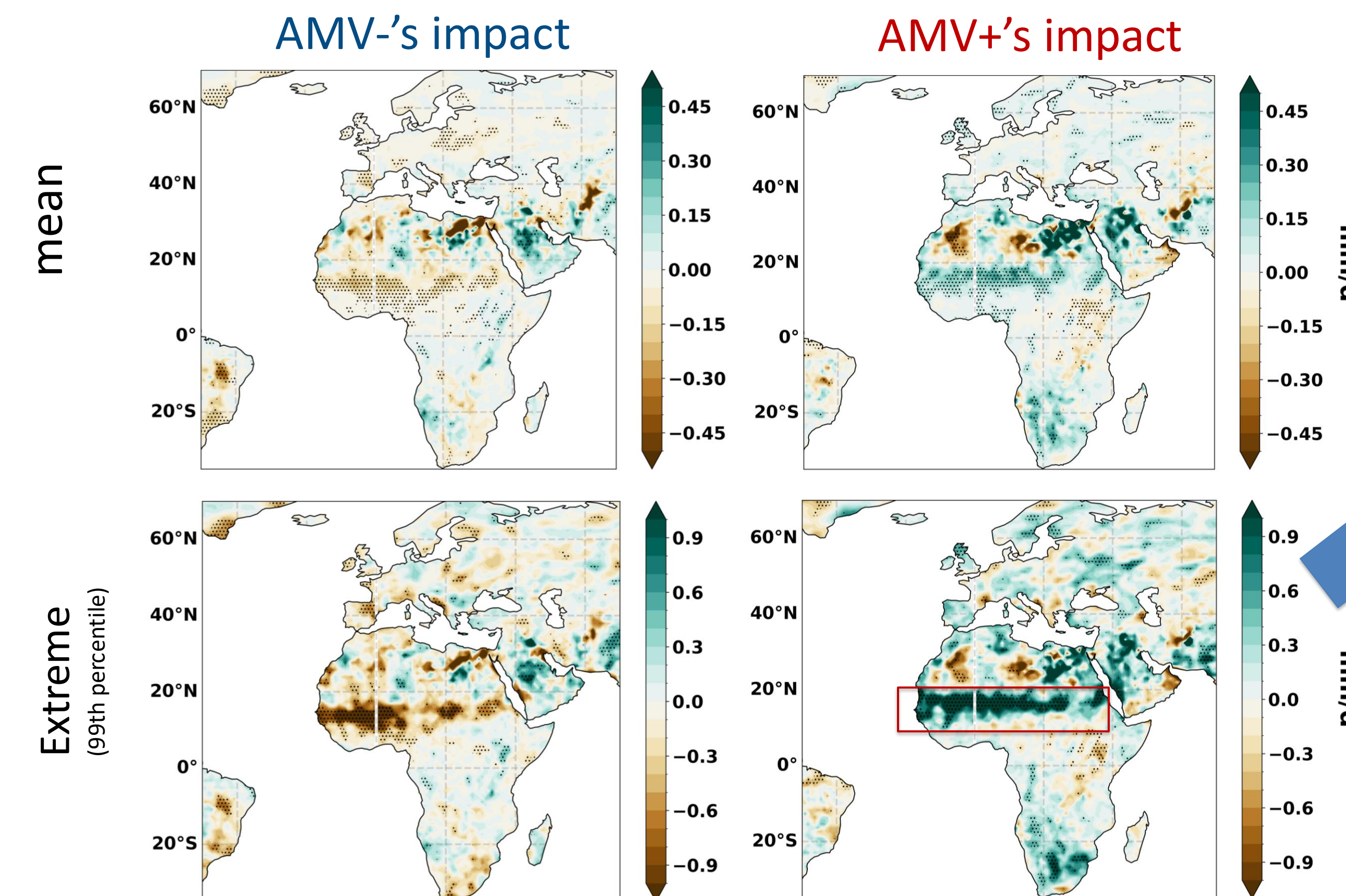
We use a prescribed SST and sea ice as lower boundary condition in OpenIFS (atmosphere model). We removed AMV and IPV by means of linear regression from the daily SST in the Atlantic Ocean and Pacific Ocean.

- Control simulations
- noAMV experiment
- noIPV experiment

\*AMV's impact = control - noAMV

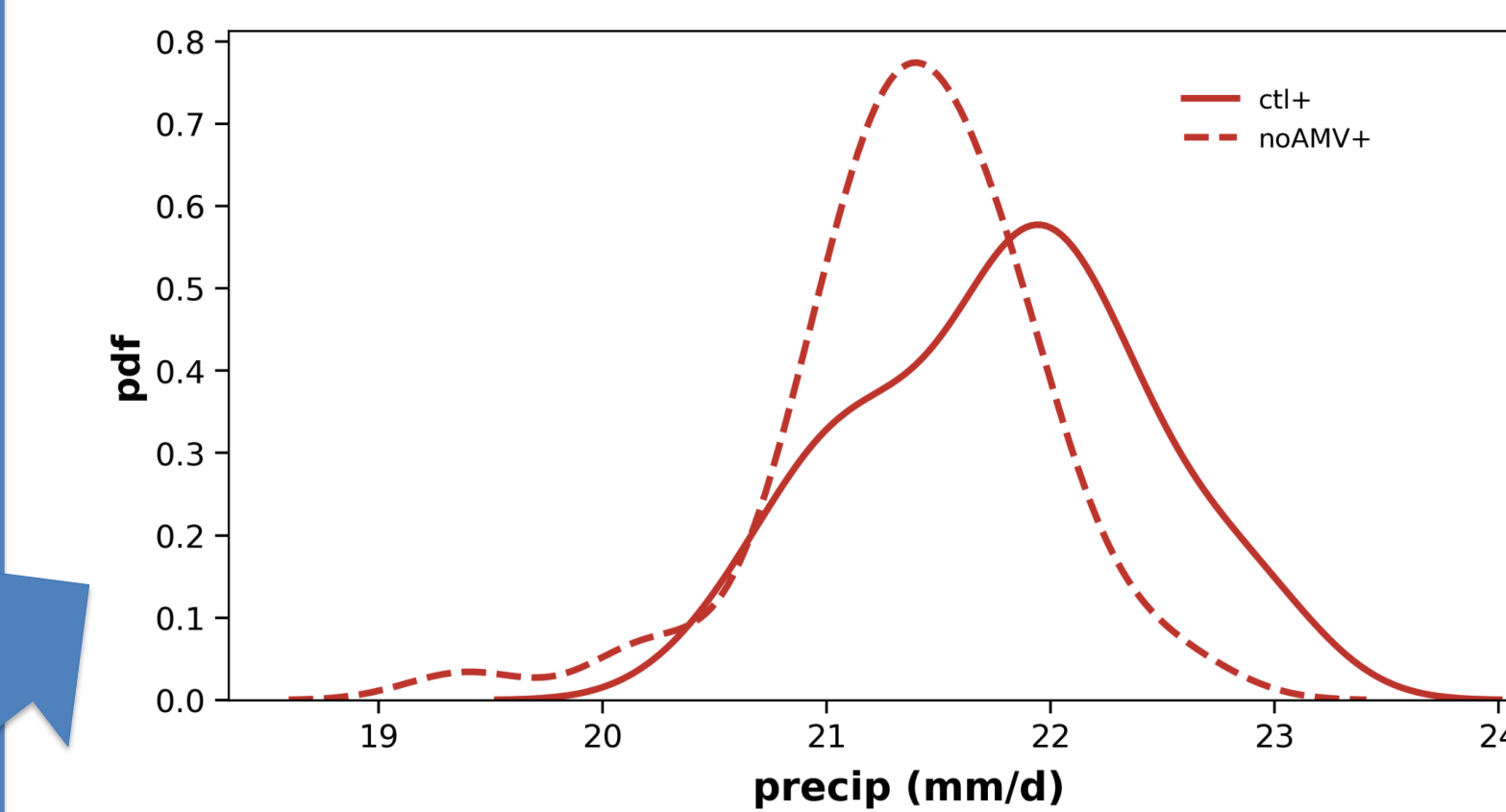
IPV's impact = control - noIPV

## 3. Ensemble mean impact of AMV on European and African (extreme) precipitation



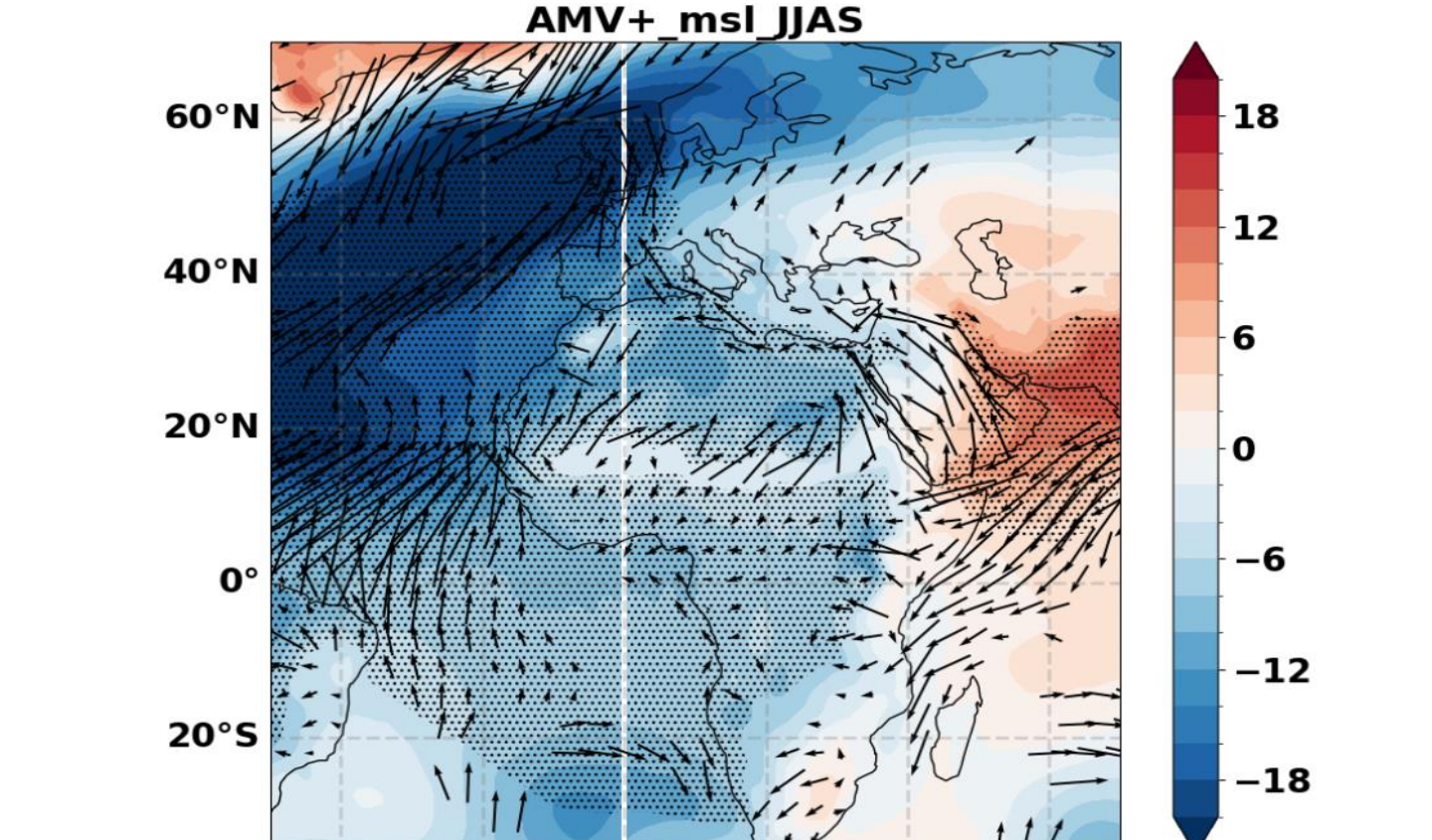
- AMV+ (-) causes more (less) mean and extreme summer (JJAS) precipitation over the Sahel region, **but not over the Europe.**

Distribution of Sahel extreme precipitation from 45 members of ctl and noAMV simulations



- OpenIFS 45 ensemble members also show similar results.

What causes the increase in summer precipitation over Sahel during AMV+ ?

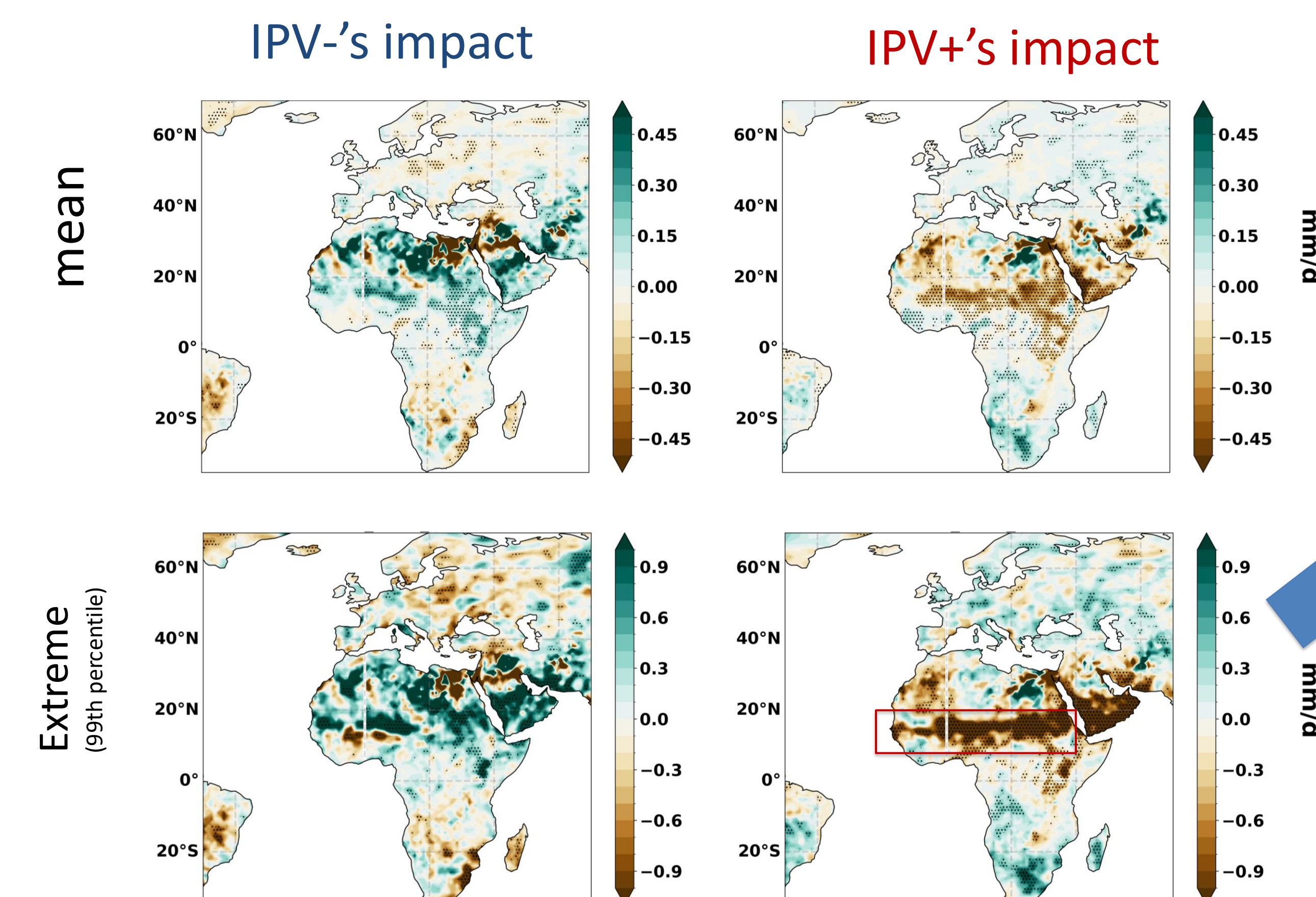


Mean sea level pressure and 10m wind anomalies during AMV positive phase

### Key message

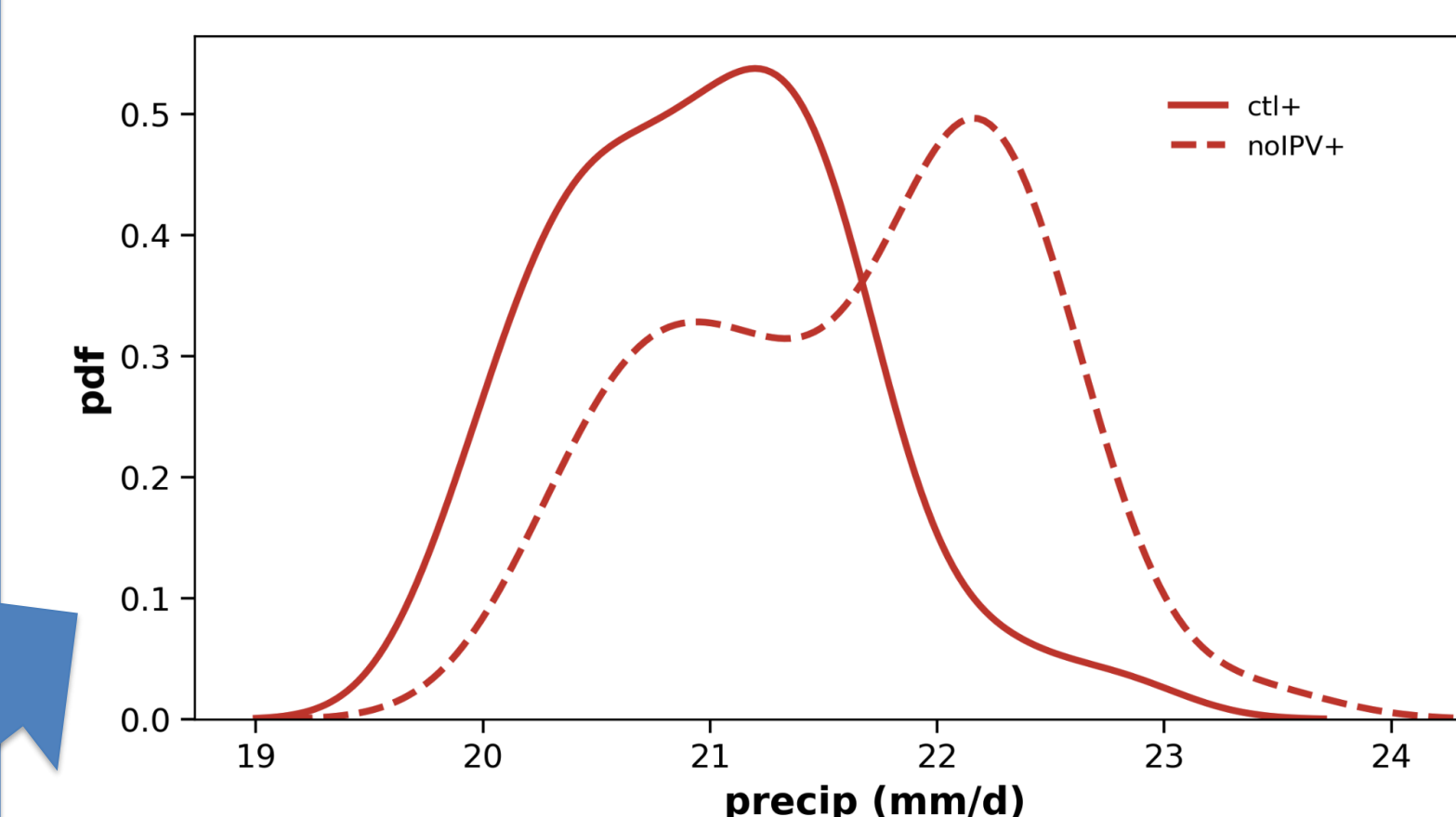
- Sahel precipitation is enhanced during AMV positive phase.
- Further investigation into mechanism is needed.

## 4. Ensemble mean impact of IPV on European and African (extreme) precipitation



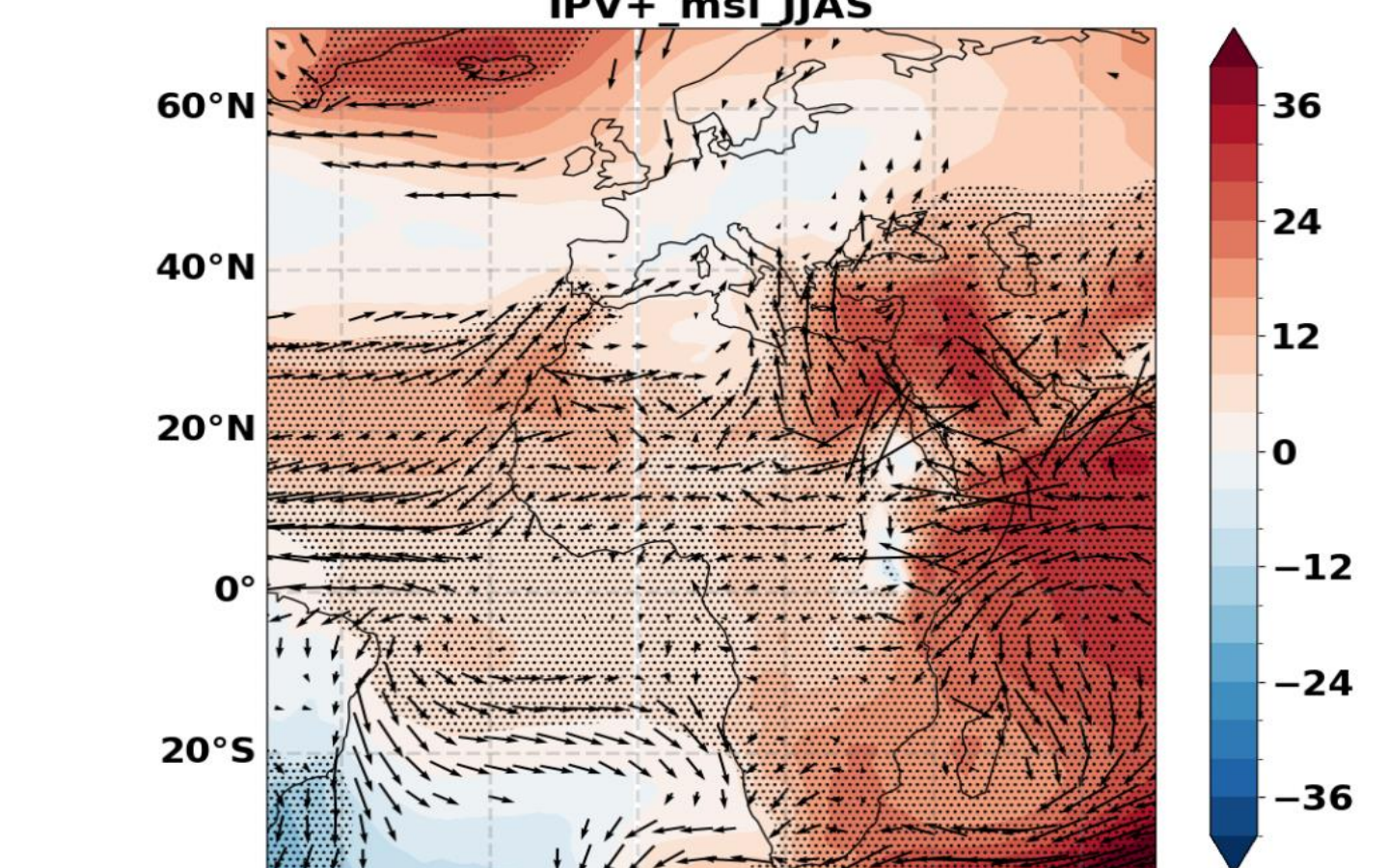
- IPV- (+) causes more (less) mean and extreme summer (JJAS) precipitation over the Sahel region, **but not over the Europe.**

Distribution of Sahel extreme precipitation from 45 members of ctl and noIPV simulations



- OpenIFS 45 ensemble members also show similar results.

What causes the decrease in summer precipitation over Sahel during IPV+ ?



Mean sea level pressure and 10m wind anomalies during IPV positive phase

### Key message

- Sahel precipitation is reduced during IPV positive phase.
- Further investigation into mechanism is needed.