

Lagrangian analysis of atmospheric water balance over the Bay of Bengal



Objective



- **Trace atmospheric freshwater to and from the Bay of Bengal drainage basin using Lagrangian water mass trajectories for both present and possible future climate**

Things to remember

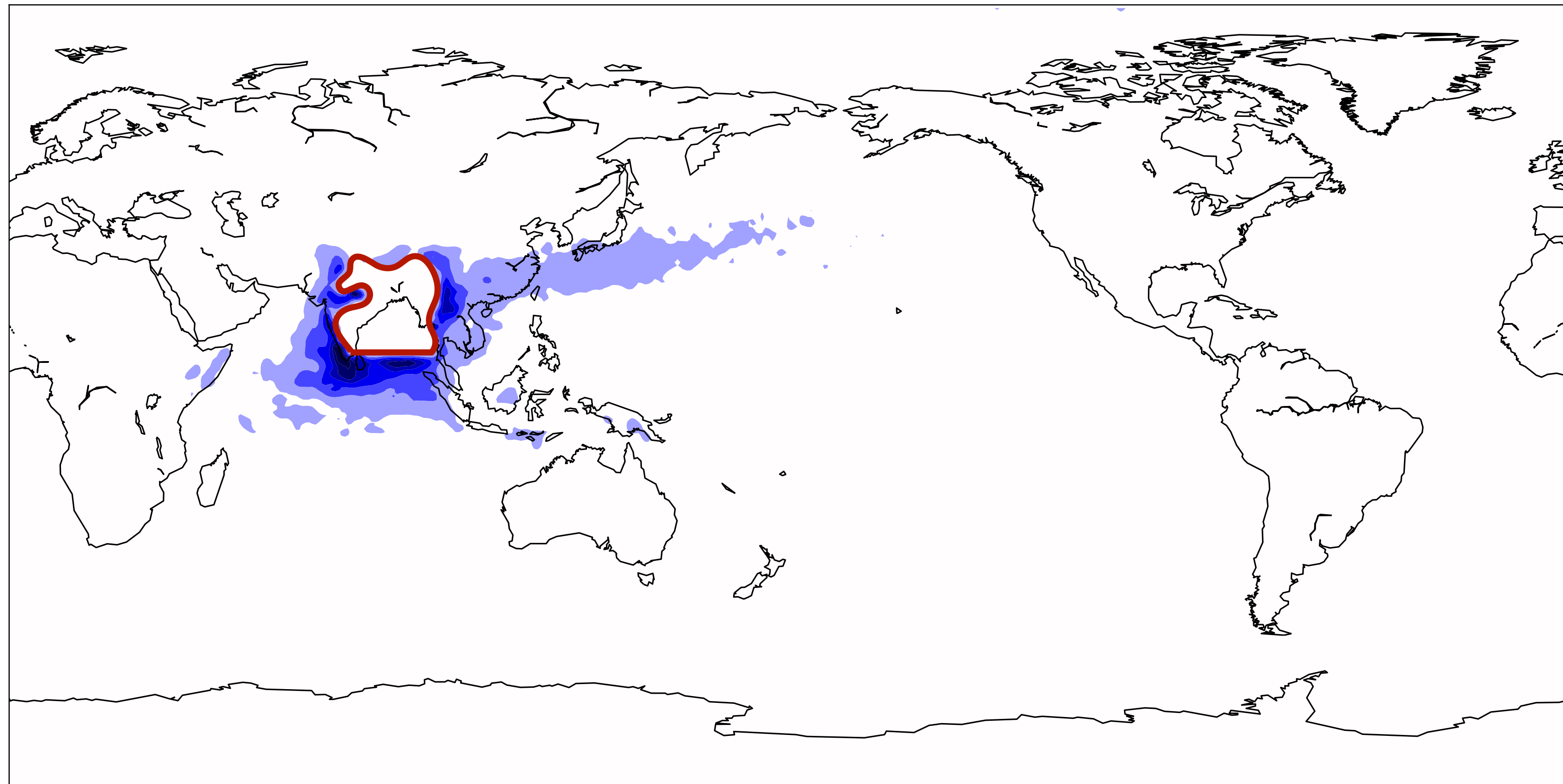


- All the results presented in the next few slides are based on the annual Lagrangian trajectory run
- Lagrangian water mass “particles” started all over the Bay of Bengal drainage basin every 6 hourly for a year.
- Forward run: Starting from the surface net evaporation and ending at the net precipitating surface
- Backward run: Starting from the surface net precipitation and ending at the net evaporating surface
- Validation of the atmospheric water mass version of Lagrangian model TRACMASS and details about the water mass tracking method are provided in the paper: *Dey, D., & Döös, K. (2020). Atmospheric freshwater transport from the Atlantic to the Pacific Ocean: a Lagrangian analysis. Geophysical Research Letters, e2019GL086176.*

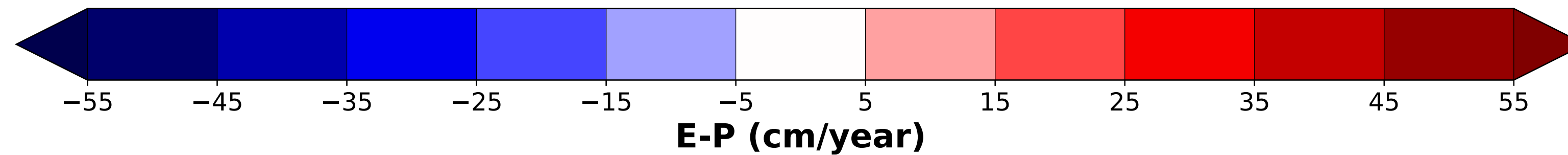
Forward trajectory run from net evaporation to net precipitation



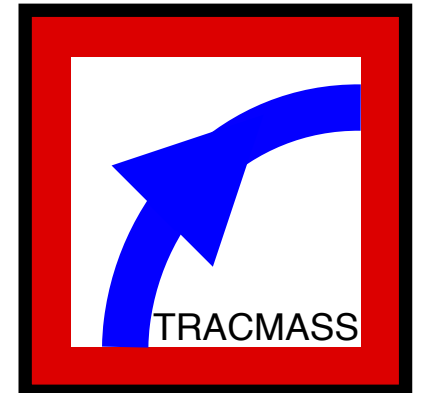
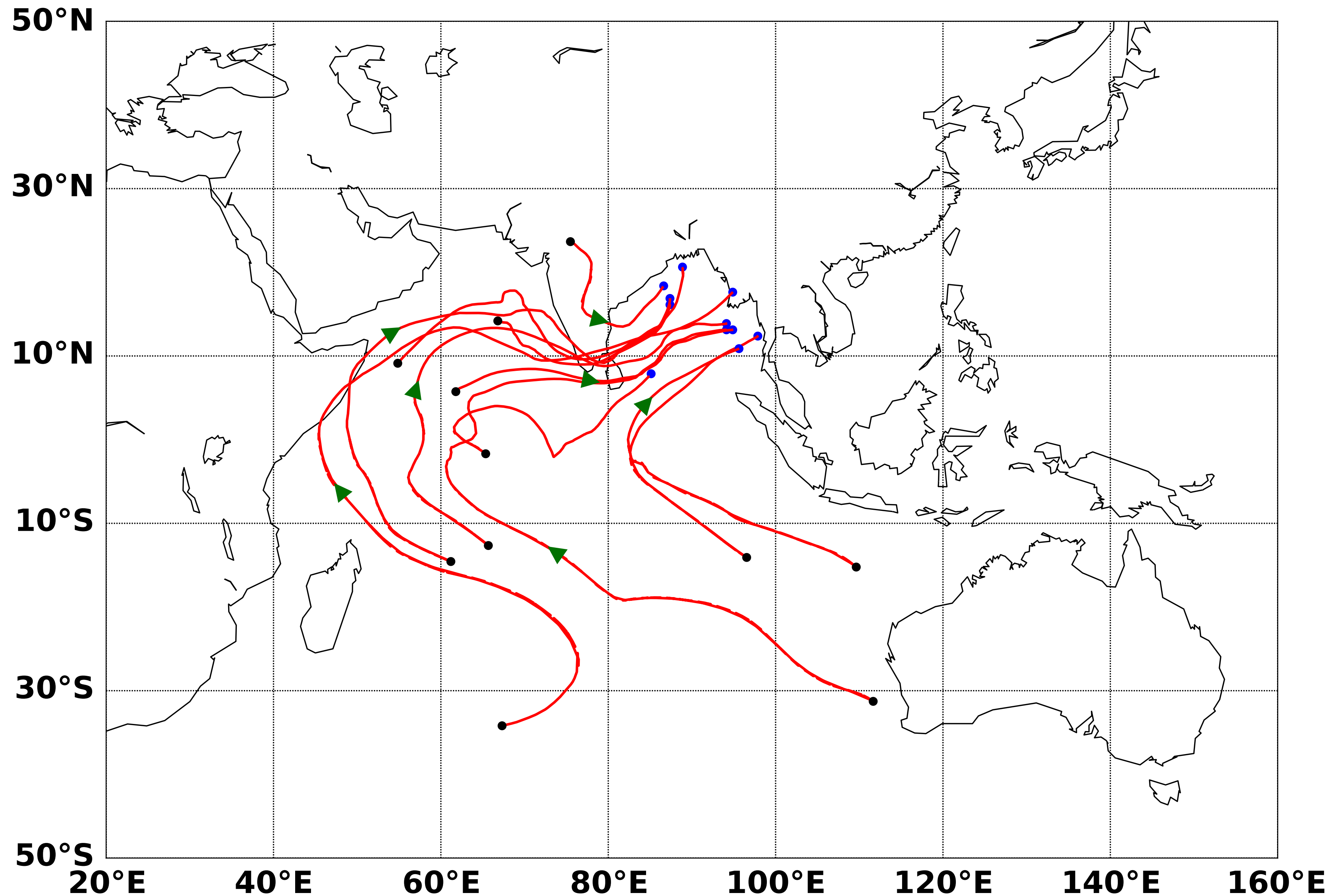
ERA-Interim




Bay of Bengal
drainage basin



Lagrangian water mass trajectories

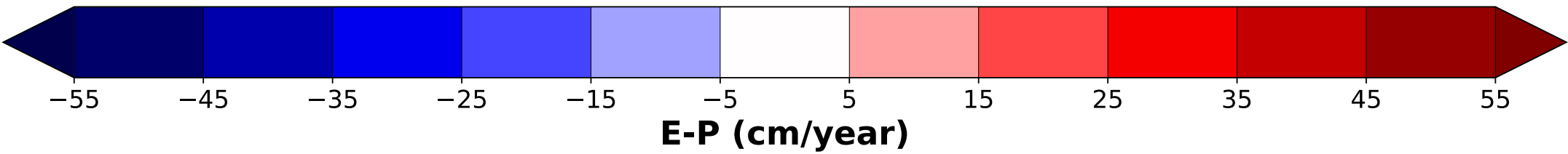
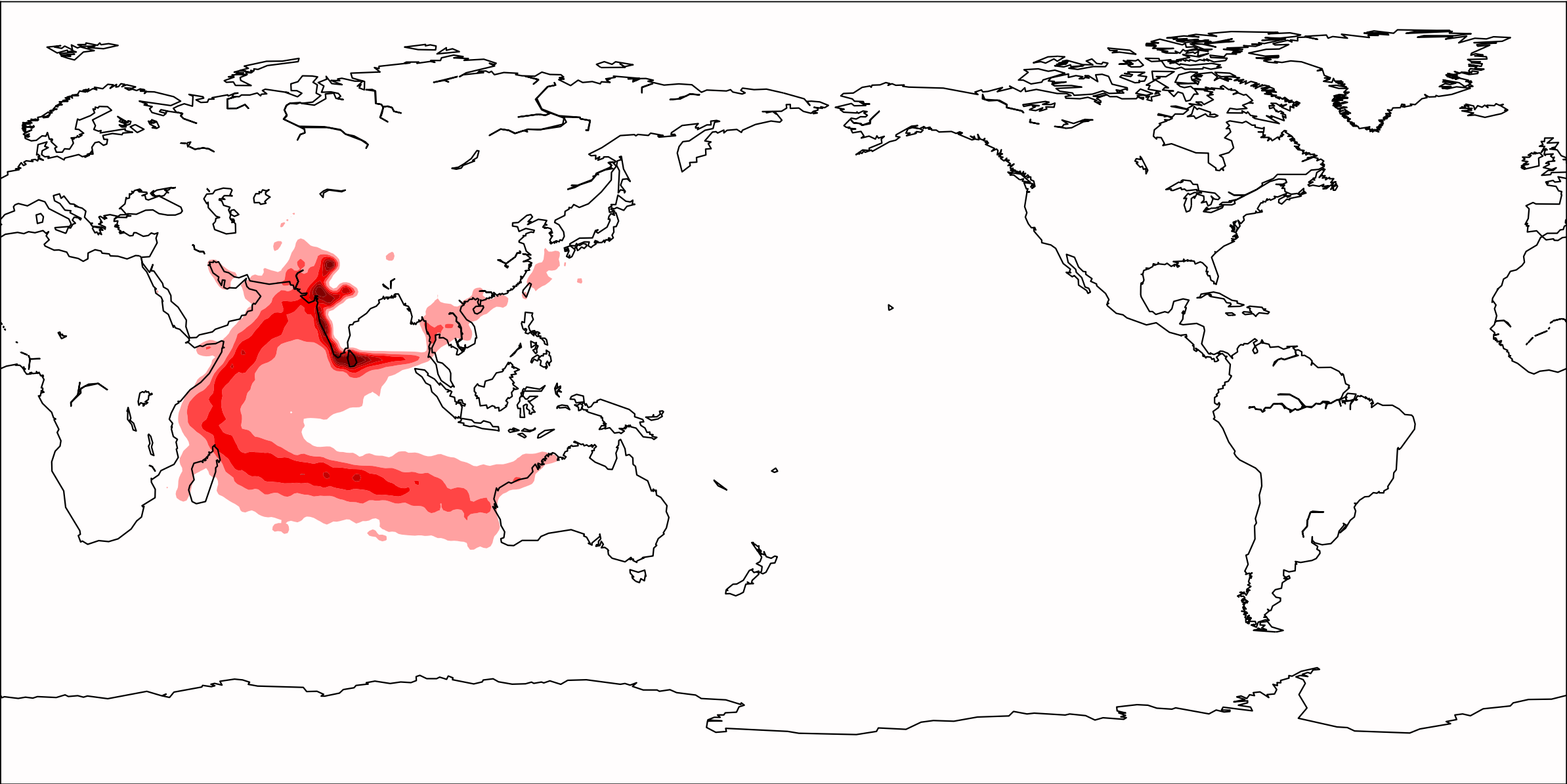


- Starting points
- Ending points

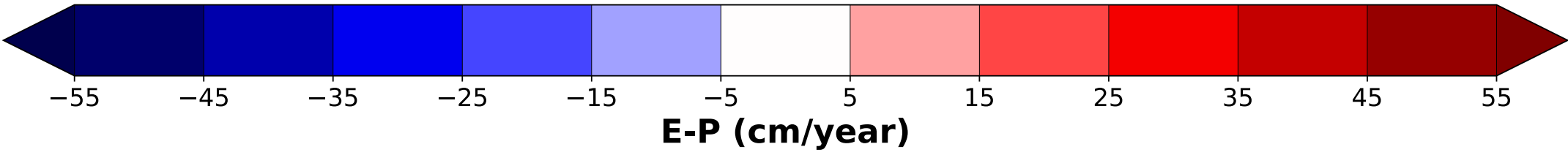
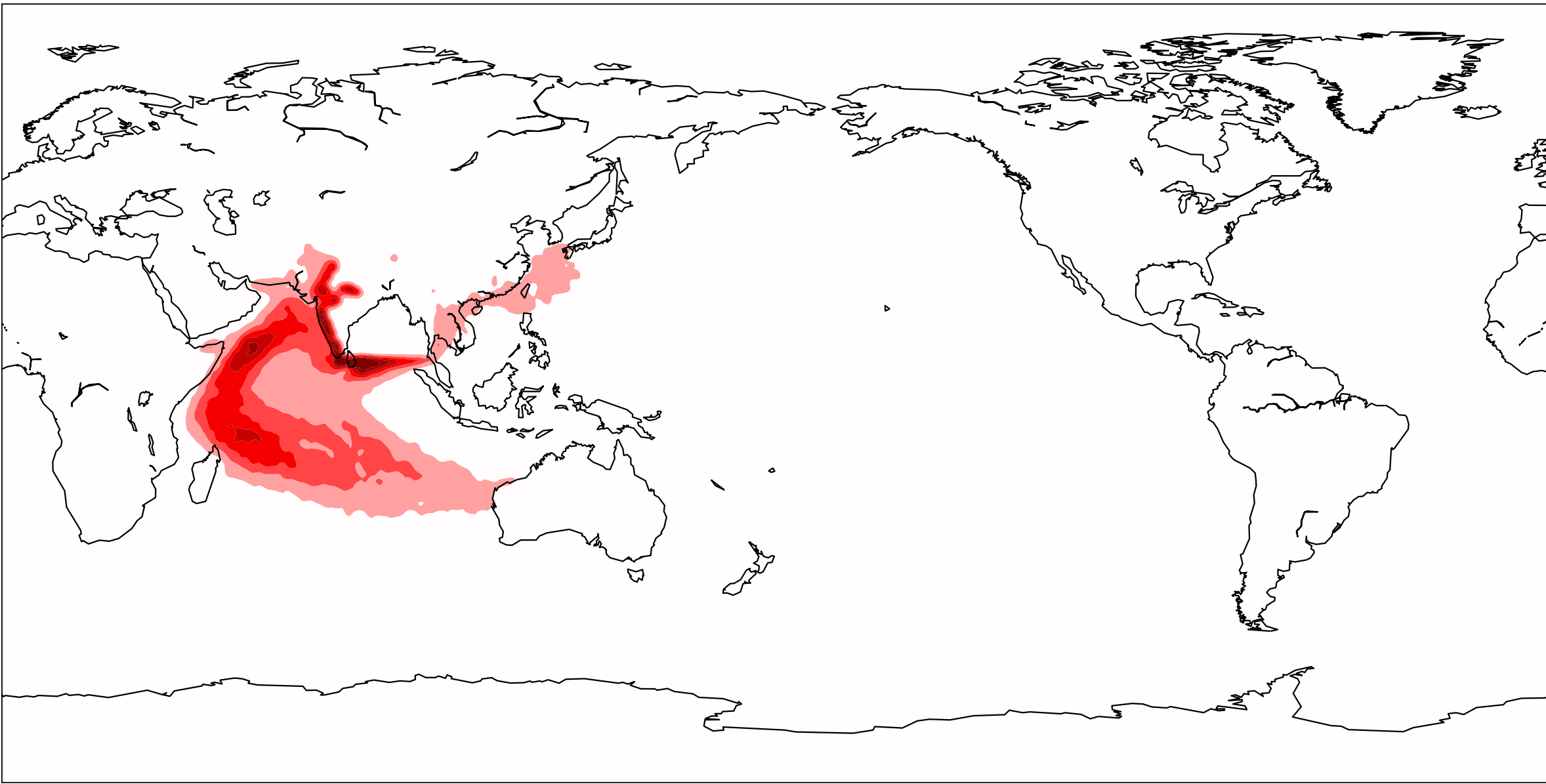
Validation (backward trajectory run from net Precipitation to net evaporation)



ERA-Interim



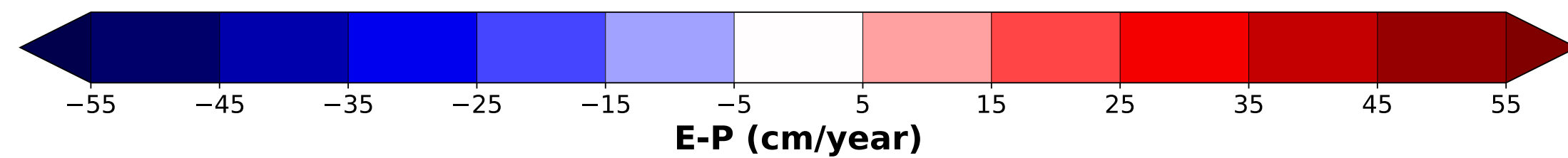
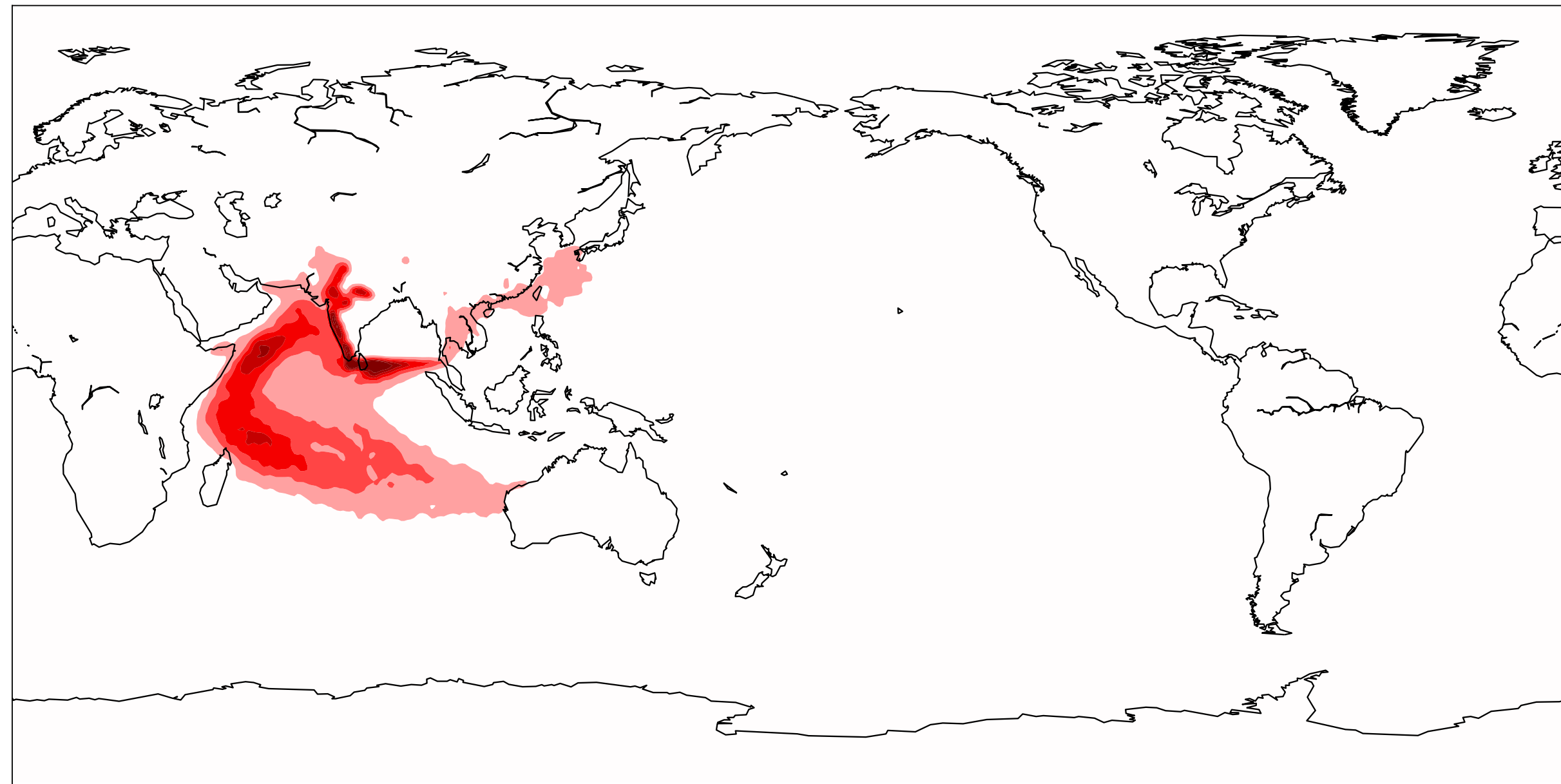
EC-Earth (CMIP6)



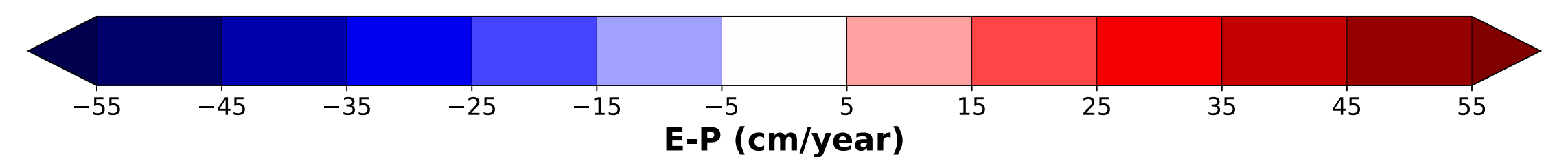
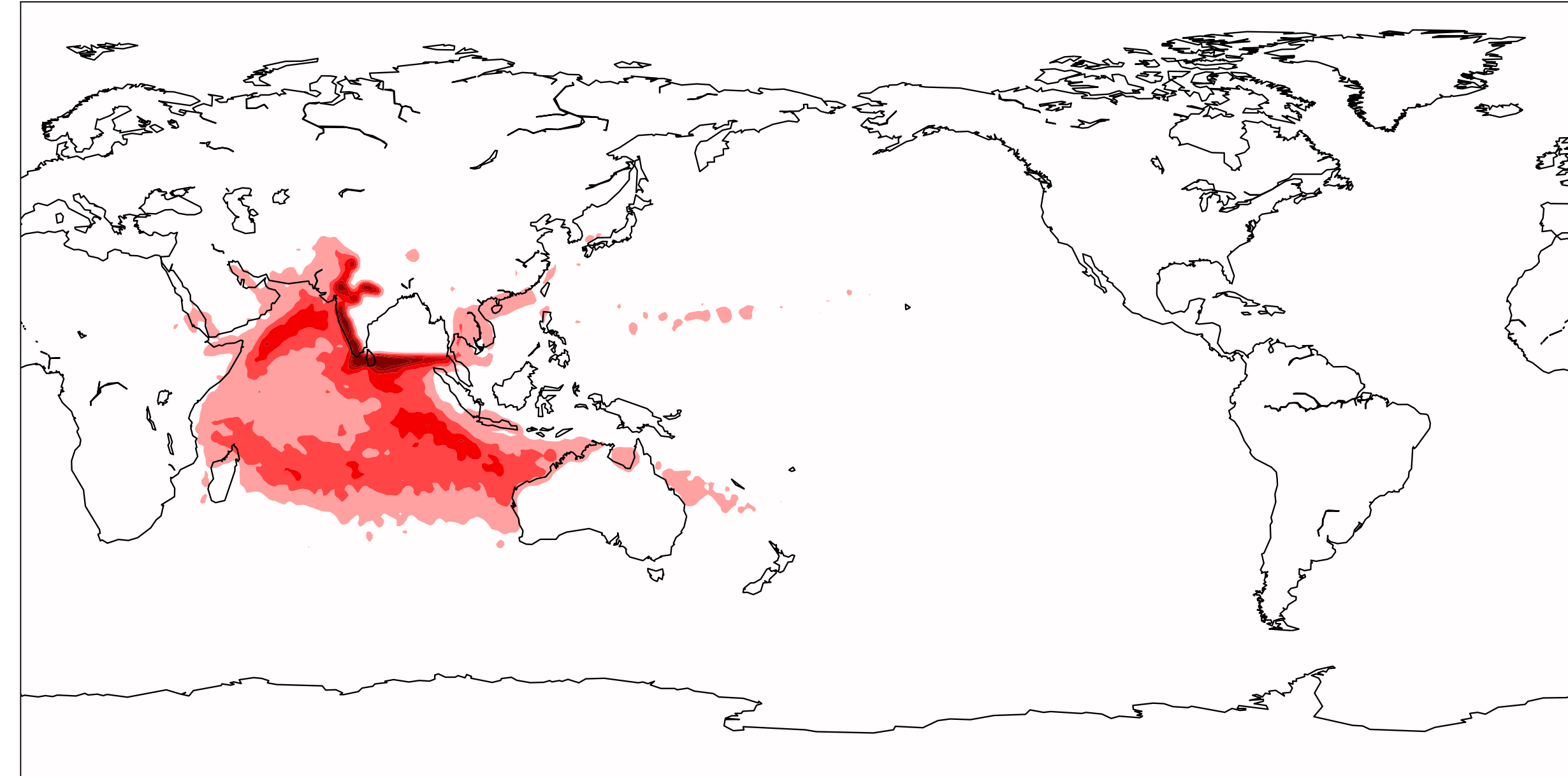
Comparison (backward run)



Present climate (HISTORICAL)



Possible future climate (SSP8.5)

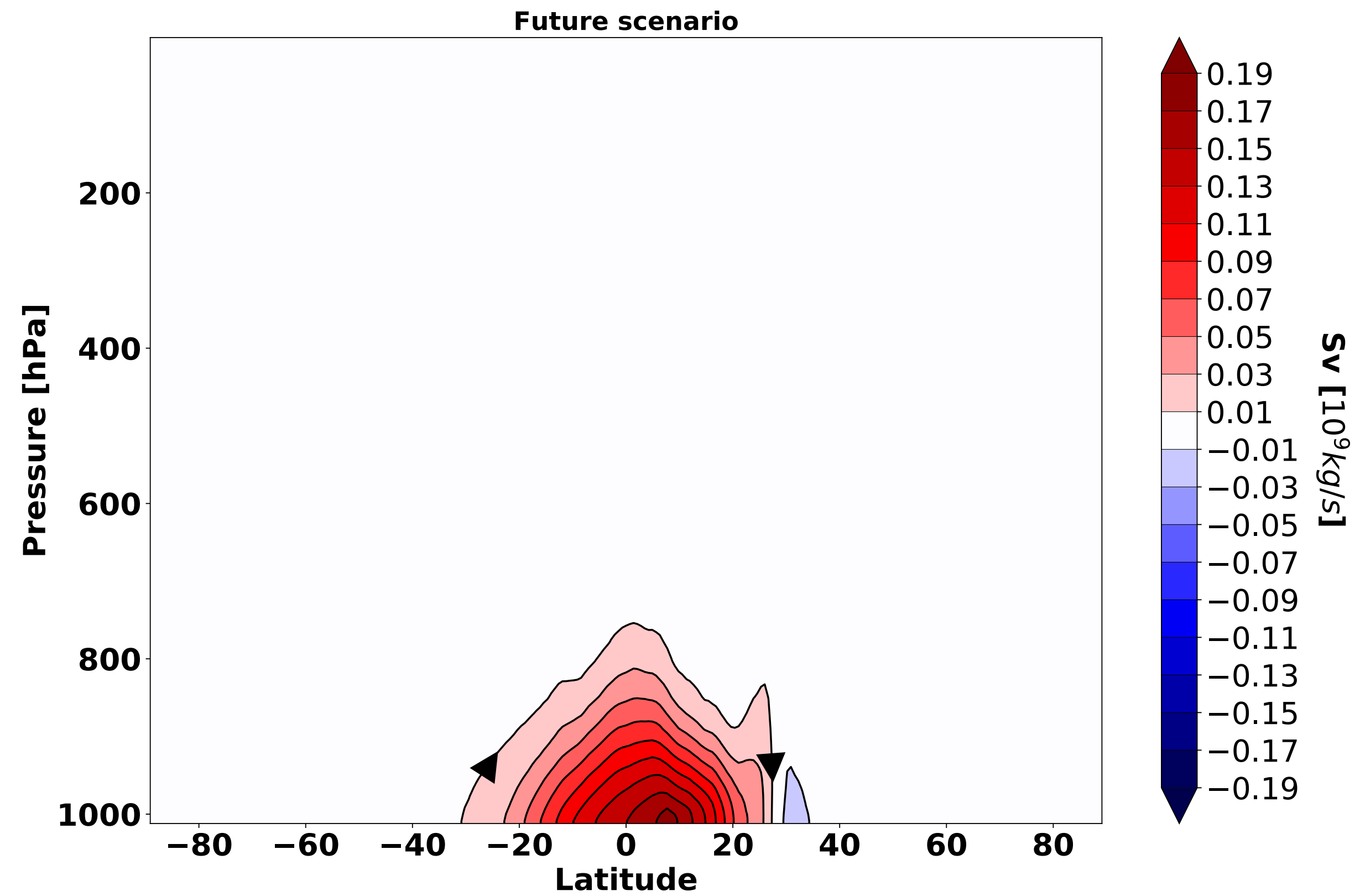
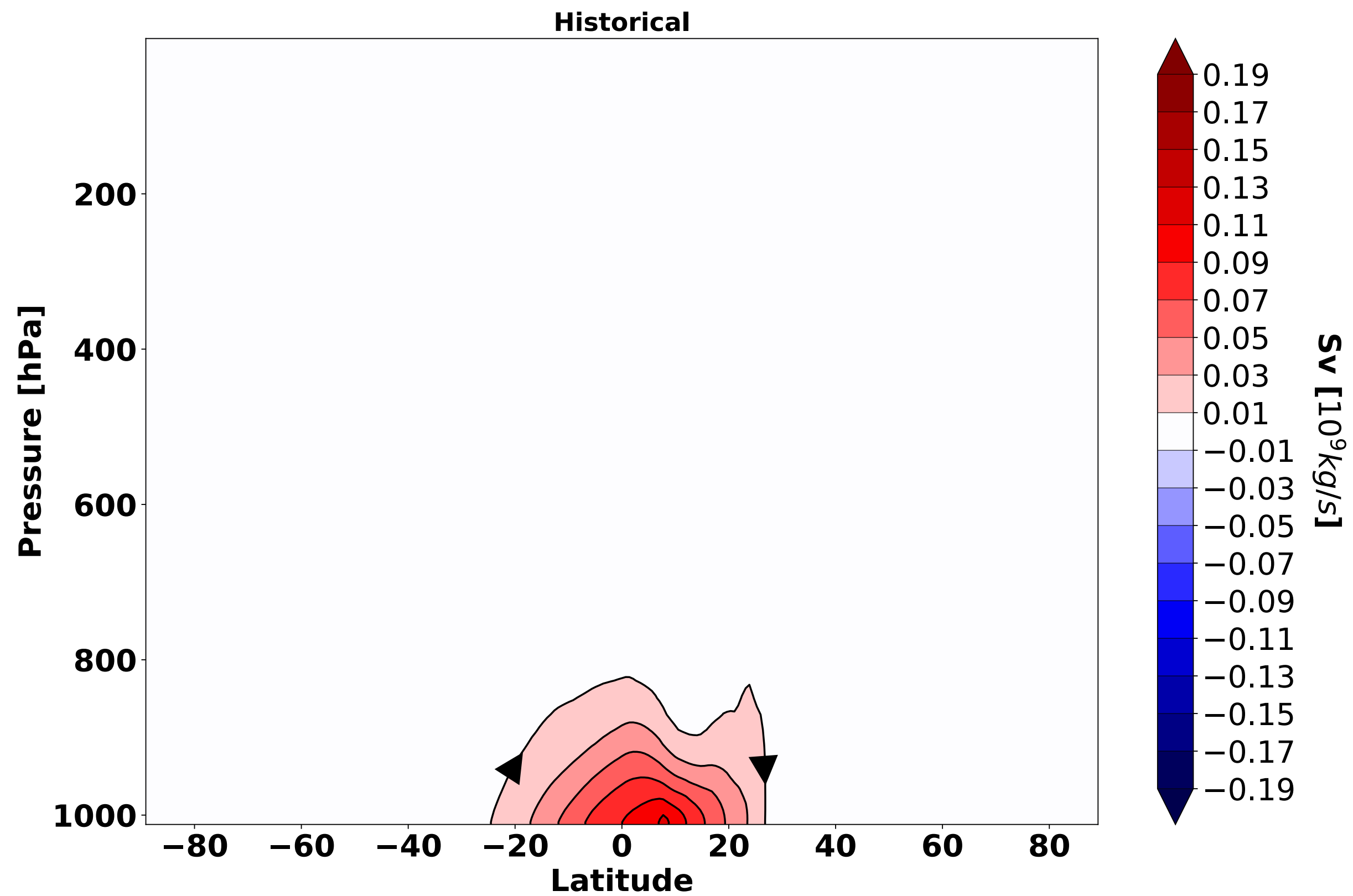


Meridional water mass transport (backward run)



Present climate (HISTORICAL)

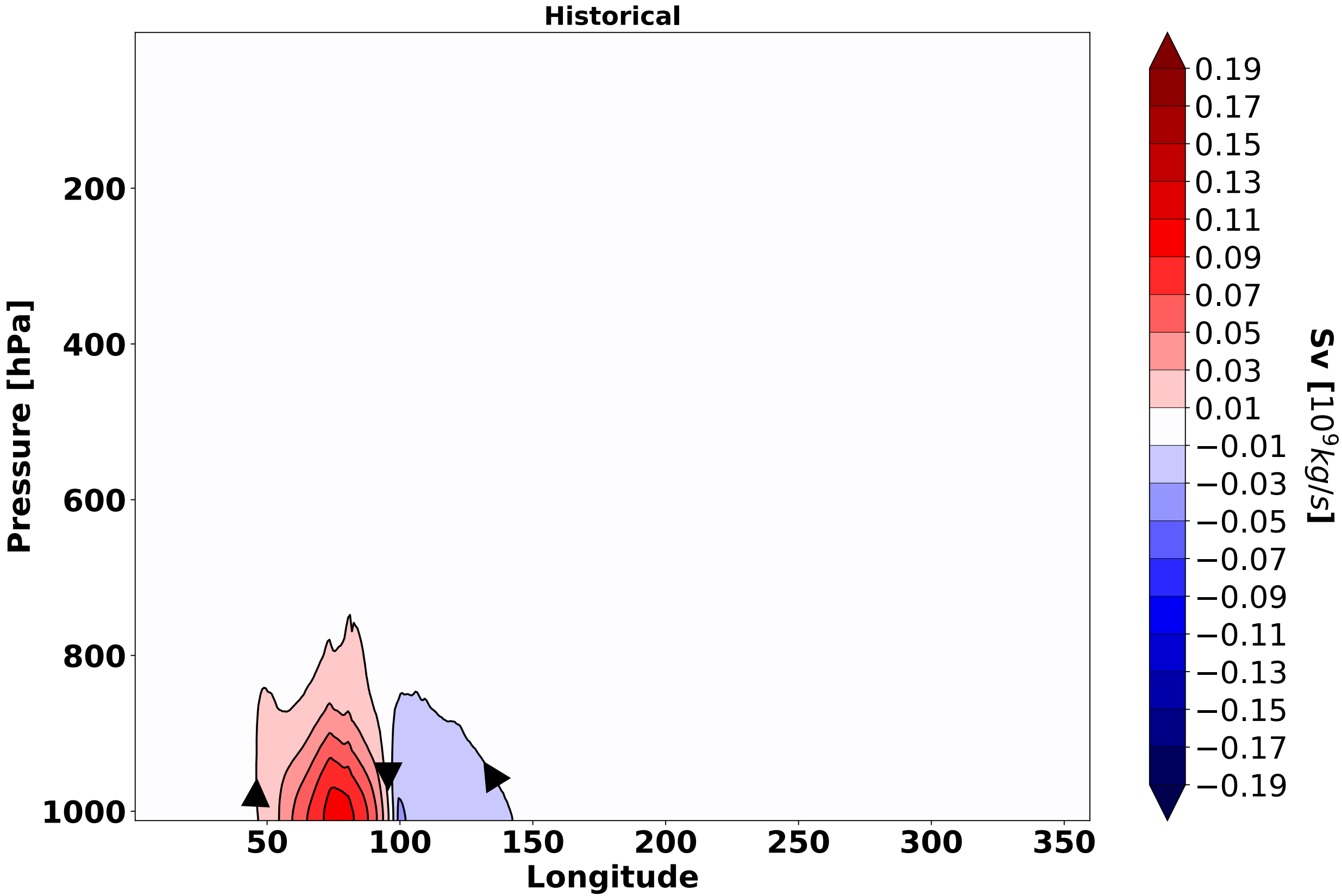
Possible future climate (SSP8.5)



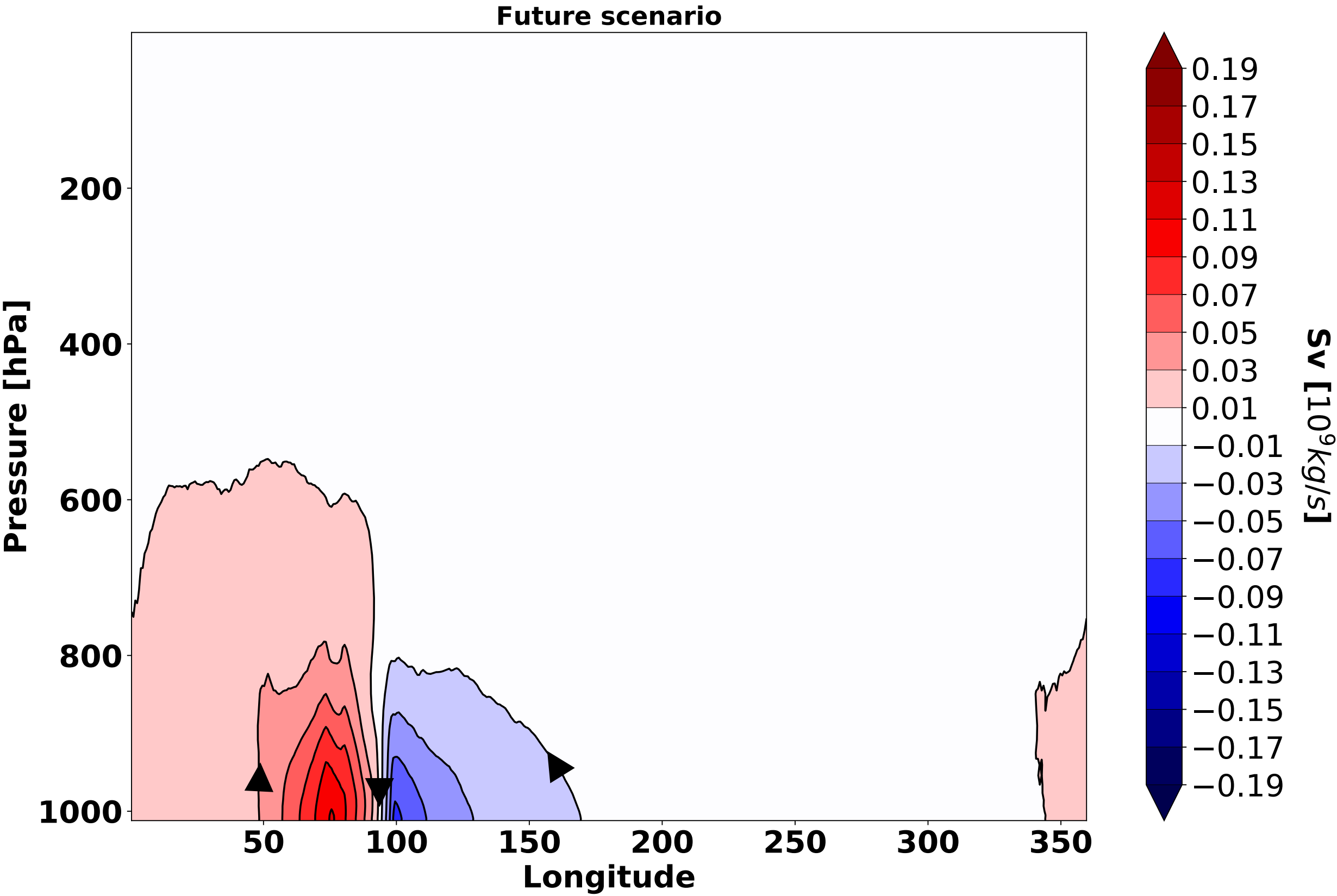
Zonal water mass transport (backward run)



Present climate (HISTORICAL)



Possible future climate (SSP8.5)



Conclusions



- In the present climate, the main remote sources of the Bay of Bengal precipitation is from the Western Indian Ocean, West Australian Coast, Western Ghats of India and a narrow strip just south of the Indian peninsula
- Possible future climate scenario shows the contribution from the Western Indian Ocean will reduce but that will be compensated by the increased water mass transport from the western Australian coast and central-east Indian Ocean
- Possible future climate scenario indicates higher zonal and meridional water mass transport into the Bay of Bengal as compared to the present climate. This will lead to a fresher Bay of Bengal, which has far reaching consequences