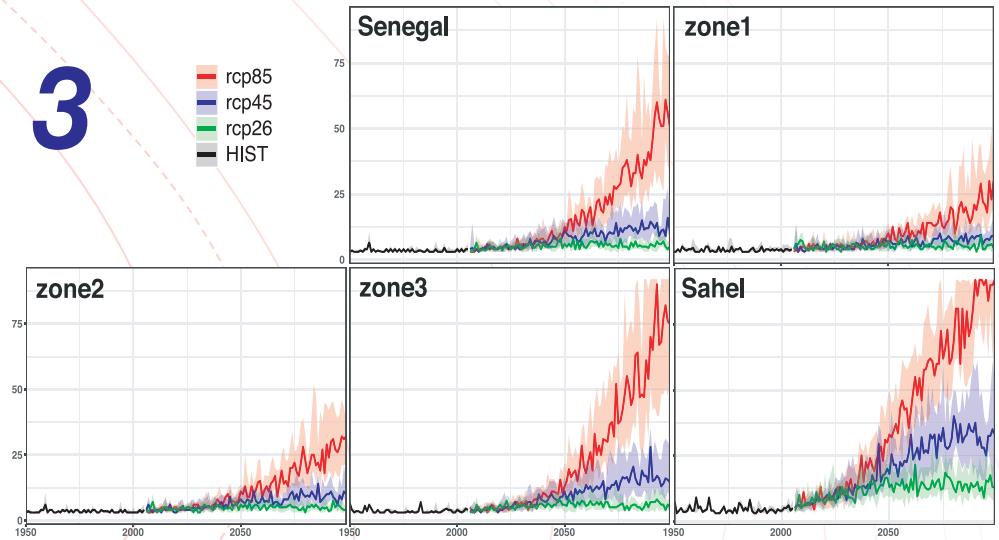
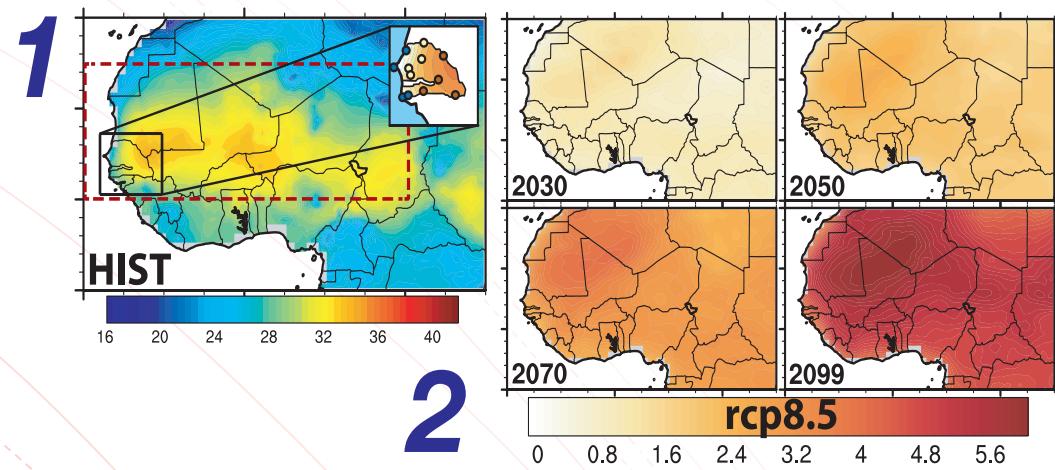
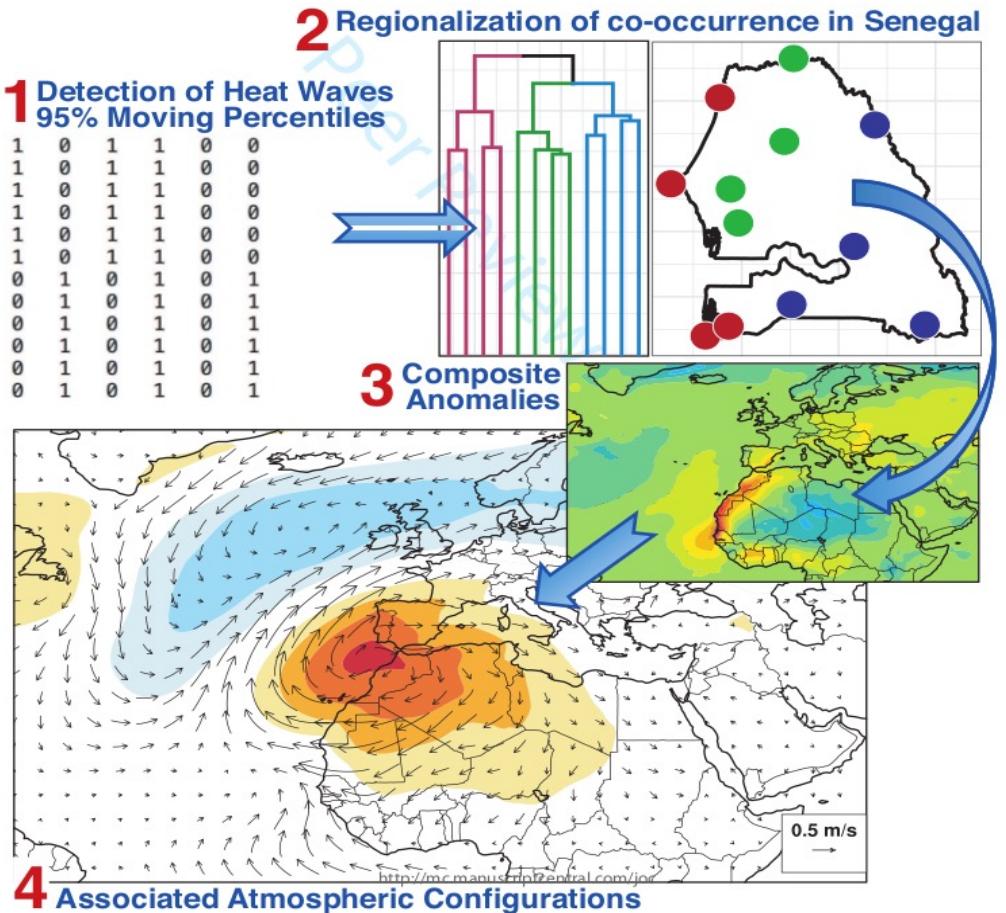


Heat Waves in Senegal : Evolution under Climate change

Marie J. G. Sambou, Benjamin Pohl, Serge Janicot, Adjoua M. Famien,
Pascal Roucou, Daouda Badiane, Amadou T. Gaye

EGU General Assembly Virtual. 19-30 April 2021

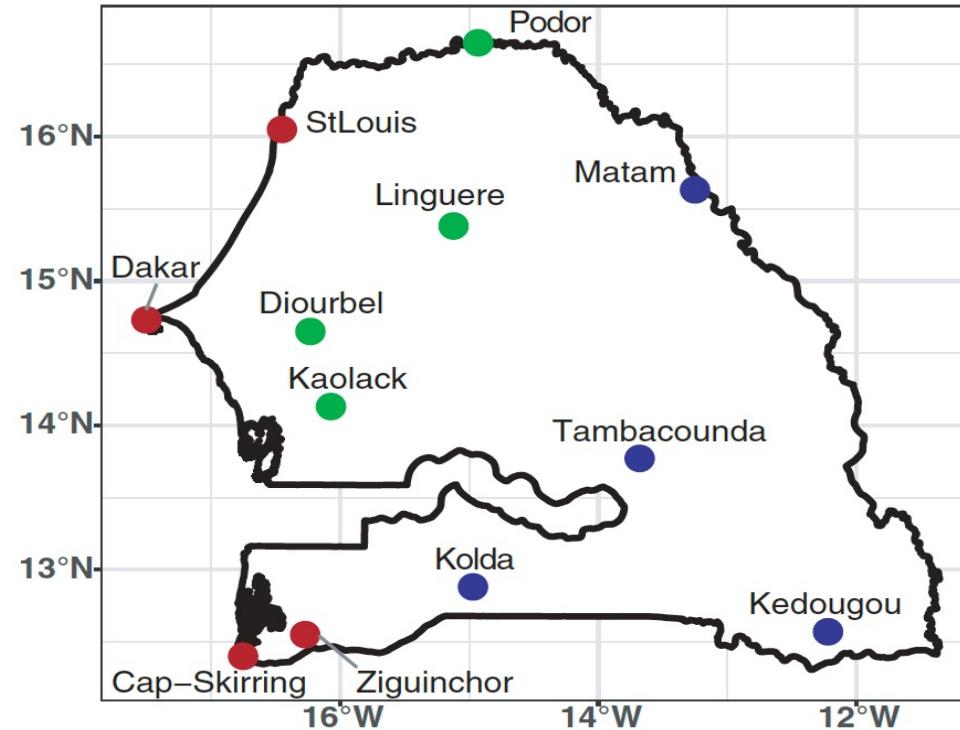
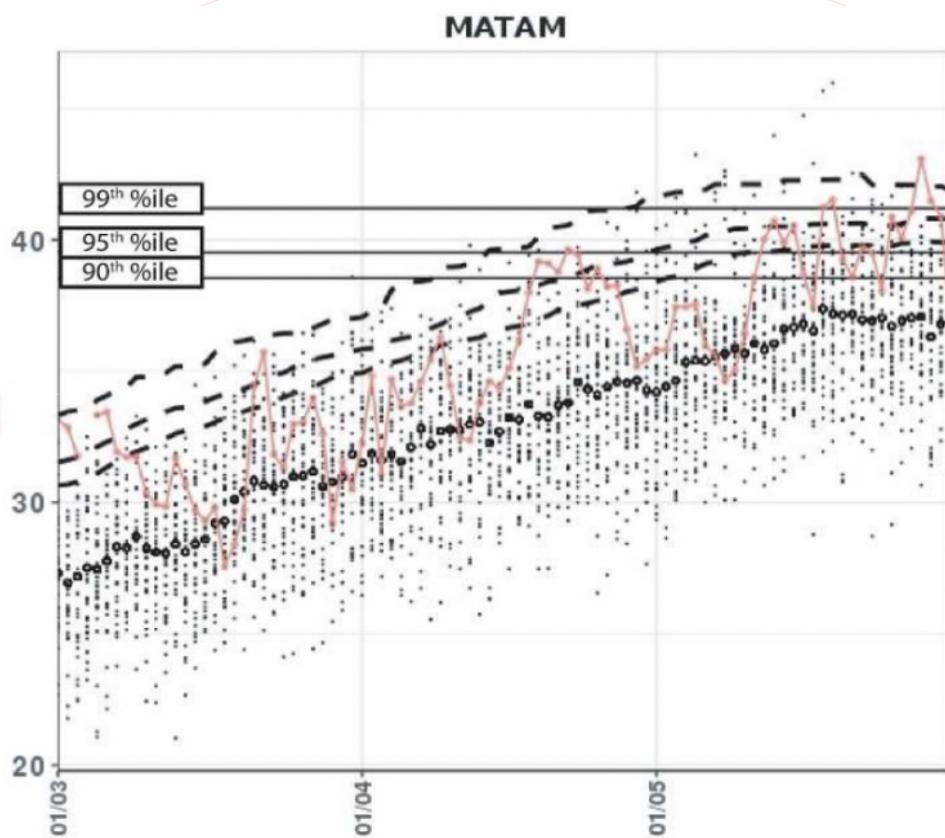
Based on Sambou et al 2020 <https://doi.org/10.1002/joc.6220>



- ✓ How will temperature evolve during spring over Senegal along this century?
- ✓ How to quantify evolution of heat wave in Senegal?

Results in review Intern. Journal of Climatology.

Data and Methods Overview



- ✓ Detection of warmest days based on 95% percentile
- ✓ Classification and regionalisation (Sambou et al 2020)
- ✓ Adaptation from Ouzeau et al. (2016) and Soubeyroux et al. (2016).

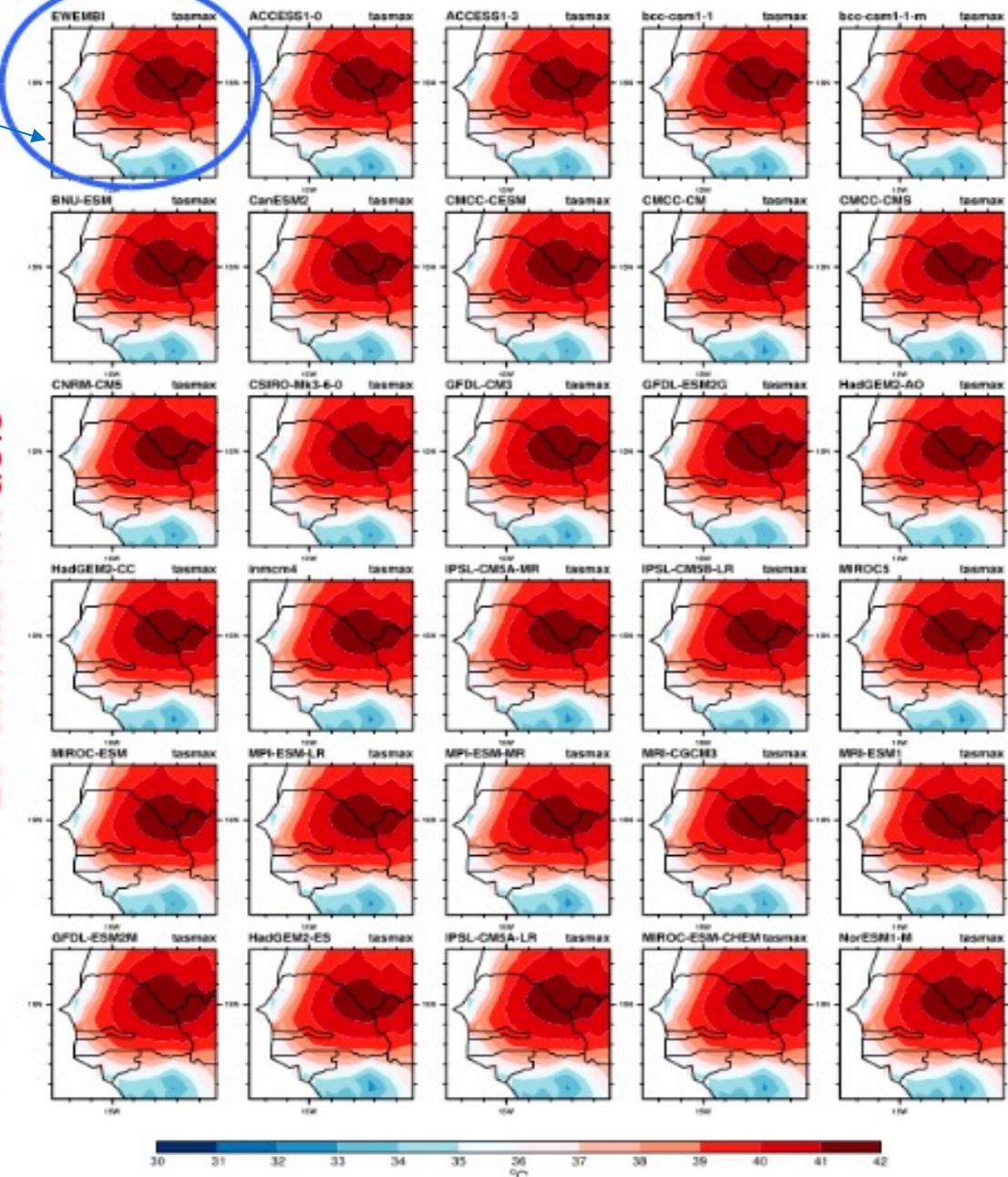
$$\text{Severity} = \sum N \frac{(T_{as} - p95)}{p99 - p90}$$

Data and Methods Overview

- ✓ The EWEMBI dataset [Earth2Observe, WFDEI and ERA-Interim data Merged and Bias corrected for ISIMIP (Lange 2018)]
- ✓ A bias-corrected CMIP5 dataset for Africa using the CDF-t method(Famien et al., 2018)
- ✓ Applied to daily mean, maximum and minimum temperature from 1950 to 2099.
- ✓ Correction methods will allow to work with HWs that will look like real world HWs and compare future vs observed HWs.

Observation

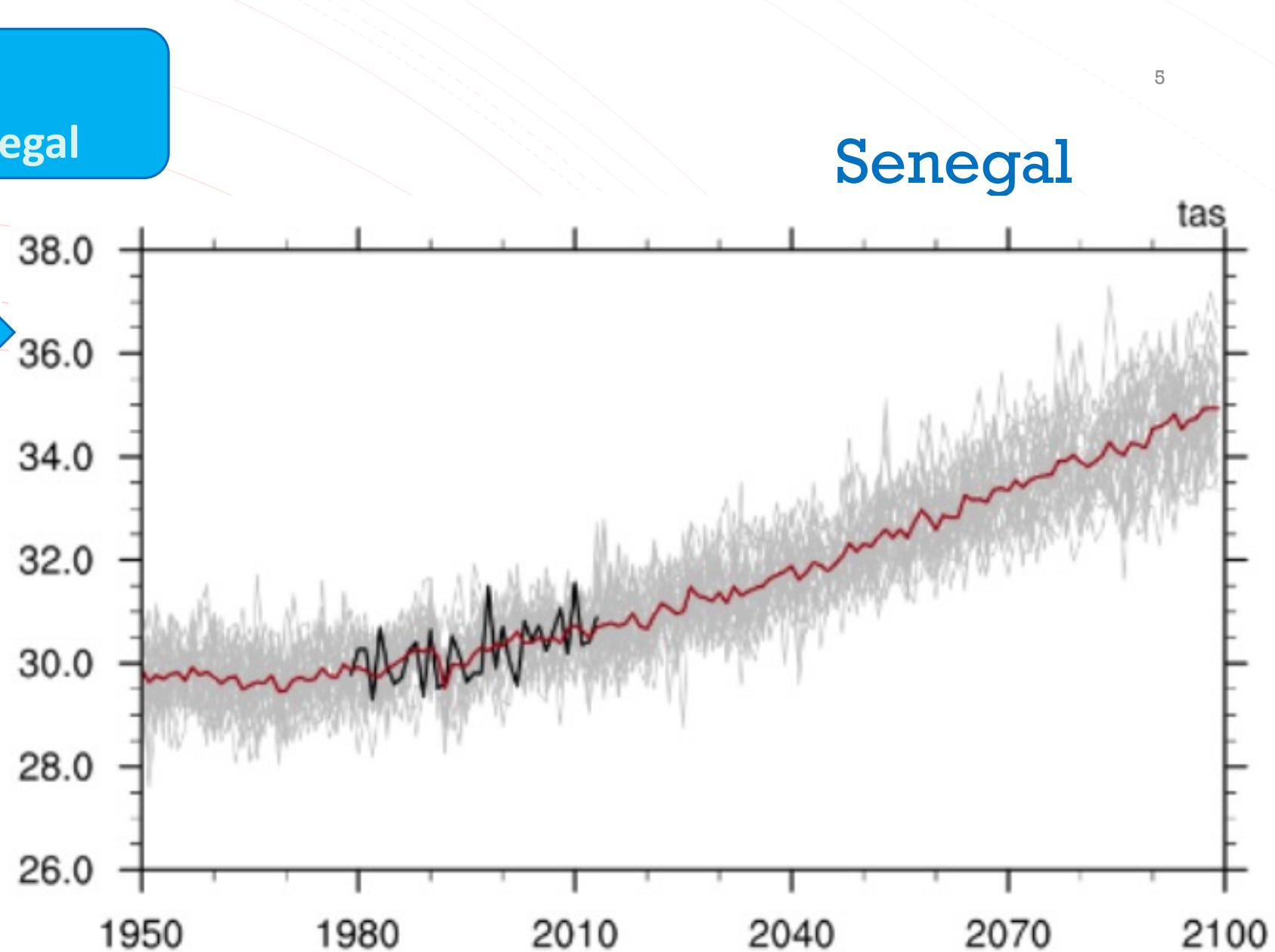
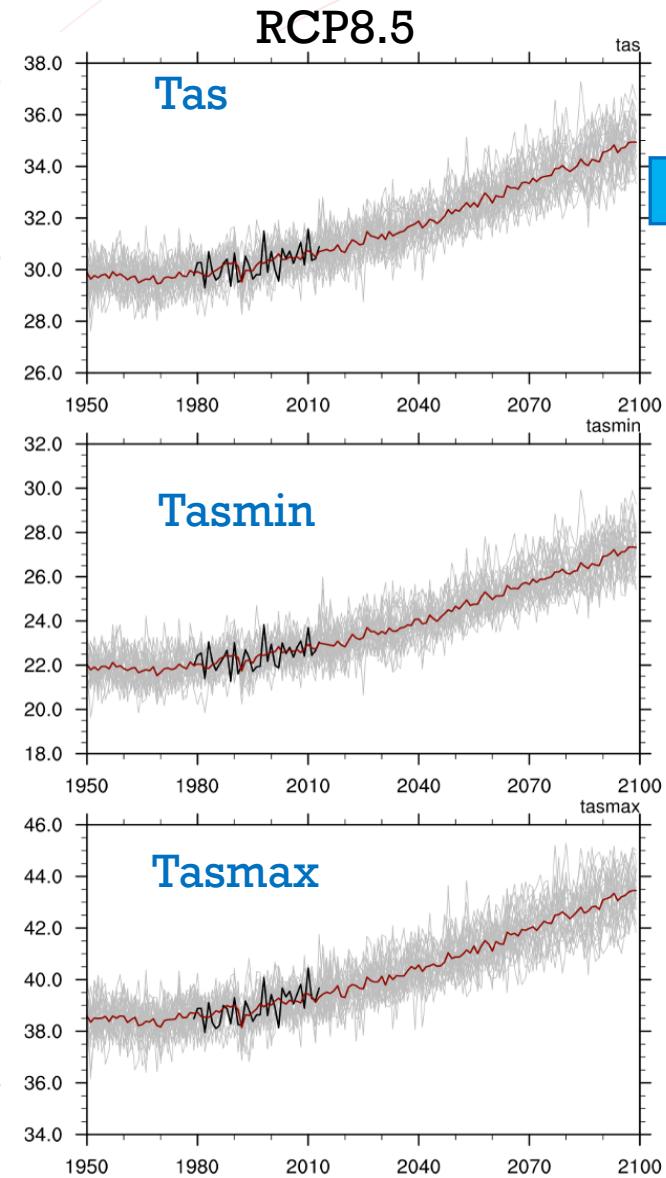
Climatology Tmax March-May 1981-2010



Correction of 29 climate models

Climate projections of spring seasonal temperature in Senegal

Senegal

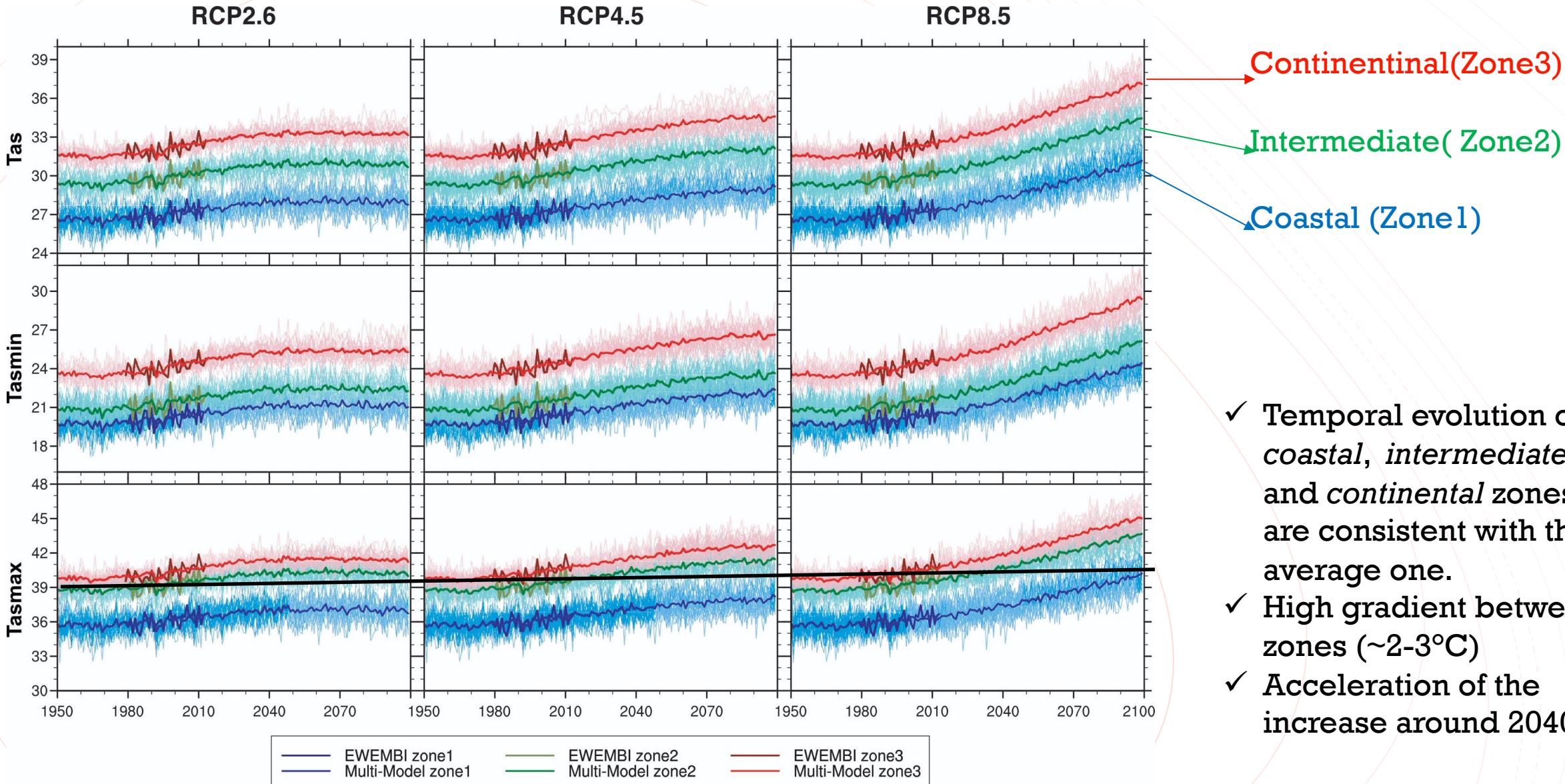


- ✓ Models evolution over 1973-2013 is consistent with EWEWEMBI
- ✓ Multi-model smooths interannual variability

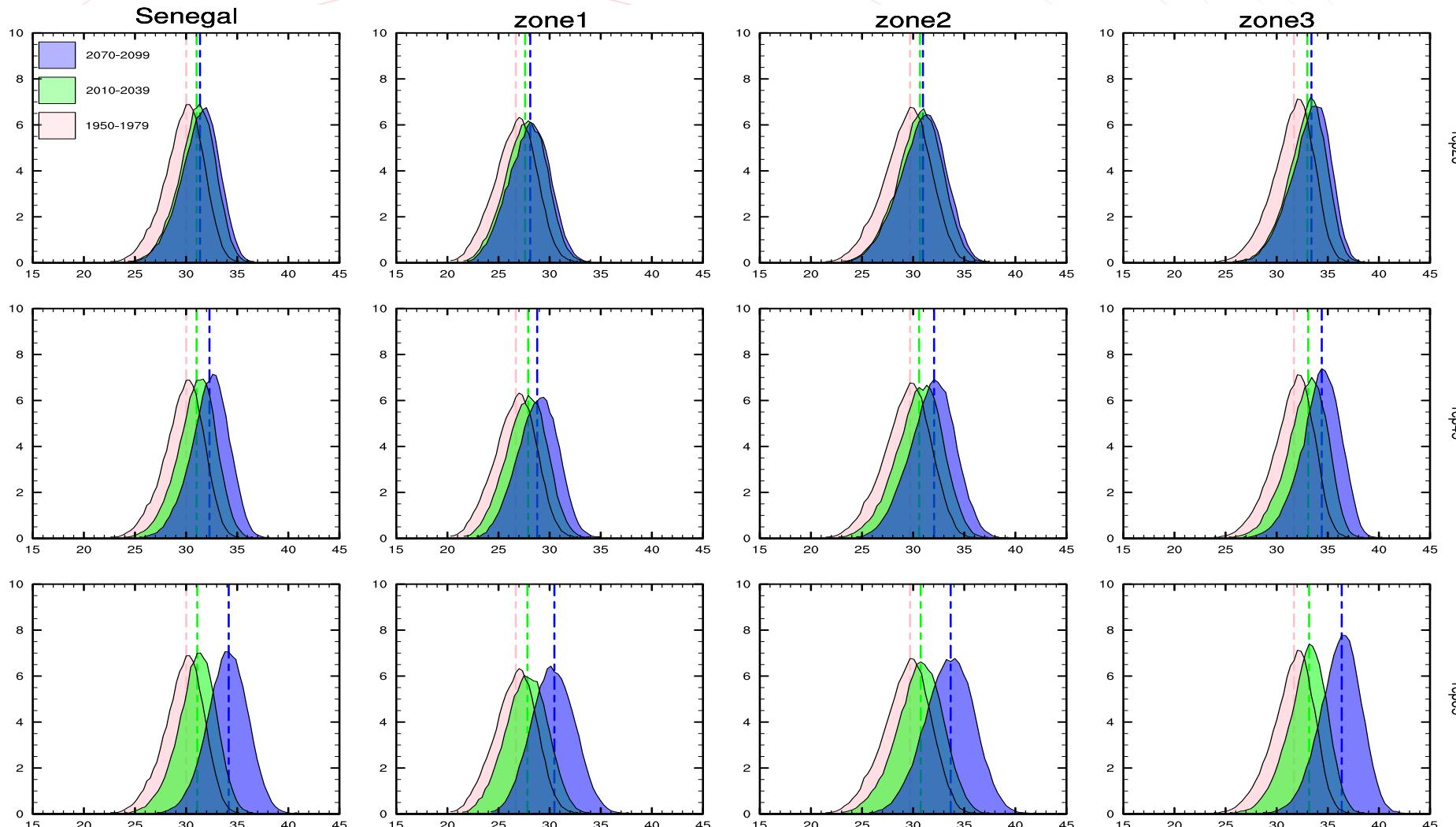
Climate projections of spring seasonal temperature in Senegal

3 zones within Senegal

6



Long-term changes in the probability density functions of multi-model

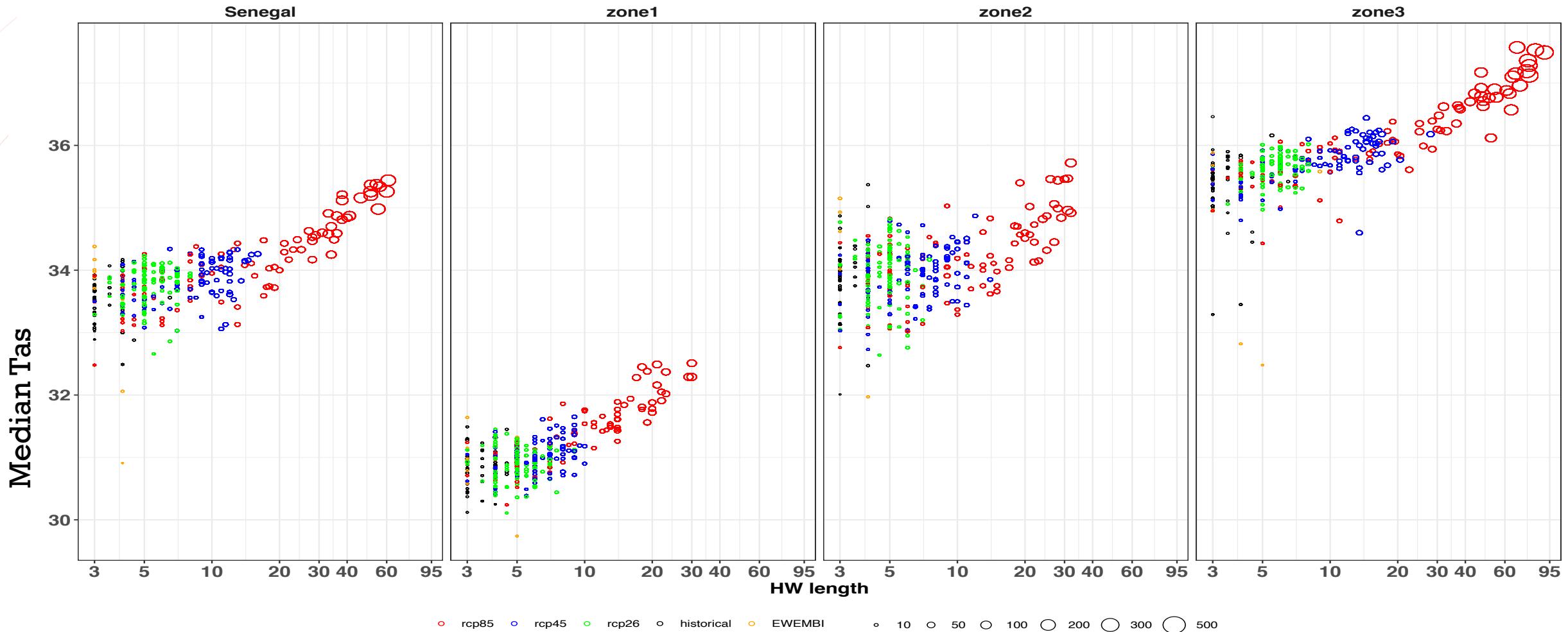


✓ Climate change can be considered as a general shift of the whole statistical distribution towards higher temperature values.

Heat wave (HW) characteristics

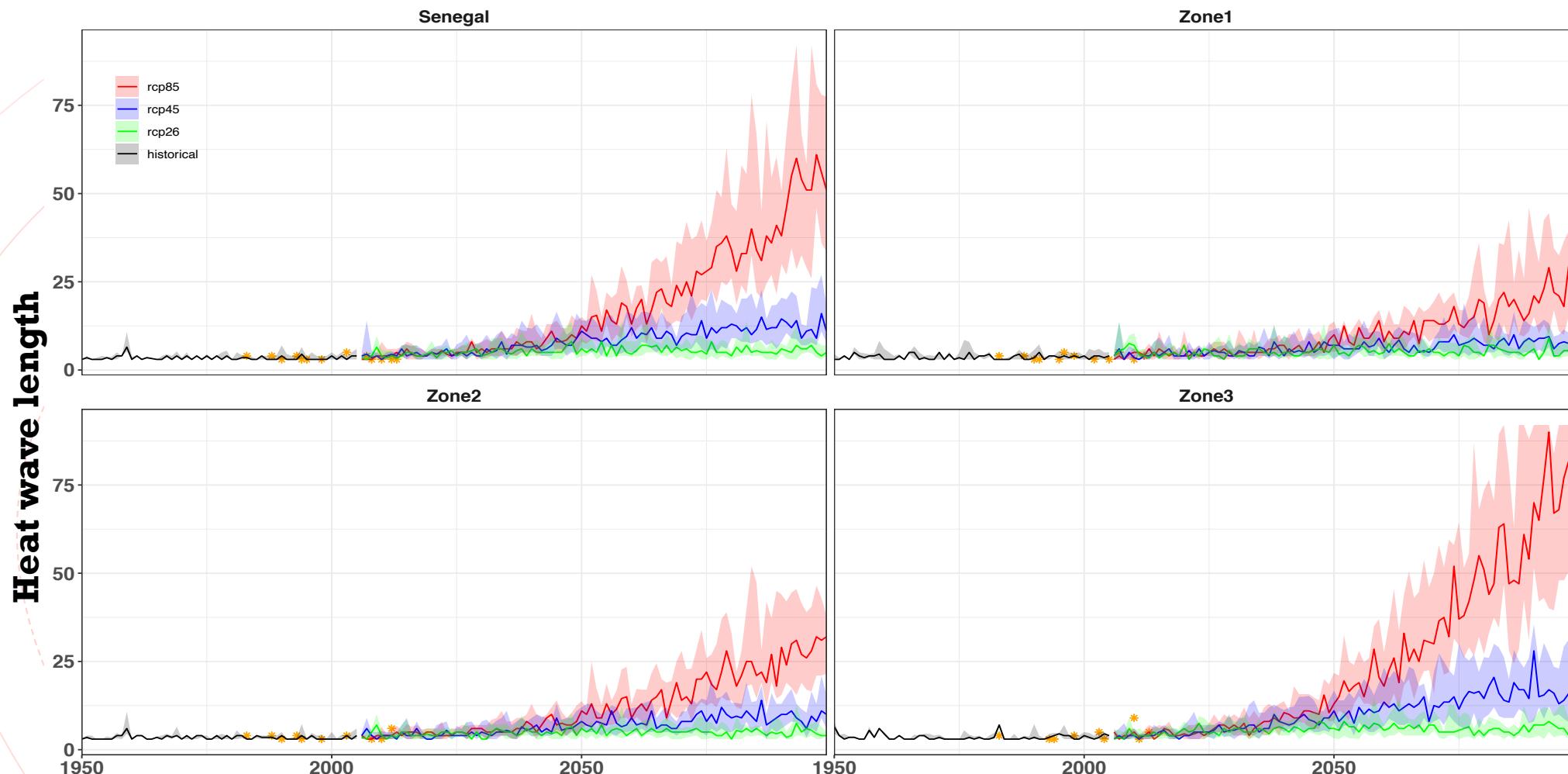
Only the most severe HW (max severity) of each year is considered.

8



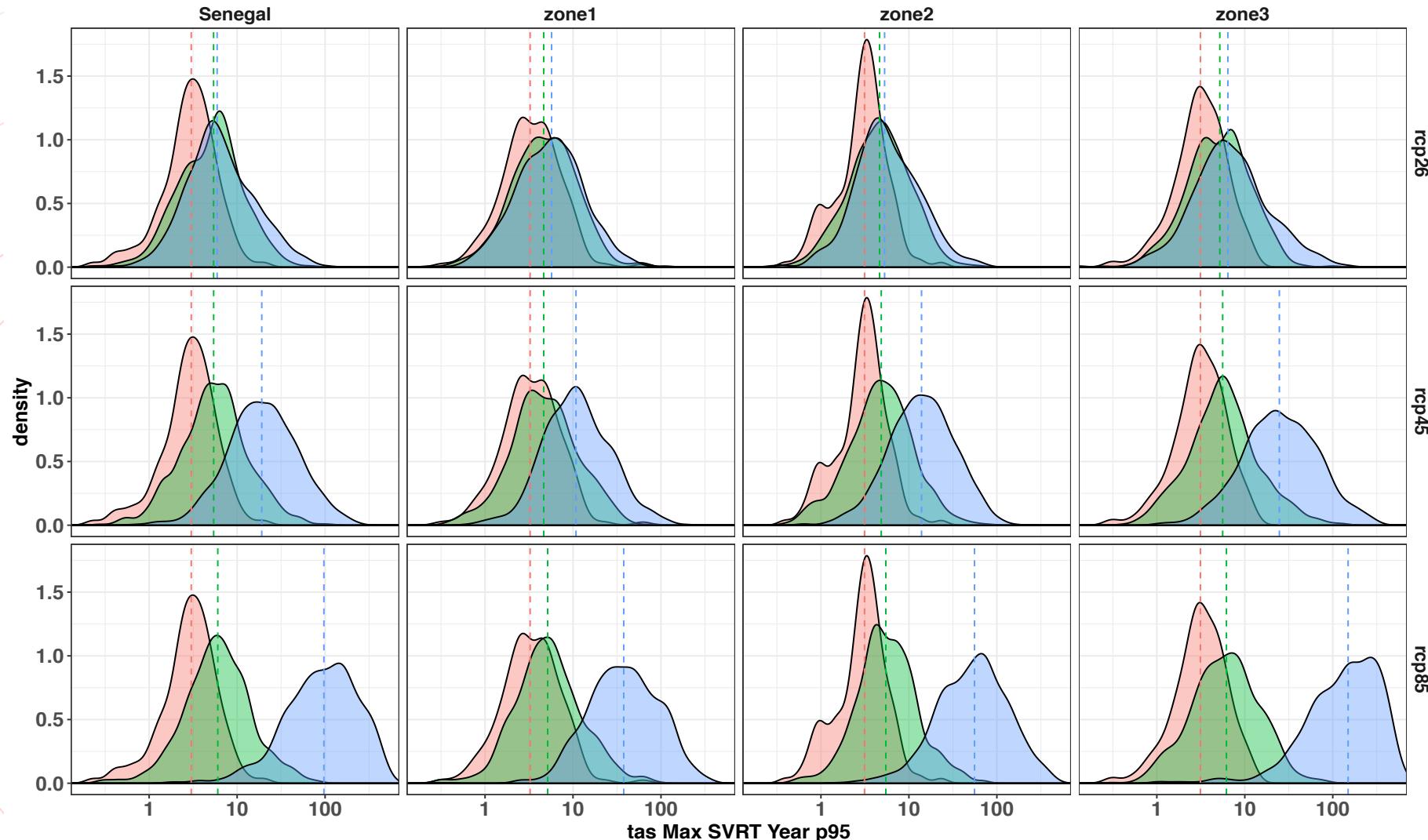
✓ For long term characteristics of heat waves, continental zone is most severe

Heat wave (HW) characteristics.



- ✓ Under RCP8.5, the spring season could become a "permanent HW" in the hinterland Z3 region of Senegal as soon as the late 2070s in some projection

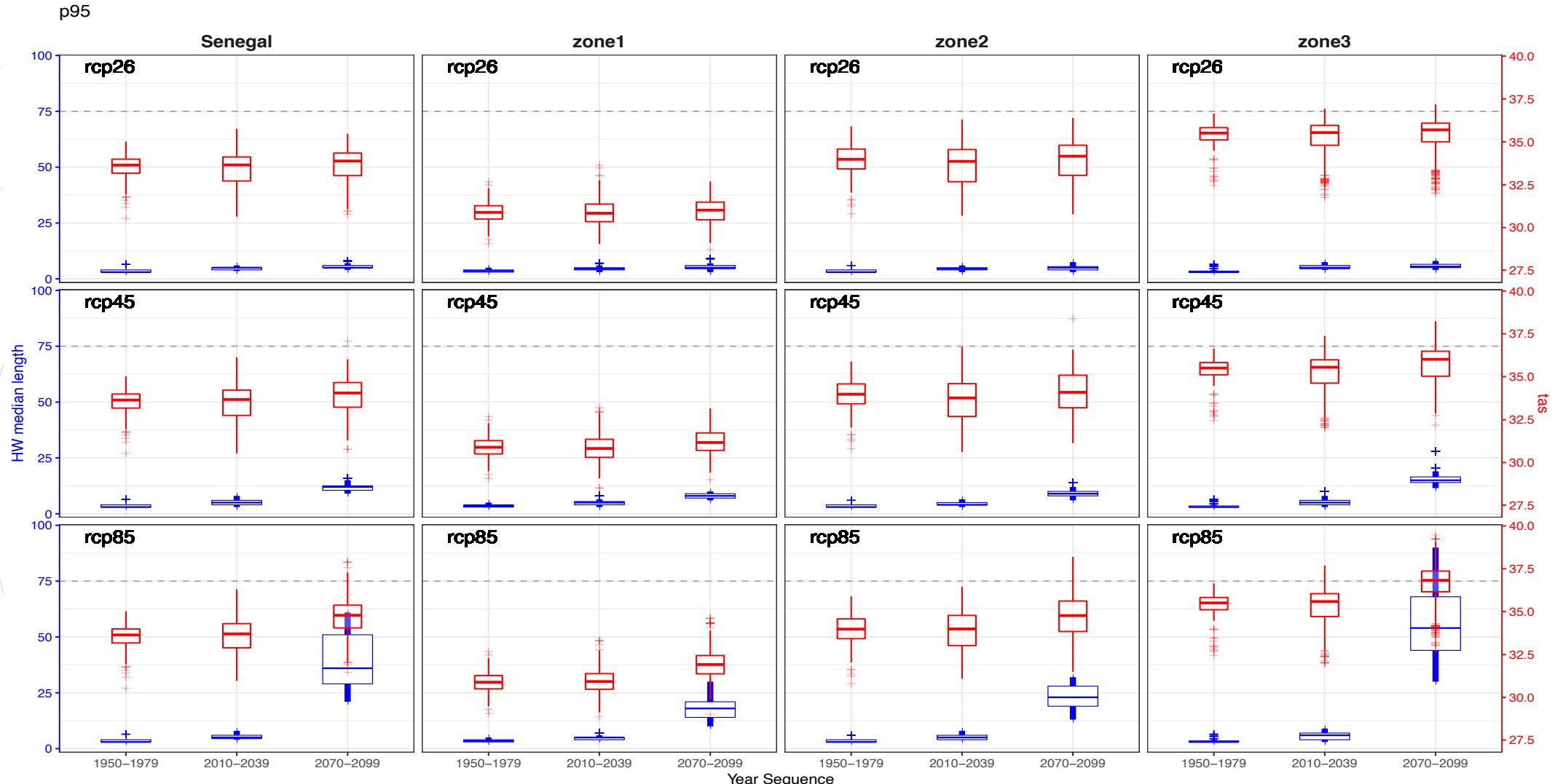
Heat wave (HW) characteristics normal comparison.



- ✓ RCP2.6 simulations lead to similar severity distributions between the early and late 21st century (stabilize)
- ✓ Both RCP4.5 and RCP8.5 produce strong changes in severity distributions

Heat wave (HW) characteristics.

11



- ✓ The average Tas values recorded during HW events is strongly region-dependent.
- ✓ coastal Senegal (Zone1), sensibly cooler than all other regions

Conclusion

- ✓ General temperature increase will continue during this century and will reach ~5°C more in 2100 according to RCP8.5.
- ✓ Climate change over Senegal will correspond to westward displacement of continental temperature towards the coast.
- ✓ Future temperatures in Dakar will be similar to the present ones in Matam
- ✓ The warmest spring seasons recorded over the past 15 years will be the norm around 2040.
- ✓ Exceptional and unknown high heat wave sequences will increase; the whole spring season could be considered as a permanent HW lasting 3 months.
- ✓ Projected changes show marked and rapid increase in these variables, the amplitude of which is primarily RCP-dependent, and secondarily region-dependent.
- ✓ For both metrics, the largest changes occur over hinterland Senegal.