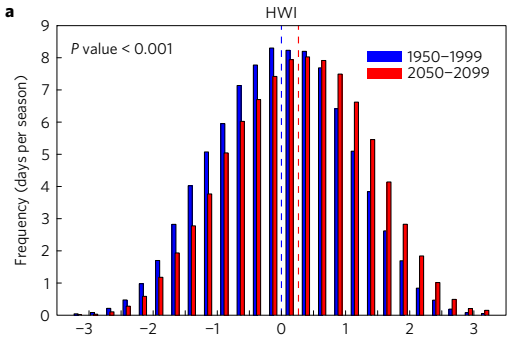
Aerosol reductions outweigh circulation changes for future improvements in Beijing haze (1/2)

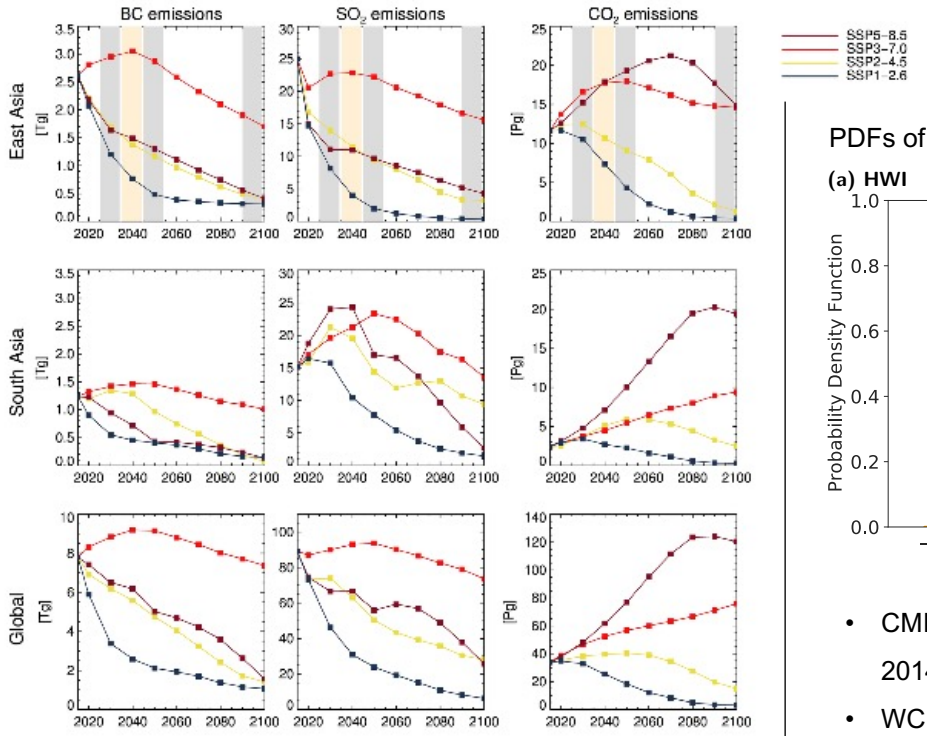
Motivation:

- Increase in GHGs contributes to the increased Beijing severe haze frequency.
- Decrease in aerosol emissions could have the same effect.



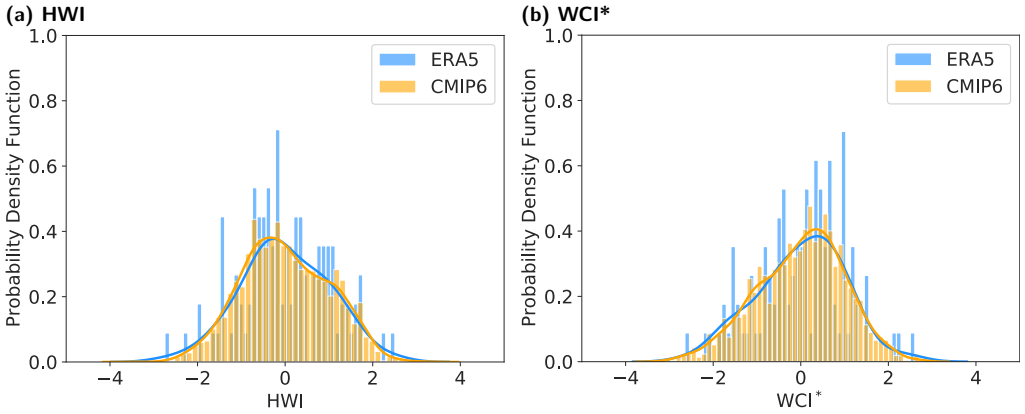
Future changes of Haze Weather Index (HWI) over Beijing. [Cai et al. 2017]

Aerosol and GHGs emissions in ScenarioMIP.



- In future scenarios, aerosol emissions decrease but GHGs emissions by the end of 21st century.

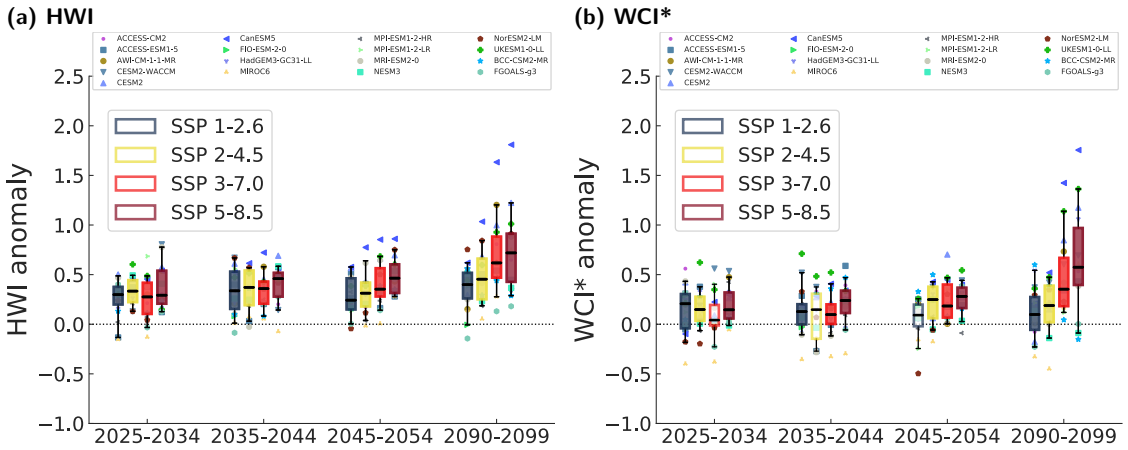
PDFs of HWI and WCI compared between ERA5 and CMIP6 during DJF 1979-2014



- CMIP6 models can represent the HWI and WCI well during the DJF 1979-2014.
- WCI – an East Asian winter monsoon index by measuring SLP (Wang and Chen, 2014).

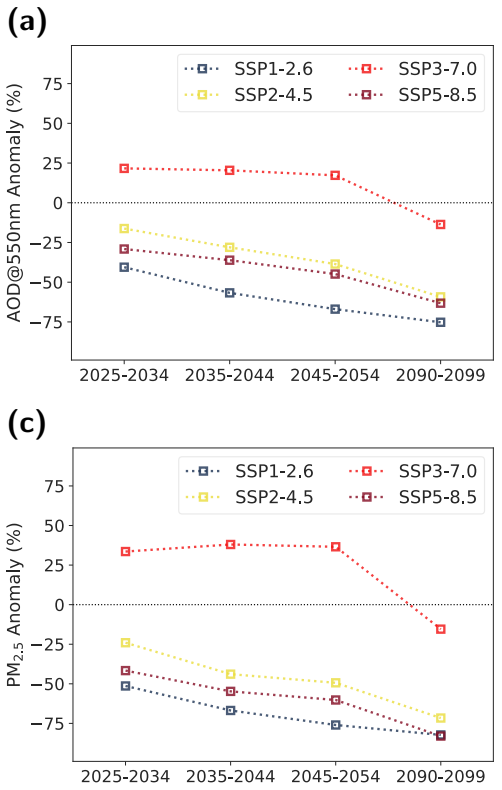
Aerosol reductions outweigh circulation changes for future improvements in Beijing haze (2/2)

Changes of HWI and WCI in the future (against 1979-2014)



- HWI increases in the future.
- HWI increases more in SSPs 3-7.0 and 5-8.5 by 2090-2099 due to larger accumulated GHGs emissions.
- HWI has the lest increase during 2025-2034 in SSP3-7.0 due to continue increasing aerosol emissions. This indicates the HWI is also enhanced aerosol reduction.
- WCI (the large circulation shows the same trend).
- Changes in HWI and WCI can be attributed to air temperature changes.

Beijing haze measured by AOD and PM2.5



- Unlike changes in HWI and WCI, Beijing haze measured by AOD and PM2.5 shows that the intensity of haze will reduce in all scenarios by 2090-2099.

<u>Conclusion:</u>

- The main influence on the haze itself is the reductions in local aerosol emissions, which outweigh the effects of changes in atmospheric circulation patterns.
- This demonstrates that aerosol reductions are beneficial, despite their influence on the circulation.