

The manuscript by Roldán-Gómez et al. investigates temperature asymmetries in response to a hypothesized future reduction in greenhouse gases (GHGs). Based on multi-model simulations from CMIP6, the authors show that these asymmetries are primarily driven by sea ice and large-scale ocean circulation processes, particularly the meridional overturning circulation in the Atlantic and Southern Oceans. The Atlantic overturning circulation contributes to hemispheric-scale temperature asymmetries, while the Southern Ocean overturning largely shapes the zonal asymmetry in the Southern Hemisphere. In addition, sea ice changes dominate the temperature response across the middle to high latitudes of the Northern Hemisphere. Despite these robust mechanisms, substantial inter-model discrepancies persist, which may influence the projected temperature response to mitigation efforts. Overall, the findings are interesting and the manuscript is clearly written. I recommend minor revision with several specific comments.

1. Several figures are difficult to interpret and would benefit from revision. For example, Figs. 2a–b, 3, 5, and 6 contain lines that are too thin to be easily distinguished, and the color schemes use shades that are too similar to be clearly identified. I also suggest that the authors consider adjusting the colors of the vertical lines to improve readability.
2. The SSP5-3.4OS ALL scenario generally produces results consistent with those of SSP1-1.9 ALL, although the magnitude differs due to the stronger and earlier CO₂ reduction in SSP1-1.9 ALL. Therefore, I recommend that the authors move the SSP1-1.9 figures to the supplementary materials, using them to support the main conclusions drawn from SSP5-3.4OS.
3. The authors use both SSP5-3.4OS EXT and SSP5-3.4OS ALL to explore the temperature response to CO₂ reduction. I would suggest the author highlight the differences of the two sets.