



Effect of stratospheric circulation on the extratropical tropopause inversion layer in a relatively simple GCM

S.-W. Son, **E. P. Gerber**, and L. M. Polvani
Columbia University (sws2112@columbia.edu)

Idealized GCM integrations have shown that, without comprehensive radiative-convective processes, the dry dynamics associated with synoptic-scale baroclinic eddies are able to produce an extratropical tropopause inversion layer (TIL). This inversion layer is qualitatively similar to the observations, but somewhat weaker in amplitude and thicker in the vertical. Extending this study, the impact of the stratospheric circulation on the extratropical TIL is examined by introducing a polar vortex and topographically-induced Brewer-Dobson circulation in an idealized GCM. It is found that the stratospheric circulation tends to slightly weaken and narrow the extratropical TIL in the winter hemisphere, where the stratosphere is most active. In all integrations, however, the extratropical TIL in the winter hemisphere is stronger than that in the summer hemisphere, in stark contrast to observations. While further studies are needed, these preliminary results suggest that stratospheric processes are not likely to play a dominant role in the formation and maintenance of the extratropical TIL. Other physical processes, particularly radiation and convection, are likely to play an important role, especially for the different TIL structure in the summer and winter hemispheres.