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Interactive comment on "Large-Scale Tropospheric Transport in the Chemistry Climate Model Initiative (CCMI) Simulations" *by* Clara Orbe et al.

Anonymous Referee #2

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This study examined the large-scale tropospheric transport in the chemistry-climate model initiative (CCMI) ensemble. As to the transport from the Northern Hemisphere midlatitude surface into the Arctic, the inter-model spreads reflect differences in parameterized convection over the northern midlatitude oceans, especially in boreal winter. In contrast, the inter-model differences in interhemispheric transport from northern midlatitudes to southern high latitudes are mostly due to differences in tropical and subtropical convection. It is also found that the simulations constrained by analyzed winds show at least as large differences as the simulations using internally generated meteorological fields, owing to differences in parameterized convection. The results are very interesting and clearly presented. My comments are very minor.

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Discussion paper

P4, L22: When the data are interpolated in pressure, were the pressure levels below the ground treated by missing values or linear interpolation?

P4, L30: This schematic refers to the mean meridional circulation only in the tropics

P7, L17-19: It might be noted that the tracer isolines tend to be more vertical than the isentropic surfaces in summer compared to winter, which indicates moisture may also contribute to the isolation of the Arctic from midlatitudes in summer — latent heat release allows moist air parcel rising along a front faster than a dry parcel.

General comment: Since these model transport differences can be attributed to differences in parameterized convection, it would be hard to reduce the transport uncertainties because we don't know which convective schemes are better. It seems that future efforts should be focused on comparing idealized tracers with realistic tracers that are available in observations, which may help to reduce the uncertainty in convective schemes.

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