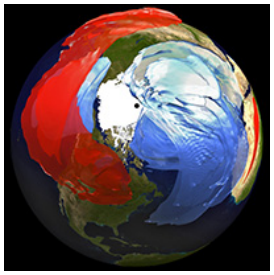

Contribution ID: **9** Type: **Oral presentation**

Remote presentation: Future trends in stratosphere-to-troposphere transport in CCMI models

Tuesday, 19 November 2019 16:30 (30 minutes)

One of the key questions in the air quality and climate sciences is how will tropospheric ozone concentrations change in the future. This will depend on two factors: changes in stratosphere-to-troposphere transport (STT) and changes in tropospheric chemistry. Here we aim to identify robust changes in STT using simulations from the Chemistry Climate Model Initiative (CCMI) under a common climate change scenario (RCP 6.0). We use two idealized stratospheric tracers to isolate changes in transport: stratospheric ozone (O3S), which is exactly like ozone but has no chemical sources in the troposphere, and st80, a passive tracer with constant concentrations in the stratosphere. We find a robust increase in the tropospheric columns of these two tracers throughout the 21st century and analyze the underlying transport mechanisms in the Transformed Eulerian Mean (TEM) framework. Future STT is enhanced in the subtropics due to the strengthening of the Brewer-Dobson circulation in the lower stratosphere and of the top of the Hadley cell in the upper troposphere. In addition, enhanced isentropic eddy mixing increases STT in middle latitudes. It is shown that these STT changes are dominated by greenhouse gas increases, while ozone recovery only partly offsets the trends in the SH upper troposphere. A higher emission scenario (RCP 8.5) produces qualitatively similar but stronger STT trends.

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