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## **Influence of the Asian Summer Monsoon on the Chemical Composition of the Upper Troposphere and Lower Stratosphere using the MUSICA Regionally Refined Chemistry Climate Model**

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The role of the Asian Summer Monsoon (ASM) on influencing the chemical composition of the upper troposphere and lower stratosphere (UTLS) will be examined using the recently developed three-dimensional MUlti-Scale Infrastructure for Chemistry & Aerosols (MUSICA) chemistry-climate model. MUSICA uses a Spectral Element dynamical core, with an ASM regional refinement (RR) option where the horizontal resolution is increased from  $\sim 1.0^\circ$  to  $\sim 0.25^\circ$  and the vertical resolution is  $\sim 500\text{m}$  in the UTLS. For this study, the specified dynamics option is applied where the temperature, zonal and meridional winds from the NASA Goddard Earth Observing System version 5 (GEOS5) data assimilation model are used to drive the physical parameterization controlling boundary layer exchanges, advective and convective transport, and the hydrological cycle. MUSICA includes fully interactive chemistry with  $\sim 240$  chemical species and over 500 chemical reactions along with the representation of sulfate, primary and aged black carbon, primary and secondary organic, sea salt, and dust aerosols. This model study will examine the magnitude and variability of ozone precursors (e.g., VOCs, NO<sub>x</sub>, and CO) and halogen ozone depleting substances in the ASM UTLS outflow region for the 2017 through 2021 boreal summer seasons. The interannual influences of the ASM chemical emissions on UTLS oxidizing capacity and odd-oxygen loss processes will be quantified. The results from this model study will address the main hypothesis of the Asian summer monsoon Chemical and Climate Impact Project (ACCLIP), namely that the western Pacific is a significant pathway for reactive chemical pollutants and climate-relevant emissions from the ASM to enter the global UTLS. ACCLIP is an NSF/NASA supported airborne mission that will be based from Osan, South Korea in July/August 2022.