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Impact of convection on trace gas composition during the summer monsoon season downwind of East Asia and over central North America

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Airborne research missions were conducted during the summer season over the Western Pacific downwind of the Asian summer monsoon (ACCLIP, Asian Summer Monsoon Chemical & CLimate Impact Project, Aug/Sept., 2022) and over central N. America (DCOTSS: Dynamics and Chemistry Of The Summer Stratosphere, July/Aug., 2021 and May/July, 2022). A major objective of both of these missions was to characterize the impact of convective transport of trace gases on regional and hemispheric air quality and on ozone chemistry in the UT/LS. The DCOTSS campaign focused on outflow from overshooting convection, and ACCLIP targeted outflow and eddy-shedding from the Asian summer monsoon anticyclone. Whole air samples were collected from the three aircraft deployed during the missions (NSF GV, NASA WB-57, and NASA ER2), and a wide range of organic trace gases were measured that included NMHC, long and short-lived halocarbons and organic nitrates. In-situ measurements of ozone and other trace gases were also included in the airborne instrument payloads. Both campaigns showed cases of tropospheric transport into UT/LS region, with significantly larger amounts of certain trace gases (e.g., dichloromethane and others) found in the ACCLIP region. This presentation will provide an overview of selected trace gas distributions and correlations from these campaigns to illustrate the role of the different monsoon regions on the chemistry of the UT/LS.

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