

6.146 Trace gas transport out of the Indian Summer Monsoon.

Early Career Scientist

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Abstract:

The trace gas transport out of the Indian summer monsoon was investigated as part of the aircraft campaign OMO (Oxidation Mechanism Observations) using the German research aircraft HALO (High Altitude and Long Range Research Aircraft) in July/August 2015. HALO was based alternatively at Paphos/Cyprus and Gan/Maledives. Flights took place over the Mediterranean Sea, the Arabian Peninsula and the Arabian Sea. Here we investigate the distribution of carbon monoxide (CO) and methane (CH₄) in the upper troposphere, measured in-situ with the IR-laser absorption spectrometer TRISTAR. During OMO enhanced concentrations of methane and carbon monoxide were detected in the Asian Summer Monsoon Anticyclone at altitudes between 11km and 15km. Mixing ratios exceeded background levels for CO and CH₄ by 10-15ppb and 30-40ppb, respectively. The enhancement in the CO concentration falls within the range of tropospheric variability, while the methane enhancement is much higher than its natural variability. Therefore methane is a very good tracer for air masses influenced by the monsoon. This is confirmed by back trajectory calculations with FLEXPART, indicating convective transport from India approximately 10 days before the observations. A comparison of observations with EMAC model simulations (global atmosphere-chemistry model ECHAM/MESy) generally agree within $\pm 5.5\%$ and $\pm 1.4\%$ for CO and CH₄, respectively.