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In-situ measurements of HNO_3 and HCN and Lagrangian backtrajectory analyses in the Asian Summer Monsoon Anticyclone

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The StratoClim aircraft field campaign took place from Kathmandu, Nepal, in the summer 2017 in order to better clarify the atmospheric composition, chemistry, and dynamics in the Asian Summer Monsoon Anticyclone (ASMA) which is known to distribute surface emissions to the mid-latitude lower stratosphere and the stratospheric overworld.

We here report on in-situ measurements of gaseous HNO_3 and HCN in the Upper Troposphere and Lower Stratosphere (UTLS) employing the Chemical-Ionization Time-of-Flight Mass Spectrometer FUNMASS (CI-ToF-MS) on board the high-altitude research aircraft M55-Geophysica. While HCN is primarily emitted from biomass burning, HNO_3 is mainly a product of NO_x oxidation. The time series of these species from flights F6 and F7 on 6th and 8th of August 2017 show interesting signatures of convective activity and lightning NO_x production at the tropopause level (F6) as well as vertical profiles under much more quiet conditions (F7). Here we present comparisons of the in-situ data with two sets of backward trajectory calculations by the lagrangian models TRACZILLA and CLaMS. The influence of convective sources and other physical-chemical processes on the observed time series is discussed.