Geophysical Research Abstracts,
Vol. 10, EGU2008-A-02902, 2008
SRef-ID: 1607-7962/gra/EGU2008-A-02902
EGU General Assembly 2008

Interpreting Aura MLS observations of hydrogen cyanide over the tropics using a chemistry transport model

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We use the GEOS-Chem global 3-D CTM to interpret the tropical atmospheric distributions of hydrogen cyanide (HCN) observed by the NASA Aura Microwave Limb Sounder (MLS) instrument. The main sources of HCN are from the burning of biofuel and biomass while the main sink is uptake by oceans, resulting in a tropospheric lifetime of 5 months. This lifetime is sufficiently long that variability in HCN introduced by surface sources and sinks can be observed in the tropical upper troposphere and stratosphere. A recent study by Pumphrey et al. has reported a 2-year cycle in elevated HCN concentrations observed by Aura MLS in the stratosphere, which they partly attribute to variability in Southeast Asian biomass burning. Intermittent tropospheric HCN column data from ground-based instruments across the tropics show an annual cycle, consistent with GEOS-Chem. We will use the GEOS-Chem CTM to reconcile the apparent discrepancy between ground-based and space-borne observations of HCN over the tropics.