



Simulation of the atmospheric tape recorder signal in HCN

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Variations in the mixing ratio of long-lived trace gases entering the stratosphere in the tropics are carried upward with the rising air with the signal being observable throughout the tropical lower stratosphere. This phenomenon is referred to as “atmospheric tape recorder”. It has previously been observed for water vapor, CO₂, and CO which exhibit an annual cycle. Recently, based on Microwave Limb Sounder (MLS) and Atmospheric Chemistry Experiment (ACE) satellite measurements, the tape recorder signal has been observed for hydrogen cyanide (HCN) but with an approximately two-year period. Here we report on a model simulation of the HCN tape recorder for the time period 2002–2008 using the Chemical Lagrangian Model of the Stratosphere (CLaMS). The model is able to reproduce the observed pattern of the HCN tape recorder signal if time-resolved emissions from fires in Indonesia are used as lower boundary conditions. This finding indicates that inter-annual variations in biomass burning in Indonesia, which are strongly influenced by El Niño events, control the HCN tape recorder signal.