Satellite Observation of Formaldehyde over China.

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Formaldehyde (HCHO) is a central component of tropospheric chemistry. It constitutes an important indicator of hydrocarbons emissions in the troposphere. The photodissociation of HCHO also plays an important role in the production of carbon monoxide (CO). More than half the global source CO is provided by the photochemical degradation of methane and other Volatile Organic Compounds (VOCs). About 80-90% of this production is represented by the photo oxidation of HCHO. Through quantification of the global abundance of formaldehyde using satellite instruments, one expects to provide new constraints on the emissions of non-methane VOCs (NMVOCs) as well as on the budget of CO, which play a key role in the budget of tropospheric ozone and the hydroxyl radical OH.

In this work, global distributions of formaldehyde columns are derived from GOME for the years 1996 to 2001. The retrieval process is based on a slant column fitting using the differential optical absorption spectroscopy technique (DOAS), followed by a conversion to vertical column using appropriate air mass factors (AMFs). For the later step, chemistry transport model provides best-guess profiles of HCHO, based on the latest emission inventories, atmospheric transport, photochemistry, lightning modelling and wet/dry removal processes.

High amounts of formaldehyde can be observed in China. Currently, not much is known about the HCHO distributions in this region. Biogenic emissions, such as isoprene from forests, are poorly quantified. As a result HCHO is poorly represented in most global chemistry-transport models, leading to an underestimation of the ozone production. Since HCHO is an important intermediate of the oxidation of biogenic emittants, the new retrieval products from GOME (SCIAMACHY and OMI) of this tracer provide an excellent opportunity to constrain current biogenic emissions estimates. Moreover, formaldehyde is an interesting indicator for biomass burning, rice fields and industrial activities.

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