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Formaldehyde from GOME-2

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Isoprene is the most abundant non-methane biogenic volatile organic compound (BVOC) emitted into the atmosphere with emissions roughly equal to global methane emissions from all sources. Isoprene strongly influences the oxidation capacity in the troposphere hence influences levels of methane and tropospheric ozone, and is also a precursor to secondary organic aerosol. Isoprene, therefore, plays a significant role in radiative forcing and determining Earth's climate trends. However, the exact mechanisms of isoprene emission from vegetation are poorly understood and current land-surface models often use different parameterisation and meteorological fields to drive such schemes. Furthermore, isoprene emissions measurements are rare and are difficult to extrapolate to regional and continental scales thus resulting in large uncertainties in the total global emissions.
Formaldehyde (HCHO) is formed as an intermediate product during the isoprene oxidation process and can be used as a proxy for isoprene emission. Global satellite observations of formaldehyde are now available from a number of satellite sensors which offer a unique ability to study isoprene emissions over large regions.
Here, we use formaldehyde observations from the Global Ozone Monitoring Experiment 2 (GOME-2) instrument retrieved with the University of Leicester retrieval (Hewson et al. 2013) to: 1) test state-of-the-art model calculations using the GEOS-CHEM global transport model; 2) investigate the key drivers for regional year-to-year anomalies in formaldehyde (or isoprene) emissions and 3) assess the ability of current land surface models (MEGAN, JULES) to reproduce the observed anomalies and their dependence on climate variations.