

Tropospheric Formic Acid Measurements from Space: Study the Variations of Formic Acid in Relation to Biomass Burning and Anthropogenic Emission Sources

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Formic acid is one of the most abundant volatile organic compounds in the atmosphere, and a dominant source of acidity in the global troposphere. In this work, we present the first global retrievals of formic acid from the Tropospheric Emission Spectrometer (TES) satellite instrument. We apply the GEOS-Chem Chemical Transport Model (CTM) and an ensemble of airborne and ground observations to evaluate the TES data, and find that the formic acid distributions derived from TES are generally consistent with *in situ* measurements. The space-based formic acid data reveal a severe model underestimate that manifests globally; however, the simulated and observed concentrations are spatially well-correlated. The discrepancy between GEOS-Chem and TES is most prominent over tropical biomass burning regions, indicating a major missing source of organic acids from fires. There is also a significant model bias over northern mid-latitude regions. We examine the seasonal variations of formic acid over Northern Hemisphere as observed by TES in terms of the constraints they can provide on biogenic, biomass and anthropogenic contributions to formic acid.