Geophysical Research Abstracts
Vol. 21, EGU2019-18201, 2019
EGU General Assembly 2019

Quantification of Isoprene emission fluxes using a dynamic branch cuvette system from Poplar (Populous deltoides) growing in North India

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Isoprene is the single largest contributor to global (BVOC) emissions and affects air quality and atmospheric chemistry on rapid scales but its emission sources over India are ill-constrained. Populus deltoides is an important commercial timber source with ∼30 million standing trees planted over an area of ∼600 km2 as part of agroforestry practices in north India alone. Here, we present measurement results quantifying isoprene emission fluxes (EFiso) from Populus deltoides growing in their natural environment in north India during the monsoon and post-monsoon seasons using dynamic branch cuvettes coupled to real-time Proton Transfer Reaction- Mass Spectrometer (PTR-MS) and Thermal Desorption Gas Chromatography-Flame Ionization Detection (TD-GC-FID). Excellent agreement was found between isoprene measurements obtained using the PTR-QMS and TD-GC-FID (r=0.97). Water vapor, carbon dioxide, PAR and temperature were measured as well to obtain mechanistic insights regarding the emission process. The daytime measured isoprene emission fluxes (EFiso) ranged from 0.1-67.8 μg g^{-1} hr^{-1} and 0.2-18 μg g^{-1} hr^{-1} for the monsoon and post-monsoon seasons, respectively. Previous studies using other methods, have reported average (normalised to 1000 μmol m-2 s^{-1} and 30 °C) isoprene emissions ranging from 37 μg g^{-1} hr^{-1} by Evans et al. to 53.6 $\pm$ 11 μg g^{-1} hr^{-1} by Singh et al. We will discuss the relevance of our results in the context of EFiso calculated using the Model of Emissions of Gases and Aerosols from Nature (MEGAN) and regional air quality effects.