

Isoprene emission responses under changing climate and landcover forcing's over Borneo Island

ABSTRACT

Isoprene is the most active biogenic volatile organic compounds (BVOCs). It is largely produced by plants and is known to play important roles in the tropospheric chemistry, greatly influencing the tropospheric ozone budget and atmospheric oxidation capacity. This paper focuses on how climate change and landcover affect isoprene emissions in the Borneo region. Climate change scenarios (RCP4.5 and RCP8.5) were developed for the Borneo region using the Weather Research Forecasting (WRF v4.0) model. The Model Emission of Gases and Aerosol from Nature (MEGAN v2.1) was used to simulate isoprene fluxes using climate output datasets scenarios from WRF model. Both climate scenarios would lead to a warming atmosphere at the end of the century, with surface temperature increases of 2.8oC (RCP4.5) and 3.1oC (RCP8.5), respectively. Under the present-day vegetation landcover scenario for RCP8.5, future emission of isoprene was projected to decrease by 11% (0.39 TgC/yr). Comparatively, higher decreases of isoprene emissions were projected under moderate climate forcing (RCP4.5) by 38% (1.14 TgC/yr) under present-day vegetation landcover. This indicates that climate forcing will have a significant impact on isoprene emissions in the region. Thus, challenges in dealing with future emission of isoprene in the region are closely tied to the management of greenhouse gases emission sources, which is the main precursor of climate change.