The Model of Emissions of Gases and Aerosols from Nature (MEGAN) estimates of global biogenic VOC emissions and their response to global change

A. Guenther (1)

(1) Atmospheric Chemistry Division, NCAR, Boulder CO USA (guenther@ucar.edu/ Fax: 1 303 4971447)

Organic molecules are the signature compounds of the biosphere. Organic compounds exist in various phases including volatile organic compounds (VOC) that are emitted into the air where they can have a substantial impact on the chemistry of the atmosphere. The role of these biogenic gases have been investigated using three-dimensional chemistry and transport models that include time dependent gridded emission estimates as driving variables. This includes both global earth system models that simulate chemistry and climate and the regional air quality models that are used to develop pollution control strategies. These models began including biogenic VOC emissions in the 1980s and by the 1990s they were routinely included in global and regional models but typically as off-line static emission inventories. There is now an increasing demand for biogenic emission algorithms that are integrated into regional and global models to facilitate studies of feedbacks and to ensure consistency in the landcover and weather variables used to simulate the behavior biogenic emissions and other earth system components. Satellite-derived global distributions of isoprene oxidation products (e.g., formaldehyde and carbon monoxide) are beginning to provide constraints on global isoprene emission rates but they also are associated with significant uncertainties and they cannot provide estimates of past (pre-satellite era) and future emissions. Thus there remains a need for models that can estimate past, current and future biogenic VOC emissions. In the early 1990s, the International Global Atmospheric Chemistry (IGAC) Global Emissions Inventory Activity (GEIA) initiated working groups that developed global emission inventories on a 1 degree by 1 degree grid for use in global chemistry and transport models. The IGAC-GEIA natural VOC working group developed a model of emissions of isoprene and other VOC that was

released in 1995. This manuscript describes advances in biogenic VOC emission modeling subsequent to this effort and introduces the Model of Emissions of Gases and Aerosols from Nature (MEGAN) for estimating biogenic emissions of reactive gases.