NCAR | ATMOSPHERIC CHEMISTRY OBSERVATIONS & MODELING

ACOM Seminar

NEIVA: Next-generation Emissions InVentory expansion of Akagi

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Livestream: https://operations.ucar.edu/live-acom

ABSTRACT

The identification, quantification, and model representation of gaseous and particulate compounds emitted from fires are critical for modeling the effects of biomass burning (BB) on air quality and climate. In the last decade, application of advanced instrumentation has yielded significantly improved estimates of the compounds emitted from fires. There have been a large number of laboratory and field campaigns, which have resulted in rapid expansion of published BB emissions datasets and have facilitated the emergence of new BB emissions inventories. Such inventories include 2019 Andreae, an update to the 2001 compilation of Andreae and Merlet, and the 2020 Smoke Emissions Repository Application (SERA), an update to the 2014 Wildland Fire Emissions Database. Here I will present a new BB database, NEIVA, the Next-generation Emissions Inventory expansion of Akagi. Similarly to Andreae, the NEIVA database includes emission factors (EFs) for globally-relevant fuel and fire types, but in contrast to Andreae, laboratory data are included. Similarly to SERA, NEIVA exists as an online, searchable database that includes source data and recommended average EFs across fuel and/or fire types. NEIVA also includes a property dataset, which links each compound with a suite of chemical and physical properties using unique identifiers. Because one function of emission inventories in air quality models is to distribute the total gaseous organic carbon emitted from fires among the suite of compounds or lumped model species included in an inventory, each of the gas-phase organic compounds in the NEIVA database has been mapped to SAPRC and MOZART (CAM-Chem, MUSICA). Using the Python script files, NEIVA can produce detailed speciation of compounds for different fuel and/or fire types, as well as lumped profiles in which individual compounds are mapped to model surrogates. The inclusion of recent laboratory and field data within NEIVA results in significant differences in the molar and mass distributions of model surrogates when compared with existing inventories, which subsequently influences predictions of atmospheric composition and chemistry in models.

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