GH11A-1026 - Evaluating Fire Emissions Inventories for Modeling Smoke Transport in the Sierra Nevada Mountains

Monday, 9 December 2019 08:00 - 12:20

Moscone South - Poster Hall

Abstract
To understand the impacts of wildfire smoke on human health, it is crucial to know the amounts and chemical species of atmospheric emissions released by wildfires. Fire emissions inventory data can be used to estimate emissions from individual wildfires using wildfire behavior models, in which emissions are influenced by weather, fuel type, fuel moisture, amount of fuel, and combustion type. These factors can change the amount and chemical species of atmospheric gasses and aerosols emitted by a wildfire. Fire emissions inventories model these variables to estimate the biomass burning emissions from wildfires. Results from emissions inventories can be input into atmospheric models, such as chemical transport models (e.g, CMAQ) or dispersion models (e.g., HySplit), to simulate smoke plume transport. Fire emissions inventories use a variety of methods and datasets to model input variables. The divergences in methodology can lead to differences in emissions results between each fire emissions inventory. It is crucial to understand how distinct methodologies create differences in wildfire emissions model results, and how these differences are propagated through transport models that determine downwind smoke plume concentrations.

The goal of this presentation is to understand differences between fire emissions inventories and how contrasting methods of modeling fire emissions effects smoke transport modeling. Three fire emissions inventories will be discussed: the Missoula Fire Lab Emission Inventory (MFLEI), the Global Fire Emissions Database (GFEDv4s), and the Wildland Fire Emissions Information System (WFEIS). Results from each inventory will be evaluated using HySplit to model smoke plume transport over the Sierra Nevada Mountains and compare how smoke plume dispersion differs due to emissions inventory methodology. HySplit is a Lagrangian particle trajectory model that simulates atmospheric particle dispersion using emission inputs and meteorological data. This work will provide insights regarding how methods of modeling wildfire emissions can impact smoke plume transport models. In a broader context, these results will be used in future exposure modeling to estimate human health impacts of wildfire smoke plumes near Reno, Nevada.

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