



RAL/ACOM SEMINAR SERIES

Fires, Fire Emissions, and Fire Impacts on Air Quality

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Fire is an important component of our Earth system and has long been recognized as one of the major sources of radiatively and chemically active trace gases and aerosols in the atmosphere. In this presentation, I will discuss a few studies related to fire emissions and fire impacts on air quality. (1) Fire impacts on atmospheric composition and chemistry start with fire emissions of trace gases and aerosols. First, I will discuss the estimation of fire emissions, and the impacts of diurnal variation of fire emissions and fire plume rise to modeled air quality. (2) Also, fire is likely to become more important in the future climate. The future projection of global fire activities under different SSP scenarios and the impacts of solar geoengineering on wildfires in the 21st century in CESM2/WACCM6 will be discussed. (3) Fires in the wildland-urban interface (WUI) are particularly important as they are closer to human settlement. We developed a multiyear worldwide unified wildland-urban interface (WUWUI) database for 2001–2020 using a machine learning approach. We found that WUI has been increasing in all populated continents from 2001 to 2020, and WUI fraction of fire counts and burned area both increased. We use the MUSICAv0 model to simulate the impacts of WUI fire on air quality and health relative to wildland fires and found that WUI fires have disproportionately large impacts of wildland-urban interface fire emissions on global air quality and human health.