ATS/CIRA Colloquium

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Hosted by Jeff Pierce

3 p.m. Thursday, March 7
ATS 101

Understanding the Burning Questions: The History of Wildfire and its Impacts on Ecosystem, Energy, and Climate

Wildfire is an integral component of the Earth's ecosystems. Millions of hectares burn annually, causing profound impacts on vegetation composition, carbon storage, hydrological processes, and socio-economic services. However, fire-adapted ecosystems may encounter new challenges due to climate-driven alterations to fire regimes, with increasing fire size, frequency, and severity observed in recent decades. The escalating impact underscores the pressing need to enhance our understanding of the interactions between wildfire, ecosystem, and climate within a changing environment.

Leveraging advanced satellite products and Earth system models, my research will comprehensively evaluate the fire impacts in the Earth system. Specifically, I aim to address three key questions: Firstly, how do wildfires reshape the terrestrial ecosystem? Secondly, how do wildfires disturb energy balance, water cycles, and emissions in the land and atmosphere interface? Lastly, how do wildfires influence the regional and global climate? I will show how the first order and second order fire impacts play a role in carbon sink and tree mortality. By analyzing the changes in vegetation composition and canopy structure resulting from wildfires, I will demonstrate their subsequent impacts on energy balance and snow hydrology. I will also demonstrate how the post-fire land cover changes influence regional and global climate through atmospheric feedbacks. Drawing from the above fire studies, I will propose promising avenues for advancing fire prediction and fire impact quantification using machine learning and process-based fire models. Colloquia page: atmos.colostate.edu/colloquia