A Virtual National Fire Sciences Laboratory for Forest Service Research in the United States: a Framework for Future Collaborations

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Abstract

Physical fire science is at the core of fire research. It advances the fundamental understanding of fire-fuel-atmosphere interactions, fire behavior, fire danger, and fire emissions in all fuel complexes. This understanding is critical for (1) developing timely, accurate, and complete predictions of fire behavior and effects, (2) improving assessments of fire hazards and risks, (3) designing and comparing fuel treatments and outcomes, and (4) prioritizing fuel treatment and response options. We have defined the respective spatial and temporal domains of 'physical fire processes' to be from mineral soil to the top of the convective plume, and from ignition to extinction of last smoldering.

To organize and accomplish new research relating to physical fire science, contributors to Core Fire Science Portfolio RD&A activities—recently defined by the Forest Service Wildland Fire and Fuels Research and Development Strategy—are evolving towards a National Fire Sciences Laboratory to work on priority core fire science problems. This "virtual laboratory" is self-organized and placeless. Additional, highly-capable core fire science expertise exists throughout the federal government outside of Forest Service. To answer questions of national significance—most core fire science questions have no geographic or ecological boundaries—the model for a National Fire Sciences Laboratory necessarily includes the establishment and nurturing of partnerships with national laboratories as well as universities.

The scope of Forest Service Core Fire Science research consists of three activities: 1. Physical fire processes; 2. Fire characteristics at multiple scales; and, 3. Fire danger assessment. Each of the three activities has an inherent temporal and spatial domain within which Core Fire Science efforts will be defined and performed. This new, invigorated core fire sciences research will provide the underpinnings for incorporating improved understanding of fire behavior, combustion, fire weather, emissions and other key processes into tools to improve the efficiency and effectiveness of fire and fuels management decisions. This research will lead to enhancements in public safety, ecosystem integrity and sustainability, and environmental quality.

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