J3E.1 CORE FIRE SCIENCE CAUCUS

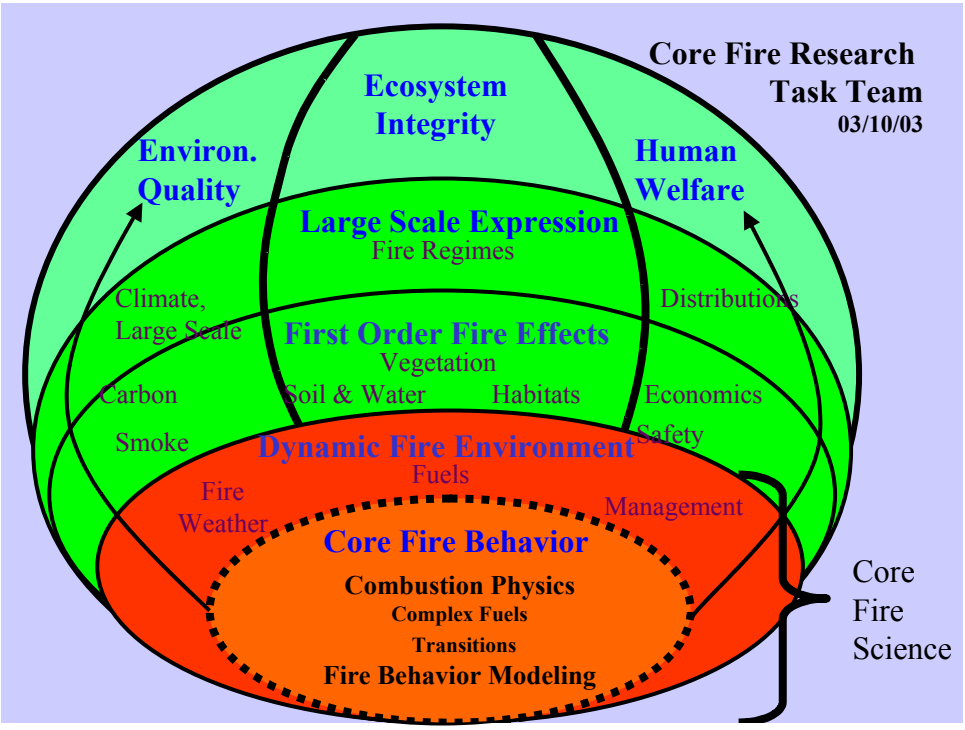
David V. Sandberg*
USDA Forest Service Research, Corvallis, Oregon
Colin C. Hardy
USDA Forest Service Research, Missoula, Montana
David R. Weise
USDA Forest Service Research, Riverside, California
Ronald Rehm
National Institute of Standards and Technology, Gaithersburg, Maryland
Rodman Linn
Los Alamos National Laboratory, New Mexico

The Core Fire Science Caucus is a self-directed team of fire scientists who are dedicated to improving the core physical science basis for fire management. Our goal is to provide fire managers with the ability to plan for and predict (in real time) the nature of the combustion process, fuel involvement, heat transfer, and atmospheric interaction that occurs from the first point of ignition to the last moment of smoldering on the landscape. We are developing an ego-less, turf-less community expression of the priority topics for core fire science and core fire behavior modeling development over the next 5-20 years.

**Corresponding author address*: David V. Sandberg, USDA Forest Service, Pacific Northwest Research Station, 3200 SW Jefferson Way, Corvallis, OR 97331; e-mail: dsandberg@fs.fed.us

The Caucus is an open process available to all fire scientists and managers limited only by the time and energy that each can contribute. Our effort is organized by the authors, by colleagues at Los Alamos National Laboratory (LANL) and the National Institute for Standards and Technology (NIST), by fire scientists at each of the USDA Forest Service Research Stations, and by Washington Office Research Staff. The authors represent LANL, NIST, and the three Forest Service Laboratories that focus on fire research: the Missoula Fire Sciences Laboratory, the Riverside Forest Fire Laboratory, and the newly-designated Pacific Wildland Fire Sciences Laboratory in Seattle.

The intent of this paper is to review our progress with the fire management and fire science communities and to recruit your participation with



us to develop a clear statement of need, i.e. a Strategic Plan, over the next year. Core fire science includes the combustion process and all that precedes or interacts with a fire or that defines the fire behavior environment. Core fire science embraces management action, fire weather and climate, dynamic fuel characteristics and conditions, and the release of heat and combustion products to the environment.

The goal of core fire behavior modeling is to provide a community modeling framework that provides mechanistic simulation of the entire combustion process in complex wildland fuelbeds, up to the event scale, in a form useful for fire management planning and operations, policy analysis, and scientific investigation. Our focus is on simulation of the thresholds (initiation and cessation) of each phase of combustion (ignition, propagating flaming, residual flaming, initial smoldering, and propagating smoldering), fire behavior (initial spread, steady-state propagation, extreme fire behavior, resurgence), involvement of each wildland fuelbed stratum (duff, litter, low vegetation, downed woody, shrubs, trees), and spatial element (natural fuelbed, manipulated fuelbed, anthropogenic fuels, structures). We will prioritize the core fire behavior processes most critical to our management clients, and focus research and development on those components of simulation.

The Core Fire Science Caucus is, at the time of this publication, in the initial stages of defining what can be done within the next few years and what should be done in the next two decades that will (1) build on the considerable current capability for modeling fire behavior, and (2) fill in the considerable lack in current capability to model all types of fire in all types of fuelbeds under all fire environments. Current model applications do an especially good job of providing managers with fire spread and intensity predictions in well-behaved, moderately intense fires in uniform fuelbeds; but are less than adequate for predicting fire behavior at the thresholds of fuel involvement and transitions to large-scale heat transfer mechanisms.

Our objective at this conference is to take the next step at defining the critical “Challenge Questions” in fire management that will shape the development of new science and model development. Everyone attending this conference is invited to participate by suggesting the future core fire behavior information needs and product designs that will serve the community most effectively. Challenging questions are sought at the operational, tactical, and strategic levels. For example, the following questions have been proposed:

1) What is the effectiveness of vegetation and fuel treatments in reducing the risk, cost, and adverse effect of wildland fire?
2) How can we anticipate and inform fire managers of the risk that a fire that will abrupt transition from initial attack to dangerous extended-attack fires?
3) Can we reduce the cost of managing very large wildland fires by timing aggressive suppression response to coincide with anticipated changes in the fire environment (e.g. long-term forecast weather)?
4) When do fires transition to include deep organic layers or other fuels that hold fire for long periods of time and cause severe environmental damage?
5) ……

The Core Fire Science Caucus is a work in progress, and a process that should continue for years to come. We recognize that core fire research has been a low priority for too many years while the importance of using fire to manage ecosystems, the costs of managing wildland fire, and the effect of fire on safety and welfare has accelerated greatly. We hope to improve the effectiveness of the fire research community by working more closely together and concentrating efforts on the outcomes that matter most to fire managers and the public.