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RAL SEMINAR SERIES

WEDNESDAY, FEBRUARY 12, 2020 | 3:30 PM – 4:30 PM | FL2-1022

NATIONAL CENTER FOR ATMOSPHERIC RESEARCH, BOULDER

The Rapid Deployments to Wildfires Experiment (RaDFIRE): Advances in observing the wildfire environment

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Extreme fire behavior has been observed frequently during recent wildfires in the Western US, yet there is still limited understanding of the role of plume dynamics on fire spread. The Rapid Deployments to Wildfires Experiment (RaDFIRE) was the first coordinated meteorological field campaign dedicated to observing fire-atmosphere interactions during large active wildfires to better understand extreme fire behavior. Using a rapidly deployable scanning Doppler lidar, airborne Doppler radar, and a suite of other instruments, the field campaign sampled 26 wildfires from 2013-2018 in California and Idaho. Access to wildfires was accomplished via team members training as wildland firefighters and through integration with wildland fire management agencies. Observations during RaDFIRE include the initiation of vigorous vertical-axis vorticity in a wildfire convective plume, convective plume entrainment processes, newly discovered smoke-induced density currents, and aircraft in-situ observations of a developing pyrocumulus with extreme updraft cores of 58 m s-1. In addition to Doppler lidar, a new mobile Ka-Band cloud radar has been deployed to four major wildland fires in 2019. These observations provide the highest resolution dual-pol measurements to date and will provide insight into the ash and debris associated with pyrometeor cores within the plumes. While observations of active wildfires have shed light on processes associated with fire- atmosphere interactions, data collected from a small-scale and comprehensive field experiment (FireFlux2) provide context on the local processes responsible for fire spread that are difficult to observe when sampling large wildfires. These processes include the development of a region of surface low pressure that increases the fire-induced wind into the rear of the fire front causing acceleration of fire spread.

Collectively, the RaDFIRE field campaign and FireFlux2 observations highlight the range of phenomena associated with fire-atmosphere interactions, especially plume dynamics, and will provide a valuable data set for the fire behavior modeling communities.