Abstract. Emissions Characterization and Smoke Transport of A Prescribed Fire

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Under the background of climate change, vast regions of the world will face a hotter and probably drier future that favors ignition and spread of wildfires. This poses additional challenges to the communities who are fighting the ever-larger wildfires. Fire and smoke models are valuable tools to fire managers and decision-makers to mitigate the impact of fires. Existing fire modeling systems bear large uncertainties due to the difficulty in collecting data to characterize fire behavior and smoke transport. More observations are urgently needed for improvement of fire modeling and reduction in model uncertainty. The coordinated prescribed burn experiment, such as the Fire and Smoke Model and Measurement Evaluation Experiment (FSMMEE), will allow the concurrent collection of critical measurements of fuel, fire behavior, smoke, and meteorology to better understand and model fires. In this preliminary investigation, we employed the data from the prescribed burn experiment at Langdon Mountain, Utah, in November 2019, to reconstruct the fire emissions and characterize the smoke transport. The NASA Unified Weather Research and Forecasting Model (NU-WRF) was utilized to assist in identifying the potential pre-fire remote sensing capabilities, such as fuel load, moisture, and fire radiative power, which are helpful to model development and advancement. Along the way, two sets of NU-WRF experiments would be done by applying either a default fire emissions inventory (i.e., NASA's Quick Fire Emissions Dataset, QFED) or reconstructed fire emissions using the data collected from the prescribed fire. The results would help answer the questions such as "How do reconstructed emissions compare to QFED emissions and their impact on plume transport".