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Extreme Weather and Climate
COLUMBIA UNIVERSITY

**Innovative approaches for modeling smoke impacts from prescribed burns and wildfires.**

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Atmospheric transport and chemistry models often have a difficult time resolving the transport of smoke from wildfires, primarily due to deficiencies in estimating the plume injection height, which has been highlighted as an important aspect of simulating wildfire plume transport. Currently, several plume rise parameterizations exist that are able to determine the injection height of fire emissions; however, the success of these parameterizations has been mixed. With the advent of WRF-SFIRE, the wildfire plume rise and injection height can now be explicitly calculated using a fire spread model (SFIRE) that is dynamically linked with the atmosphere simulated by WRF. However, this model has only been tested on a limited basis due to computational costs. Here, we tested the performance of WRF-SFIRE against a Lagrangian particle dispersion model (LPDM) that uses the Freitas model to estimate the injection height of fire emissions for a prescribed burn (L2F) during the RxCADRE field campaign. Initial results show that the LPDM approach that uses the Freitas model parameterization was able to accurately capture the fire plume rise and downwind transport of smoke ($R = .78$), while WRF-SFIRE significantly underestimated smoke enhancements during the later half of the event ($R = .48$), likely the result of a surface fire that progressed too quickly. These results suggests that simpler methods may be able to reproduce the wildfire plume rise and the downwind smoke transport, which could have significant implications for larger-scale atmospheric and chemistry models that are unable to explicitly resolve fire-scale processes.