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Coupled atmosphere-fire modeling with data assimilation for 2007 Santa Ana fires

J. Mandel (1), A. K. Kochanski (2), V. Y. Kondratenko (1), and J. D. Beezley (1)

(1) University of Colorado Denver, Center for Computational Mathematics and Department of Mathematical and Statistical Sciences, Denver, United States (jan.mandel@gmail.com), (2) University of Utah, Department of Atmospheric Sciences, Salt Lake City, Utah, United States (adam.kochanski@utah.edu)

We present a case study using the fire spread code SFIRE coupled with the the Weather Research Forecasting (WRF) model. This code is available from the Open Wildland Fire Modeling environment (OpenWFM.org), and it extends WRF-Fire, available from the WRF release. The 2007 Santa Ana fires are well documented but their modeling presents particular technical challenges because of the mosaic character of the fuel at landscape scale. We discuss accuracy of the simulation as a function of spatial and temporal resolution and data assimilation. A sequence of perimeters at different times is used to estimate the simulation parameters and to adjust the model state. Changes in fuel moisture due to changing atmospheric conditions have a profound effect on the fire. Therefore, the fire and atmosphere models are also coupled with a fuel moisture model. The moisture model takes the input from the atmospheric state, and the moisture then influences the fire spread. The differences between the modeled and observed fire perimeters are used to drive changes in the fuel moisture.