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Natural Hazards and Earth System Sciences
Discussions

Interactive comment on "Resolving vorticity-driven lateral fire spread using the WRF-Fire coupled atmosphere-fire numerical model" *by* C. C. Simpson et al.

Anonymous Referee #2

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The paper contains an interesting computational study of the sensitivity of the lateral fire spread in WRF-Fire simulations to two-way atmosphere-fire coupling and to the model resolution. The simulation setup is described carefully.

Page 3500 lines 10 and elsewhere: Say here which grid spacing - apparently atmosphere, see page 3505.

Page 3502 line 9 and page 3504, line 20: The version of SFIRE available in WRF since 3.3 had the wind reduction factors removed. See http://www.openwfm.org/wiki/Fire_code_in_WRF_release for details, and the confirmation in Coen at al. (2013,

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page 18, column 1, bottom). The code with the wind reduction factors is WRF-SFIRE from openwfm.org mirrors (http://www.openwfm.org/wiki/How_to_get_WRF-Fire), described in Mandel et al. (2011), but that code is currently updated only to WRF 3.4. The version of the model needs to be clarified for the sake of reproducibility.

Page 3504, line 12: Cite Rothermel (1972) only. It is unclear what modification of the fire spread rate equation is meant here. One significant modification from Rothermel (1972) is the use of the components of the wind and slope vectors normal to the fireline to drive Rothermel's formula. That, however, is due to Clark et. al. (1996a,b), not Mandel et al. (2011). Also, Clark et al. (2006a,b) should be cited for the concept of the two-way coupling of a fire spread model with an atmospheric model by the heat fluxes and the wind.

Page 3505, line 21: It should be mentioned here that the simulations are not only idealized in the sense of disabling many schemes, but they are set up in on an ideal domain with a prescribed wind profile rather than a real terrain and data. There is a more detailed description of the ideal domain and the wind profile later.

Page 3507: It should be noted that the 6.1 m wind is obtained by an interpolation using the logarithmic wind profile (Mandel et al. 2011, sec. 5.2), and what roughness height was used.

Page 3515: Please state the conclusion clearly: what mesh resolutions (horizontal and vertical) are needed for acceptable results?

Interactive comment on Nat. Hazards Earth Syst. Sci. Discuss., 2, 3499, 2014.