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SHORT ABSTRACT

Abstract title: Modelling wildfire pollution with an Eulerian and Lagrangian dispersion model

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Abstract text *(maximum 350 words.)*

Wildfires emit a complex mix of atmospheric pollutants that can drive poor air quality. A good understanding of the air quality impacts of wildfires is required to inform policy decisions that aim to reduce the risk of wildfire occurrence, and to mitigate impacts when they do occur. Using wildfires that occurred in Northwest England in 2018 as a case study, we compared wildfire pollutant concentrations predicted by a model using a Lagrangian particle dispersion approach or a gridded Eulerian approach. Three different horizontal resolutions were explored: 12 km, 2.2 km and 1 km. For the Lagrangian approach, the spatial resolution is that of the grid used to convert model particle masses to concentrations. In both Eulerian and Lagrangian simulations, a finer spatial resolution better resolved the wildfire smoke plume. This lead to a prediction that a smaller geographical area was impacted by smoke from the Saddleworth Moor fires. However, finer resolution simulations predicted higher PM2.5 concentrations in the centre of the plume, better in-line with maximum observed concentrations. Differences between the Eulerian and Lagrangian became smaller as the model resolution was made finer. Spatial resolution was concluded to be an important source of uncertainty in estimates of air quality impacts of wildfires over relatively small distances, for example wildfires that occur close to urban areas.