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Abstract

Forecasting the Effects of Wildland Fires on Air Quality and on Human Health †

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Abstract: The impact of smoke from wildland fires on human health is currently a serious concern due to the high levels of emitted gases and particulate matter that affect populations and firefighters. In recent decades, scientific developments regarding smoke dispersion and its impacts were achieved using modelling systems, which include different components of wildfire behavior, such as fire spread, atmospheric emissions, smoke transport, and chemistry. In Europe, for instance, the European Forest Fire Information System (EFFIS) provides a fire database with fire danger and fire detection forecasts based on satellite imagery. The European Copernicus Atmospheric Monitoring Service (CAMS) is also monitoring emissions from fires using satellite observations and is delivering smoke dispersion information. Over North America, the systems BlueSky and FireWork provide near-real-time forecast data regarding wildfires' spread and smoke dispersion. The purpose of this paper is to answer two main questions: (i) Why do we need a wildland-smoke-forecasting system? (ii) What should be the main characteristics of this forecasting system? For this, a review of available smoke-dispersion-modelling systems is conducted identifying the main advantages and drawbacks. Based on this review, on the needed computational resources, and on the stakeholders' needs, in particular those from the health communities, a proposal for a smoke-forecasting system to be applied with a high spatial–temporal resolution is described, including its main components and the way they should be integrated, the input data, and the produced results that have to be oriented towards a clear communication to potentially exposed people, to health entities, and to other stakeholders.

Keywords: wildfire smoke dispersion; smoke-forecasting system; human health; air quality

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