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2013-2016 Wildfire-Related PM2.5 Pollution Exposure over North America Estimated from Operational Air Quality Forecasts

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FireWork is Environment and Climate Change Canada's operational on-line meteorology-chemistry model with near-real-time wildfire emissions. Two-day wildfire-related PM2.5 forecasts from FireWork are provided to Canadian Meteorological Centre Operations division forecasters and external partners in Canada and the U.S. twice daily during the Canadian wildfire season.

A multi-year (2013–2016) retrospective analysis of FireWork wildfire-related PM2.5 forecasts has been conducted for the 5-month period from May to September. Different concentration thresholds, ranging from 0.2 to 28 μg m-3, were considered. More than 60% of Canadians and Americans were affected by wildfire-related PM2.5 levels above 0.2 μg m-3 over a fire season, on average. However, comparisons of average monthly forecasted surface PM2.5 concentrations due to wildfire emissions for the 2013–2016 period showed large year-to-year variations in both the timing and the spatial locations of impacts. In much of the western U.S. and northwestern Canada, wildfire emissions contributed more than 1 μg m 3 to daily average PM2.5 concentrations on 30% or more of fire-season days. In terms of population exposure, August 2015 was found to be the most extreme month, when approximately 3 million Canadians and 3 million Americans were exposed to mean monthly PM2.5 concentrations of 10 μg/m3 or more due exclusively to wildfire smoke.