Forecasting Long-Range Transport of Wildfire Smoke in North America with the FireWork Air Quality Forecast System

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Abstract

The wildfire season in Canada generally starts in the spring and ends in the late fall. ECCC has been running an AQ forecast system with near-real-time biomass-burning emissions named FireWork during the Canadian wildfire season since 2013. ECCC objectives for FireWork are not limited to AQ forecasts for regions close to wildfires. Long-range transport and the associated pollution at different atmospheric levels are also considered. In fact, over the last four years, a number of major wildfire events have occurred in western Canada and the western U.S., where smoke from these fires has been transported over long distances, affecting air quality even in eastern North America. In particular, in both 2014 and 2015, smoke from wildfires in northwestern Canada travelled thousands of kilometers across North America, reaching the East Coast and the Gulf of Mexico. This poster presents analyses of forecasted long-range transport of wildfire smoke using surface observations and satellite images. Lessons learned, model weaknesses, and potential improvements are also reviewed.

Conclusions

The ECCC AQ forecasting system with near-real-time biomass burning emissions, named FireWork has proven to be capable of forecasting the long-range transport of wildfire pollution. This capability was demonstrated during the 2014, 2015 and 2016 wildfire seasons, when smoke from wildfires in northwestern Canada travelled thousands of kilometers across North America, reaching the East Coast and the Gulf of Mexico. FireWork forecasts correlated well with satellite images in terms of the time and area affected by long-range transport. However some PM$_2.5$ under-estimates were sometimes observed. ECCC will continue to improve FireWork, especially wildfire emission estimates, injection heights and dispersion. Some major improvements are planned for the next (2017) wildfire season.