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Formation of a fire-induced convective cloud: Observations and simulations of the Chisholm fire, 2001

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Fire-induced convection is an effective vertical transport mechanism for boundary layer air with high concentrations of numerous atmospheric pollutants (e.g., CO, smoke particles) into the upper troposphere and under certain conditions as high as the lower stratosphere. Especially in boreal regions intense crown fires regularly create intense convection and deposit fire emissions into the upper troposphere/lower stratosphere (UT/LS) that can be observed for considerable time (i.e., several weeks) after the fire [*Fromm et al.*, 2004].

The plume atop the Chisholm fire that burned an area of about 100,000 ha near Edmonton, Alberta, Canada between 23 May and 29 May 2001, is a prominent example of such an event [*Fromm and Servranckx*, 2003]. At the arrival of a cold front, the fire-induced convection reached up to 13 km (i.e., well above the local tropopause). Satellite imagery show a wide-spread anvil with an overshooting top.

Here, we present remote sensing observations (Radar, AVHRR, MISR) and model simulations using the Active Tracer High-Resolution Atmospheric Model (ATHAM) of the convection induced by the Chisholm fire. In the model simulations, the convection is induced by assuming fluxes of heat and humidity based on analysis of the fuel that was burned in the Chisholm fire. The model is able to reproduce the intense convection and transport of fire emissions into the stratosphere.

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