

Forest Fires in Boreal Forest — Frostfire in Alaska Taiga
(*Extended Abstract*)

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A forest fire experiment called FROSTFIRE [1] was carried out in the taiga zone of Alaska, U.S.A. in July 8-15, 1999 and ended successfully. The specialists of various fields such as forest service research scientists and fire managers have joined FROSTFIRE. They have measured thermal, chemical, and hydraulic properties from the molecular to the global level to build a full picture of the carbon, water, and energy pools and fluxes in the boreal forest before, during, and after the fire.

I have joined FROSTFIRE as a fire scientist. FROSTFIRE has given me good opportunity to clarify the conditions of boreal forest fires by conducting field research of the vegetation, thunderstorm observations before the fire, observation of large forest fire areas, etc. The Donnelly Flats forest fire happened in June 1999 just before FROSTFIRE and burnt area was 7284 ha. An investigation of the Donnelly Flats forest fire site found that the main burnt matter were branches with needles of black spruce and moss and lichen which cover the ground. On the basis of these results, a vegetation investigation was carried out before the FROSTFIRE experiment. The following items were measured: weight of branches with needles of two black spruce trees and the thickness of moss that covered the surface around the trees. Thunderstorm observations by video camera from the Poker Flat top recorded multiple lightning strikes. After the storm, three plumes from forest fires were observed in different directions and the probability of ignition of forest fires by the lightning is discussed.

Finally, the combustion calculations using mean tree densities of black spruce and mean thickness of mosses estimate the maximum quantity of CO₂ released and the maximum heat generated in forest fires in Alaska.

Investigation of forest fire site and observation of thunder and forest fire allow these conclusions that:

1. The main fuels of a forest fire in Alaska taiga are moss and lichen on the ground, foliage and twigs on the thick branches of trees. Thus, a forest fire may be termed a "foliage, twig, and moss fire" rather than a "forest fire".
2. We should pay more attention to the lightning-caused forest fires and clear a fire starting mechanism by lightning.
3. Landscape such as a mountain and artificial constructs such as a pipeline may influence lightning locations.

This year, 2000, Russian taiga field research is scheduled to observe forest fires occurring in the Russian taiga [2].

References

- [1] FROSTFIRE Home Page, <http://www.fsl.orst.edu/fera/frostfire.html>, 1999. 8
- [2] CREST Home Page, <http://frost2.lowtem.hokudai.ac.jp/pdgg/>, 1999. 4