

Evaluation of the Finnish and the Canadian forest fire danger forecasting system in the boreal forests environment (Finland)

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Forest fires are the major disturbance form in the boreal forest zone and in the transition zone between forest and tundra. These fires often occur as a consequence of a weather situation characterized by low precipitation and relative humidity combined with high temperature and wind speed. A large number of forest fire danger indices have been developed to assess the risk or potential for dangerous fires. Although these indices are based on analogous weather parameters, their structure and calculation system varies and their reliability may depend on local fire environment, such as meteorological variables and vegetation conditions.

In the present study we have evaluated two fire danger indices, the Finnish Forest Fire Index (FFI) and the Canadian Fire Weather Index (FWI), both of them originally developed for boreal forests environment. The Finnish FFI is based on estimated surface moisture that is calculated utilizing precipitation, solar radiation, temperature, relative humidity and wind. The Canadian FWI requires as input precipitation, temperature, relative humidity and wind data; the output of the system consists of six relative numerical ratings for various aspects of fire danger.

The two indices were computed for several Finnish locations using the daily records of meteorological parameters for the period 1961-2005. The outputs of these rating methods are compared and statistically analyzed. Based on the daily maps of FFI and FWI, the spatial variation of the fire indices are analyzed for the fire season 2005. The fire risk maps were prepared with a 10*10 km² spatial resolution and cover the whole area of Finland. To assess the performance of the two methods, the fire indices and their components are tested against fire observation data, available for the period 2001-2005.