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Analysis of the Ability of Large-scale Reanalysis Data to Define Siberian Fire Danger in Preparation for Future Fire Weather

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Fire is the dominant disturbance that precipitates ecosystem change in boreal regions, and fire is largely under the control of weather and climate. Fire regimes (frequency, severity, area burned, season length) are predicted to increase in boreal regions under current climate change scenarios. Therefore, changes in fire regimes have the potential to compel ecological change, moving ecosystems more quickly towards equilibrium with a new climate.

The ultimate goal of this presentation is to demonstrate the viability of large-scale (1°) data to be used to define fire weather danger and fire regimes, so that large-scale data can be confidently used to predict future fire regimes using large-scale fire weather data, like that available from current Intergovernmental Panel on Climate Change (IPCC) climate change scenarios. In this talk, we intent to: (1) evaluate Fire Weather Indices (FWI) derived using reanalysis and interpolated station data; (2) discuss the advantages and disadvantages of using these distinct data sources; and (3) highlight established relationships between large-scale fire weather data, area burned, active fires and ecosystems burned.

Specifically, the Canadian Forestry Service (CFS) FWI is derived using: (1) NASA GEOS-4 large-scale reanalysis and GPCP data; and NCDC surface station-interpolated data. Requirements of the FWI are local noon surface-level air temperature, relative humidity, wind speed, and daily (noon-noon) rainfall.

GEOS-4 reanalysis and NCDC station-interpolated fire weather indices are generally consistent spatially, temporally and quantitatively. Additionally, increased fire activity coincides with increased FWI ratings in both data products. Relationships have been established between large-scale FWI to area burned, fire frequency, ecosystem types, and these can be use to estimate historic and future fire regimes.