Using Large-scale Spatially and Temporally Consistent Reanalysis Data to Assess Fire Weather and Fire Regimes in Siberia in Preparation for Future Fire Weather Prediction

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Introduction: Fire is the dominant disturbance that precipitates ecosystems change in boreal regions, and fire is largely under the control of weather and climate.\(^1\) Large-scale climate models contain the largest part of real-world forcing, and Russian forests\(^2\) of the boreal forests.\(^3\) Fire frequency, fire severity, area burned and fire season length are predicted to increase in boreal regions under current climate change scenarios.\(^4\) To predict fire weather and sequences change, we must understand the factors that influence the regimes and at what scale these are viable.

Objective: The goal of this research is to assess the viability of large-scale fire data to be used to assess fire severity and fire regimes, so that large-scale data can be confidently used to predict future fire regimes using large-scale fire weather data, that like that available from current International Panel of Climate Change (IPCC) climate change scenarios.

Methodology: We compare fire indices from interpolated surface station and large-scale reanalysis data during the fire season in Siberia in 1999, 2002 and 2004. The Canadian Fire Weather Index (FWI) is used for this comparison, and it is calculated using local noon surface-level air temperature, relative humidity, wind speed, and daily (noon-noon) rainfall.\(^5\) The Canadian Forest Service (CFS) Natural Resources Canada derived spatially-explicit FWI for Russia by interpolating National Climate Data Center (NCDC) surface station data to 0.04\(\times 0.04\) resolution. For this comparison, these data are re-gridded to 1\(\times 1\)\(\degree\) by averaging the data in each cell. Large-scale FWI are calculated on the NASA Langley Research Center (LaRC) using NASA Goddard Earth Observing System version 4 (GEOS-4) large-scale weather model. The GEOS-4 reanalysis weather data are already data in a 1\(\times 1\)\(\degree\) resolution.

Conclusion: The LaRC GEOS4-derived and CFS NCDC-interpolated FWI categories move north and south in parallel with the increasing number of active fire category FWI difference or less (2 CD\(\times 0.04\)\(\degree\)). Even then, during the peak of the fire season (~ June 1st – August 15th). Even then, GEOS/GPCP- and CFS NCDC-based FWI is remarkably similar. The density and accuracy of Siberian forests and tundra,\(^6\) and Bioclimatic Models”,\(^7\) Climate In Siberia: Developing Weather and Climate Data Sets For Use In Fire Weather Prediction: Science Systems and Applications, Inc.,\(^8\) and Ji-Zhong Jin

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\(^3\) Stocks, A. Amiro, P.Englefield, D.J. Westberg, 2008 AGU Fall Meeting, Vienna, Austria (2008).

\(^4\) Stocks, A. Amiro, P.Englefield, D.J. Westberg, 2008 AGU Fall Meeting, Vienna, Austria (2008).


\(^7\) Stocks, A. Amiro, P.Englefield, D.J. Westberg, 2008 AGU Fall Meeting, Vienna, Austria (2008).

\(^8\) Stocks, A. Amiro, P.Englefield, D.J. Westberg, 2008 AGU Fall Meeting, Vienna, Austria (2008).