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# Wildfire, Ecosystems and Climate in Siberia: Developing Weather and Climate Data Sets for Use in Fire Weather and Bioclimatic Models

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A primary driving force of land cover change in boreal regions is fire, and extreme fire seasons are influenced by local weather and ultimately climate. It is predicted that fire frequency, area burned, fire severity, fire season length, and severe fire seasons will increase under current climate change scenarios. Already, there is evidence of an increased number of extreme fire seasons in Siberia that correlate with current warming. Our overall goal is to explore the degree to which current and future climate variability has and will affect wildfire-induced land cover change and to highlight the significance of the interaction between the biosphere and the climate system. Developing reliable weather and climate data provides the backbone of this research, which is to examine the relationships between weather, extreme fire events, and fire-induced land cover change in the changing climate of Siberia.

The primary focus in this presentation is the description of the assembled weather and climate data sets and the verification efforts, followed by an example where the data set is used in a fire prediction application. Ground-based weather observations from the National Climatic Data Center (NCDC) for the years 1983-2006, have been used to verify various modeled meteorological parameters from the NASA Goddard Earth Observing System version 4 (GEOS-4) data. Specifically, we have extracted “Summary of the Day” and “Integrated Surface Hourly (ISH)” weather data from the NCDC. The ISH data has been processed to obtain hourly observation times for all stations

in Siberia, including Mongolia and parts of northern China. A subset of these stations have been selected for validation purposes if they meet a criteria of having at least 75\% of the possible reporting observations per day and 75\% of the possible days in each month. GEOS-4 data interpolated to a 1x1 degree grid have compared well with the NCDC station data, covering the burning season from April through September and for the entire 1983-2006 period. In cases where large differences exist between the NCDC station and the GEOS-4 grid elevations, lapse rate corrections have been applied to the temperature parameters. With the declining number of Siberian surface observation stations through the 1983-2006 period, using GEOS-4 data ensures data coverage over the entire Siberian region and through the entire data set period.

One advantage of the GEOS-4 data is that it is consistent and spatially explicit, which makes it easily portable to multiple data applications or models. One such application being used in this study is the Canadian Forest Fire Weather Index (FWI) System developed by the Canadian Forestry Service. Using local noon values of air temperature, relative humidity, wind speed, and daily rainfall as input, the FWI assesses the conditions of forest fire burning potential for the day. Typically, local weather observation stations supply these meteorological parameters. In Siberia, the density of stations is limited; hence results may not be representative of the spatial reality. GEOS-4 data, on the other hand, provides complete temporal and spatial coverage. Using the GEOS-4 meteorological data as input into the FWI, the generated indices compare well with large and small fires in the 1983 to 2006 timeframe.