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**Linking Satellite-Derived Fire Counts to Satellite-Derived Weather Data in Fire Prediction Models to Forecast Extreme Fires in Siberia**

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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 frequency, fire severity, area burned and fire season length are predicted to increase in boreal regions under climate change scenarios. Therefore to predict fire weather and ecosystem change, we must understand the factors that influence fire regimes and at what scale these are viable.

The Canadian Fire Weather Index (FWI), developed by the Canadian Forestry Service, 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. The FWI assesses daily forest fire burning potential. Large-scale FWI are calculated at the NASA Langley Research Center (LaRC) using NASA Goddard Earth Observing System version 4 (GEOS-4) large-scale reanalysis and NASA Global Precipitation Climatology Project (GPCP) data. The GEOS-4 reanalysis weather data are 3-hourly interpolated to 1-hourly data at a 1ox1o resolution and the GPCP precipitation data are also at 1ox1o resolution.

In previous work focusing on the fire season in Siberia in 1999 and 2002, we have shown the combination of GEOS-4 weather data and Global Precipitation Climatology Project (GPCP) precipitation data compares well to ground-based weather data when used as inputs for FWI calculation. The density and accuracy of Siberian surface station data can be limited, which leads to results that are not representative of the spatial reality. GEOS-4/GPCP-dervied FWI can serve to spatially enhance current and historic FWI, because these data are spatially and temporally consistency. The surface station and model reanalysis derived fire weather indices compared well spatially, temporally and quantitatively, and increased fire activity compares well with increasing FWI ratings.

To continue our previous work, we statistically compare satellite-derived fire counts to FWI categories at different time scales. We spatially compare the FWI using GEOS-4 / GPCP data on a grid from 50-80 degrees latitude and 70 degrees East longitude to 170 degrees West longitude. We are covering the burning season from April through October for the years of 1999 and 2002. Extreme fires occurred in central Siberia in 2002. In contrast, minor fires occurred in central Siberia 1999. Our analysis shows a direct correlation between increased fire activity and increased FWI, independent of time or the severity of the fire season. We noticed the density of fire counts per 1-degree grid box increased with increasing FWI rating. During normal and extreme fire seasons, the percentage of 1-degree grid boxes with and without fire counts increased with increasing FWI rating. Given this analysis, we are confident large-scale weather and climate data, in this case from the GEOS reanalysis and the GPCP data sets, can be used to accurately assess future fire potential. This increases confidence in the ability of large-scale IPCC weather and climate scenarios to predict future fire regimes in boreal regions.

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