Geophysical Research Abstracts
Vol. 12, EGU2010-2087-3, 2010
EGU General Assembly 2010

Assessment of a Forest-fire Danger Index for Russia Using Remote Sensing Information

Anatoly Sukhinin (1), Douglas McRae (2), Jin Ji-Zhong (3), Olga Dubrovskaya (4), and Eugene Ponomarev (5)

(1) V.N. Sukachev Institute of Forest, Russian Academy of Sciences, Krasnoyarsk, Russian Federation (boss@ksc.krasn.ru, +7 391 2433686), (2) Canadian Forest Service, P.O. Box 490, Sault Ste. Marie, Ontario, Canada P6A 5M7, Doug.McRae@NRCan-RNCan.gc.ca, (3) Canadian Forest Service, P.O. Box 490, Sault Ste. Marie, Ontario, Canada P6A 5M7, Ji-Zhong.Jin@NRCan-RNCan.gc.ca, (4) Institute of Computational Technologies, Russian Academy of Sciences, Novosibirsk, Russian Federation, olga@ict.nsc.ru, (5) V.N. Sukachev Institute of Forest, Russian Academy of Sciences, Krasnoyarsk, Russian Federation, evg@ksc.krasn.ru

Intensive exploitation of Siberian forest resources requires to increase the level of their protection. In Russia, forests annually disturbed by fire make up about 6% of the total forest area, whereas they account for hundredth or even thousandth of percent in the West European countries and Canada. Devastating forest fires associated with long draughts have become very common over recent decades in some parts of Siberia and the Russian Far East. Fires burning under these conditions disturb hundreds of thousands hectares of forest lands. Forest fires impact essentially on different biogeocenosis and on ecological situation in region as well. Thus their detrimental effects, including economic damage, are hard to overestimate.

Remote sensing data using is more perspective method for forests monitoring in Russia. Moreover satellite data is only available information for non-protected Russian boreal forests and tundra also. To be efficient, modern forest fire managers require a reliable method for estimating fire danger. For large remote forested areas, such as found in Russia where a dense network of local weather station needed to calculate fire danger does not exist, this can be a major problem. However, remote sensing using satellite data can provide reasonable estimates of fire danger across Russia to allow for an understanding of the current fire situation. An algorithm has been developed that can assess current fire danger by inputting ambient weather conditions derived from remote sensing data obtained from NOAA, TERRA-series satellites. Necessary inputs for calculating fire danger, such as surface temperature, dew-point temperature, and precipitation, are obtained from AVHRR, MODIS and ATOVS satellite data. By generating the final products as maps a concise picture can be presented of fire danger across Russia. In order to understand future fire suppression needs, fire danger predictions for an advanced 7-day period can be made using meteorological forecasts of near surface pressure and air temperatures. The only problem with this type of forecasting is the absence of knowing exactly what precipitation will occur during the forecasted period. This is resolved using an interactive method that continually updates the forecasted fire danger map using current precipitation. One important application of this product for remote sensing will be the ability to classify fire severity on burn scar areas for predicting carbon release better over the vast areas of Russia. This will require the development of fire behavior models that use components of the fire danger systems as key independent variables. Modern wildfire prevention programs cannot be successful unless they are fully supported by fire-danger analysis acquired from detailed daily fire-danger mapping. This enables better coordination and potential success of limited suppression forces. Currently the existing network of weather stations in Russia, especially in remote areas, does not allow for the estimation of fire danger over the entire country. Thus, northern forests are deprived of badly needed fire protection information because of the lack of weather stations. Remote sensing analysis and diagnosis of forest fire danger conditions is an emerging field both in Russia and abroad. V.N. Sukachev Institute of Forest, located in Krasnoyarsk, is supporting research this field and is proposing the development of methodology for generating daily fire weather danger maps based on the digital multispectral images obtained from satellites. This will allow the computation of fire danger for remote areas without the need for supplementary on-ground weather stations.

KEYWORDS: Fire weather danger system, meteorological data, remote sensing data, wildfires, Siberian boreal forests.