Chapter 12

Influence of Climatic Conditions on Western Siberian Forest Fires

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ABSTRACT

Current climate changes in Russia are attended by the increase in frequency of dangerous weather events. This chapter researches long-term variations of the dangerous weather’s events on Western Siberia and to reveal general regularity, which can be associated with forest fires. The researches have been carried out for the territories of southeast of Western Siberia. The duration of the fire season increases due to climate change. This is due both to the earlier snowfall and the onset of the phenological spring, and to the increase in the duration of the thunderstorm period. Thunderstorms in Siberia are a much more frequent cause of forest fires (28%) than in other territories. Wildfire frequency is correlated with air temperature and drought anomalies.

DOI: 10.4018/978-1-7998-1867-0.ch012
INTRODUCTION

In this chapter, we consider the influence of climate on the fireiness of forests on the example of the taiga of Western Siberia.

Forest fires are a serious and growing hazard over territory of the Russia and over Siberia too. One of the features of global warming, observed from the middle of 70s XX century, is its spatial inhomogeneity. The global climate change issue has raised serious questions about changes in repetition of weather extremes, such as thunderstorm, heavy rain, strong wind, duration of high-low temperature periods. All these characteristics are important for initiating or preventing forest fires. Besides, extreme temperature conditions affect the rigidity and strength of structures, performance capabilities, the ecological situation of the area (fire hazards, the level of pollution), housing and utilities infrastructure and other branches of economy. Every year many billions of dollars are spent on fire management and fire suppression.

Forest fires are frequent in the Siberian taiga and are predicted to increase in frequency as a result of increased fire risk under drought conditions, and prolonged fire seasons caused by climate change.

The goal of the present park work is presentation of long-term variations of the dangerous weather events above Western Siberia and to reveal general regularity, which can be associated with forest fires.

BACKGROUND

The global climate is warming and this may have a profound and immediate impact on wildland fire activity (Flannigan et al., 2013). Some suggest that wildland fire activity has already increased due to climate change. Hansen and colleagues (Hansen, Ruedy, Sato, & Lo, 2010) showed in their work that warming for the territory of Siberia has more rapid growth, than for Northern Hemisphere, in general. The positive trend of annual averaged surface air temperature is 0.36°C per every 10 years with higher values in some months. It was found that the rise in temperature occurs in February, March, October and May basically (Intergovernmental Panel on Climate Change [IPCC], 2013, 2014). Note that in May in Siberia most often the fire-dangerous season begins. Increases in average annual temperatures create conditions that dramatically elevate the risk and severity of forest fires.

The authors Ponomarev and Kharuk (2016) noted an increase of fire frequency and burned area in Altai-Sayan region of southern Siberia. The important issue of climate impact on the wildfires and burns dynamics in Siberia was discussed only in a few papers. The authors of Flannigan at al. (2013); Gorbatenko, Gromnitskaya, Konstantinova, Ershova, & Nechepurenko (2015); Ponomarev, Kharuk, & Ranson (2016); Polyakov, Barashkova, & Kuzhevskaya (2014) discuss it in their research. In Siberia most often the fire-dangerous season begins. Increases in average annual temperatures create conditions that dramatically elevate the risk and severity of forest fires.

The authors observed that the occurrence of extreme fire events in Central Siberia and the Trans-Baikal region were related to soil moisture and precipitation anomalies (Ponomarev et al., 2016). Lightning frequency, air temperature and moisture, wind speed have an impact on the fire regime too. Under scenarios of climate change many predictions show an intensification of the fire regime, i.e. more frequent and/or more intense fires (IPCC, 2014). It is known, that the increase in mid-annual values of temperature of air even on 1 degree provides increase in storm activity at least on 10 per cent (Gorbatenko et al., 2015). Therefore, will increase not only quantity of thunderstorms, but also quantity of downpours, squalls and other phenomena that accompany them. Weather conditions conducive to forest fires in Western Siberia:
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