

# **Recent Trend of Large-Scale Fires in Tropical and Boreal Forests**

Hiroshi Hayasaka, Murad Ahmed Farukh and Erianto Indra Putra  
Graduate School of Engineering, Hokkaido University,  
Sapporo, Japan

Large-scale fires occurring increasingly frequently since the 1990s in boreal forests in Alaska, North America, and Sakha, Far Eastern Siberia, are supposedly due to so-called climate change or global warming, and potential causes are discussed from a climatic and vegetative perspective. Mean air temperature has increased about 3°C since 1830 in Yakutsk, Sakha, and in Yakutsk and in the interior of Alaska, the rate of warming increased notably in the 1970s. A gradual decreasing trend in precipitation occurred simultaneously, and forest-fire records from the mid-1950s in Alaska and Sakha show that mean annual area burn increased notably in the 1990s. A warmer, drier climate greatly increases boreal forest flammability. Under such climatic conditions, large forest fires occurred near Yakutsk, Sakha, in 2002, and wildfires in 2004 burned 26,700km<sup>2</sup> in Alaska. Nine individual fires exceeded 1,000km<sup>2</sup> during a summer characterized by record-high temperatures and extreme drought. Part of the fire grew substantially in just a few days when winds due to strong pressure gradient occurred. Total burn in 2004 was the largest since record-keeping began in Alaska in 1956. Combined with an additional 19,000km<sup>2</sup> burned in 2005, the area accounted for 10% of Alaska's boreal forests in just two years. The correlation between fire activity and climate trends suggests that global warming may bring more frequent large-scale fire events to the boreal forest.

In tropical forests in Kalimantan and Sumatra, peat fires have become very widespread, especially since 2002, and are no longer “El Niño events.” This recent increase in peat fires is also related to human activities such as cultivation and logging. In 2002, 2004, and 2006, severe haze from peat fires occurred under weak El Niño conditions in Kalimantan and Sumatra. To clarify this recent incendiary trend, we summarized and analyzed forest and peat fire histories in detail based on burnt area data (Ministry of Forestry, Indonesia) and hot-spot satellite data from NOAA (JICA: Japan International Cooperation Agency), and Terra and Aqua (NASA: MODIS Rapid Response System).