

Large-Scale Forest Fires in Alaska: Weather Conditions in 2004 and 2005

HAYASAKA, Hiroshi^{1*}

¹Graduate School of Hokkaido University

In Alaska, large-scale forest fires mainly occurred in the boreal forest of the Interior (area roughly around 400 x 800 km) in 2004 and 2005. Number of large-scale forest fires (burnt area more than 500km²) were 17 in 2004 and 12 in 2005. These large-scale forest fires boosted up burnt areas 26,000km² in 2004 and 18,800km² in 2005. Their areas were largest and third largest among the past 58 years from 1956 to 2013.

In order to evaluate large-scale forest fires in both years, statistical analysis for the fire data in the past 58 years was carried out. As a result, annual average burnt area was 3,480 km², and the coefficients of standard deviation (sigma) were +4.25 for 2004 and +2.88 for 2005. In the background of these large standard deviation coefficients, only 11-year could show large burnt area of more than 6,000km², and burnt area of other 47-year were less than 5,000km². In addition to this trend, the occurrence of fire year with burnt area more than 6,000 km² was once per decade from the 1950s to the 1980's. But from the 1990's, fire year tended to occur more frequently. That is, they were 1957 (2nd largest), 1969 (6th), 1977 (7th), 1988 (8th), and these frequencies were once per decade. However, from the 1990s, fire years occurred in 1990 (4th largest), 1997 (9th), and 1991 (11th). From the 2000s, four fire years observed in 2004 (largest), 2005 (3rd largest), 2009 (5th), and 2002 (10th). The frequent occurrence trend of such fire year may be suggesting close relationship with the rapid reduction of sea ice in the Arctic Ocean under a rapid climate change.

From the comprehensive analysis in this paper, largest burnt areas in 2004 happened under the condition made by ridge extended from Canada lasted about three month from June to August. The very severe fires observed in August 2005 occurred along with the movement of the high pressure system from the Gulf of Alaska to the Beaufort Sea.

Keywords: Forest Fire, Hotspot, Climate Change, Lightning, Jet Stream, Sea ice