A 235 YEARS BOREAL FOREST FIRE HISTORY IN EASTERN CANADA: THE PART OF CLIMATE AND LAND USE

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ABSTRACT

A 235 years forest fire history reconstruction (1760 to 1995) was undertaken in eastern Canada to characterize forest fire fluctuations in an area that covers up to 600 000 ha at the southern edge of the boreal forest. The border between the provinces of Ontario and Quebec divides the whole sector into two landscapes, each of which has undergone a different land use when the area was opened up to settlement in 1912 with the completion of the transcontinental railroad. Forest management took place in Ontario (500 000 ha) whereas farming occurred on Quebec's side (130 000 ha) -the latter landscape is still dominated by a forest matrix-. Natural forest fire reconstruction was completed by studying aerial photographs and by sampling fire-origin forest stands. Forest fire history under human influence was done by compiling government records which include information on fire ignition source, fire location, burned surfaces and the date on which the fire was reported. Results indicate that between 1760 to 1853, fire years were infrequent but burned large areas. In fact, more than 50% of the fire-origin stands in 1996 originate from fires that occurred before 1854. The following period before european settlement (1854 to 1912) was characterized by a low fire occurrence: only 3% of the overall study area was burned. Natural fire regime variations were related to climatic fluctuations that undergone with the Little ice Age Period (1650 to 1850), which was a drier and cooler period than the following one. With the arrival of european man, fire occurrence increased dramatically. However, logged area (Ontario) had 7 times less fewer fires than the area devoted to agriculture (Quebec) and two times less fewer burned areas. Fire ignition and burned areas depend on many factors: type of land use, month in the fire season, period of technological development and population density. Although there was an upward trend in fire occurrence since 1912, burned areas and their mean extent have decreased. An analysis of fluctuations in the Fire Weather Index (FWI), a rating of fire danger severity, showed a significant decrease in climatic stresses since 1912. However, improved fire suppression and landscape fragmentation may also have contributed to the decrease in mean fire size. Our results indicate that the importance of old-forest has decreased in managed landscapes as a comparison to one under a natural fire regime. This decrease may have important consequences on biodiversity conservation.