



Cloud-to-ground lightning in Yukon, Canada during a season of extreme wildfire activity

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The 2004 wildfire season and associated lightning activity in the Yukon Territory of northern Canada was unusual in many aspects. Climatologically, the spring and summer seasons were much warmer and much drier than normal. The number of cloud-to-ground (CG) flashes, lightning-initiated forest fires and extent of the area burned exceeded historic records. This region typically experiences 141 wildfires annually which burn over 160,000 hectares between June and August. The lightning season in the Yukon usually starts in May, peaks in July and is over in September. An annual average of over 20 thousand CG flashes account for about 54% of these ignitions. During the summer of 2004, over 40 thousand CG flashes accounted for 88% of the 282 wildfires consuming over 1.7 million hectares of the territory.

The temporal and spatial characteristics of lightning data from the Canadian Lightning Detection Network during the 2004 season are compared against the previous two and subsequent two years. Previous studies have suggested that thunderstorms entraining smoke from forest fires may exhibit enhanced positive CG lightning activity. The diurnal distribution of positive lightning during 2004 showed a considerable increase in nocturnal activity. A map of the percentage of positive CG flashes shows that large areas of the Yukon experienced values in excess of 60%, with some areas above 75%. Similar maps during the 2002-2003 and 2005-2006 seasons show that much of the Yukon experienced values around 20%. The first-stroke positive peak currents were found to be higher in 2004, while the negative peak currents were lower than in the previous and subsequent two seasons.