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Fire occurrence prediction in Canada

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Fire is the main natural disturbance of the boreal forest and an important driver of ecosystem dynamics. Increased fire activity, both natural and anthropogenic, is expected with changing climate scenarios and detection of anomalous fire pattern is important for managing Canada's natural landscape. Fire risk is evaluated by the Fire Occurrence Prediction System (FOPS), one of three major components of the Canadian Forest Fire Danger Rating System, but a standardized, national measure of fire ignition expectation has not been developed. The focus of this research is to determine the spatial and temporal pattern of fire ignition and expectation baseline across Canada. Wildfire data from 1980–2006 was used to create temporal trajectories of ignition density. K-means cluster analysis was completed on temporal trajectory metrics to identify regions with a similar historical fire regime. 2007 ignition data was used to identify regions where ignitions were above or below the expected. Human influence was assessed for each regime using proximity to urban centers and proximity to road as covariates. High ignition regimes are found to be close to human settlement and road networks while low ignition regimes are further away. The results provide Canada with an improved nationwide fire ignition expectation for use with the FOPS and highlight the impact of humans on wildfire ignitions.