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Development of an arctic-boreal fire atlas using Visible Infrared Imaging Radiometer Suite active fire data

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Intensifying wildfires in high-latitude forest and tundra ecosystems are a major source of greenhouse gas emissions, releasing carbon through direct combustion and long-term degradation of permafrost soils and peatlands. Several remotely sensed burned area and active fire products have been developed, yet these do not provide information about the ignitions, growth and size of individual fires. Such object-based fire data is urgently needed to disentangle different anthropogenic and bioclimatic drivers of fire ignition and spread. This knowledge is required to better understand contemporary arctic-boreal fire regimes and to constrain models that predict changes in future arctic-boreal fire regimes.

Here, we developed an object-based fire tracking system to map the evolution of arctic-boreal fires at a sub-daily scale. Our approach harnesses the improved spatial resolution of 375m Visible Infrared Imaging Radiometer Suite (VIIRS) active fire detections. The arctic-boreal fire atlas includes ignitions and daily perimeters of individual fires between 2012 and 2021, and may be complemented in the future with information on waterbodies, unburned islands, fuel types and fire severity within fire perimeters.