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Improved estimates of boreal Fire Radiative Energy using high temporal resolution data and a modified active fire detection algorithm

Kirsten Barrett
University of Leicester, Geography, Leicester, United Kingdom (kirsten.barrett@le.ac.uk)

Reliable estimates of biomass combusted during wildfires can be obtained from satellite observations of fire radiative power (FRP). Total fire radiative energy (FRE) is typically estimated by integrating instantaneous measurements of fire radiative power (FRP) at the time of orbital satellite overpass or geostationary observation. Remotely-sensed FRP products from orbital satellites are usually global in extent, requiring several thresholding and filtering operations to reduce the number of false fire detections. Some filters required for a global product may not be appropriate to fire detection in the boreal forest resulting in errors of omission and increased data processing times. We evaluate the effect of a boreal-specific active fire detection algorithm and estimates of FRP/FRE. Boreal fires are more likely to escape detection due to lower intensity smouldering combustion and sub canopy fires, therefore improvements in boreal fire detection could substantially reduce the uncertainty of emissions from biomass combustion in the region. High temporal resolution data from geostationary satellites have led to improvements in FRE estimation in tropical and temperate forests, but such a perspective is not possible for high latitude ecosystems given the equatorial orbit of geostationary observation. The increased density of overpasses in high latitudes from polar-orbiting satellites, however, may provide adequate temporal sampling for estimating FRE.