CONTROL ID: 1499413

TITLE: Improving Large-scale Biomass Burning Carbon Consumption and Emissions Estimates in the Former Soviet Union based on Fire Weather

ABSTRACT BODY: Estimating the amount of biomass burned during fire events is challenging, particularly in remote and diverse regions, like those of the Former Soviet Union (FSU). Historically, we have typically assumed 25 tons of carbon per hectare (tC/ha) is emitted, however depending on the ecosystem and severity, biomass burning emissions can range from 2 to 75 tC/ha. Ecosystems in the FSU span from the tundra through the taiga to the forest-steppe, steppe and desserts and include the extensive West Siberian lowlands, permafrost-lain forests and agricultural lands. Excluding this landscape disparity results in inaccurate emissions estimates and incorrect assumptions in the transport of these emissions.
In this work, we present emissions based on a hybrid ecosystem map and explicit estimates of fuel that consider the depth of burning based on the Canadian Forest Fire Weather Index System. Specifically, the ecosystem map is a fusion of satellite-based data, a detailed ecosystem map and Alexeyev and Birdsey carbon storage data, which is used to build carbon databases that include the forest overstory and understory, litter, peatlands and soil organic material for the FSU. We provide a range of potential carbon consumption estimates for low- to high-severity fires across the FSU that can be used with fire weather indices to more accurately estimate fire emissions. These data can be incorporated at ecoregion and administrative territory scales and are optimized for use in large-scale Chemical Transport Models. Additionally, paired with future climate scenarios and ecoregion cover, these carbon consumption data can be used to estimate potential emissions.

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