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Fire management is one way to reduce CO2 emissions —how much would that cost?

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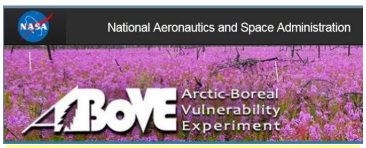

NASA ABoVE website: https://above.nasa.gov/

Fire management practices CAN reduce area burned—those places in Alaska currently targeted for aggressive suppression action burn less.

Read the paper in Science Advances <HERE>

To thwart runaway climate warming, the global community is struggling to find strategies to limit carbon dioxide (CO_2) emissions that are steeply climbing. Increasing boreal wildfires in Alaska and Canada also threaten to increase CO_2 emissions and could contribute potentially 12 gigatons (Gt) to the world's carbon headache by mid-century. That number represents about 3% of the world's remaining emissions "quota" to stay below 1.5° C temperature threshold goals set by the United Nations IPCC panel, yet boreal wildfires emissions are not accounted for in their global climate scenarios. Does fire management present an opportunity to intervene and keep carbon in the ground?

Fire Severity & Fire Effects Studies

A research team led by Carly Phillips, Brendan Rogers, and Peter Frumhoff wondered whether fire management offered a realistic way to slow down the release of legacy carbon in boreal forests, giving Nature and humans time to adapt and implement other mitigation strategies. How much would it cost? And was it even possible to make a difference? In short, the study found that—yes—more fire suppression could keep nearly 1/3 (4 Gt) of that carbon in the ground in Alaska and Canada. That is equivalent to the annual emissions from more than 850 million cars! Fire management option at a fire's origin was the fifth most important predictor of fire size, behind max & mean temperature, maximum duff moisture code (DMC) and fire cause. The team also noted a significant relationship between annual fire extent and fire management expenditures. For example, doubling fire spending in the model led to a 21% reduction in fire

In Alaska, *the average annual area burned has been increasing over the last 3 decades and new research points to increases in fire severity (indicated by depth of organic soil consumption) as well (Grzesik, et al. 2022). Shorter fire return intervals, or an uptick in re-burns, are occurring in interior Alaska (Hayes and Buma, 2021). Some relief is offered by the moderation of vegetation flammability in stands recovering from wildfire—in Alaska, young stands burn about 6% less than expected if they were undisturbed (Young et al. 2018). Nevertheless, more burning and repeat burning seem poised to release more carbon into the atmosphere in the coming decades. Most of this carbon is stored below-ground, in cold (or frozen), slow-decomposing, and acidic forest floors. Up to 95% of the carbon released from a wildfire ultimately is attributable to organic soils.*

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extent. They calculated an average cost of $12.63 to avoid the release of one ton of CO_2. Now, to see whether this strategy is "worth it" one should compare it to costs of other carbon-sparing strategies being employed or considered. Direct air capture of CO_2, for example, costs about $58/T, and tree-planting strategies around $15-$50/T (see the authors' Table 1 for more).

Trade-offs

Side benefits to increased fire protection to some forests might include maintaining refugia of older-growth habitats for wildlife species that require them, reducing health hazards of smoke exposure to the public, and slowing the thaw of permafrost soils—with the concomitant release of CO_2 and methane. Fires reduce the depth of organic soil that overlays and insulates permafrost, accelerating permafrost degradation and thaw. Thawing these large and ancient carbon stores risks releasing them to the atmosphere—but those releases were not considered in this project. It should be noted that this study examined increasing fire suppression to maintain fire occurrence at *historical levels*, to thwart the increase in burning from a warming climate. A suppression strategy to reduce wildfire extent *below* historical levels may be undesirable because over time that would lead to loss of the natural mosaic of young and old stands and could increase the continuity of burnable fuels.

Alaska Boundary Creek fire, 2005.
Photo credit: BLM Alaska Fire Service

Read the paper: Phillips, et al. 2022. **Escalating carbon emissions from North American boreal forest wildfires and the climate mitigation potential of fire management.** *Science Advances,* Vol. 8(17), https://www.science.org/doi/10.1126/sciadv.abl7161

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