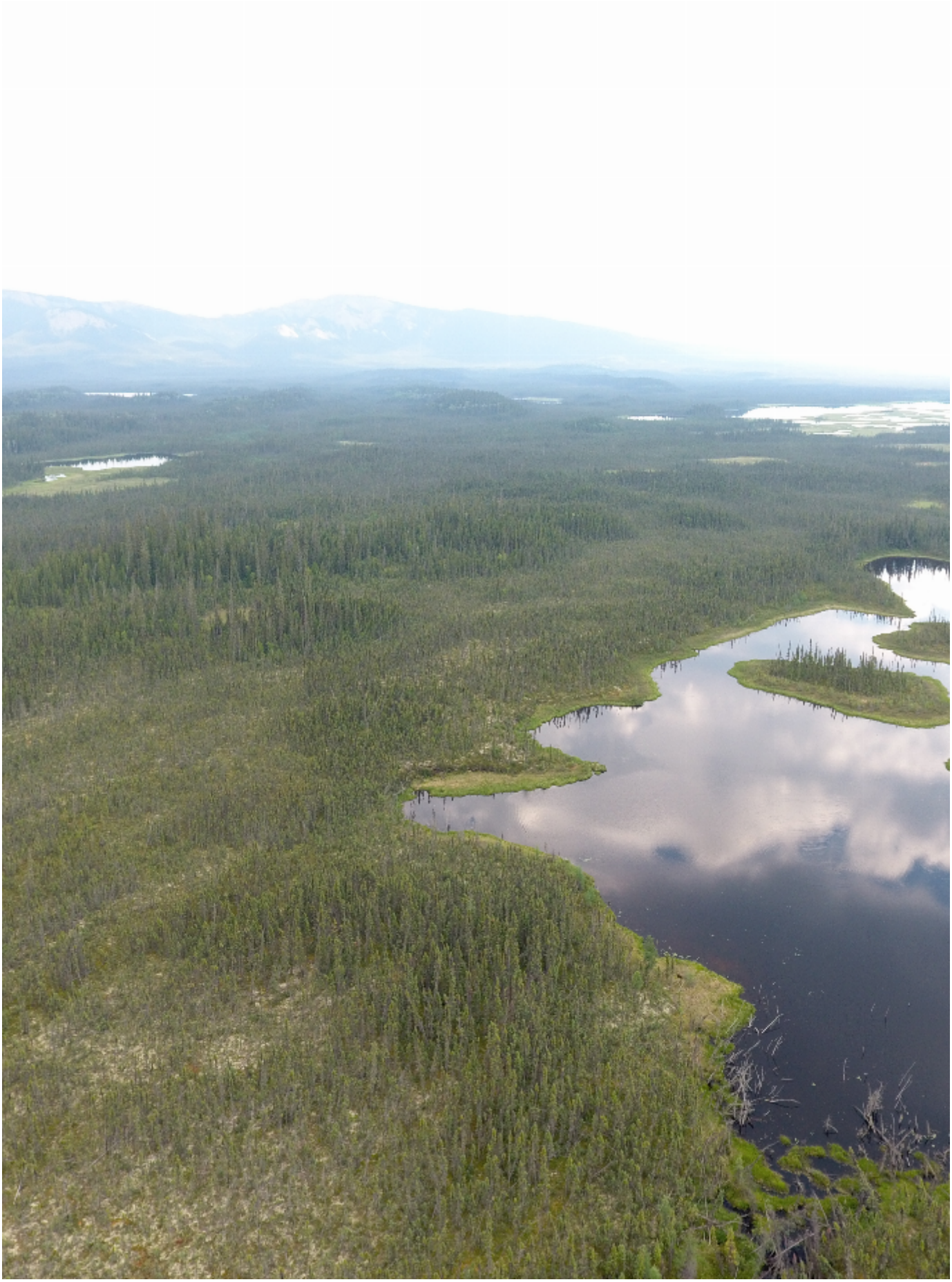

The Arctic’s greening, but it won’t save us

The Arctic is getting greener as the climate warms — but it’s not greening fast enough to absorb very much carbon dioxide, Boston University and UC Irvine scientists find.

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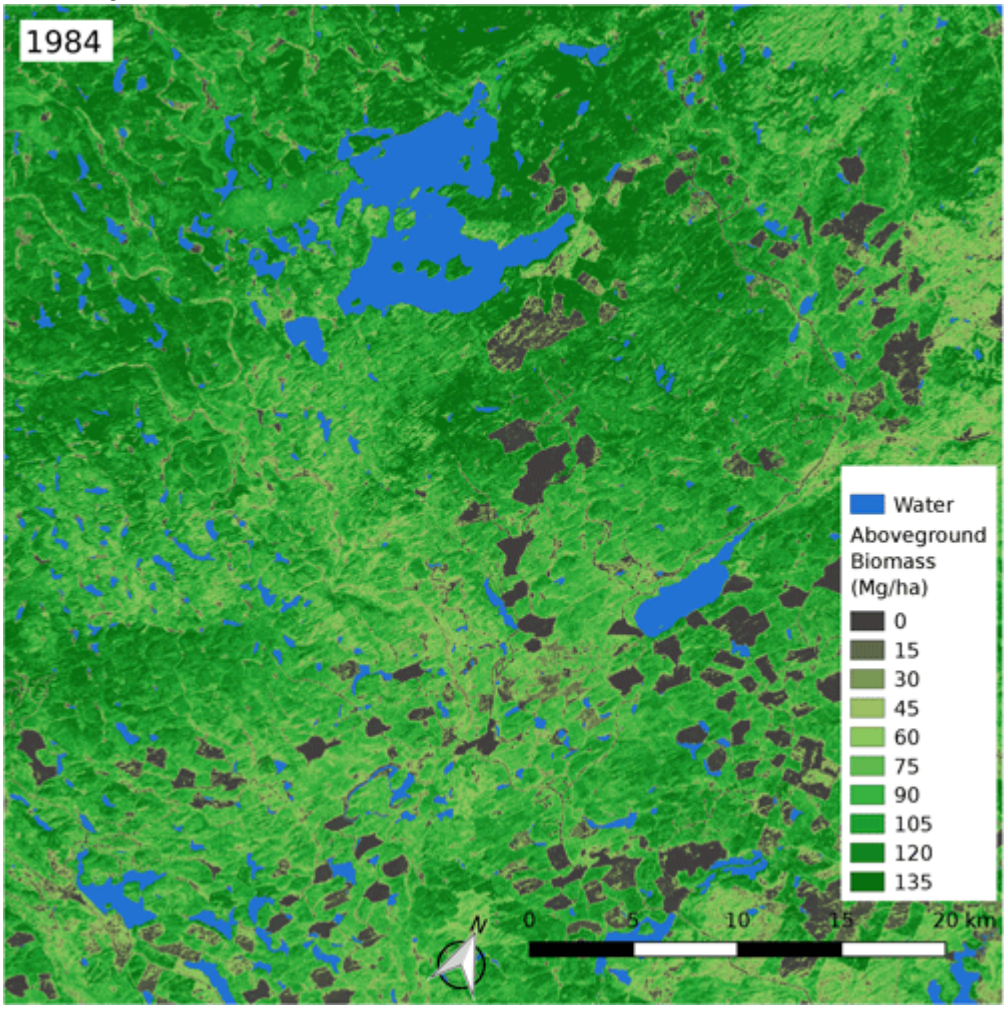

Upper: A wooded peatland and forest landscape near the town of Wrigley in the Northwest Territories, which is representative of much of the landscapes of the study domain. **Lower:** A region of British Columbia that experiences frequent timber harvests. Each year year, harvests remove small areas of biomass in the dense, mountainous forests about 100 miles north of Prince George, British Columbia.

Clearcut areas experience gradual regrowth of biomass over the next couple of decades following the timber harvest, resulting in a complex mosaic of forest stand ages and biomass densities.

Picture Credit:
Jonathan Wang

There was a hope that as more plants start to grow in Arctic and boreal latitudes as our warming climate makes those regions more hospitable for plants, those photosynthesizing plants would work to help sequester the atmospheric carbon dioxide that helped them flourish in the first place. But new research led by scientists at UC Irvine and Boston University, out in *Nature Climate Change*, suggests that all the new green biomass is not as large a carbon sink as scientists had hoped.

“What does greening really mean? Can we really trust it to save us from climate change?” said Jon Wang, an Earth system scientist at UCI who the led the work alongside BU Earth & Environment professor Mark Friedl. “A big question is: What’ll happen to the carbon that’s currently stored in these forests as above-ground biomass in the face of a changing climate?”

The answer, it turns out, is that a lot of the carbon isn’t staying stored in the plants, because as fires and timber harvests at those latitudes become more and more common as climate change makes those parts of the world hotter and drier and more arable at rates sometimes twice that seen at lower latitudes, much of the new green biomass isn’t storing carbon — it’s combusting during wildfires.

“What we found overall is across this whole domain over the past 31 years the carbon stocks have increased modestly,” Wang said. “What we estimate is that 430 million metric tons of biomass has accumulated over the last 31 years — but across this domain it would’ve been nearly double if it weren’t for these fires and harvests that are keeping it down.”

The assumption before, Wang explained, was that greening was happening and it was going to help draw climate-warming carbon dioxide concentrations down — but no-one knew the exact extent of that help.

To test the assumption, Wang and his team combined observational data from two different satellite missions from the US Geological Survey and NASA, Landsat and ICESat, so they could model the amount of carbon stored in biomass across a 2.8-million-square-kilometer region spanning Canada and Alaska.

ICESat data provides measurements of the height of forest canopies, while Landsat data extends back 31 years to 1984 and provides data on the reflection of different wavelengths of light from the surface of the planet — which also provides information about plant biomass abundance. Juxtaposing that with a two-to-three times increase in the severity of wildfires in the region, and the pictures started to take shape.

Wang found that plant biomass still increased, but not as much as previous computer models that aim to simulate climate change suggested they would, as those models have struggled to account for fires as a variable. The results, Wang hopes, will help scientists who construct those models — models that tell the world what we can expect climate change to look like — build ever-more-accurate pictures of what's in store as the century unfolds.

Co-author James Randerson from UC Irvine believes these new data are important because they provide an independent means to test climate models, and because of the way they represent feedbacks between the carbon cycle and the climate system. "The rates of carbon accumulation in this region are lower that what previous studies have indicated, and will push the science community to look elsewhere for the main drivers of the terrestrial carbon sink," Randerson said.

Wang added: "The change is good news for climate — but it's also much lower than we might've expected, because these fires have raged, and gotten more severe."

About the University of California, Irvine: Founded in 1965, UCI is the youngest member of the prestigious Association of American Universities. The campus has produced three Nobel laureates and is known for its academic achievement, premier research, innovation and anteater mascot. Led by Chancellor Howard Gillman, UCI has more than 36,000 students and offers 222 degree programs. It's located in one of the world's safest and most economically vibrant communities and is Orange County's second-largest employer, contributing $5 billion annually to the local

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