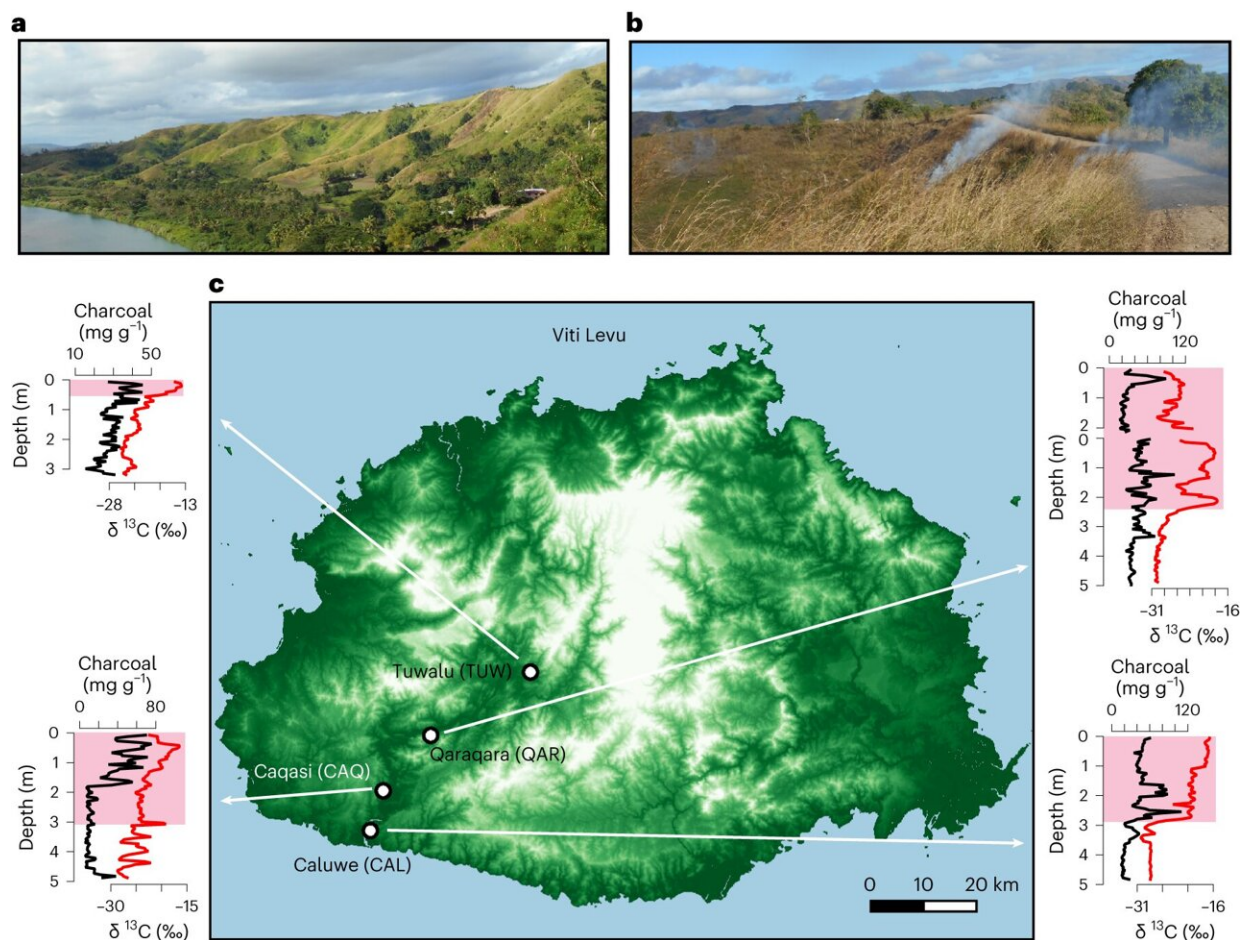


Climate and human land use both play roles in Pacific island wildfires past and present: Study

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Stratigraphic records of charcoal and stable carbon isotopes from Viti Levu. **a–c**, Photos of grasslands (**a**) and grassland fires (**b**) in the Sigatoka River valley of Viti Levu (**c**). The leeward (dry) side of Viti Levu is largely ‘talasiga’ or grassland/savanna on the west/northwest side of the island. Stratigraphic charcoal

concentrations (black lines) and $\delta^{13}\text{C}$ ratios (red lines) for each coring location are plotted by depth, with strata deposited during human occupation highlighted by the pink areas. Elevation data are from the Copernicus 90 m dataset. Photo and map: C.I.R. Credit: *Nature Ecology & Evolution* (2023). DOI: 10.1038/s41559-023-02212-8

It's long been understood that human settlement contributes to conditions that make Pacific Islands more susceptible to wildfires, such as the devastating Aug. 8 event that destroyed the Maui community of Lahaina. But a new study from SMU fire scientist Christopher Roos published in the journal *Nature Ecology & Evolution* shows that climate is an undervalued part of the equation.

Roos, SMU environmental archaeologist and professor of anthropology, traveled with his team to the Sigatoka River valley in southwestern Fiji in 2013, where they collected charcoal and stable carbon isotopes from deep soil cores to understand historic patterns of fire activity in the area. Different plants have distinct carbon isotopic signatures, which can provide information about past plant communities.

The team found fires and fire-created [grassy areas](#) that predate [human settlement](#) by millennia and actively corresponded to droughts likely driven by a regularly occurring weather pattern known as El Niño. El Niño events can alter precipitation patterns worldwide, making [environmental conditions](#) more favorable for wildfires. The National Oceanic and Atmospheric Administration issued an El Niño advisory in June, announcing the latest arrival of the [climate](#) event that continues to influence weather worldwide.

Lightning strikes also act as a natural cause of wildfires, igniting plant material that acts as fuel.

The impact of human settlement, farming activity (particularly the clearing and burning of land) and resulting deforestation of remote Pacific islands is well established in the scientific record, and research from the Roos team only confirms what Roos calls "a modern environmental parable." But the impact of climate must be considered, too, the study finds.

"It struck me that these fires are not exclusively human-driven, because when I looked at earlier pre-human spikes in fire activity, those lined up with El Niños," said Roos. "The combination of climate and [human activity](#) drives island deforestation and increases wildfire activity. It may be that human activity is making the landscape more sensitive to those climate variations. But, it could also be that the climate is making the landscape more sensitive to human activity."

In the past, Roos said, research often focused more on human activity harming Pacific Islands' land without considering climate's role in the damage. He believes an approach that considers both causes is necessary, especially with catastrophic wildfire events occurring more regularly.

Roos also points out that the Pacific Islands are natural laboratories to study the grass-fire cycle, which is prevalent in areas where wildfire is occurring with the spread of invasive grasses. Traditional farmers have practiced successful techniques for clearing and burning land for centuries, and past lessons could offer ways to prepare and cope with future wildfire events. Roos stresses that we must adapt to the new environment climate and humans have created.

"Droughts triggered by El Niño events appear to have played a role in intensifying the grass-fire cycle and contributing to deforestation in the past," he said. "And looking forward, climate models indicate that the Pacific Islands could experience conditions similar to El Niño events more frequently due to ongoing climate change. We need to reflect on

what we're doing and whether or not those actions make places more or less vulnerable to future [wildfire](#) events."

More information: Roos, C.I. et al, Fire activity and deforestation in Remote Oceanian islands caused by anthropogenic and climate interactions, *Nature Ecology & Evolution* (2023). [DOI: 10.1038/s41559-023-02212-8](#)
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