

A deep dive into organic carbon distribution in hadal trenches

May 31 2021, by Kate Wheeling



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Hadal trenches are one of the ocean's most extreme and least studied regions. Hadal zones, which begin at depths of around 6,000 meters, were once thought to be "biological deserts," but over time they have been shown to be [teeming with life](#). However, the distribution and source of organic carbon in hadal sediments are still not well understood.

In a new study, Xu et al. analyze organic carbon characteristics in [sediment cores](#) from two deep-ocean regions: the Kermadec Trench,

which reaches depths of 10,177 meters and is located north of New Zealand where the Pacific plate is subducting beneath the Indo-Australian plate; and the Atacama Trench, which reaches depths of about 8,000 meters and was created where the Nazca plate is subducting beneath the South American plate. The team collected a dozen sediment cores on research cruises carried out by New Zealand's [R/V Tangaroa](#) in 2017 and Germany's [R/V Sonne](#) in 2018. The cores were collected from both within the hadal zones of the trenches and along the nonhadal, abyssal plains of the region.

In each [core](#), the researchers analyzed trends for several geochemical parameters, including total organic carbon content, the ratio of total organic carbon to total nitrogen content, and the stable carbon isotopic composition of total organic carbon. They looked at lipid biomarkers to determine how much of the organic carbon in the trenches came from eroded land and how much came from marine sources. In addition, the authors looked at radiocarbon isotopes to determine how long the organic carbon had been in the trenches.

The team found that samples from the Kermadec Trench and the Atacama Trench were 18% and 24% richer, respectively, in terrigenous (or land-based) [organic carbon](#) than nonhadal sites. The significant amounts of terrigenous carbon in both trenches suggest that hadal zones could be important carbon sinks for land-derived [carbon](#).

More information: Yunping Xu et al, Distribution, Source, and Burial of Sedimentary Organic Carbon in Kermadec and Atacama Trenches, *Journal of Geophysical Research: Biogeosciences* (2021). [DOI: 10.1029/2020JG006189](#)

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