

Deep Igneous Rock Biosphere Unveiled beneath Ultra-Oligotrophic South Pacific Gyre Sediments

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The upper oceanic crust is composed of basaltic lava and overlying sediment. The aged basaltic basement is considered to be inhospitable for microbial life, because the apparent energy source is lacking. By drilling >10-million-years-old basaltic basement underneath oxygenated, ultra-oligotrophic sediments in South Pacific Gyre, microbial communities were profiled by single-gene analysis. The dominant occurrence of microorganisms phylogenetically affiliated within methanotrophic lineages suggests that the crustal biosphere is likely fueled by methane in the old basaltic basement. The dense colonization of endolithic life was observed for the first time in the deep basaltic basement. Given that the areal coverage of basaltic basement overlain by oxygenated sediments reaches up to 25% on Earth, we conclude that microbial life is widespread in the upper oceanic crust.

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