

Temperature Limits of the Deep Biosphere

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In the course of 50 years of scientific ocean drilling, microbial cells have been found all over the ocean floor. To date, the bottom of the deep biosphere has not been located yet, and it remains to be resolved which factors pose ultimate limits to life in subsurface environments. Possibly, life ceases at a certain depth where sediments and rocks become too hot because of geothermal heating. Expedition 370 of the International Ocean Discovery Program (IODP) aimed to explore the limits of life in the deep subsurface biosphere at a location where elevated heat flow lets temperature increase with sediment depth beyond the known maximum of microbial life (~120°C) at only ~1.2 km below the seafloor. Such conditions are met in the protothrust zone of the Nankai Trough off Cape Muroto, Japan, where Site C0023 was established in 2016 using the drilling vessel *DV Chikyu*. The expedition was specifically prepared to detect and investigate the presence or absence of life and biological processes with unprecedented analytical sensitivity, and to comprehensively study the factors that control biomass, activity, and diversity of microbial communities. Based on new insights that result from Expedition 370, this contribution will discuss the temperature limits of the deep biosphere and their impact on carbon flow in subduction zones.

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