

IODP T-Limit Project: Constraining the temperature limit of seafloor life in the Nankai subduction zone

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Determining factors that limit the biomass, diversity and activity of seafloor microbial communities is one of the major scientific goals to be addressed by scientific ocean drilling. In the International Ocean Discovery Program (IODP) T-Limit Project, we will drill and core at new boreholes using the drilling vessel *Chikyu* in the immediate vicinity of the Ocean Drilling Program (ODP) Sites 1173 and 1174 off Cape Muroto in the central Nankai Trough, Japan, where anomalously high heat flow regimes observed at both sites result in *in-situ* temperatures up to 110 to 130°C at the sediment-basement interface. While the upper temperature limit of cultured microbes appears well constrained at relatively energy-rich hydrothermal vent systems at around 120°C, it remains unknown in energy-starved sedimentary seafloor settings but is generally presumed to be lower, and thus expected to be covered by the target sites. Due to their location in the trench outer margin (Site 1173) and landward prototrust zone of the Nankai Trough accretionary prism (Site 1174), the selected sites have different geotectonic and thermal histories that resulted in contrasting biogeochemical modes of hydrocarbon gas production and consumption.

During the T-Limit Project, we aim to comprehensively study (1) the factors that control biomass, activity and diversity of sedimentary microbial life in a temperature window that likely encompasses the biotic-abiotic transition, the so-called “biotic fringe”, (2) the relationship between geogenic release of water and potential substrates that support microbial activities, and (3) to determine the chemical and physical characteristics of sediments that define habitable conditions for deep seafloor life.