

Endospore distribution in the Nankai Trough deep biosphere – Insights from IODP Expedition 370

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Expedition 370 of the International Ocean Discovery Program (IODP) established Site C0023 in the Nankai Trough off Cape Muroto, Japan, to investigate the upper temperature limit of microbial life in deep seafloor sediments. Temperatures ranged from ~30°C at 200 mbsf to ~120°C at 1200 mbsf covering mesophilic to hyperthermophilic growth conditions of microbes known from cultivation based studies. The formation of highly resistant endospores enables some microorganisms, in particular bacteria of the phylum Firmicutes to survive otherwise lethal conditions, such as, high temperatures. Therefore, the investigation of endospores can provide important insights into the limits of life in the deep biosphere.

To quantify endospores we used the biomarker dipicolinic acid (DPA) specific for intact endospores. In total, 1 g of each sediment sample was extracted with a newly developed protocol, which increases extraction efficiency. To maximize data quality, each extraction set consisted of five randomly chosen samples in duplicates and two extraction blanks. DPA extracts were then analyzed by high performance liquid chromatography coupled to a fluorescence detector following a dedicated method [1].

To the best of our knowledge, this is the first high resolution record of endospore abundance in a deep biosphere environment with temperatures ranging from 30 to ~120°C. We will discuss our findings in the context of lithology, sediment age, and the preservation potential of the biomarker DPA in the up to 16 Ma old sediments.

[1] Fichtel (2007), *J. Microbiol. Meth.* **70**, 319-327.