

The deepest places on Earth – Bringing light in Hadal zones

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Hadal zones are the deepest regions of the global ocean (> 6,000 m), mainly comprised by tectonic plate boundaries such as convergent subduction zone, fracture zone along transcurrent faults and spreading centers. It is technically challenging to operate instrumentation and collect samples at these extreme depths, so they remain virtually unexplored; however, these trenches likely host numerous unknown lifeforms and biogeochemical functions and pathways. Adaptations to high hydroauric pressure, low temperature and remoteness from primary production of the sea surface are key factors for hadal life. The hadal biological communities seem to be sustained in part on sinking or laterally-advected organic matter funneled to the deepest portions of trenches in connection to active material cycles among litho-, hydro- and bio-spheres. However recent findings show high benthic carbon turnover rates in hadal trenches usually exceed those observed in abyssal sediments and rival measurements in bathyal and shelf sediments. Trenches thus appear to act as largely unexplored hotspots for material deposition and deep sea life. Moreover, anthropogenic pressure has been observed in hadal environment that apparently hold surprisingly high levels of pollutants and microplastic.

The main purpose of this session is to discuss the i) the diversity, origin and adaptations of hadal life; ii) material transport and biogeochemical cycling in hadal trenches; iii) the connectivity between abyssal and hadal environments; and iv) novel technological developments facilitating the exploration of the deepest parts of the global ocean.