Preliminary findings of benthic megafaunal community structure and habitat relationships in the Kermadec Trench using submersible imagery

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Benthic sampling in hadal trenches, such as the Kermadec Trench, faces several unique challenges in collecting visual images (video footage and still imagery) at depths > 6,000 m and at regional scales (i.e., across the steep depth gradient or along the horizontal axis of a trench). As the fourth deepest hadal trench in the world at ~10,000 m depth, the Kermadec Trench is the deepest part of New Zealand's Exclusive Economic Zone. Difficulties in collecting spatial observations at such depths therefore limit our knowledge of benthic megafaunal biodiversity patterns that exist within New Zealand's only fully hadal trench and how they compare to other trench systems.

In 2022, a four-week joint China-New Zealand expedition to the Kermadec Trench was conducted onboard the R/V *Tan Suo Yi Hao*, utilising the Institute of Deep-Sea Science and Engineering's full-depth Human Operated Vehicle *Fendouzhe*. Thirty-two dives were conducted and video transects up to 6 km in length per dive were recorded, resulting in a total of ca. 180 hours of video footage ranging between 1,181 – 10,010 m in depth.

We will discuss the preliminary results for benthic megafaunal community structure within the Kermadec Trench in relation to depth, latitudinal gradient, and habitat heterogeneity across the slopes and trench axis. In addition, we will present unique observations of megafaunal behaviour and lebensspuren activity that were revealed by the *Fendouzhe*'s video footage.

Future work for this study will investigate the connectivity within and between sites across the Kermadec Trench using graph network and multivariate analyses, as well comparing benthic megafaunal biodiversity found in the Puysegur Trench south of New Zealand.