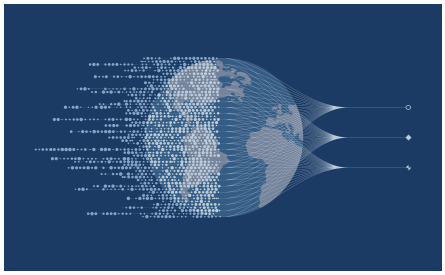

ID: **P2.2-617** Type: **E-poster**

location of oceanic transform fault earthquakes constrained by IMS hydrophone triplets in the Indian Ocean

T-waves are hydroacoustic waves that propagate as guided waves over long distances through the ocean, representing energy trapped in the Sounding Fixing and Ranging (SOFAR) channel. T-waves resulting from earthquakes have complex waveforms and simulations suggest that their long wavetrains are generated by scattering of upward traveling seismic energy at a rough seafloor and multiple reverberations in the water column. The aim of our study is to reveal whether T-phase locations represent earthquake epicenters.

We study submarine earthquakes in the Indian Ocean using the IMS Cape Leeuwin and Diego Garcia hydrophone triplets, applying a plane-wave array technique to obtain the back-azimuth and source location. For earthquakes at transform faults, we found that hydroacoustic source locations occur over the prominent valley of transform faults and not over the adjacent flanking shoulders. We infer that seismic energy generated by the earthquake is coupled into the ocean at the valley floor and not at the much shallower flanking mountains. Thereafter, converted energy is trapped in the transform valley, causing multiple water column reverberations, and subsequently energy leaking into the SOFAR channel. The hydroacoustic source locations agree well with epicenters derived from seismic waves and our understanding of seismic faulting at oceanic transform faults.

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Session Classification: P2.2 Seismoacoustic Sources in Theory and Practice

Track Classification: Theme 2. Monitoring events and Nuclear Test Sites: T2.2 Seismoacoustic Sources in Theory and Practice