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hydroacoustic observations of earthquakes along the Middle America Trench

Large-magnitude (>5 mb) earthquakes occur regularly along the northern Middle America Trench, a major subduction zone located offshore the Pacific coast of Mexico. Time-difference-of-arrival calculations suggest that low-frequency acoustic phases generated by these events couple into the Sound Fixing and Ranging (SOFAR) channel and can be recorded as far as Diego Garcia, Indian Ocean, where a hydrophone station (H08) is operated as part of the International Monitoring System (IMS). Transmission loss modeling indicates that hydroacoustic propagation between the epicenter region and the IMS station is feasible and matches observed travel times. At more than ~21,300 km, arrival ranges exceed the source-receiver distance of any previously documented, artificial or naturally occurring underwater signal, making them the furthest hydroacoustic transmissions to have ever been observed on Earth. Implications for test-ban monitoring and the potential of the H08S hydrophone array for further studying seismic activity along the Middle America subduction system will be discussed. These preliminary findings show that the detection of oceanic events relevant to the CTBT verification regime is possible even beyond the antipodal range, thus highlighting the exceptional capabilities of the IMS hydroacoustic network.

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