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Search for Non-Volcanic Tremor in the Northeast Caribbean Subduction Zone

Non-volcanic tremor (NVT) is observed episodically on some major faults, particularly in subduction zones but also on the San Andreas Fault in California. NVT often occurs in conjunction with slow slip events, so such tremor may signal times at which slip is intiating and hence increased seismic hazard. The mechanism underlying the generation of tremor and its relationship to aseismic slip are, however, unresolved. Observations of NVT are rare; only a handful of observations have been confirmed and all of those observations were made around the Pacific “Ring of Fire”.

This does not mean that the process itself is rare, however. NVT is comprised of weak, extended duration signals, so it is difficult to locate because it lacks the distinct impulsive, body wave arrivals used by traditional earthquake location methods. A dense collection of continuously-recording seismographs that are deployed directly above a subduction zone and are optimized for the 2-10 Hz frequency passband is required. We happen to have two ideal datasets for a study of non-volcanic tremor and now propose to pursue a search for NVT in conjunction with Baylor undergraduate John Duncan using these data. The result, if successful, would be the first observation of NVT outside the Pacific Basin and the first observation with ocean bottom seismographs (OBS). Our OBS deployments targeted swarms of small earthquakes that had been occurring occasionally for at least thirty ears and we succeeded in capturing several such swarms. Our hope is that, if NVT is observed in our data, we would be able to link it to the swarms, or other “tectonic” (classical, impulsive) seismic activity, and thereby shed light on the nature of the non-volcanic tremor itself, including its role in the earthquake cycle.