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Seismotectonics of the northern Bay of Bengal: Modeling source mechanism of moderate-to-strong intraplate earthquakes

Riddhi Mandal and Supriyo Mitra

Department of Earth Sciences, Indian Institute of Science Education and Research Kolkata, Mohanpur, West Bengal, India (archonriddhi@gmail.com)

The intraplate region of the northern Bay of Bengal has occasional moderate-to-strong earthquakes ranging in depth from 10 to 60 km. This region is known to have a very thick sedimentary cover ($\sim$20 km) underlain by the oceanic plate. These intraplate earthquakes occur both within the sedimentary layers and the basement. In order to understand the seismotectonics of this region, we study the source mechanism of recent moderate-to-strong earthquakes (Mw>5.5). We model teleseismic body waveforms (P and SH) to obtain the best fit double couple solution and well constrained centroid depth. The dataset has good azimuthal coverage and clear depth phase. We use a simple source time function which reproduces the main features of the observed waveforms and invert the dataset using linearized least squares algorithm. We also perform uncertainty tests on the modeled source parameters by fixing each parameter to a range of values and allowing the inversion to find the best fit solution. Through this we are able to ascertain the $\pm$1 sigma bound on the modeled parameters. Our results reveal strike-slip faulting in the northernmost Bay of Bengal and normal faulting to its east, close to the Indo-Burman subduction zone. The strike-slip faults originates at depth between 20-30 km, while the normal faulting are shallower than 10 km. We conjecture that the strike-slip faulting occurs on passive margin rift faults within the basement, which are reactivated under oblique N20E motion of India. Whereas the shallow normal faulting close to the Indo-Burman subduction zone occurs due to flexural extension of the top of the downgoing Indian plate.