

# Characteristics of shallow very low frequency swarms along the Nankai Trough

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By using long-term moment rate function catalogs of shallow very low frequency earthquake (VLFE) along the Nankai Trough, we defined shallow VLFE swarm activities and investigated scaling relationships of their cumulative moments, activity area, and durations in each region. Detected shallow VLFE swarms can be considered as candidates of shallow slow slip events. Before defining shallow VLFE swarms, we divided those into three regions: (A) southeast off the Kii Peninsula, (B) south off the Kii Peninsula, and (C) off the Cape Muroto and Kii Channel. Based on Kurihara & Obara (2021), we defined shallow VLFE swarms in each region. First, we evaluated the expected inter-event times in each region by dividing the analysis period (17 years) by the total number of shallow VLFEs in each region. Then, the shallow VLFE swarms in this study were defined when ten or more shallow VLFEs occurred consequently with inter-event times less than the expected inter-event time in each region. After the swarm detection, we evaluated cumulative moment, duration, activity areas, and apparent along-strike spreading speeds of each shallow VLFE swarm.

A similar scaling relationship between cumulative moments and activity areas irrespective of regions was found, indicating similar stress drops in each region. However, the relationship between cumulative moments and durations was various. The apparent along-strike spreading speeds were also varied in each region. This difference can be explained by along-strike variations in fracture energies of shallow slow earthquakes. According to structural monitoring using DONET, Tonegawa et al. (2017, 2021) suggested that pore fluid pressure around the plate boundary in region C is expected to be higher than that in region A. Pore fluid pressure can reduce effective normal stress on the fault. Consequently, fracture energy and rupture velocity of possible shallow SSEs may be various in each region.

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