

振幅—継続時間スケーリングから推測される四国西部における深部低周波微動のスケール長の空間変化
Spatial variation in scale length of deep low-frequency tremor inferred from duration-amplitude scaling in western Shiko

堀野 一樹^{1*}; 平松 良浩²; 水上 知行²; 小原 一成³; 松澤 孝紀⁴

HORINO, Kazuki^{1*}; HIRAMATSU, Yoshihiro²; MIZUKAMI, Tomoyuki²; OBARA, Kazushige³; MATSUZAWA, Takanori⁴

¹ 金沢大学大学院自然科学研究科自然システム学専攻, ² 金沢大学理工研究域自然システム学系, ³ 東京大学地震研究所, ⁴ 防災科学技術研究所

¹Division of Natural System, Graduate School of Natural Science and Technology, Kanazawa University, ²School of Natural System, College of Science and Engineering, Kanazawa University, ³Earthquake Research Institute, University of Tokyo, ⁴National Research Institute for Earth Sciences and Disaster Prevention

Slip properties on plate interface vary largely along dip direction from seismic to aseismic slip. At the transition zone at depths of 25-35 km, non-volcanic deep low-frequency (DLF) tremor and short-term slow slip event occur in the Nankai subduction zone. Recent detailed studies (e.g. Obara, 2010) reveal along dip and along strike variations in the occurrence and the migration of DLF tremor in the transition zone. We report here an along dip variation in scale length of DLF tremor inferred from duration-amplitude scaling in the western Shikoku.

A physical process of natural phenomena is reflected by scaling law, for example, frequency of occurrence versus size distribution. Watanabe et al. (2007) reported that a duration-amplitude distribution of DLF tremor shows a better fit to the exponential model rather than the power-law model, which is different from regular earthquakes. We investigate the duration-amplitude distribution of DLF tremor using Hi-net data in the western Shikoku. The procedure of analysis is the same as that of Watanabe et al. (2007).

We focus on the slope of the exponential distribution for the duration-amplitude distribution of DLF tremor. The value of the slope is small in the western area and large in the eastern area. Noting along dip direction, we can recognize a weak variation of the value of the slope. Deeper DLF tremor tends to show a larger value of the slope than shallower DLF. A large value of the slope means a small scale length and vice versa.

Beneath the western Shikoku, the configuration and the age distribution of the subducting Philippine Sea plate changes significantly along the strike, generating a large variation in a thermal structure. Such a variation causes various modes of serpentinization in the hanging wall mantle. The resultant structures due to the different modes are the most likely cause of the detected transition of the scale length.

キーワード: 深部低周波微動, スケーリング則, 沈み込み帯, 規模別頻度分布, 蛇紋岩化

Keywords: deep low-frequency tremor, scaling law, subduction zone, size distribution, serpentinization