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We examine b-values of the lower-plane events than beneath Tohoku. Using the acoustic emission (AE) experimental result, the b-values for intermediate-depth intraslab earthquakes in the Pacific slab beneath the Tohoku and Hokkaido regions, northeastern Japan and find a difference in the b-values of lower-plane events in the double seismic zone. Lower-plane events reveal significantly larger b-values beneath Tohoku (0.96) than Hokkaido (0.86), implying that the brittle deformation beneath Hokkaido is more localized and leads to higher ratio of relatively large lower-plane events by Ferrand et al. [2017, Nature Communications], we also found that the b-values for experimental earthquakes increase with increasing antigorite content in serpentinized peridotite. A comparison of experimental and natural earthquake b-values implies that lower- plane peridotite is more hydrated beneath the Tohoku region, which is consistent with the difference in oceanic-plate velocity structures near the trench identified in Ocean Bottom Seismometer studies off Tohoku and Hokkaido by Fujie et al. [2017, Nature communications]. Since the density of fracture zones offshore Tohoku is larger than offshore Hokkaido, the extent of hydration of the oceanic mantle beneath Tohoku could be larger than beneath Hokkaido.

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