鳥取地震と大山火山：スラブ年齢、スラブ溶融と熱いマントル上昇流の影響

Tottori earthquakes and Daisen volcano: Effects of slab age, slab melting and hot mantle upwelling

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We investigate the three-dimensional (3-D) seismic structure of source areas of the 6 October 2000 Western Tottori earthquake (M 7.3) and the 21 October 2016 Central Tottori earthquake (M 6.6) which occurred near the Daisen volcano in SW Japan. A seismic tomography method (Zhao et al., 1992, 1996) is applied to a large number of arrival-time data of local earthquakes to determine high-resolution 3-D P and S wave velocity and Poisson’s ratio images in SW Japan. The two large Tottori earthquakes took place in a high-velocity zone in the upper crust, whereas low-velocity (low-V) and high Poisson’s ratio (high-σ) anomalies are revealed in the lower crust and upper mantle. Low-frequency micro-earthquakes (M 0.0-2.1) occur in or around the low-V and high-σ zones, which reflect upward migration of magmatic fluids from the upper mantle to the crust under the Daisen volcano. The nucleation of the Tottori earthquakes may be affected by the ascending fluids. The flat subducting Philippine Sea (PHS) slab has a younger lithosphere age and so a higher temperature beneath the Daisen and Tottori area, facilitating the PHS slab melting. It is also possible that a PHS slab window has formed along the extinct Shikoku Basin spreading ridge beneath SW Japan, and mantle materials below the PHS slab may ascend to the shallow area through the slab window. These results suggest that the Daisen adakite magma was affected by the PHS slab melting and upwelling flow in the upper mantle above the subducting Pacific slab (Zhao et al., 2018).

References

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