

# The aseismic islands, Amakusa-Kamishima and Shimoshima, Kumamoto Prefecture, southwest Japan: What persistently shuts off regional seismicity

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Is there any inland region in Japan totally aseismic? This is a simple question against the frequently releasing comment by seismologists to the general public “none of the region in Japan can be avoided from strong ground motion.” To strictly check if this is true, we simply examined the Japan Meteorological Agency (JMA) earthquake catalog of 1923-January 2019, and then found one of the significantly aseismic regions in Kumamoto Prefecture, Amakusa-Kamishima and Shimoshima islands that extend about an area of 2,000 km<sup>2</sup> (hereinafter AAR). Neither historical destructive earthquake is documented in the AAR (Usami et al, 2013). Instead the AAR is surrounded by tectonically and seismically active zones of the Beppu-Shimabara graben to the north, Amakusa-nada graben to the west, the Futagawa-Hinagu fault system that caused the 2016 Kumamoto earthquake to the east, and highly seismic zone to the south. The AAR is characterized by high-Bouguer gravity anomaly possibly related to the underlying metamorphic rocks, while the most of the area exposes upper Cretaceous to Paleogene sedimentary rocks folded along NNE-trending axes (Takai and Sato, 1982). Numerous WNW-trending strike-slip faults, transverse these anticlines and synclines, are thought to have developed in the Miocene period but not been active during the late Quaternary period. Although the coastal geomorphologic features suggest uplifted marine terraces to the north and rias-type subsidence to the south formed during the late Quaternary, we infer long-term very gradual crustal uplift has been lasting since late Miocene due to the lack of sediments. Since the recent GNSS observation indicates a very low rate of strain in the AAR (GSI, 2018), we believe the AAR behaves as a rigid block enclosed by active tectonic zones mentioned above, those condition brings long-term stress shadow to bear such a persistent aseismic region.

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