

Late Holocene uplift of the Izu Islands on the northern Zenisu Ridge off Central Japan: Implication for the tsunami source area of the AD 1498 Meio earthquake

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The 25 August 1498 Meio earthquake (M 8.2–8.4) is thought to have been caused by rupture along the Nankai Trough, off southwest Japan. However, another possible interpretation is that the rupture area extended north to the Zenisu Ridge, off southeast coast of Izu Peninsula. Examination of the co-seismic uplift caused by the Meio earthquake along the northern Zenisu Ridge allows us to assess the rupture area of this event. We analyze the elevation and ^{14}C dates of emerged marine sessile assemblages on the islands of Niijima, Jinaijima, Shikinejima and Kozushima on the northern Zenisu Ridge. The results show that uplift events took place after 1950 AD (uplift event 1) and at some time during 1810–1950 AD (uplift event 2), 786–1891 AD (uplift event 3), 600–1165 AD (uplift event 4), and 161–686 AD (uplift event 5), although uplift events 4 and 5 are identified only at Kozushima. Based on the present-day elevational distributions of species, the uplift amounts were estimated to be 0.2–0.9 m (uplift event 1), 0.2–0.4 m (uplift event 2), 0.3–2.6 m (uplift event 3), 1.6–4.4 m (uplift event 4) and 8.2 m (uplift event 5). Uplift event 1 was caused by dike intrusion related to the 2000 AD eruption of Miyakejima Volcano near Kozushima. Uplift event 2 was probably caused by strong earthquakes (i.e. $M_w \sim 6$) and/or dike intrusion. Possible mechanisms for uplift event 3 include strong earthquakes, dike intrusion and the AD 1498 Meio earthquake. It is likely that uplift events 4 and 5 were caused by lava-dome formation during the AD 838 eruption and previous volcanic activity in Kozushima, respectively. These findings do not preclude the possibility that the AD 1498 Meio earthquake caused uplift event 3 at Shikinejima and Kozushima. However, based on our data and those of other recent studies, we propose that the 1498 AD Meio earthquake occurred along the Nankai Trough and that rupture of the fault around the southern margin of the northern Zenisu Ridge caused both co-seismic uplift of the study area and the historically recorded AD 1495 earthquake and tsunami at Sagami Bay.

Keywords: AD1498 Meio earthquake, Izu islands, emerged marine sessile assemblages, ^{14}C dating