

Fossil coral records paleo tsunamis and storm surges on Yakushima Island, Japan

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Southeast Japan experiences frequent and significant geological hazards that threaten human life and have severe economic repercussions. To predict the scale of future hazards and devise mitigation plans, an understanding of the timing and magnitude of historical events is vital. Yakushima, an island south of Kyushu, experiences regular typhoons and is vulnerable to destructive tsunamis generated at nearby volcanos or the Nankai megathrust subduction zone. Evidence of these hazards is found in the form of beach boulders: large rocks washed above the high-water mark by storm waves or tsunamis. To estimate the date of deposition, which corresponds to the hazard event, coral growing on or within the boulders can be radiocarbon dated. In this study we gathered radiocarbon ages from ten boulders distributed along Yakushima's north coast. We find evidence of four distinct events during the Holocene: at 2100–2707 cal yr BP, 3621–4131 cal yr BP, 4846–5827 cal yr BP, and 6265–6691 cal yr BP respectively. Three of the events coincide with known eruptions of Kuchinoerabujima and/or Kaimondake, two nearby volcanos that may have generated volcanogenic-tsunamis. Additionally, the same three events could be linked to tsunamis generated by ruptures of the Nankai trough. However, research identifying the magnitude of historical eruptions and earthquakes is needed to confirm this. We found no link between a tsunami and the fourth, oldest event, suggesting the boulders associated with it were deposited by a typhoon storm surge.

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