

Development of the Izu-Oshima Pre-caldera Volcano examined by lacustrine deposits and tephra around the Funoh-Falls in the east coast region, Izu-Oshima Island, Japan

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The Izu-Oshima Volcano (110 km SSW of Tokyo) in northern Izu-Bonin Arc, is one of the most active Quaternary volcanoes in Japan. This volcano originating from basaltic magma has frequently erupted; that is, 12 times of major eruptions occurred during last 1800 years. Studies of its eruption history for this period, named Syn- and post-caldera volcano, have been well carried out by Nakamura (1964), Kawanabe (2012) and so on. The history of Izu-Oshima volcano preceding Syn- and post-caldera volcano was divided into the Younger Edifice of pre-caldera and the Older Edifice of pre-caldera of Izu-Oshima Volcano, and fall-out tephra group (18 to 1.8 ka; Suzuki et al., 2019), typically exposed along so-called Great Cut of Beds in SW part of the island, was identified as volcanic products of the Younger Edifice of pre-caldera (Kawanabe, 2008). However, the history older than this period has not been well studied. Here, we present new data on the identification of marker tephra originated from other areas and ¹⁴C ages within volcanic products of the Younger Edifice of pre-caldera around the Funoh-Falls in the east coast region, Izu-Oshima Island.

Along the east coast of the island, a steep coastal cliff with a height of >350 m develops, exposing products of the Younger Edifice of pre-caldera, Older Edifice of pre-caldera, and Fudeshima Volcano older than the Izu-Oshima Volcano (Issiki, 1984; Kawanabe, 1998). Round the Funoh-Falls, the coastal cliff is composed of volcanic products of the Younger Edifice of pre-caldera unconformably underlain by lavas of the Fudeshima Volcano. The former is composed of lava and pyroclastic products, lacustrine, and fall-out tephra sandwiching lava in descending order. Issiki (1984) also reported a biotite bearing rhyolitic volcanic ash layer in the lowest part of the lacustrine.

We examined this ash layer and defined as the Funoh-Falls ash layer. In addition, we detected volcanic glass shards in the volcanic soil deposits immediately below the lacustrine (here, defined as the Funoh-Falls Lake Sediments). Two horizons for carbon dating on peaty sediments in the Funoh-Falls Lake Sediments (1.5 m above the Funoh-Falls ash layer) and one horizon in the volcanic soil deposits below the Funoh-Falls Lake Sediments have been carried out. The Funoh-Falls ash layer contains abundant pumice-type volcanic glass shards with the following chemical composition (mean); SiO₂: 78.14 wt %, CaO: 0.55 wt%, K₂O: 3.34 wt%, suggesting its source might be Kozushima or Niijima Volcanoes in north Izu Islands. Besides, the chemical composition of glass shards (pumice-type) in the volcanic soil deposits immediately below the lacustrine is broad SiO₂ content of 74.44–79.94 wt % and high K₂O content of 0.86–1.26 wt%, showing obvious difference from those of tephra from Kozushima and Niijima Volcanoes. ¹⁴C ages from peaty sediments above the Funoh-Falls ash layer and one horizon in the volcanic soil deposits below the Funoh-Falls Lake Sediments are 9231–9116 cal BC (46.5%) (9016–8842 cal BC (46.7%)) and 9692–9368 cal BC (92.0%), respectively.

We concluded that the Funoh-Falls ash layer and detected volcanic glass shards in the volcanic soil deposits are correlative to the Niijima-Miyatsukayama Tephra (L: 12.8 ka; Kobayashi et al., submitted) and Omurodash-1 Tephra (10 ka; Saito et al., 2007; Tani et al, 2017), respectively. Both tephra have been

already correlated to O55 and O58 exposed at the Great Cut of Beds in SW part of the island. This findings imply that the formation of east volcanic edifice of the Younger Edifice of pre-caldera, composed of lava flows (>8 units) (Isshiki, 1984) and products, occurred before and after 11—12 ka. The Funoh-Falls Lake Sediments deposited at the elevation of >200 m at that time (present elevation is ca. 180 m) indicates a favorable depositional condition of lake sediment such as marsh occurred. Nakamura (1978) suggested that a lake was temporally formed by connecting of the Fudeshima Volcano with the Izu-Oshima Volcano expanded from west. The period of volcanic edifice of the Younger Edifice of pre-caldera can be determined by the age of unconformity between them, and it is an issue in future to solve for constructing the history of the Izu-Oshima Island.

Keywords: Izu-Oshima, Pre-caldera Volcano, lacustrine, tephra