

# 宮崎平野に分布するテフラから推定される 過去 60 万年間の霧島火山の爆発的噴火史

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## The Past 600 ka Explosive Eruptive History of Kirishima Volcano Based on Tephra Layers in Miyazaki Plain, Southern Japan

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### Abstract

The study investigates the past 1 Ma tephrostratigraphy of the Miyazaki plain in southern Japan. There are over 50 tephra layers, 80% of which originate from Kirishima volcano 25 km west of the plain. Several widely spread marker tephra layers in the layers and fission-track dating are used to establish tephrochronology. The explosive eruptive history of the volcano was reconstructed on the basis of tephrostratigraphy and tephrochronology. The history has two volcano groups: Pre-Kirishima 900–600 ka and Kirishima 600–0 ka. Pre-Kirishima volcanoes are unknown in detail.

Kirishima volcano is divided into the Older Kirishima volcano, 600–330 ka, and the Younger Kirishima volcano, 330–0 ka.

The Older Kirishima is characterized by calder-forming eruptions and large-scale pyroclastic flows, > 100 km<sup>3</sup> in volume. Older Kirishima consists of four stages: O1 (600–530 ka), O2 (530–520 ka), O3 (520–340 ka), and O4 (340–330 ka). The tephra of O1 includes over five crystal-enriched ash fall layers, which indicate that vulcanian and phreatomagmatic eruptions occurred intermittently at that stage. O2 is the first calder-forming stage, in which the Kobayashi-Kasamori pumice fall and pyroclastic flows and Kobayashi caldera were formed. The pumice falls and a co-ignimbrite ash fall of the pyroclastic flow were dispersed over 1000 km east of the source, and covered the western half of the main island of Japan. O3 tephra layers are composed of over ten tephra layers formed by intermittent plinian and phreatomagmatic eruptions. The latter indicates that lakes emerged in the caldera. O4 stage is a large-scale eruption with the Kakuto pyroclastic flow and Kakuto caldera forming. The Kakuto pyroclastic flow was accompanied by a pumice fall and a scoria fall. They were small-scale scatterings near the source from small-scale eruptions, while the co-ignimbrite ash fall reached Kanto, which is 1000 km east of the source.

The Younger Kirishima began with intermittent pumice and scoria falls soon after the O4 stage. The Younger Kirishima forms the main landform in the Kirishima volcano. Most of the Younger Kirishima tephra layers of more than twenty scoria and pumice falls were caused by plinian and sub-plinian eruptions accompanied by lava flows. The activity of the Younger

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Kirishima volcano is subdivided into four stages: Y1 (330–130 ka), Y2 (130–50 ka), Y3 (50–30 ka), and Y4 (30–0 ka) on the basis of thick soil and erosive horizon, which suggest quiet volcanic activity with no eruptions or only lava flow eruptions. Y1 includes over five tephra layers from sub-plinian eruptions in the western part of Kirishima volcano. There is a long quiet period between 240 ka and 130 ka. Y2 has six scoria falls, which show sub-plinian eruptions in the western part of the volcano. Y3 tephra is composed of Uchiyama pumice fall, Iwaokoshi pumice fall, and Awaokoshi scoria fall. Iwaokoshi from Onaminoike 40 ka old and Awaokoshi from Hinamori-dake 30 ka old, were much larger eruptions than other tephra of the Younger Kirishima volcano. Forming stratovolcano at the source, they reach the Pacific Ocean and Miyazaki plain 50 km east of the source, while most of the Younger Kirishima tephra are distributed near Kirishima volcano. Y4 has more than ten pumice, scoria, and ash falls, which include historically recorded tephra layers. Of them, the Kirishima-Kobayashi pumice fall from Karakuni-dake 16.7 ka spread over the widest area, covering half of the Miyazaki plain and reaching the Pacific Ocean.

**Key words:** Kirishima volcano, tephra, stratigraphy, pumice, scoria, ash, pyroclastic flow  
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