

Formation history and active age of Iwaonupuri Volcano of Niseko volcanic group, southwestern Hokkaido, Japan

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Niseko volcanic group (NVG), located at the northern part of southwestern Hokkaido, is Quaternary volcanoes composed of stratovolcanoes and lava domes. There are some previous geological studies about NVG (Hirokawa and Murayama, 1955; Oba, 1960; NEDO, 1986, 1987). It is revealed that NVG started its activity at 1.6 Ma and the active area had moved from west to east. It is believed that Iwaonupuri volcano is the youngest volcano in NVG on the basis of the fresh morphology as well as fumarolic activity. Okuno (2003) reported the ^{14}C age from the soil beneath Iwaonupuri tephra: ca. 6 ka. However, he also indicated the low reliability of this ^{14}C age, and the source and eruption style of this tephra are still unclear. Therefore, in order to reveal the eruptive history and eruption style of the NVG, especially in Holocene epoch, we performed geological study about NVG.

Iwaonupuri and Nitonupuri have been considered as the youngest volcanoes in NVG. The rocks of both volcanoes are andesite, containing plagioclase, clinopyroxene, orthopyroxene, and magnetite phenocrysts. In addition, the rocks of Nitonupuri have hornblende. On whole-rock chemistry, Iwaonupuri can be clearly distinguished from Nitonupuri on many Harker diagram. According to vent location, stratigraphical relationships, petrological features, it is considered that these two volcanoes are the distinct ones. Therefore, we define the volcano has been active after the activity of Nitonupuri as Iwaonupuri, which is the youngest one in NVG.

Iwaonupuri (1,116 m a.s.l.) is located at the eastern part of NVG. This volcano has been built on the east of Nitonupuri, composed of a pyroclastic cone and several lava domes and lava flows. Iwaonupuri Big Crater pyroclastic cone (IBC) with a crater (ca. 1 km in diameter) locates at the western part of Iwaonupuri. Sho-Iwaonupuri lava dome (SI) exists in this crater. IBC and SI are covered with the Dai-Iwaonupuri volcanic edifice (DI). DI consists of the lower lava dome and the upper lava flows distributed from the summit to the east. In addition, several small craters such as Gosikionsen crater are found in the whole area of Iwaonupuri. Iwaonupuri volcano can be divided into five units on the basis of stratigraphic relationship, eruption style and the location of the eruptive center: IBC pyroclastic rocks, SI lava dome, DI lower lava dome, DI upper lava flows, and Iwaonupuri phreatic explosion breccia in ascending order. The activity of Iwaonupuri started with forming IBC. At first, phreatic eruptions occurred. After that, its activity changed to the magmatic eruptions, forming eruption column and generation pyroclastic flows intermittently. This activity provided Nslw-1 tephra found by Okuno (2003). The thickness as well as the grain size of component in this tephra become larger from east to west, suggesting that this tephra can be correlate with IBC. In this study, we obtained two ^{14}C ages: 9480 cal.yBP from the charcoal in the pyroclastic flow and 10910 cal. yBP from the soil beneath the Nslw-1 tephra. Accordingly, it is concluded that Iwaonupuri started its eruptive activity about 9,500 years ago and has extruded lava domes and lava flows repeatedly. It is also considered that phreatic and phreatomagmatic eruptions were occurred contemporaneously, to form many explosion craters in the whole area. Although the latest magmatic eruption is DI upper lava flows from the summit, the phreatic eruptive activity would have continued after this eruption. Actually, we obtained “Modern” as the result of the ^{14}C age from a layer of explosion breccia near Gosikionsen spa. In this study, we revealed the age of the initial stage of Iwaonupuri eruptive activity. Considering the eruption age at 9,500 years ago, the growth history of volcano and the existence of many young explosion craters, it is probable that Iwaonupuri is the volcano with high level of activity through Holocene epoch.

Keywords: Iwaonupuri, formation history, active volcanoes, geology, radiocarbon dating, Niseko volcanic group