

A Fallout Tephra from Tenchozan Volcano, Shiretoko Peninsula, Hokkaido, Japan

Yoshihiko GOTO*

(Received March 4, 2011; Accepted September 7, 2011)

Mt. Tenchozan, located on the Shiretoko Peninsula, eastern Hokkaido, Japan, is a Quaternary andesitic volcano with crater chains on its summit. This paper reports on a fallout tephra (the Ten-a tephra) extruded from the volcano. The tephra extends from the summit area of the volcano to the eastern shore of the peninsula, and is composed of pyroclastic lithic fragments, minor juvenile pumice and ash. The tephra increases in thickness and grain size toward the summit of the volcano. Radiocarbon dating of a buried soil located immediately beneath the tephra yields an age of 1930 ± 40 years BP, and a calibrated calendar age of 1960–1810 cal BP (2σ , 95% probability). The distribution, components and radiocarbon age of the tephra suggest that phreatomagmatic eruptions took place at the summit of the volcano at ca. 1900 years BP, resulting in the formation of the crater chains.

Key words: fallout tephra, radiocarbon age, crater chain, Tenchozan Volcano, Shiretoko Peninsula

1. Introduction

Mt. Tenchozan is a Quaternary andesitic volcano located on the Shiretoko Peninsula, eastern Hokkaido, Japan (Fig. 1). The volcano has two crater chains on its summit (Fig. 2, Moriya, 1984; Katsui *et al.*, 1985). The craters display well-preserved, primary morphological features, suggesting a series of eruptions occurred in recent geological time. However, the timing of the eruptions remains unknown. This paper reports on the distribution, components and radiocarbon age of a fallout tephra extruded from the volcano, and discusses the timing of the crater-forming eruptions.

2. Tenchozan Volcano

Tenchozan Volcano is located 4.5 km southwest of Rausu Volcano (Fig. 2A). It reaches an elevation of 1046 m above sea level and has a base diameter of 2.5×4 km (Fig. 2A). The volcanic edifice is flat-topped with steeply sloping sides and is composed of andesitic lavas (Tenchozan Lavas, Fig. 2). The lavas retain their primary morphological features, including curved flow fronts, and consist mainly of hypersthene–augite andesite. Table 1 lists the whole-rock major-element chemical composition of the andesite (sample numbers Ten-13, -14, -15, -16, -18, -20), which contains 57–61 wt.% SiO_2 .

There are two chains of explosion craters on the summit (Fig. 2B, Katsui *et al.*, 1985). The northern

chain trends southwest–northeast, extends for 1800 m, and consists of 10 explosion craters. Each crater is circular to elliptical in plan view, 100–250 m in diameter, and 30–70 m deep. Some craters are connected to each other. Larger craters are filled with water (Fig. 3A and 3B). The southern chain trends southwest–northeast to west–east, extends for 700 m, and consists of four explosion craters. Each crater is elliptical in plan view, 70–100 m in diameter, and 20–30 m deep. At present, the craters in both chains contain no active fumaroles. Historical records make no mention of volcanic eruptions from these craters.

3. Fallout Tephra extruded from Tenchozan Volcano

3-1 Nomenclature

The newly identified fallout tephra extends from the Tenchozan summit to the eastern shore of the Shiretoko Peninsula. Outcrop locations are shown in Figure 2. In this paper, the tephra is referred to as the ‘Tenchozan-a tephra’ (Ten-a tephra) (Goto *et al.*, 2005; Nakamura *et al.*, 2008; Goto, 2009). The type locality is in a gully located 100 m east of Shiretoko Pass (Loc. 1 in Fig. 2, latitude $44^\circ 03' 17''$ N, longitude $145^\circ 06' 24''$ E), where the tephra is located approximately 30 cm beneath the surface (Fig. 4).

3-2 Description

At the type locality, the Ten-a tephra is a 50 cm thick, pale brown, massive (non-stratified) pyroclastic deposit,

*College of Environmental Technology, Graduate School of Engineering, Muroran Institute of Technology, Mizumoto-cho 27-1, Muroran, Hokkaido 050-8585, Japan.

Corresponding author: Yoshihiko Goto
e-mail: ygoto@mmm.muroran-it.ac.jp