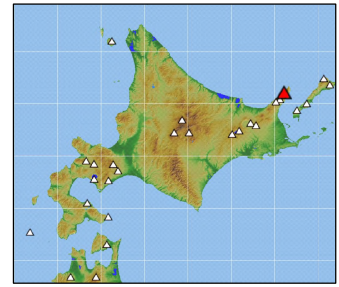


## 1. Shiretoko-Iozan

Latitude: 44°08'00" N, Longitude: 145°09'41" E, Elevation: 1,562 m (Iozan)  
(Triangulation Point)

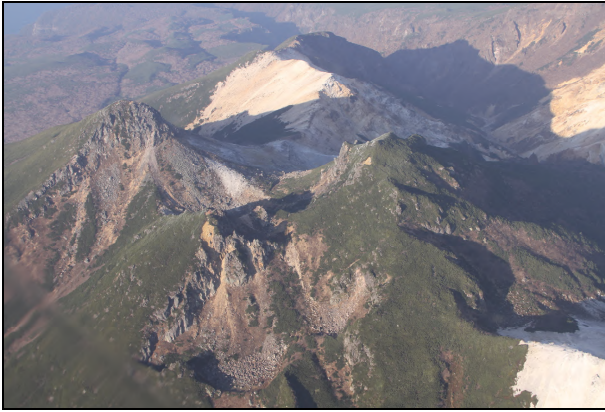


Overview of Shiretoko-Iozan -taken from northwest side on October 19, 2011 by the Japan Meteorological Agency

### Summary

Shiretoko-Iozan is an andesite (The  $\text{SiO}_2$  content is between 53.6 and 60.3 wt %) stratovolcano. It is the largest of the Quaternary volcanoes on the Shiretoko Peninsula, and became active at least 240,000 years ago. This stratovolcano formed by the ejection of andesite lavas and pyroclastic materials. The volcano has two large craters at its summit (Minamidake Crater and Higashidake Crater). When the Minamidake Crater formed, a debris avalanche occurred, and the Namakoyama Lava Dome formed within the crater. After the formation of the Namakoyama Lava Dome, the Nampo Lava Dome formed on the northern crater wall of the Minamidake Crater. An explosion crater located on the northwest slope (Chufuku Explosion Crater) has frequently exhibited distinctive activity, ejecting large amounts of molten sulfur (Katsui et al., 1982; Goto et al., 2000; Goto, 2009).

### Photos



Summit - from south side on October 19, 2011 by the Japan Meteorological Agency



Chuhuku Explosion Crater on the northwest slope from southwest side on October 19, 2011 by the Japan Meteorological Agency



Water Discoloration due to the flow of hot spring water from the Kamuiwakka river on October 19, 2011 - from southwest side by the Japan Meteorological Agency

### Topography around the Crater

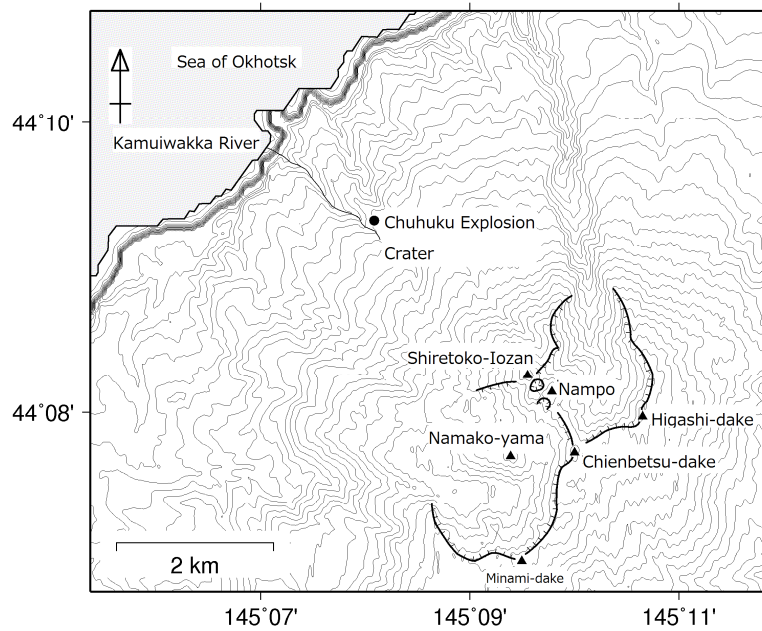


Figure 1-1 Detailed topography of the crater area.

Red Relief Image Map



Figure 1-2 Topography of Shiretoko-Iozan. 1:50,000 scale topographic maps (Yagihama, Rausu and Shiretoko Misaki) and digital map 50 m grid (elevation) published by the Geospatial Information Authority of Japan were used.

## Chronology of Eruptions

### ▪ Volcanic Activity in the Past 10,000 Years

An andesite stratovolcano was built since about 240,000 years ago. Approximately 4,000 years ago a sector collapse occurred at the summit, forming a horseshoe-shaped crater, and a debris avalanche cascaded down to the western foot of the volcano (Goto et al., 2011). Immediately after this, a lava dome formed at the bottom of the crater (Namakoyama Lava Dome). Much later, Lakes Shiretoko-Goko formed on the debris-avalanche deposit. The volcanic ash found near the coast at the eastern foot of the volcano may consist of ejecta resulting from a phreatic eruption of Shiretoko-Iozan between 1,400 and 300 years ago (Miyaji et al., 2000). Within recorded history, phreatic eruptions occurred at the Chuhuku Explosion Crater on the northwest slope of the volcano in 1857–1858, 1876, 1889–1890, and 1935–1936 (Katsui et al., 1982). These phreatic eruptions are characterized by discharging molten sulfur and hot water. The amount of sulfur produced by the 1935–1936 eruptions reached as much as several thousand tons per day, for a total emission of 200,000 tons, resulting in the Kamuiwakka River and the beach being covered in yellow sulfur. Fumaroles have been identified at this crater even now (confirmed by the Japan Meteorological Agency on October 19, 2011).

Period	Area of Activity	Eruption Type	Main Phenomena / Volume of Magma
1.4←→0.3ka	Unknown	Phreatic eruption	Pyroclastic fall. Details regarding amount of ejecta and eruption locations are unavailable.

\* Reference documents have been appended with reference to the catalog of eruptive events during the last 10,000 years in Japan, database of Japanese active volcanoes, and AIST (Kudo and Hoshizumi, 2006 ) for eruptive period, area of activity and eruption type. All years are noted in calendar years. "ka" within the table indicates "1000 years ago", with the year 2000 set as 0 ka.

A←→B: Eruption events taking place at some point between year A and year B

### ▪ Historical Activity

Year	Phenomenon	Activity Sequence, Damages, etc.
1857 (Ansei 4)	Phreatic eruption (molten sulfur overflow) <sup>1</sup>	Eruption from explosion crater on northwest slope, with a volcanic plume and discharge of sulfur into the sea.
1858 (Ansei 5)	Phreatic eruption	Eruption from explosion crater on northwest slope. A black plume rose from the volcano side, and explosions could be heard. <sup>1</sup>
1876 (Meiji 9)	Phreatic eruption	Eruption from explosion crater on northwest slope from September 24 to September 26. Flames destroyed 1000m <sup>2</sup> area (vegetation destroyed?).
1889 (Meiji 22)	Phreatic eruption (molten sulfur overflow)	On August 9, the northwest slope explosion crater began emitting a volcanic plume and a large amount of sulfur. Small explosions occurred repeatedly until October.
1890 (Meiji 23)	Phreatic eruption	On June 15, an explosion occurred at the northwest slope explosion crater, and the crater wall was destroyed. Hot water was emitted for approximately half a month.
1935 (Showa 10)	Phreatic eruption	Frequent small explosions at explosion crater on northwest slope in December.
1936 (Showa 11)	Phreatic eruption (molten sulfur overflow)	Eruption began at northwest slope explosion crater on May 4. The following volcanic activity occurred cyclically every 3 to 6 days until the end of October. (1) Discharge of molten sulfur (2) Explosive discharge of hot water and steam (3) Intermittent discharge of boiling water and steam (4) Dormant period Up to several tens of thousands of tons of sulfur were ejected each day. This sulfur was carried down the Kamuiwakka River and into the sea. Total sulfur discharge of approximately 200,000 tons.
1937 (Showa 12)	Hot water	Hot water boiled at bottom of northwest slope explosion crater in August.

\* Reference documents have been appended with reference to the catalog of eruptive events during the last 10,000 years in Japan, database of Japanese active volcanoes, and AIST (Kudo and Hoshizumi, 2006 ) for eruptive period, area of activity and eruption type.

## Major Volcanic Activities

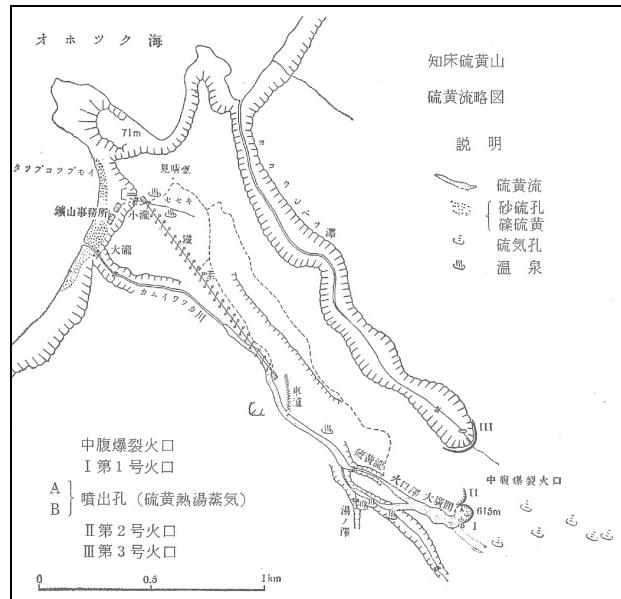


Figure 1-3 Schematic view of 1936 (Showa 11) sulfur flow (Watanabe and Shimotomai, 1937b).

## Recent Volcanic Activity

### ▪ Seismic Activity

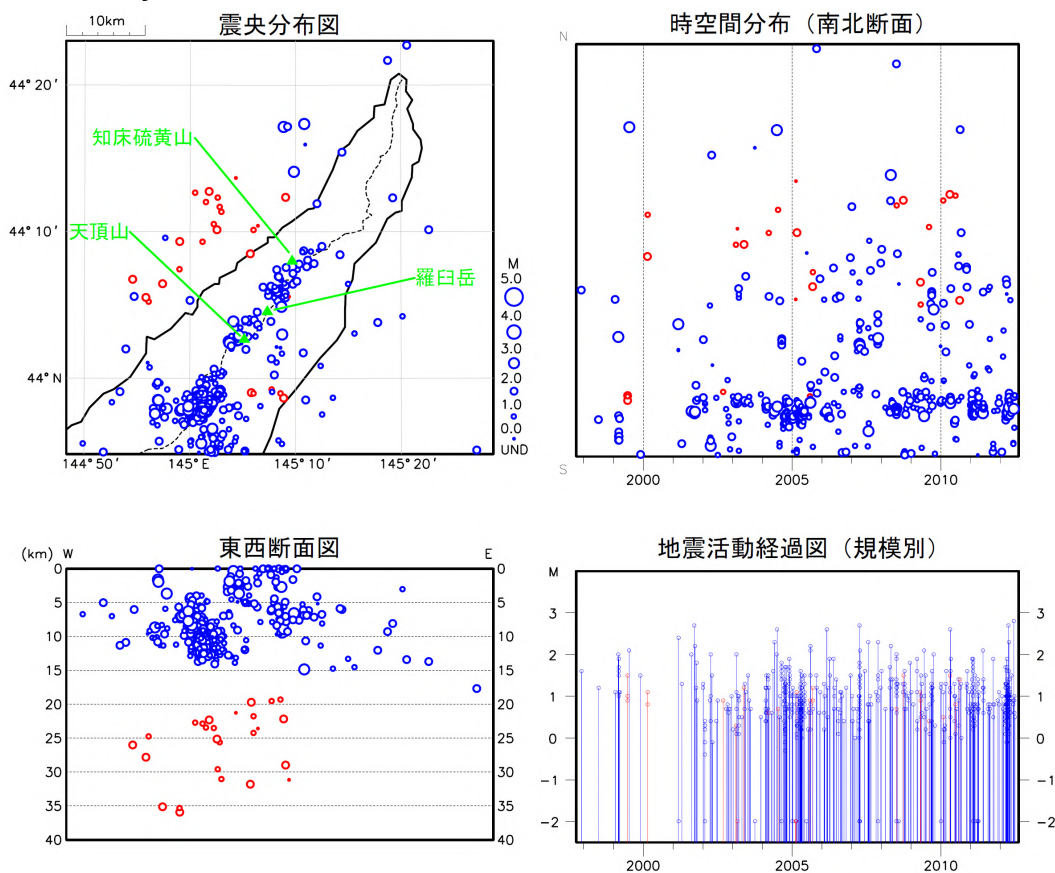


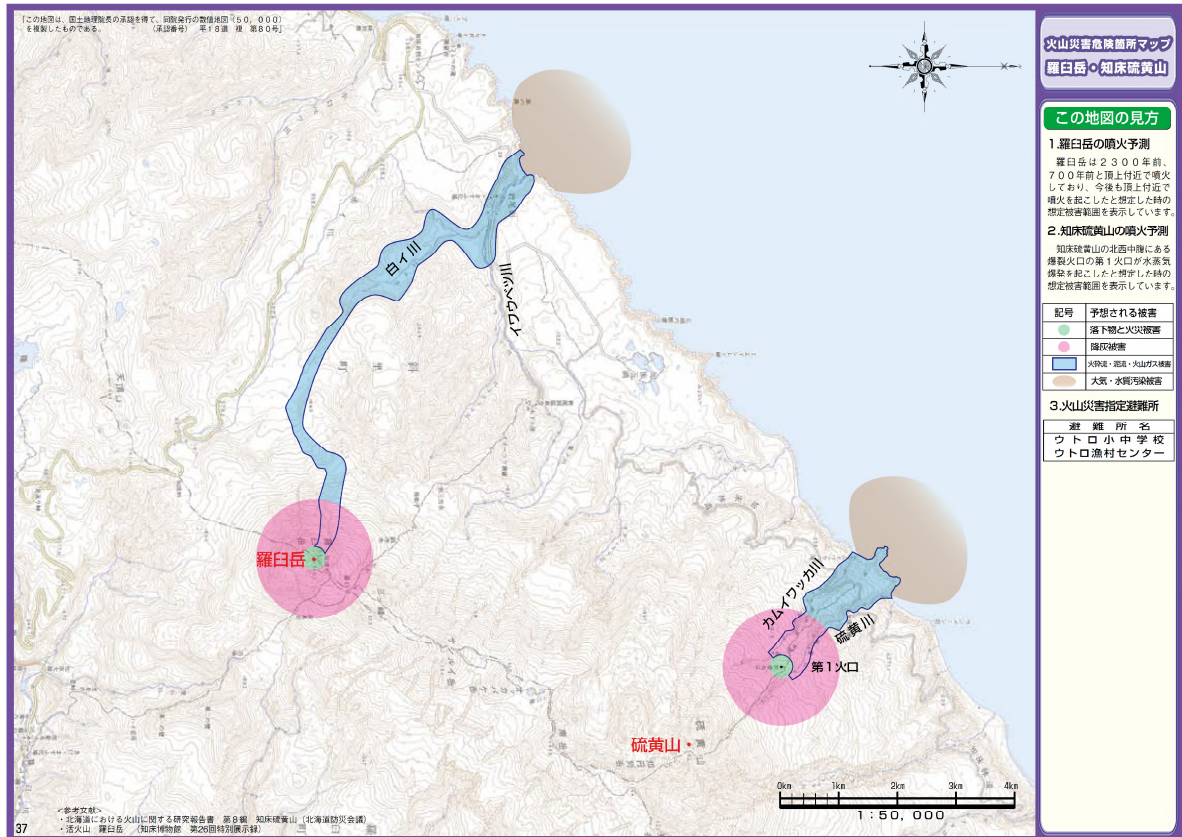
Figure 1-4 Activity of shallow VT earthquakes (blue circles) and deep low-frequency earthquakes (red circles) observed by a regional seismometer network (October 1, 1997, to June 30, 2012). Epicenter distribution (upper left), space-time plot (N-S cross-section) (upper right), E-W cross-section (lower left) and magnitude-time diagram (lower right).

# Information on Disaster Prevention

## ① Hazard Map

Volcano Disaster Danger Location Map - Shari - Revision of overall April 2011 disaster map

[http://www.town.shari.hokkaido.jp/02life/20bousai\\_yobou/20bousaimap/kazan.html](http://www.town.shari.hokkaido.jp/02life/20bousai_yobou/20bousaimap/kazan.html)



## **Social Circumstances**

### ① Populations

- Rausu side: Rausu Town population 5,955 (as of November 30, 2011, according to family registers)
- Shari side: Shari Town population 12,600 (as of November 30, 2011, according to basic resident registers)

### ② National Parks / Quasi-National Parks / Number of Climbers

- Shiretoko National Park

Rausu side - Number of sightseers per year: 599,275 (according to 2010 sightseer admission number survey)

Shari side - Number of sightseers per year: Approx. 1,200,000 (according to 2010 Commerce, Industry and Tourism

Section, Town of Shari)

- Shiretoko-Iozan

Rausu side - Number of mountain-climbers per year: Unknown

Shari side - Number of mountain-climbers per year: 635

(according to Commerce, Industry and Tourism Section, Town of Shari for special road usage period from June 25 to August 25, 2011)

### ③ Facilities - None

# Monitoring Network

## Wide Area

\* Monitoring sites with multiple observation instruments are indicated by small black dots and other symbols indicate types of monitoring.



1:200,000 scale regional maps (Shiretoko Misaki, Abashiri, Shari and Shibetsu) published by the Geospatial Information Authority of Japan were used.

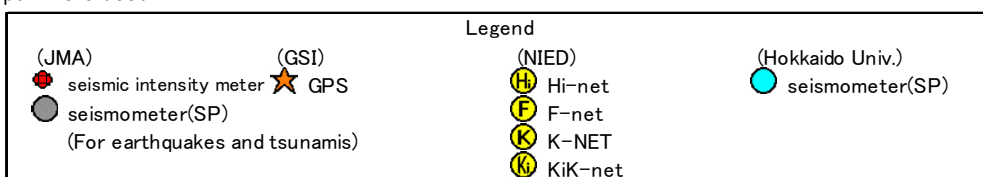


Figure 1-5 Regional monitoring network.



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Watanabe, T. and Shimotomai, T. (1937b) Hokkaido Geol. Rep. **9**, 1-37 (in Japanese).

(Goto, Y.)