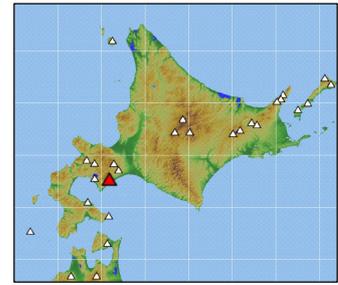


14.Kuttara

Continuously Monitored by JMA

Latitude: 42°30'19" N, Longitude: 141°08'40" E, Elevation: 377 m
(Hiyoriyama) (Elevation Point)

Latitude: 42°29'29" N, Longitude: 141°09'35" E, Elevation: 549 m (Shihorei)
(Triangulation Point - Onsenzan)



Kuttara from front to back: Jigokudani, Oyunuma, Hiyoriyama, taken from south side on July 19, 2011 by the Japan Meteorological Agency

Summary

Kuttara is a stratovolcano, consisting of basalt and andesite (The SiO₂ content is between 50.0 and 75.1 wt %). Until approximately 45,000 to 80,000 years ago, repeated large eruptions occurred at multiple craters, accompanied by pyroclastic flows. The activity leading up to approximately 40,000 years ago produced a circular caldera with 3 km in diameter (Moriizumi, 1998).

The Noboribetsu volcano is a post-caldera volcano, located at the western foot of the Kuttara volcano. Jigokudani and Oyunuma are explosive crater groups formed by phreatic eruptions. Hiyoriyama is a dacitic lava dome. Fumarole and geothermal activity continue in the Hiyoriyama explosion crater.

Photos and Topography around the Crater



Area around Oyunuma, taken from northeast side on June 19, 2011 by the Japan Meteorological Agency



Jigokudani, taken from southwest side on May 22, 2007 by the Japan Meteorological Agency



Hiyoriyama Summit Explosion Crater, taken from southeast side on April 26, 2011 by the Japan Meteorological Agency



Lake Kuttara, taken from east side on February 15, 2010 by the Japan Meteorological Agency



Camera image of 414 m Mountain on October 31, 2011 - by the Japan Meteorological Agency

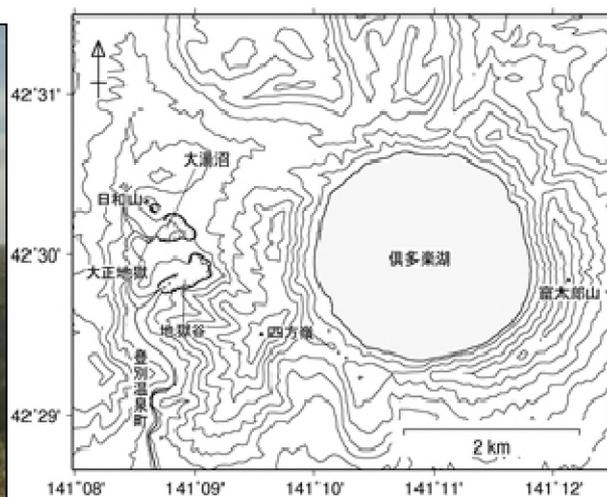


Figure 14-1 Topography around the crater

Red Relief Image Map

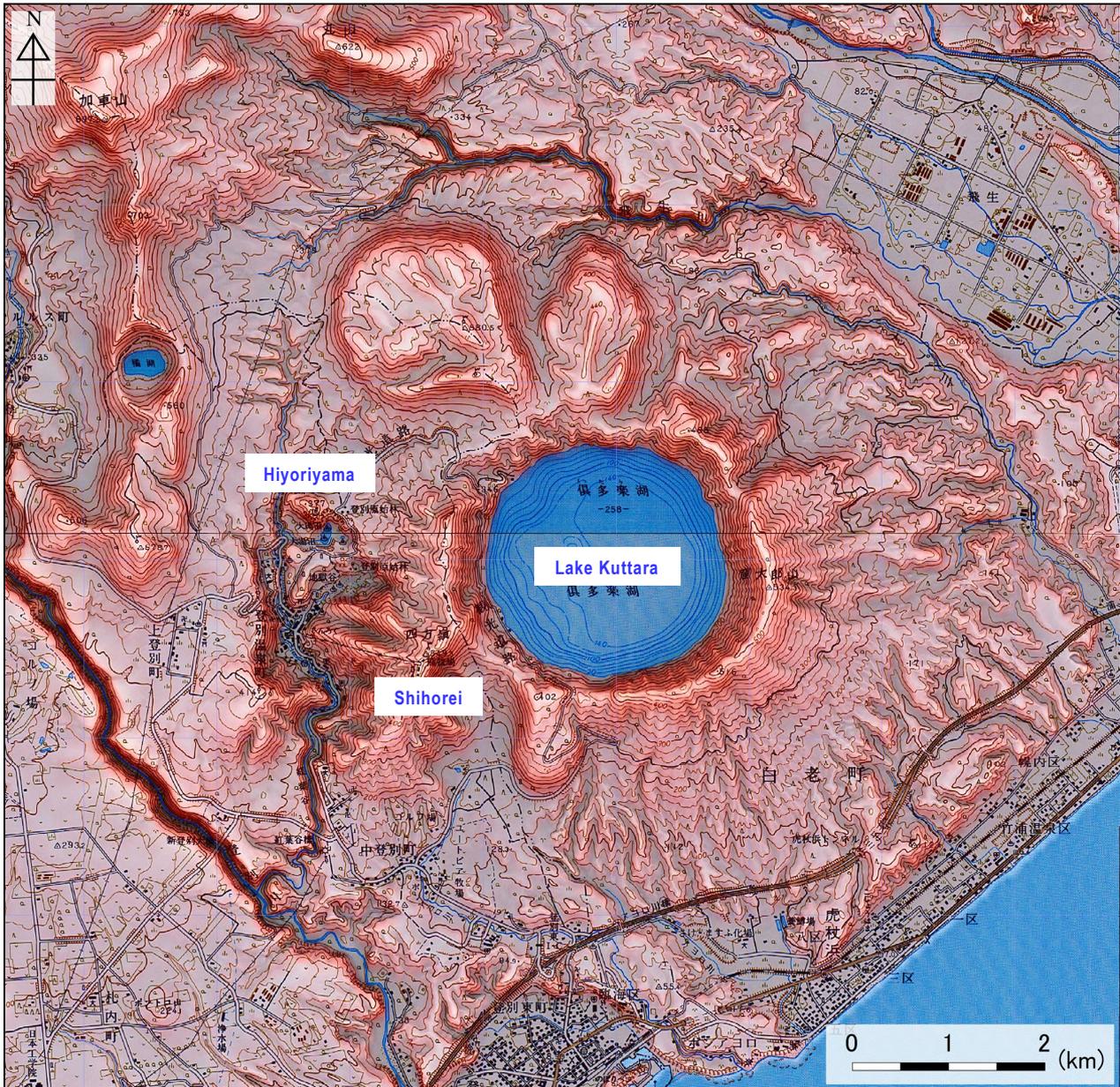


Figure 14-2 Topography of Kuttara.

1:50,000 scale topographic maps (Noboribetsu Onsen and Tokushunbetsuyama) 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

After the formation of the Hiyoriyama lava dome by volcanic activity, which began at the western foot of the volcano approximately 15,000 years ago, repeated phreatic eruptions began approximately 8,000 years ago, resulting in the formation of Oyunuma and Jigokudani. The most recent eruption formed the Hiyoriyama - Oyunuma - Urajigoku crater chain. The deposits from this eruption cover the volcanic ash deposited by the 1663 eruption of Usuzan, so the most recent volcanic activity is estimated to have occurred approximately 200 years ago (Katsui et al., 1988; Toriguchi et al., 2005; Goto and Danhara, 2011; Goto et al., 2011).

Period	Area of Activity	Eruption Type	Main Phenomena / Volume of Magma
10←→1.7ka	Oyunuma or Jigokudani	Phreatic eruption	7 eruptions occurred during this period (all with tephra fall).
1.9←→1.7ka	Oyunuma or Jigokudani	Phreatic eruption	Pyroclastic fall.
0.2ka	Hiyoriyama - Jigokudani - Urajigoku crater chain	Phreatic eruption	Tephra fall (Noboribetsu air-fall pyroclastic deposits). Total ejecta: $1.7 \times 10^5 \text{ m}^3$. (VEI 1)

* 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

There are no records of volcanic activity.

Major Volcanic Activities

▪ Eruption Approximately 200 Years Ago

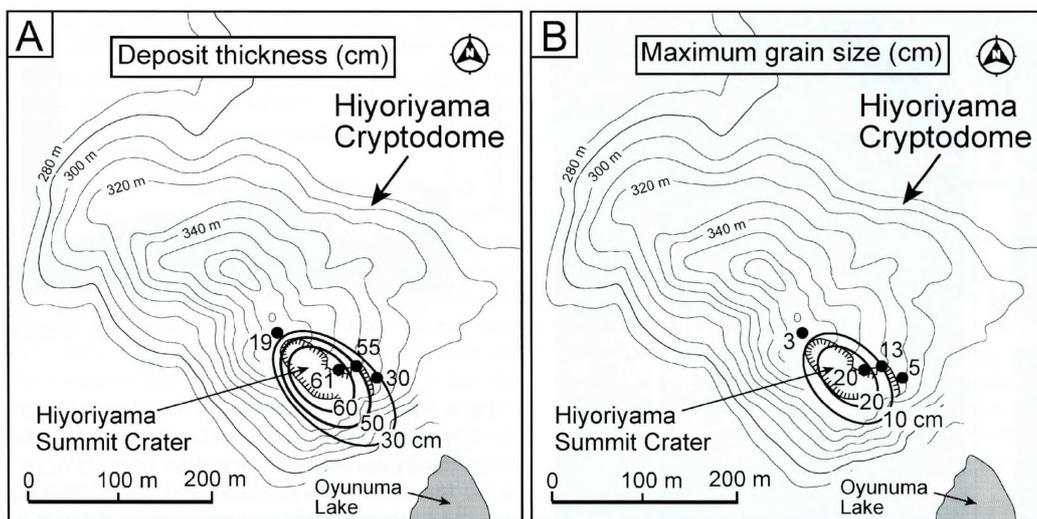


Figure 14-3 Distribution of tephra at the formation of Hiyoriyama summit crater (Goto et al., 2011).

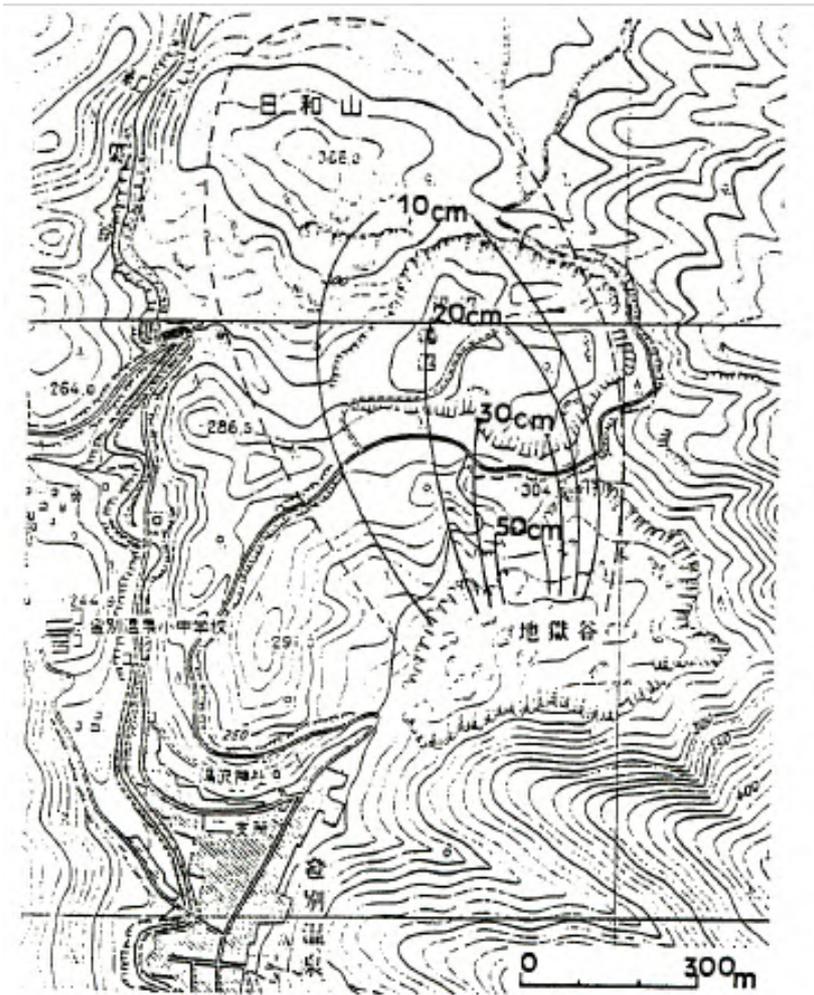


Figure 14-4 Distribution of ejecta from eruption at Jigokudani explosion crater, approximately 200 years ago (Katsui et al., 1988).

Recent Volcanic Activity

• Time series of activity

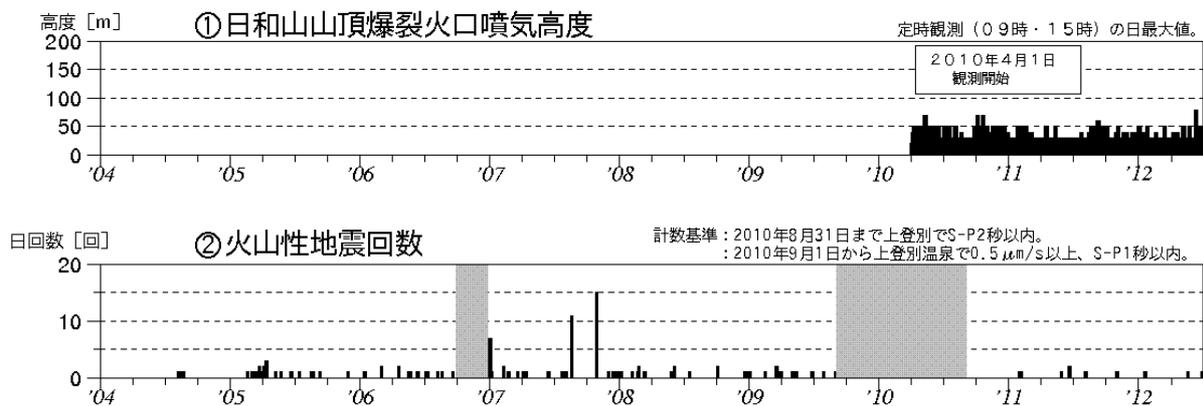


Figure 14-5 Volcano activity (January, 2004 to June, 2012).

Gray areas indicate the period of missing data

① Fume heights at Hiyoriyama

② Number of volcanic earthquakes

▪ Seismic Activity

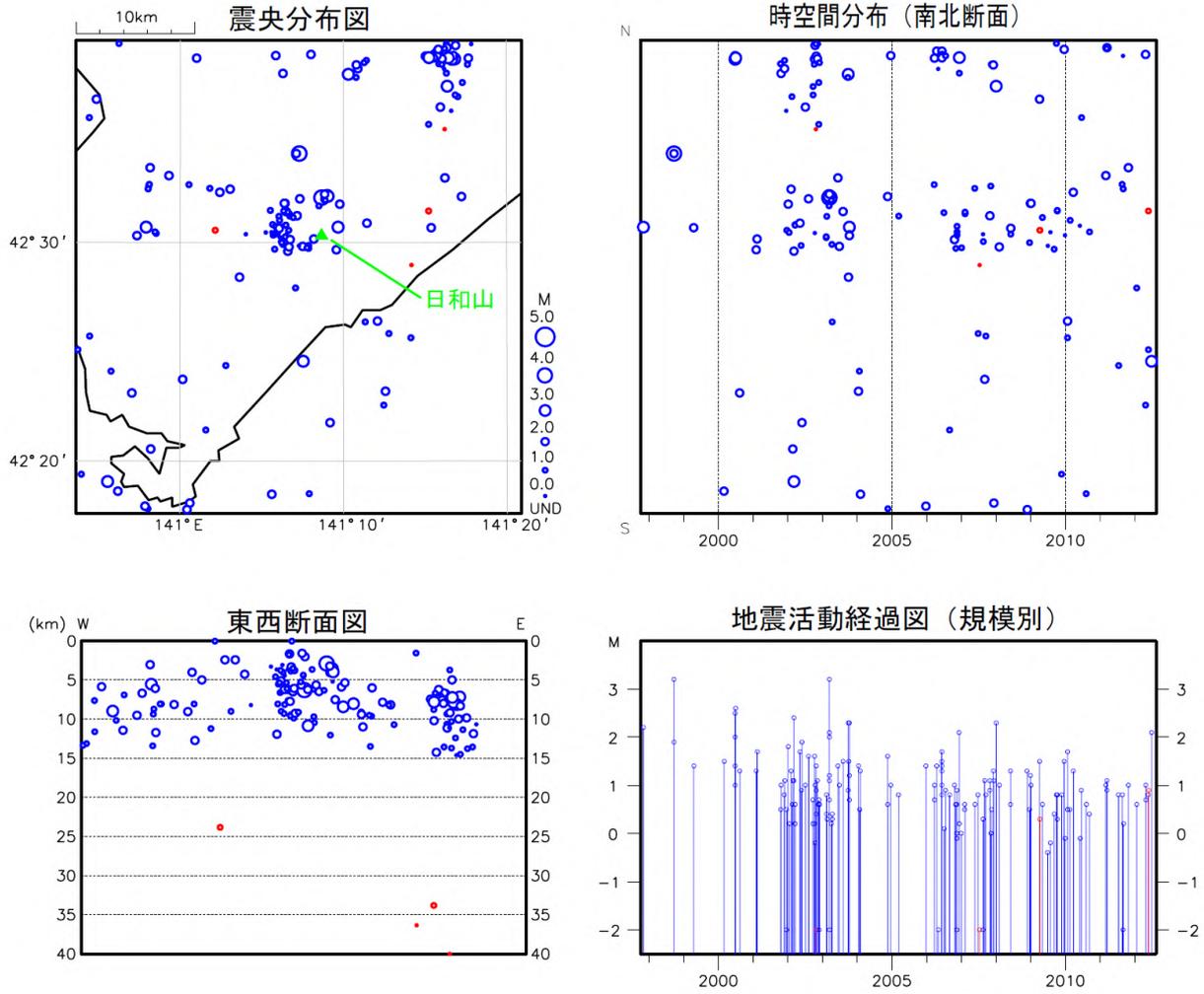


Figure 14-6 Activity of shallow VT earthquakes (blue circles) and deep low-frequency earthquakes (red circles) observed by a regional seismometer network (October 1, 1997, to June 30, 2012). Epicenter distribution (upper left), space-time plot (N-S cross-section) (upper right), E-W cross-section (lower left) and magnitude-time diagram (lower right).

▪ Temperatures at the Hioryiyama Fumarole

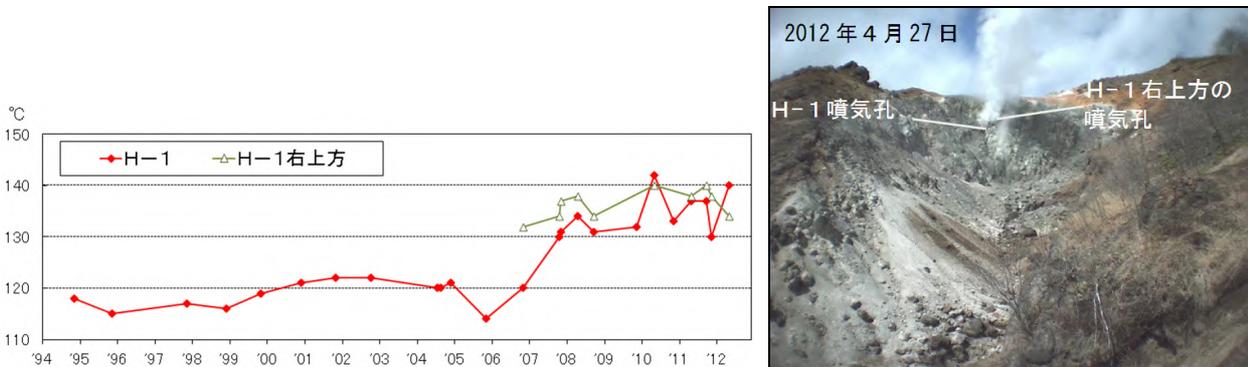
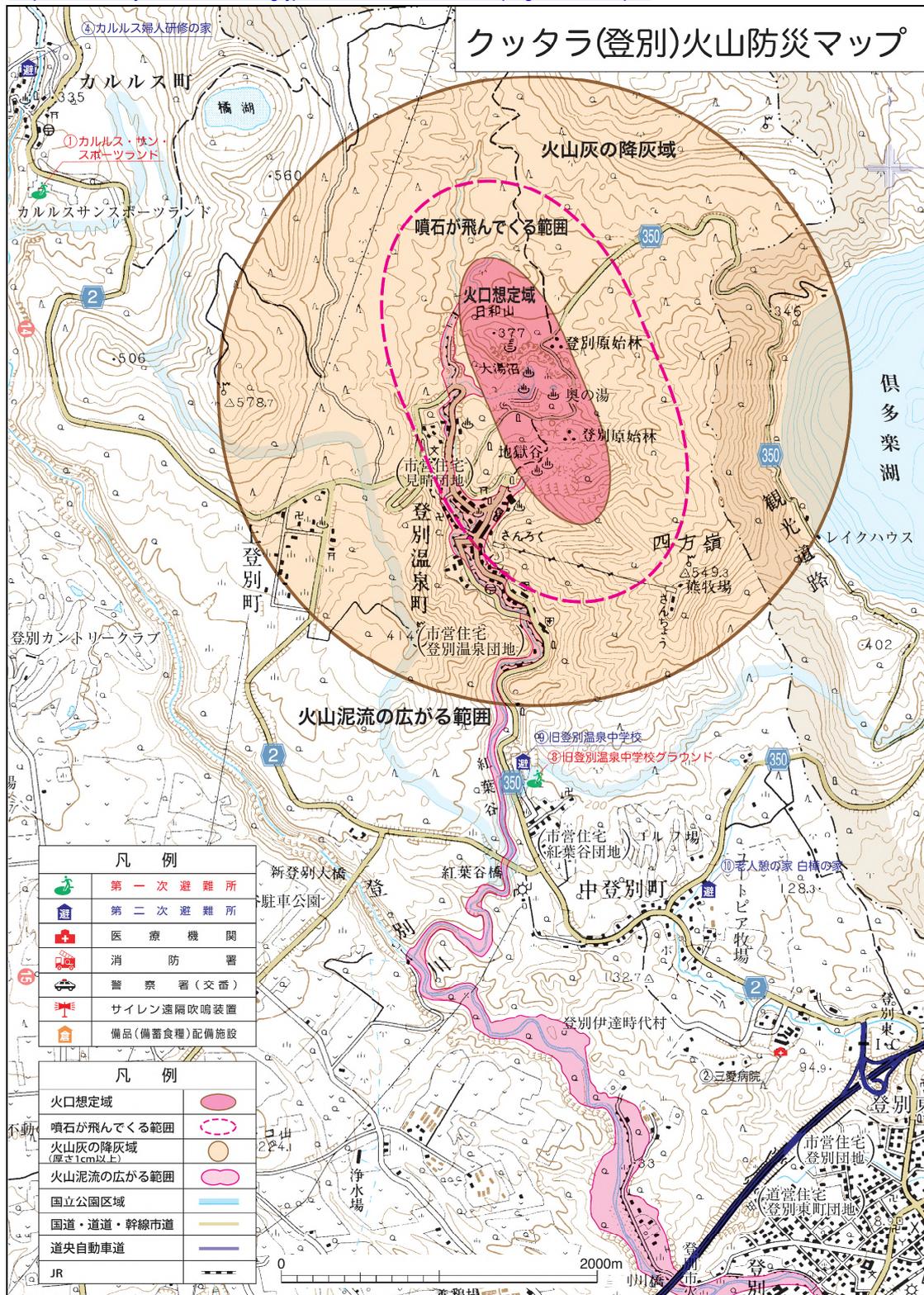


Figure 14-7 Time series of fumarole temperature at the summit crater of Hioryiyama (1994 to 2012).

Information on Disaster Prevention

① Hazard Map

Disaster Prevention Map - Protecting Yourself from Natural Disasters - Published by Noboribetsu in December, 2006
<http://www.city.noboribetsu.lg.jp/somu/bousai/hazard/page/kuttara.pdf>



Social Circumstances

① Populations

- Noboribetsu City:51,847 (25,002 households) (as of end of October, 2011)
- Shiraoi Town:19,357 (9,717 households) (as of end of October, 2011)

② National Parks, Quasi-National Parks, Number of Climbers

- Shikotsu-Toya National Park (Shikotsu, Jozankei, Noboribetsu areas)

Noboribetsu Onsen area estimated number of sightseers per year: 3,042,258 in 2010

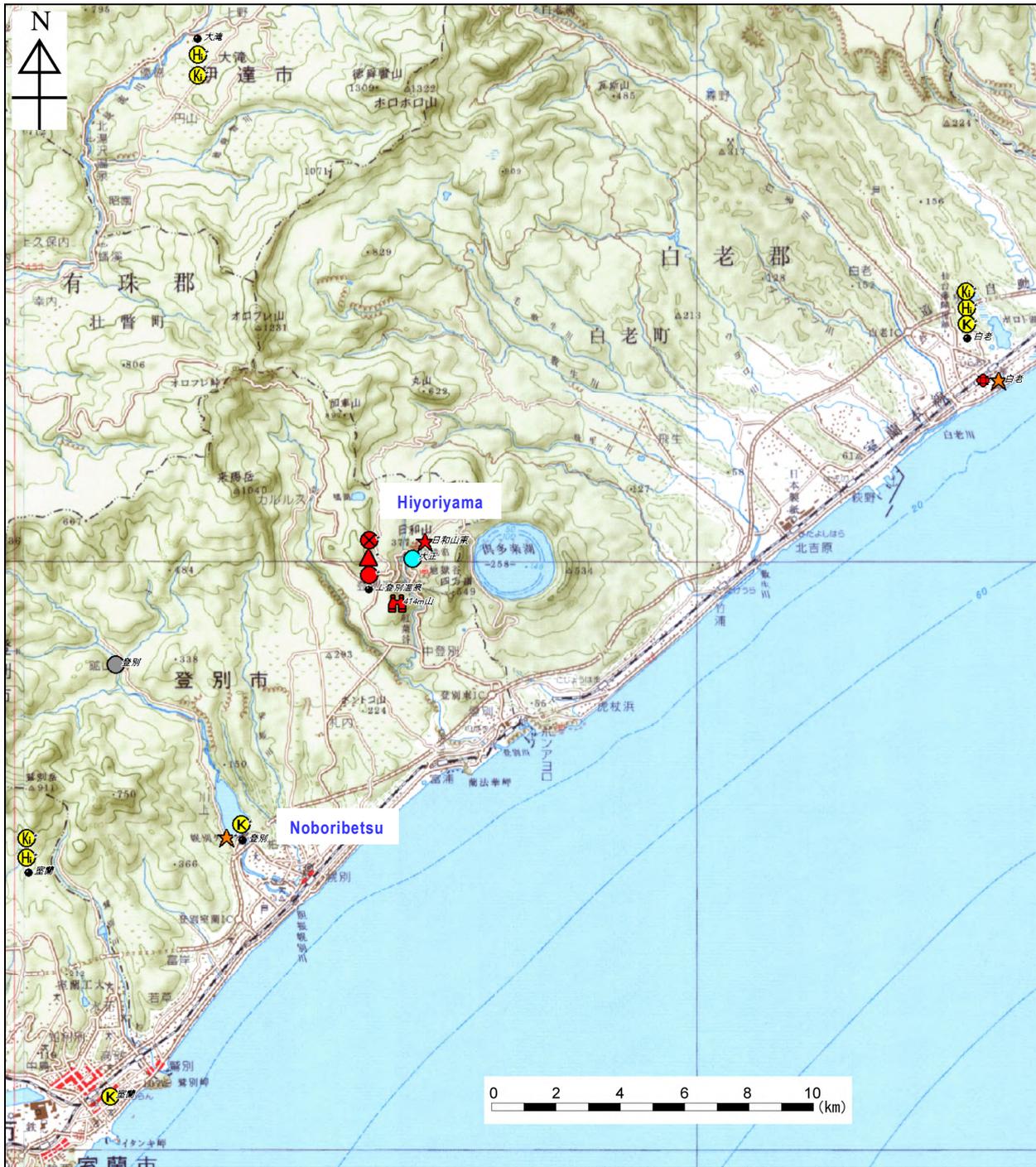
③ Facilities

- Noboribetsu City
 - Noboribetsu History Museum

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 (Tomakomai and Muroan) published by the Geospatial Information Authority of Japan were used.

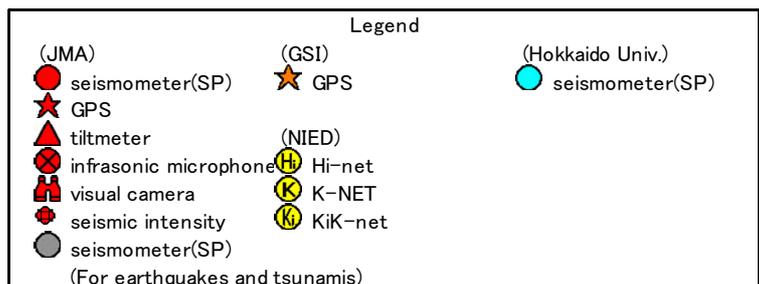


Figure 14-8 Regional monitoring network.

In and Around the Summit

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



1:50,000 scale topographic map (Noboribetsu Onsen, Tokushunbetsuyama and Shiraoi) published by the Geospatial Information Authority of Japan were used.

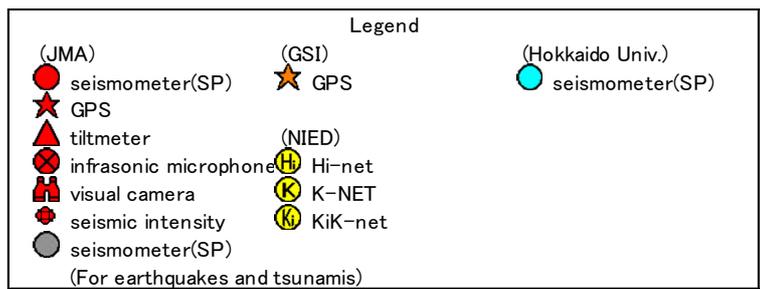


Figure 14-9 Local monitoring network.

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(Goto, Y., Murakami, M., and Nakagawa, M.)G