

25. Akita-Yakeyama

Continuously Monitored by JMA

Latitude: 39°57'50" N, Longitude: 140°45'25" E, Elevation: 1,366 m (Yakeyama)
(Triangulation Point)



Yunuma and Karanuma Area, taken from the southeast side on November 1, 2006 by the Japan Meteorological Agency. Karanuma is at the center, and Yunuma is at the upper left.

Summary

Akita-Yakeyama is a small, gently sloped (slope of 15° or less) stratovolcano, approximately 7 km in diameter, and with a relative height of approximately 700 m. The volcanic edifice is mainly of andesite. A summit crater (somma) 600 m in diameter is located at the summit area, and the Yakeyama summit (highest point) is located on its southwestern rim. The volcano has two dacite lava domes; one is the central cone, Onigajo dome, and the other on the southeastern rim of the crater. A flank volcano, Tsugamori, is located on the east side of the main volcanic edifice, discharging lava to the east. Another flank volcano, Kuroishimori, is located on the south side of the main volcanic edifice. The SiO₂ content is between 56.9 and 70.8 wt %.

The Yakeyama summit area exhibits strong alteration. Many hot springs are located in the summit crater and at the volcano foot. Tamagawa Onsen which is located at the western foot of the volcano is highly acidic hot spring, and is famous for the deposit, hokutolite (lead-bearing barite) which is designated as a special natural treasure. Climbers' accident by volcanic gas was reported. Within the recorded history, eruptions have occurred at Onigajo and the northern explosion crater, and lahar flowed from Karanuma.

Photos



Yunuma and Karanuma Area taken from the northwest side on October 23, 1997. At the center are Yunuma and Karanuma. At the bottom right is the source of Sakebizawa. Courtesy of T. Chiba.



The Source of Sakebizawa (Yunuma and Karanuma at the top), taken from the southwest side on November 11, 2006 by the Japan Meteorological Agency.



Yunuma Fumaroles, taken from the northeast side on October 4, 2011 by the Japan Meteorological Agency.



Fumarolic and geothermal area near the head of Sakebizawa, taken on October 4, 2011 by the Japan Meteorological Agency



Fumarolic and geothermal area at Yunuma, taken on October 4, 2011 by the Japan Meteorological Agency

Topography around the Crater

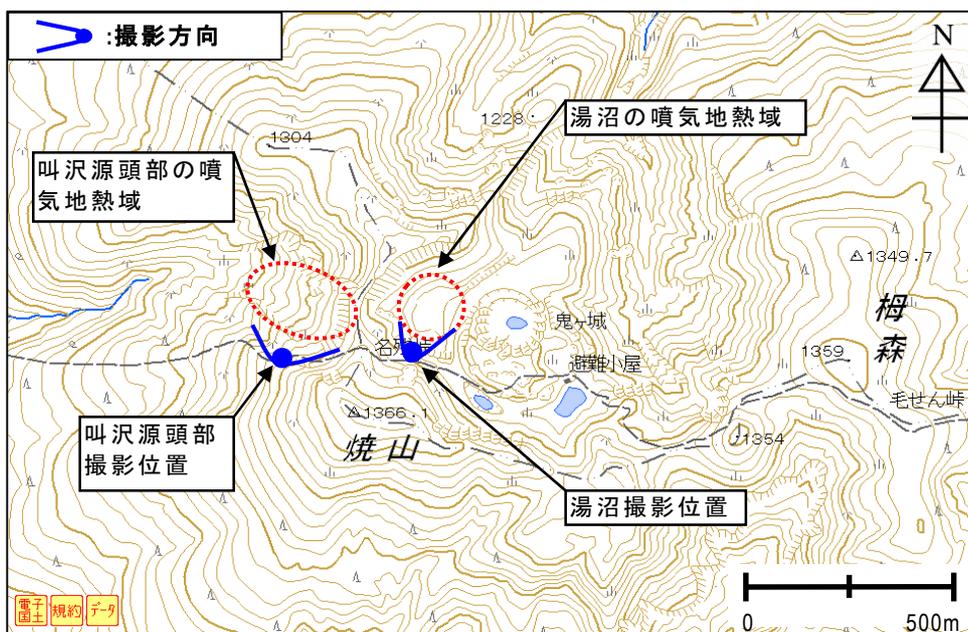


Figure 25-1 Topography around the summit crater and the volcanic situation as of October 4, 2011. Red dotted circles indicate geothermal areas.

The 1:25,000-scale digital map published by the Geospatial Information Authority of Japan was used to create this map.

Red Relief Image Map

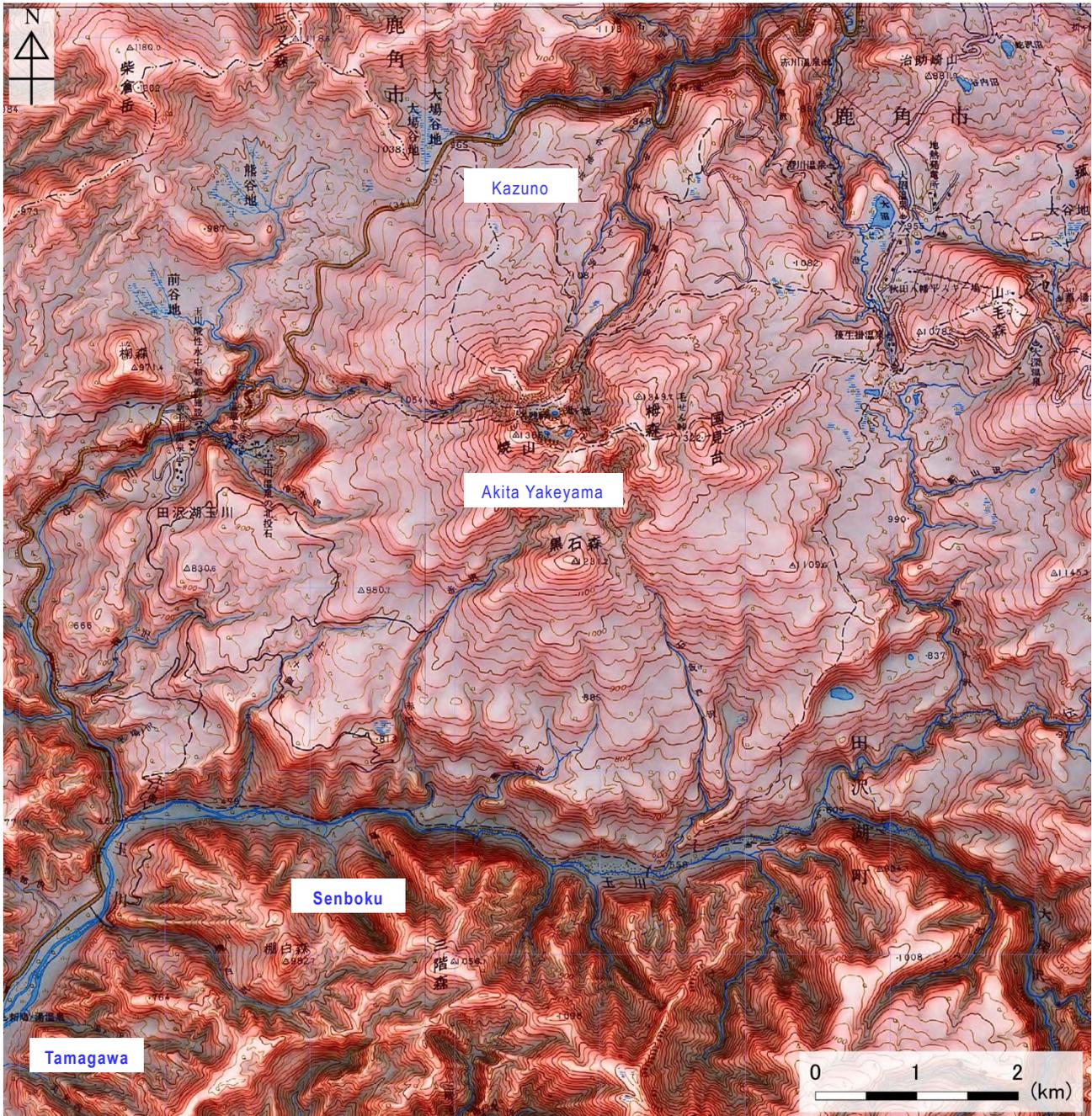


Figure 25-2 Topography of Akita-Yakeyama.

1:50,000 scale topographic maps (Moriyoshizan, Hachimantai, Okuzo, and Tayama) and digital map of 50m grid (elevation) published by the Geospatial Information Authority of Japan were used.

Chronology of Eruptions

▪ Volcanic Activity in the Past 10,000 Years

The Tsugamori western lava dome was formed at the summit approximately 2,500 years ago (Ohba, 1991). This was followed by, at least, three phreatic eruptions which occurred around the summit, in the 14th to 15th century, 15th to 17th century, and after the 17th century (Ito, 1998). Several small phreatic eruptions whose deposits have not been preserved are considered to have occurred within the historical period, but details of them are not known.

Period	Area of Activity	Eruption Type	Main Phenomena / Volume of Magma
3.4 to 3ka ⁶		Phreatomagmatic eruption ⁶	Tephra fall
1.385ka ¹²	Karanuma (Onigajo) crater ¹²	Phreatomagmatic eruption ¹²	Tephra fall

* 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.

▪ Historical Activity

Year	Phenomenon	Activity Sequence, Damages, etc.
807 (Daido 2)	Eruption?	Details unknown.
1310 to 1460	Phreatic eruption ⁶	Tephra fall.
1678 (Enpo 6)	Moderate: Phreatic eruption	On February 21 tephra fall. The eruptive activity occurred at the Karanuma (=Onigajo) crater. (VEI 2)
1867 (Keio 3)	Phreatic eruption?	Details unknown.
1887 (Meiji 20)	Phreatic eruption?	The eruptive activity occurred at the Karanuma (Hinuma) crater.
1890 (Meiji 23)	Phreatic eruption?	On September 23, tephra fall
1929 (Showa 4)	Phreatic eruption?	In September tephra fall
1948 (Showa 23)	Phreatic eruption?	Tephra fall. Mud scattered up to 5 to 7 km.
1949 (Showa 24)	Small-scale: Phreatic eruption (producing lahar)	During August 30 to September 1, tephra fall, lahar.
1951 (Showa 26)	Phreatic eruption	Approximately February. Air-fall tephra. The eruptive activity occurred at the Karanuma (Hinuma) crater. ¹ Mud scattering.
1957 (Showa 32)	Phreatic eruption? (Lahar produced)	Air-fall tephra, lahar.
1986 (Heisei 9)	Volcanic gas	Volcanic gas (H ₂ S) at Sakebizawa killed 1 person.
1997 (Heisei 9)	(Collapse) → phreatic eruption	May 11. Debris avalanche, landslide deposits, debris flow, air-fall tephra. The eruptive activity occurred at Sumikawa Onsen, at the northeastern foot of the volcano,
1997 (Heisei 9)	Phreatic eruption, (lahar produced)	August 16. Air-fall tephra, lahar. The eruptive activity occurred at the Karanuma crater, ⁴ and volcanic tremors accompanied it. (VEI 0)
2011 (Heisei 23) March to April	Earthquake swarm	The 2011 off the Pacific coast of Tohoku Earthquake (M9.0, March 11, 2011) triggered an earthquake activity approximately 10 km south-southwest of the summit.

* 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 year, area of activity and eruption type.

Major Volcanic Activities

▪ May 11, 1997 Landslide and Phreatic Eruption

Around 02:00, May 10, a landslide occurred on the mountain behind Sumikawa Onsen (approximately 4 km northeast of Akita-Yakeyama). The landslide reached at the top of the hot spring, Around 08:00 of the following day (May 11) a large collapse occurred on the same flank; resultant debris flows swept the entire area of the hot spring and entered in the Akagawa River. Steam discharge and ash fall were observed at the collapse site. Analysis of the volcanic ash indicated that altered clay on the ground surface was sprayed by the eruption.

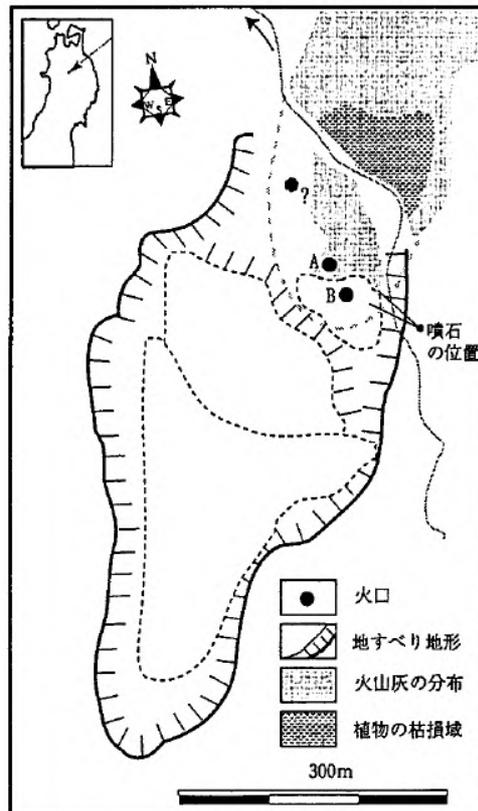


Figure 25-3 Distribution of ejecta (shaded area) from a phreatic eruption on May 11, 1997, and position of the discharge source (solid circles) (Akita University, 1997).

▪ August 16, 1997, Phreatic Eruption

Around 10:53 a small phreatic eruption occurred in the southeast of Karanuma, near the summit. Mountain-climbers witnessed a volcanic plume. The crater was approximately 20 m in diameter. A large number of volcanic blocks of 20 cm across were scattered around the crater. Muddy volcanic ash was sprayed up to about 300 m south of Karanuma. Mud accumulated in the bottom of Karanuma was 50 cm deep. Tremors accompanying the eruption continued for approximately 1 hour. Only one eruption occurred, and no precursor phenomena were observed. After the eruption, seismic activity increased, and 7 volcanic tremors occurred. The number of earthquakes peaked at 448 on August 19 and thereafter decreased. The activity calmed till mid October (Sendai Meteorological Observatory et al., 1998)

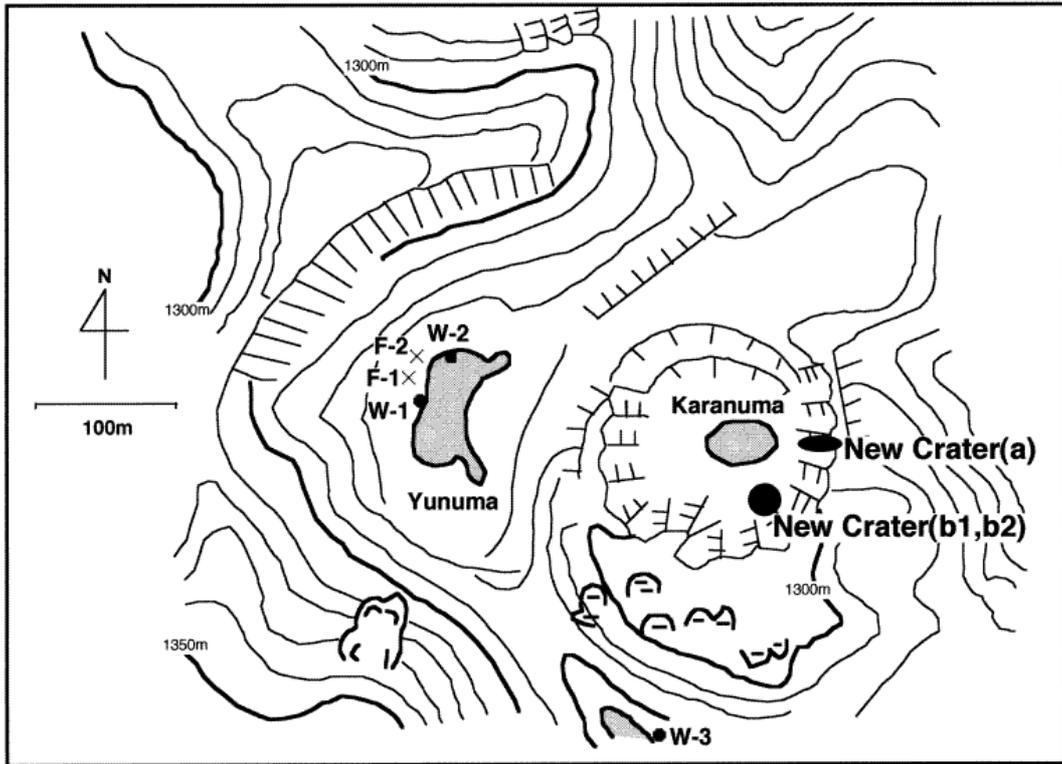
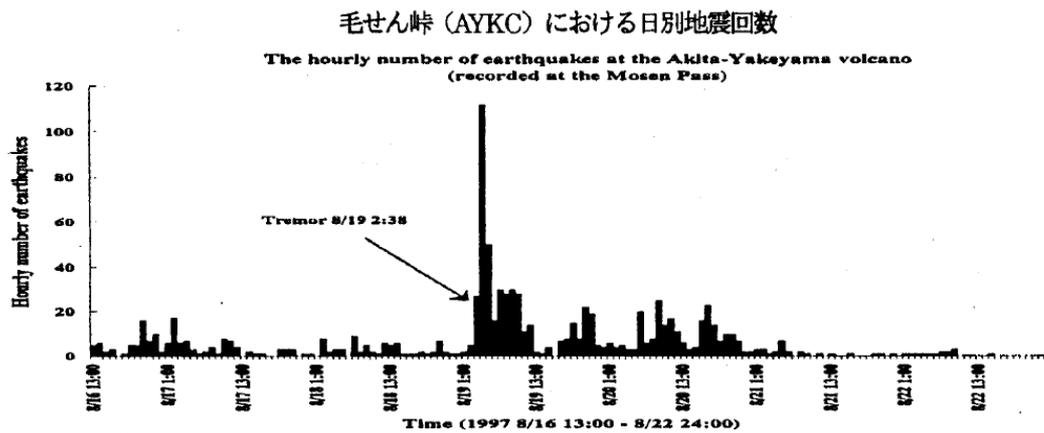
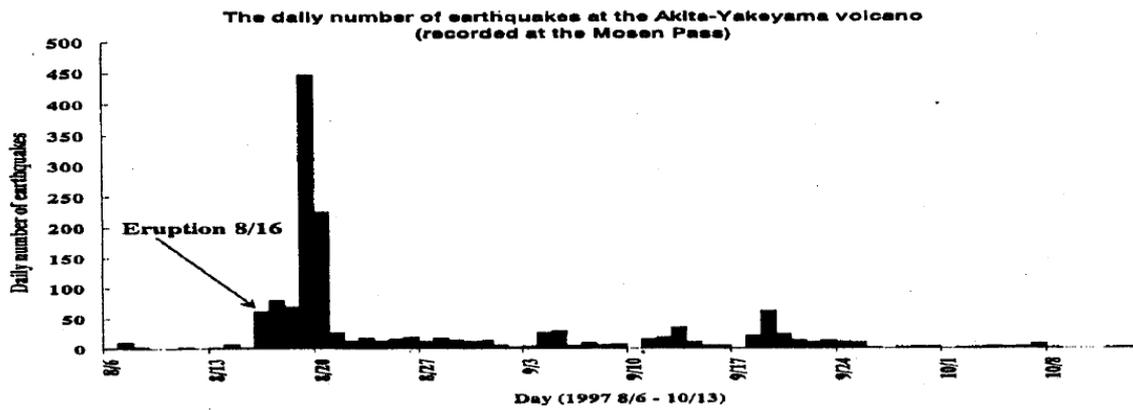


Figure 25-4 Locations of craters of the 1997 eruption (Nogami et al., 2000).



毛せん峠 (AYKC) における時間別地震回数

Figure 25-5 Daily (upper) and hourly (lower) numbers of earthquakes observed at Mosen Pass before and after the eruption of August 16, 1997.

(Sendai Meteorological Observatory et al., 1998)



Figure 25-6 Photograph of the eruption of August 16, 1997. Taken from Mosen Pass. Courtesy of Y. Fujii..

Recent Volcanic Activity

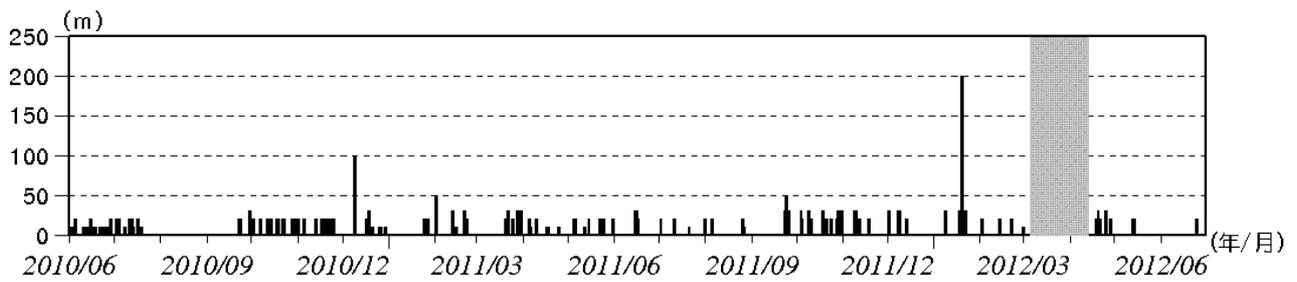


Figure 25-7 Maximum fume height per day (June 1, 2010 to June 30, 2012) observed by the Yakeyama monitoring camera (Tohoku Regional Bureau, Ministry of Land, Information, Transportation and Tourism). Data are unavailable for the period from March 6 to April 13, 2012 (gray area in figure) due to equipment failure. Fumarolic activities are seen at Yunuma and Sakebizawa, etc.

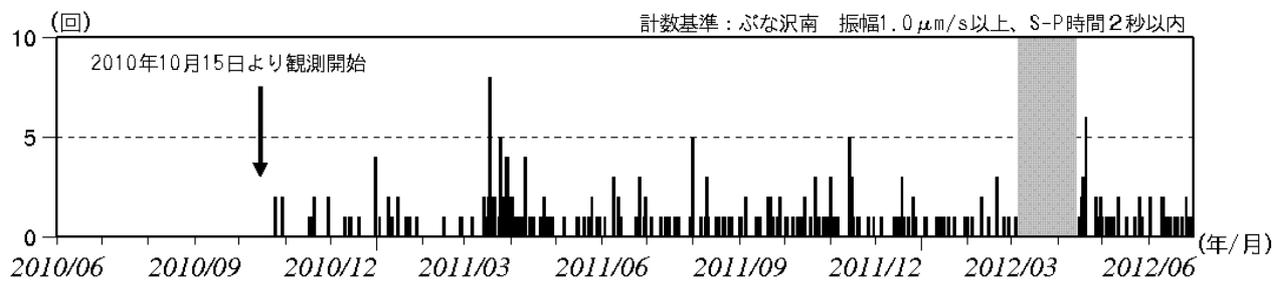


Figure 25-8 Daily number of volcanic earthquakes (October 15, 2010 to June 30, 2012). Data are unavailable for the period from March 6 to April 13, 2012 (gray area in figure) due to equipment failure.

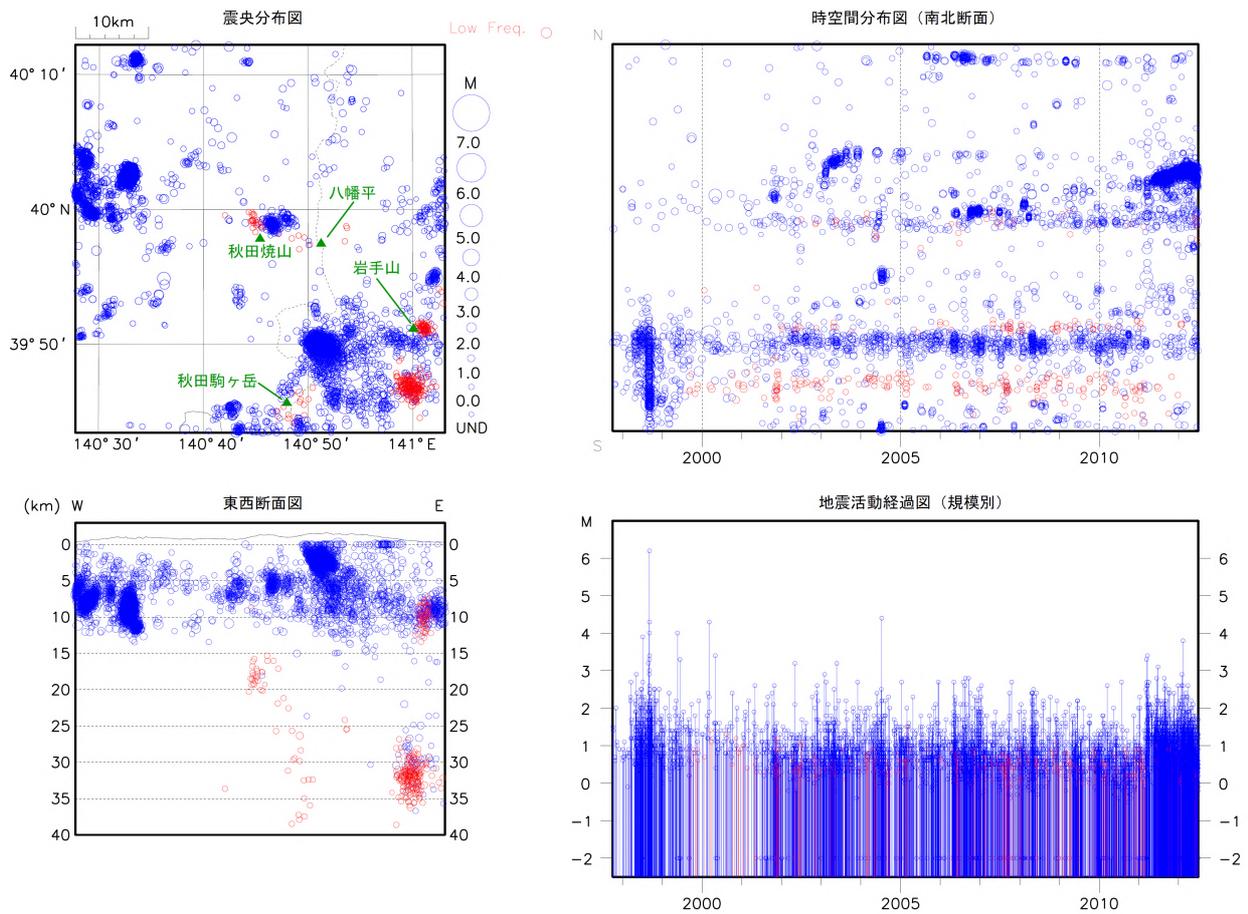


Figure 25-9 Shallow VT seismic activity (blue circles) and deep low-frequency seismic activity (red circles) observed in a regional seismometer network (October 1, 1997 to June 30, 2012). Epicenter distribution (upper left), space-time plot (N-S cross-section) (upper right), E-W cross-section (lower left) and magnitude-time diagram (lower right).

Information on Disaster Prevention

① Hazard Map

-Volcano Disaster Prevention Map - Akita-Yakeyama (Wide Area Version) January, 2002- Published by Akita Prefecture, editorial supervision by Dr. Shintaro Hayashi

Source: - Volcano Disaster Prevention Map - Active Volcanoes, Nurturing Nature and Famous Hot Springs - Akita-Yakeyama

Date of Publication: January 2002

Created by: Akita Prefecture

URL:

<http://www.pref.akita.lg.jp/www/contents/1205470577085/html/common/480d4b88005.html>



Social Circumstances

① Populations

- Kazuno City: 34,883 (as of October 31, 2011, according to the Kazuno website)
- Senboku City: 30,007 (as of October 31, 2011, according to the Senboku website)

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

- Towada Hachimantai National Park (Hachimantai)

Number of sightseers per year: Approximately 1,650,000 (according to the 2010 sightseeing statistics, Akita Prefecture)

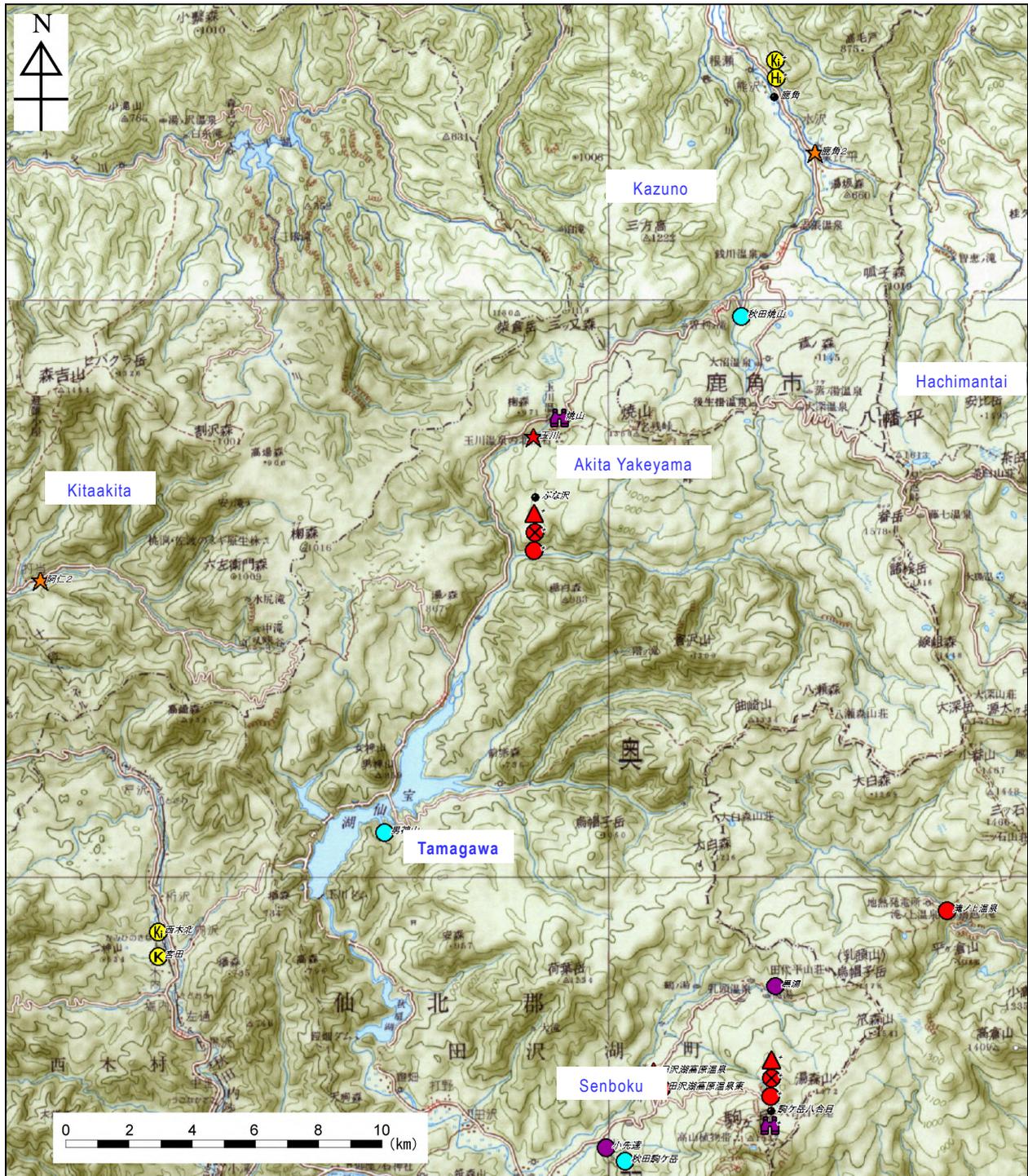
③ Facilities

- Kazuno City
Hachimantai Visitor Center
- Senboku City
Tamagawa Onsen Visitor Center

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 topographic maps (Hirosaki, Hachinohe, Akita, and Morioka) published by the Geospatial Information Authority of Japan were used.

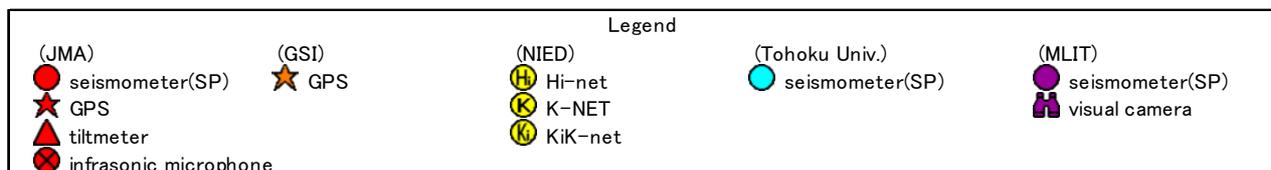


Figure 25-10 Regional monitoring network.

Bibliography

Akita University (1997) Report of CCPVE, **68**, 4-7 (in Japanese).

Nogami, K., et al. (2000) Earth Planets Space. **52**, 229-236.

Ohba (1991) J. Mineral. Petrol. Econ. Geol., **86**, 305-322 (in Japanese with English abstract).

Sendai Meteorological Observatory et al. (1998) Report of CCPVE, **69**, 5-12 (in Japanese).

(Nakada, S., and Ueki, S.)