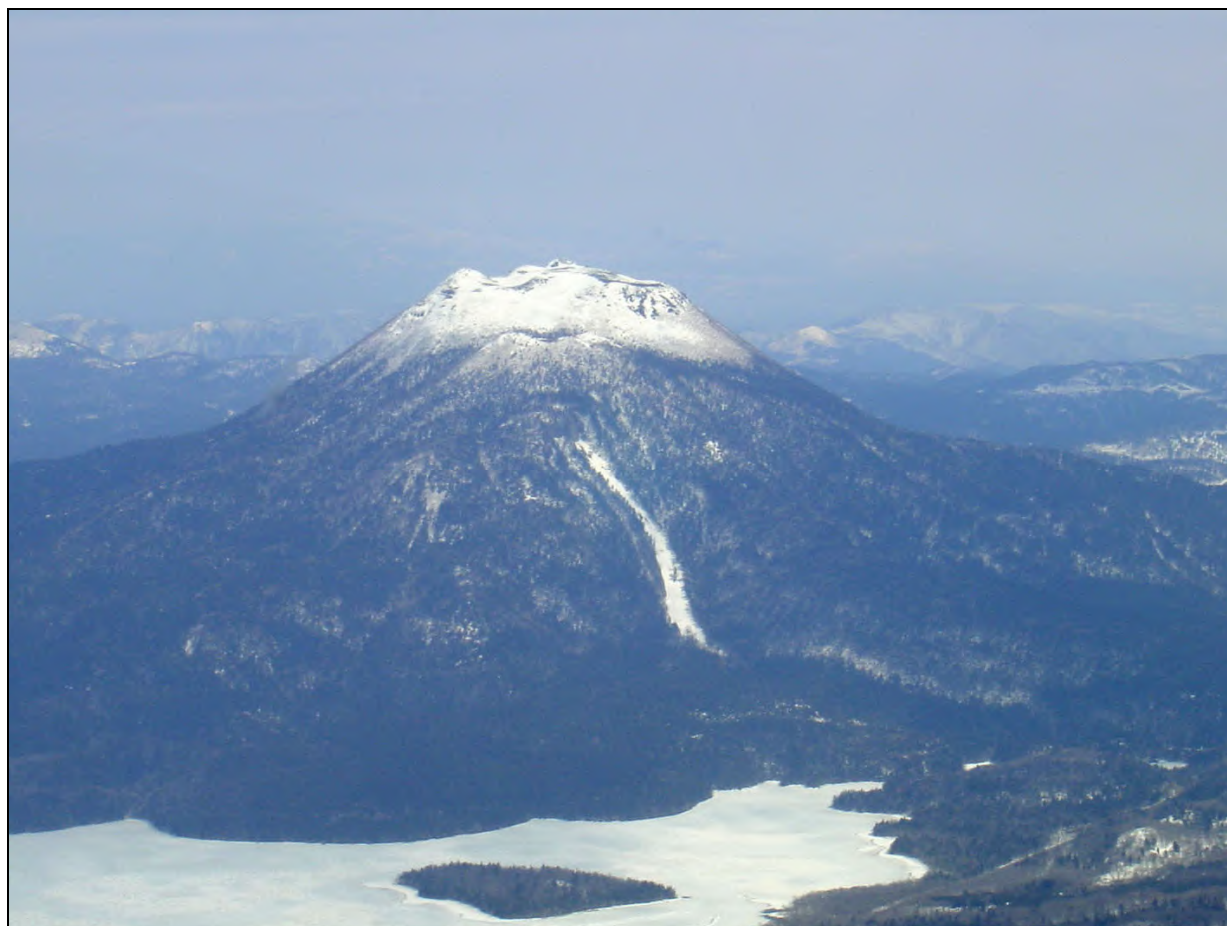
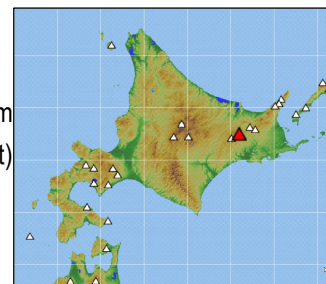


## 6.Oakandake

Latitude: 43°27'15" N, Longitude: 144°09'53" E, Elevation: 1,370 m  
(Oakandake) (Triangulation Point)



Overview of Oakandake taken from southwest side on April 16, 2008. Courtesy of Nakagawa, M.

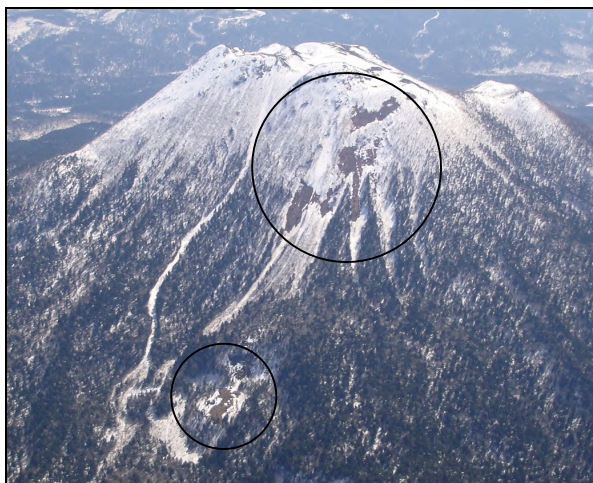
### Summary

Oakandake is a volcano located in the north of Kushiro, Hokkaido. Together with Meakandake, Fuppushidake, and Furebetsudake, it is one of the Akan caldera's post-caldera volcanoes. Oakandake's eruptive activity can be divided into early and late stage activity. It is unclear when it began its early stage activity, but it was more than 13,000 years ago. After a dormancy period of over 8,000 years, it entered its late stage activity period approximately 5,000 years ago, with many andesite lava emissions. Until approximately 1,000 years ago, no further eruptive activity occurred at the summit. Oakandake is primarily composed of lava emission, and approximately 5,000 years ago eruptions occurred which were large enough to form pyroclastic cones, but no explosive eruptions large enough to result in wide scale tephra sediments have been recognized (Tamada and Nakagawa, 2009). The  $\text{SiO}_2$  content is between 53.9 and 63.8 wt %.

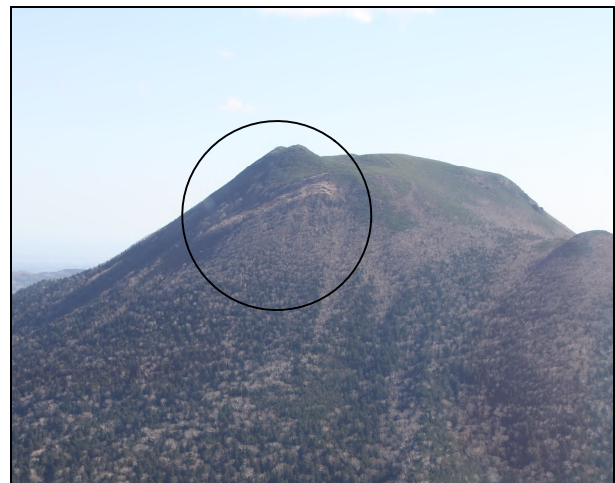
Photos



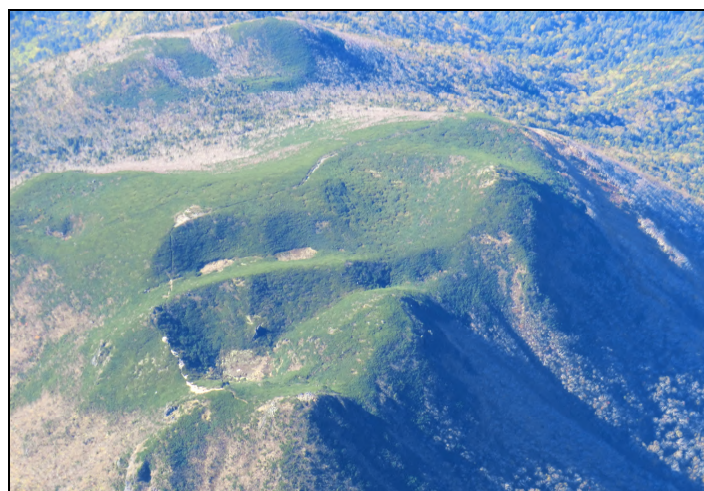
Summit Crater Group - Aerial Photo Taken from Southeast Side - April 17, 2009 - Taken by the Japan Meteorological Agency



Geothermal Area on Northern Slope (inside circle)  
Aerial View from North Side - April 17, 2009 - Taken by the Japan Meteorological Agency



Geothermal Area on Northern Slope (inside circle)  
Aerial View from Northwest Side - October 19, 2011 - Taken by the Japan Meteorological Agency



Summit Crater Group - Aerial Photo Taken from Northeast Side - October 18, 2012 - Taken by the Japan Meteorological Agency



### Red Relief Image Map

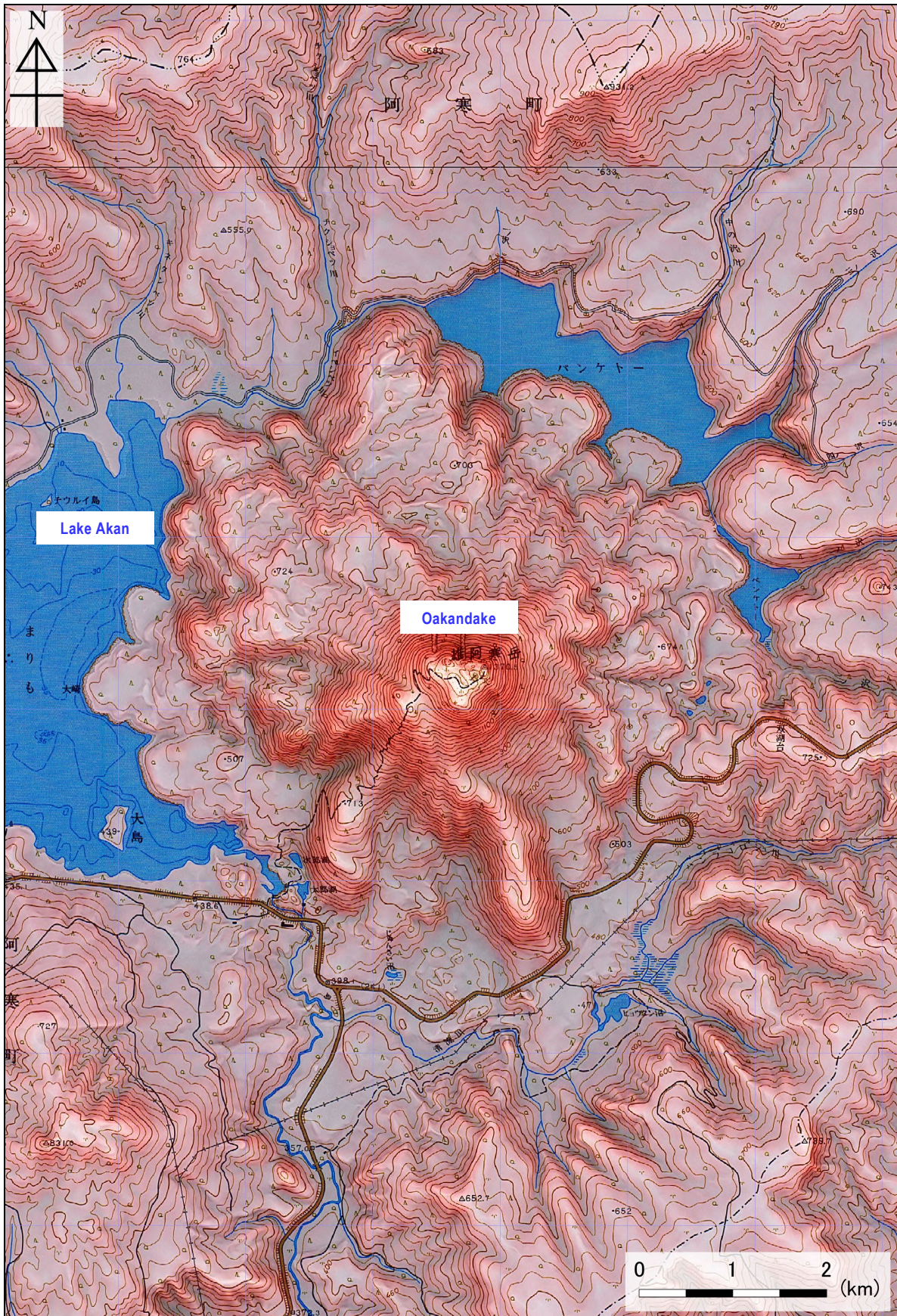


Figure 6-1 Topography of Oakandake.  
1:50,000 scale topographic maps (Akan Ko and Kamisato) and digital map 50 m grid (elevation) published by the Geospatial Information Authority of Japan were used.



## Chronology of Eruptions

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

After a roughly 8,000 year dormant period, Oakandake began emitting lava approximately 5,000 years ago, followed by an explosive eruption at a crater near Futatsudake, resulting in sedimentation on the mountain's southeast side of scoria, pumice, and Oakandake air-fall pyroclastic material (Oafa) composed of andesitic accessory fragments. A lava flow then occurred on the mountain's south side. Approximately 2,500 to 5,000 years ago, a strombolian eruption occurred near the summit, forming a pyroclastic cone, and a large volume of lava flowed over a wide area on the mountain's north and east sides. Then, until approximately 1,000 to 2,500 years ago, phreatic explosions occurred in the summit crater group (Tamada and Nakagawa, 2009). There are records of weak fumarolic activity in the north crater, on the northern slope (Sato, 1965).

Period	Area of Activity	Eruption Type	Main Phenomena / Volume of Magma
5ka	Futatsudake	Magmatic eruption	Lava flow on the mountain's west side. This was followed shortly by an eruption on the No. 1 crater at Futatsudake, forming the Futatsudake pyroclastic cone. A lava flow then occurred from the Futatsudake crater to the south. The amount of ejecta is unknown.
5←→2.5ka	Summit	Magmatic eruption	The summit crater area is composed of sources of lava flow and air-fall pyroclastic material, which composes the summit pyroclastic cone. The lava flow covered the north and west faces of the mountain, and a wide area to the north and east. The amount of ejecta is unknown.
2.5←→1ka	Summit	Phreatic eruption	

\* 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

A field observation by the Kushiro Local Meteorological Observatory in 1991 identified over 10 weak fumaroles in the geothermal area on the mountain's north flank.

Recent aerial observation by the Sapporo District Meteorological Observatory in 2011 confirmed the presence of geothermal areas.

Year	Phenomenon	Activity Sequence, Damages, etc.
1976 (Showa 51)	Earthquake	July 7 10:57 Oakandake area seismic intensity of 3 in JMA scale: Lake Akan, Meakan Onsen.
1980 (Showa 55)	Earthquake	March 28 22:36 Oakandake area (M2.5) seismic intensity of 4 in JMA scale: Lake Akan (Oakan Hotel).

\* 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.

### Whole Rock Chemical Composition

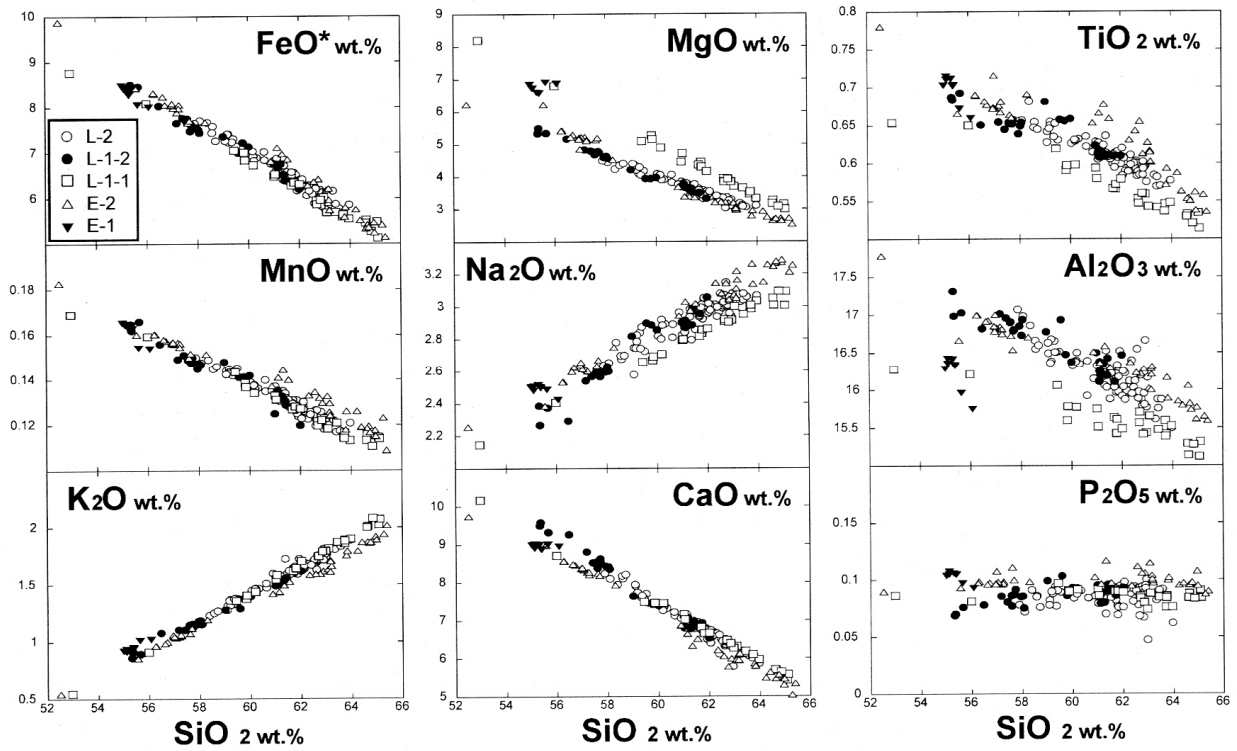


Figure 6-2 Oakan volcano ejecta whole rock chemical composition Harker diagram (Tamada and Nakagawa, 2009).

### Main Volcanic Activities

- Eruption 5,000 Years Ago

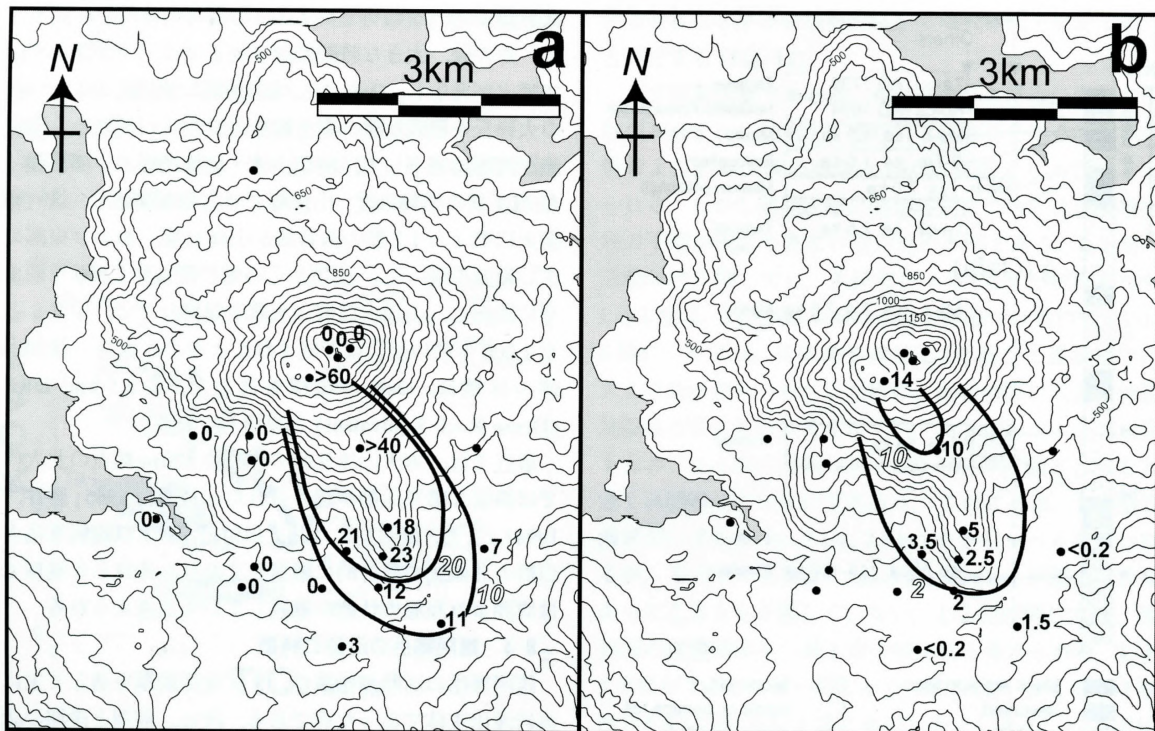


Figure 6-3 Isopach of air-fall pyroclastic material (a: tephra strata thickness (cm), b: essential magma material maximum grain size) (Tamada and Nakagawa, 2009).

• Volcanic Activity in the Past 1,000 Years

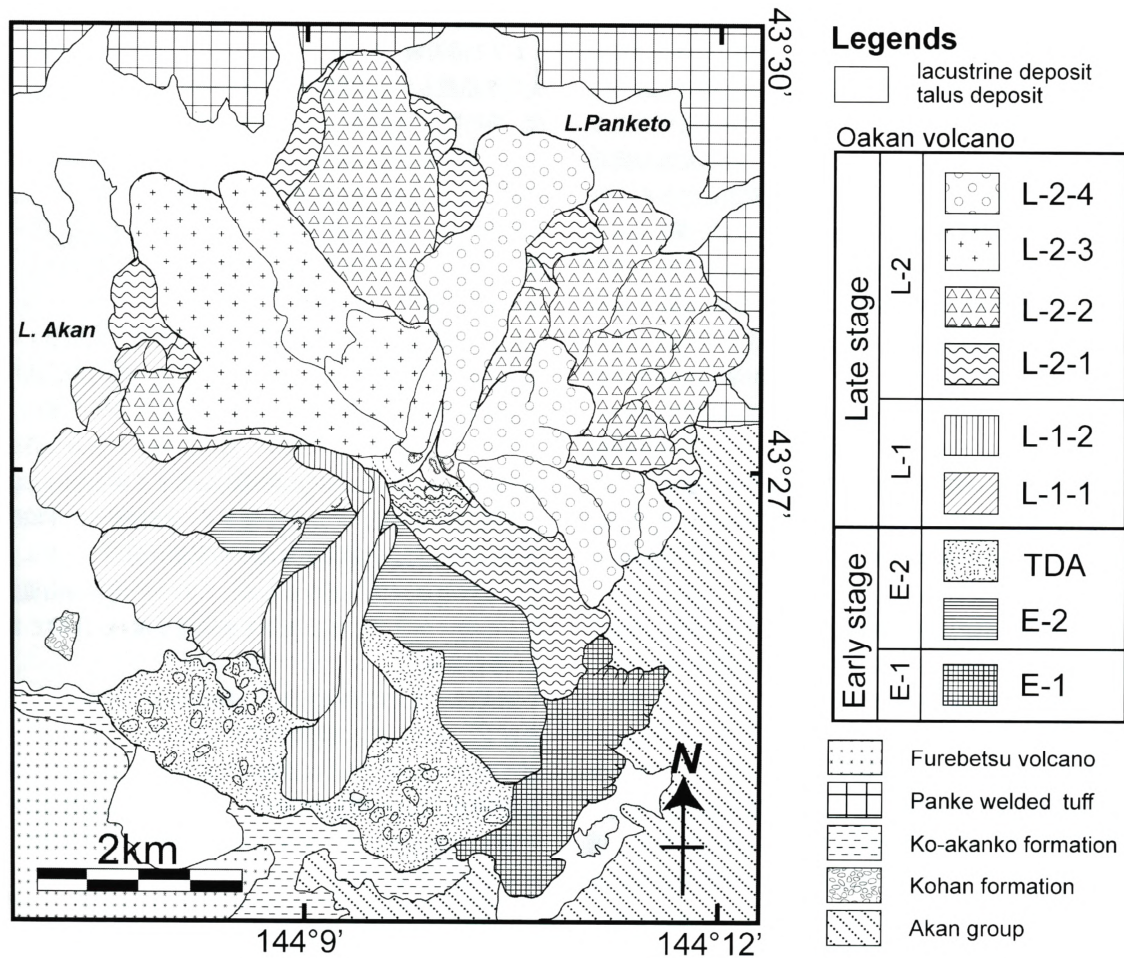


Figure 6-4 Geological map of Oakandake and surrounding area (Tamada and Nakagawa, 2009). TDA in legend indicates sedimentary Takiguchi debris avalanche resulting from collapse after early stage mountain formation (Wada, 1988). Others are mainly lava flows, including pyroclastic rock.

**Recent Volcanic Activity**

See the Meakandake

## Information on Disaster Prevention

### ① Hazard Map

None

## Social Circumstances

### ① Populations

- Lake Akan Onsen area population: 1,402 (from statistics current as of October 31, 2011)

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

- Akan National Park, Lake Akan Onsen area

Number of sightseers per year: Approx. 924,000

(Number of sightseers entering Lake Akan Onsen area, from 2010 Hokkaido-wide municipal study)

- Akan National Park Oakandake

Number of mountain-climbers per year: Approx. 1,900 (June 1 to October 31, 2010)

Akanko Ranger Office for Nature Conservation mountain-climber counter

### ③ Facilities

- Kushiro City Akan-cho Akanko Onsen

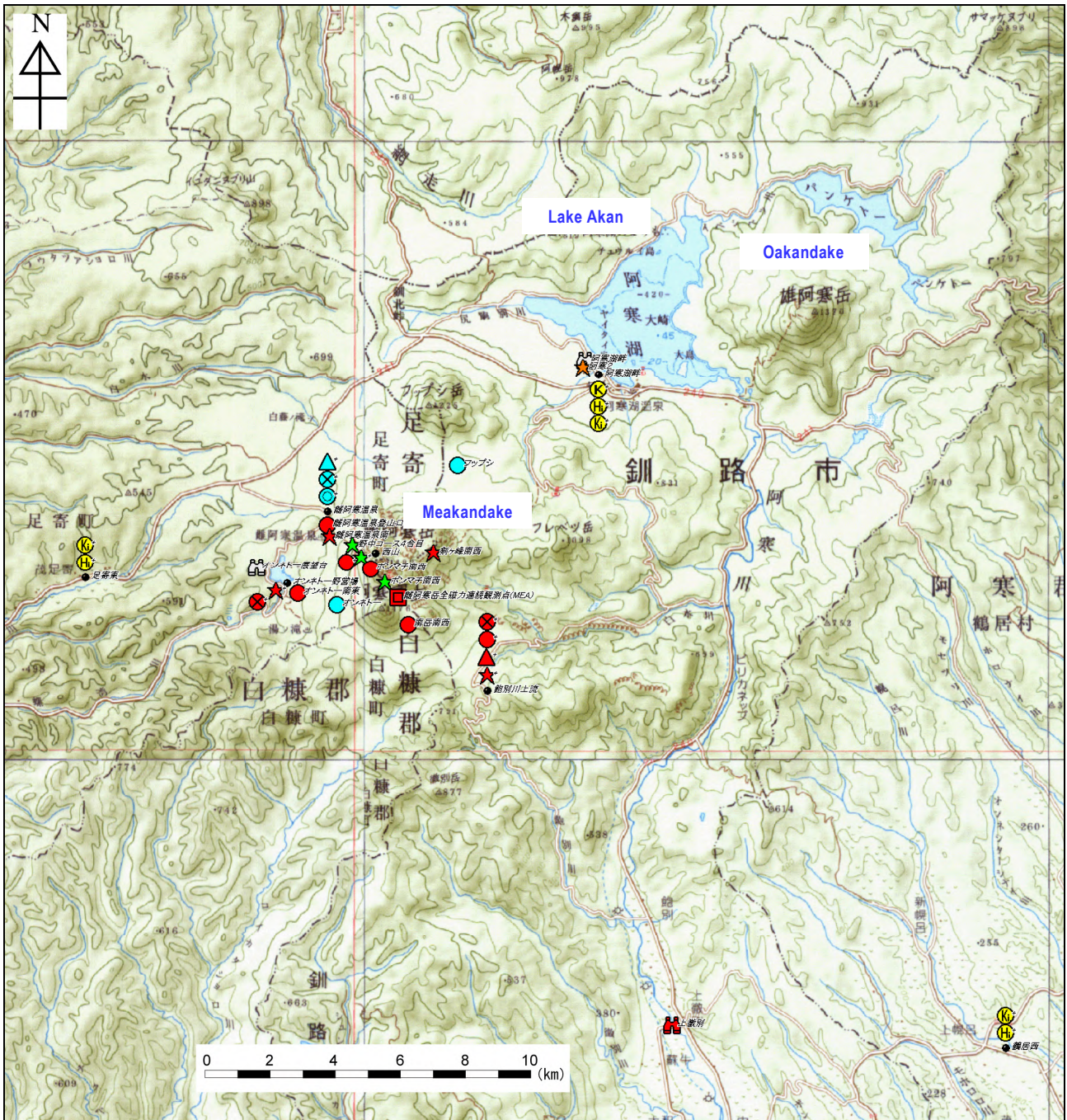
Akankohan Eco-Museum Center



## 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 regional maps (Kitami, Obihiro, Shari and Kushiro) published by the Geospatial Information Authority of Japan were used.

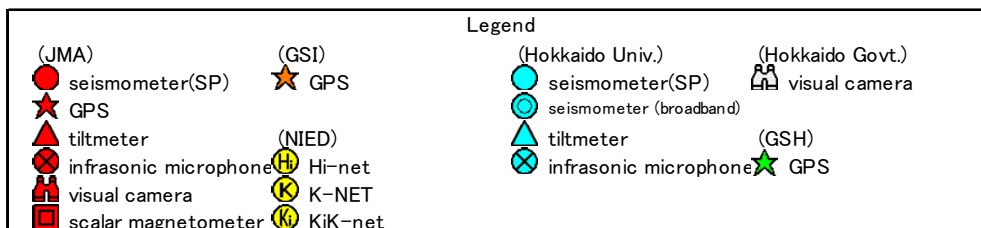


Figure 6-5 Regional monitoring network.



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Sato, H. (1965): 1:50000 Geological map of Akanko, Geol. Surv. Jap., 82p (in Japanese).

Tamada, J. and Nakagawa, M. (2009): Bull. Volcanol. Soc. Jap., **54**, 147-162 (in Japanese with English Abstract).

Wada, K. (1988): J. Mineral. Petrol. Econ. Geol., **83**, 273-288 (in Japanese with English Abstract).

(Nakagawa, M., and Wada, K.)