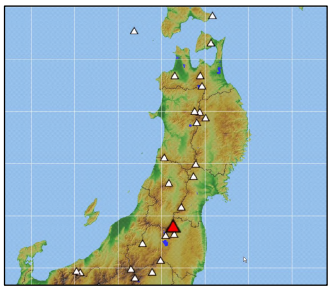
34. Azumayama



Continuously Monitored by JMA

Latitude: 37°44'07" N, Longitude: 140°14'40" E, Elevation: 1,949 m (Issaikyozan)
(Triangulation Point - Azumayama)

Overview of Azumayama, taken from Fukushima city on April 5, 2011 by the Japan Meteorological Agency.

Summary

Azumayama is a volcanic group that consists of some stratovolcanoes and monogenetic volcanoes along the border of Yamagata and Fukushima prefectures. Its ejecta is composed of basalt to andesite, and is distributed over an area 25 km east-west and 15 km north-south. It is divided into the Nishi-Azuma, Naka-Azuma, and Higashi-Azuma volcanoes, and the discharge centers are broadly divided into two chains, one north of the other, running east-southeast to west-northwest (Hasenaka et al., 1992). Many of the volcanoes in the northern volcano chain have summit craters, and near Issaikyozan, in the east, many new pyroclastic cones and craters, such as Goshikinuma, Oana, Okenuma, and Azuma-Kofuji, were formed. Eruptions within recorded history consisted of explosions at and around the Oana crater, and currently a large fumarolic area extends across its southern and eastern flanks. The SiO_2 content is between 51.9 and 64.2 wt %.

Higashi-Azuma is composed of volcanic cones such as Higashi-Azumayama, Issaikyozan, and Azuma-Kofuji. Issaikyozan became volcanically active 300,000 years ago. Between roughly 100,000 and 280,000 years ago a sector collapse occurred and formed a horseshoe-shaped explosion caldera with a diameter of approximately 2 km, opening to the east and having its floor in the Jododaira area. Furthermore, discharge activity after this created features such as Azuma-Kofuji and Okenuma within the caldera.

Photos

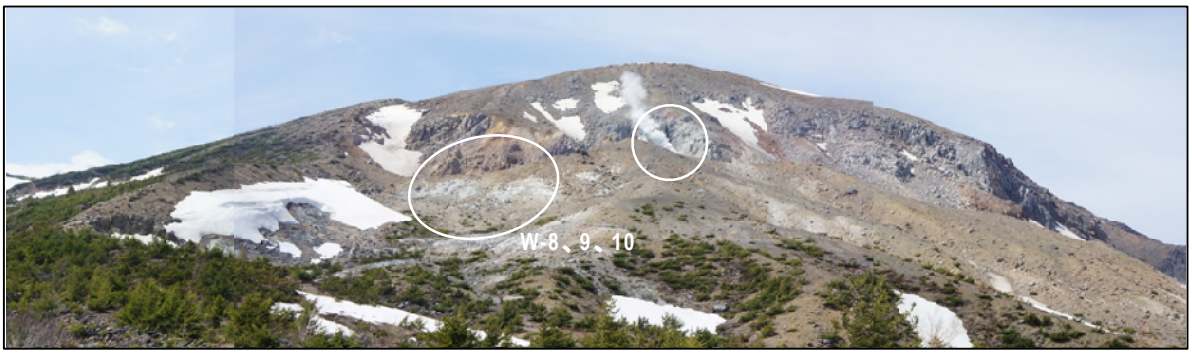
Jododaira Area, taken from the west side on January 18, 2012 by the Japan Meteorological Agency.
Jododaira is at the center, Azuma-Kofuji at top right, and the Oana crater at left.

Fumarole from the Oana Crater, taken from the east side on November 11, 2008 by the Japan Meteorological Agency

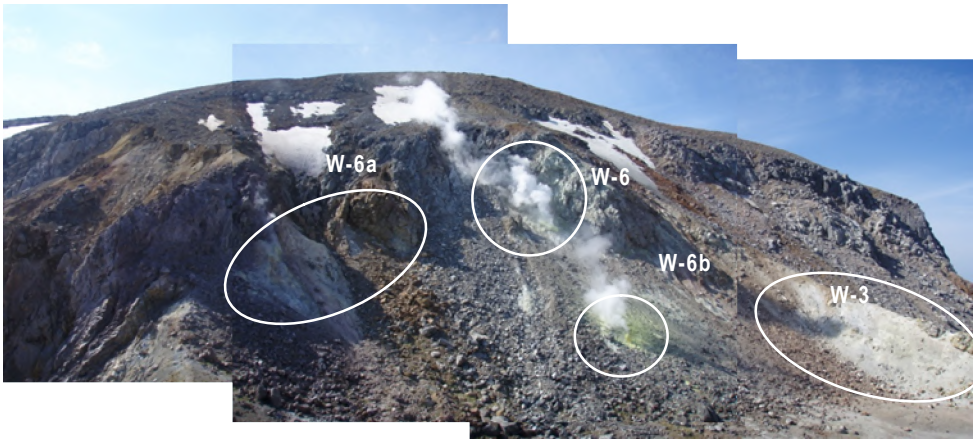
Liquid sulfur discharged from the Oana crater, taken on August 24, 2010. Courtesy of the Fukushima Jododaira Astronomical Observatory.

Volcanic Plume from the Issaikyozan Oana Crater on February 15, 1950, taken from Jododaira by the Japan Meteorological Agency.

Volcanic Plume from the Issaikyozan Oana Crater on November 29, 1977, taken from Arakawa, Fukushima City by the Japan Meteorological Agency.



Fumarolic Areas at Hachimanyaki, taken on May 14, 2012 by the Japan Meteorological Agency.



Fumarolic Areas of the Oana Crater, taken on May 14, 2012 by the Japan Meteorological Agency.

Topography around the Crater

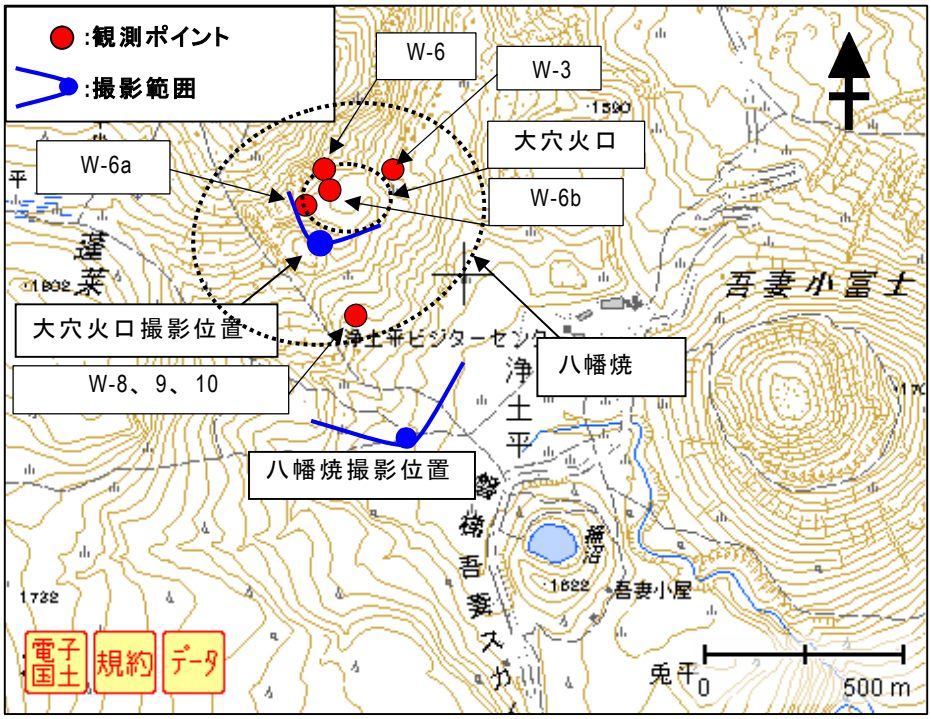


Figure 34-1 Topography around the crater.

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

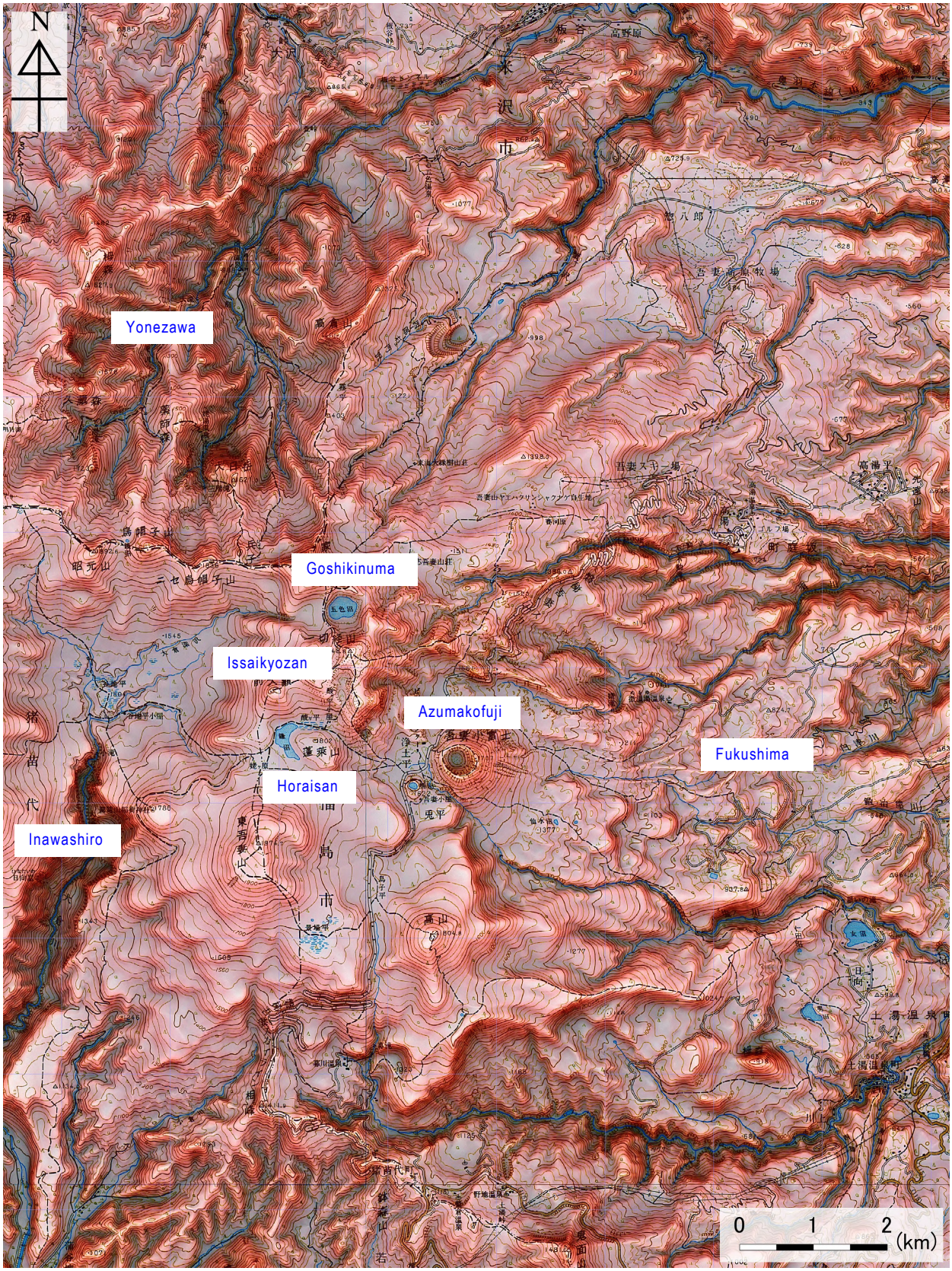


Figure 34-2 Topography of Azumayama.

1:50,000 scale topographic map (Bandaisan, Nihonmatsu, Azumayama and Fukushima) 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

Pyroclastic cones such as Azuma-Kofuji and Okenuma were formed between approximately 4,900 and 7,700 years ago, and at the same period lava flowed from the Azuma-Kofuji area to the eastern foot of the volcano. Activity after this mainly consisted of phreatic eruptions and magmatic explosions, leaving deposits at least 6 times.

Period	Area of Activity	Eruption Type	Main Phenomena / Volume of Magma
7.7←→7.6ka	Okenuma	Magmatic eruption	Tephra fall.
7.5←→7.2ka	Goshikinuma	Phreatic eruption → magmatic eruption	Tephra fall.
7.5←→5.5ka	Issaikyo southern crater chain	Phreatic eruption	Tephra fall.
6.8→5.4ka	Azuma-Kofuji	Magmatic eruption	Az-kf eruption: Tephra fall, lava flow.
5←→4.9ka	Issaikyo crater	Magmatic eruption	Tephra fall.
4.9←→4.5ka	Issaikyo crater	Phreatic eruption	Tephra fall.
3.8←→3.7ka	Issaikyo crater	Phreatic eruption	Tephra fall.
3←→2.8ka	Issaikyo crater	Phreatic eruption	Tephra fall.
2.4←→1.8ka	Issaikyozan - Iodaira area	Phreatic eruption	Tephra fall.
1.5←→1.2ka	Iodaira area	Phreatic eruption	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.

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

A→B: Indicates a continuous chain of eruptive events beginning in year A and ending in year B.

・Historical Activity

Year	Phenomenon	Activity Sequence, Damages, etc.
Approximately 1331 (Genko 1)	Small-scale: Phreatic eruption → magmatic eruption	Tephra fall. The eruptive activity occurred from the Issaikyo Oana crater to the Iodaira southern crater chain. Magmatic eruption volume = 0.0001 km^3 DRE. (VEI 1)
Approximately 1711 (Shotoku 1)	Small-scale: Phreatic eruption	Tephra fall. The eruptive activity occurred in the Issaikyo Oana crater area. (VEI 1)
1893 to 1895 (Meiji 26 to 28)	Small-scale: Phreatic eruption	Tephra fall. May 19, 20, June 4 to 8, and November 9 to 10, 1893. March 16, April 5 and 12, 1894. March 8 to 11, May 18 to 19, July 6 to 7, July 17, and September 13, 19 1895. Explosive eruptions at Tsubakurozawa (on the west of Oana, separated by one ridge). 5 major craters ejected volcanic blocks, causing tephra fall, and producing $5x10^5$ m^3 of ejecta. The June 7, 1893, eruption killed two researchers near the crater. (VEI 1)
1950 (Showa 25)	Small-scale: Phreatic eruption	Oana: February 10 and 19. Tephra fall. Rumbling and tephra fall. The eruptive activity occurred in the Issaikyo Oana crater area. Tephra fall reached the Tsuchiyu Onsen area at the volcano foot. Acidic water flowing out from the crater killed fish downstream and caused damage to power generation facilities.
1952 (Showa 27)	Eruption?	Relatively large amount of volcanic smoke on May 23. Small rocks scattered within 200 m from fumaroles were found later. Another explosion-like phenomenon was observed on June 18.

Year	Phenomenon	Activity Sequence, Damages, etc.
1966 (Showa 41)	Geothermal activity, earthquake	March to October. Increased fumarolic activity and new fumarole formation (max. 234 C). Muddy hot water emission from a collapsed hole on the crater floor of Oana. Sulfur sublimation. Earthquake swarms (multiple felt-earthquakes in the Jododaira area).
1977 (Showa 52)	Very small-scale: Phreatic eruption	December 7. Tephra fall. From roughly February, 1977, the amount of fumarolic activity at Issaikyozan's Oana crater gradually increased, and on October 26 an even more powerful discharge began. The emission of acidic muddy hot water killed fish in Shiokawa (Acid River), and caused damage to a fish farm. In the early morning of December 7 a small eruption occurred, with a very small amount of tephra fall in and around the crater area. A high level of fumarolic activity continued until 1979.
1996 (Heisei 8)	Tremor	April through June, September.
1998 (Heisei 10)	Earthquake, volcanic tremor	Earthquake swarms from June to September.
1999 (Heisei 11)	Earthquake	Earthquake swarms from February to June. Increase in earthquakes from July to October. Tremor occurred every month from June to October.
2000 (Heisei 12)	Fume	From September. Slightly high level of fumarolic activity.
2001 to 2002 (Heisei 13 to 14)	Earthquake	Slightly high level of seismic activity from May to July, 2001. Volcanic tremor activity occurred in November and December. Activity fell from June, 2002.
2003 to 2005 (Heisei 15 to 17)	Earthquake, ground deformation	November, 2003 to January, 2005. The number of volcanic earthquakes, which increased from November, 2003, peaked in January, 2004, rising and falling repeatedly thereafter, while decreasing overall. Activity was calm from September, 2004. Ground deformation observation found minor changes indicating localized inflation near the Oana crater, aligned with the increase in the number of earthquakes.
2006 to 2008 (Heisei 18 to 20)	Earthquake, ground deformation	July, 2006, to May, 2008. Activity peaked in January, 2007, and was calm from April. GPS measurement found minor changes indicating localized inflation near the Oana crater, aligned with the increase in the number of earthquakes.
2008 to 2011 (Heisei 20 to 23)	Earthquake, ground deformation, fume	Increased fumarolic activity at Oana from November 11, 2008. From 1977, to 1979 fumarolic activity was high in the Oana crater. After 1980 the geothermal activity level fell. On November 11, the low-level geothermal activity of about 28 years since 1980 was followed by a sudden fumarolic discharge from one of the 1977 fumaroles.The increase in geothermal activity was preceded by a swarm of monotonic earthquakes. The fume was 300 m high. Pyroclastic materials were scattered on the Oana crater wall and in its vicinity. The sound of fumarolic activity could be heard in Jododaira, and seismic activity was slightly high. 300 tons of sulfur dioxide was emitted per day. GPS measurement found minor changes indicating localized inflation near the Oana crater. By June, 2009 most fumarolic and seismic activity temporarily stopped. Fumarolic activity intensified again from October. Tremor events occurred in 2010. In May, sulfur combustion was observed in the fumarole area after a tremor event, and similar phenomena were also observed in August. Fumarolic activity was kept at a relatively high level, with the fume reaching a height of 700 m. Approximately 100 ton/day of sulfur dioxide were emitted through 2010-2011. The 2011 off the Pacific coast of Tohoku Earthquake (M9.0, March 11) increased the fumarolic activity more, and sulfur combustion was observed almost every day. The activity remained at a high level till the end of 2011.

* 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 Activity

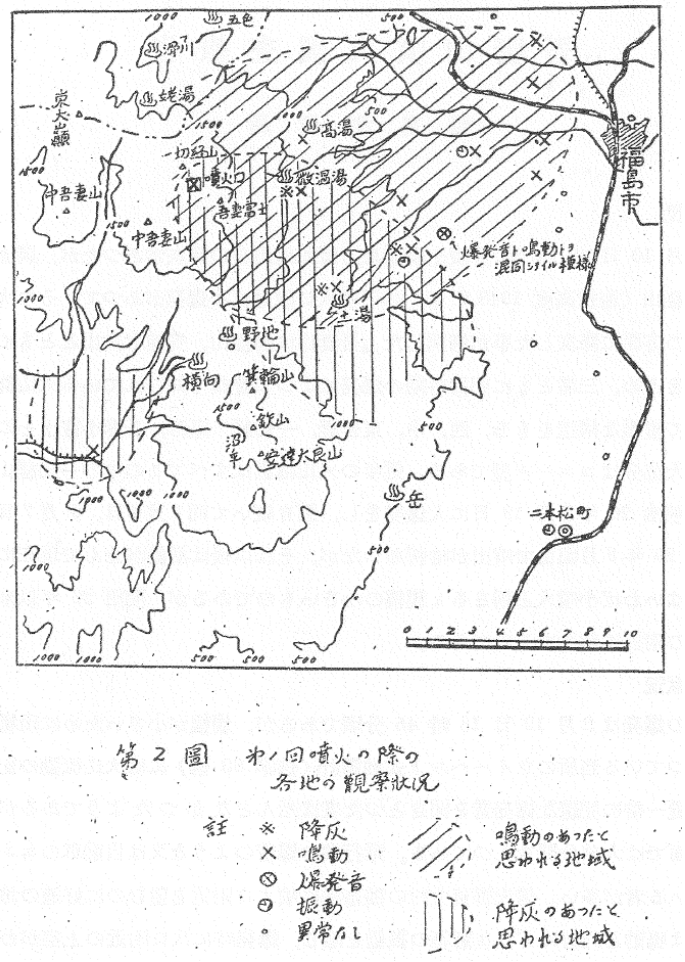
・1893 to 1895 Eruption

A series of explosive eruptions occurred at around11:30 on May 19, 1893. A chain of craters was at Tsubakurozawa, which runs from south-southeast to north-northwest midway down the southern flank of Issaikyozan. The volcanic plume reached a height of approximately 2,000 m. Ash fell within approximately 20 km to the southeast of the crate. Mud and ash mixed with a large amount of steam formed a muddy layer approximately 3m deep near the crater and 60 cm deep at Jododaira. Surface block ejecta with radii as large as roughly 2.5 m were scattered as far as Jododaira. The volume of ejecta erupted by the

eruptions in the first stage was estimated to be $5x10^5$ m^3. The eruptive activity reached its peak from 4th to 7th of June, 1893. The largest of blocks ejected by the major eruptions in this period was measured to be approximately 4 m in diameter near the crater, and blocks were scattered as far as approximately 1.5 km away. Ash fall covered an area of about 2,000 km^2 and reached as far as the coast of the Pacific Ocean near the border with Miyagi Prefecture. The depth of ash fall deposits was approximately 1cm at a distance of about 2 km from the crater. A small amount of ash fell in the Nuruyu Onsen area. The explosion sound sounded like distant thunder as far away as Fukushima City, and paper screen doors rattled for approximately 30 seconds. A small explosion on June 7 killed two members of the Ministry of Agriculture and Commerce who were carrying out researches near the crater. Small eruptions continued until 1895.

・1950 Eruption

On February 10, at around 18:45, an explosion occurred, resulting in ash fall in the Tsuchiyu Onsen direction (the area shaded by vertical lines in the Figure 34-3). Rumbling could also be heard at the foot of the volcano (shaded by diagonal lines in the figure). Eruption occurred near Oana, and lapillis, rocks with diameters of up to 1 m, and chunks of soil containing sulfur were scattered over a fan-shaped area towards Jododaira, to the southeast. Many blocks 10 to 20 cm in diameter were found approximately 600 m away, with some being scattered as far as 1,200 m away. On February 11 and February 12 steam mixed with black smoke temporarily reached a height of 1,000 m. A second explosion occurred on February 19 at approximately 18:35, scattering a small amount of rocks. Toxic water was discharged from nearby the explosion crater, killing fish in rivers and the Menuma pond. Ash fell in the Tsuchiyu Onsen direction 3 to 5 mm deep.



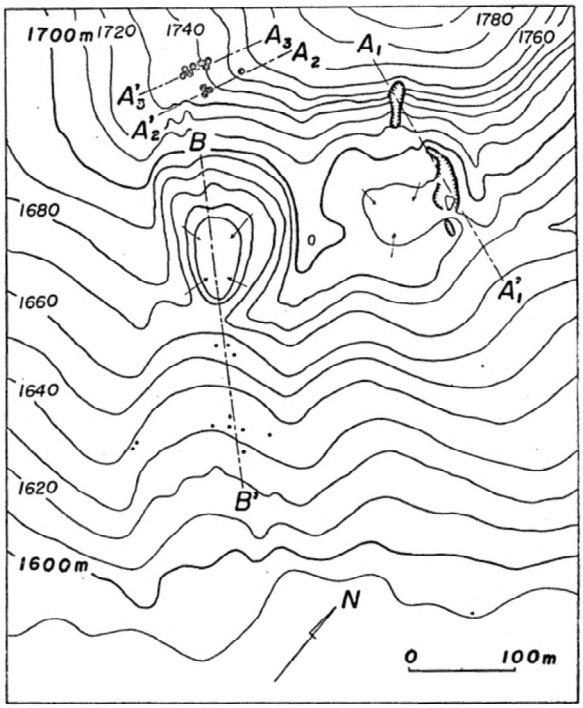


Figure 34-3 Left: Distribution of areas where rumbling (diagonal lines) and ash fall (vertical lines) during the 1950 eruption were reported by Fukushima Weather Station. Right: Locations of the fumaroles formed and craters at Azumayama in 1950 and 1893-1895 (Minakami and Hiraga, 1951). A1A1', A2A2' and A3A3' indicate the craters and fumaroles formed in 1950. BB' indicates a chain of craters formed in 1893.

▪ 1977 Eruption

From roughly February, 1977, the amount of fumarolic activity at Issaikyozan's Oana crater gradually increased. At the end of March warm water welled up at the center of Jododaira, followed by the appearance of a hot crater lake and hot water emissions. Seismic activity became active at the end of August. An earthquake felt at Jododaira took place on September 8. The level of the seismic activity started to decrease in October and returned to a normal level in December. On October 26 fumarolic activity suddenly activated, enlarging a fumarole and ejecting mud, as well as producing a 400 m high volcanic plume. Ejected materials such as lapillis and small blocks covered an area of about 0.1 km^2 elongated to the east about 300 m long. The emission of acidic muddy water killed fish in Shiokawa (“Acid River”), and caused damage to a fish farm. In the early morning of December 7 a small eruption occurred, with a very small amount of ash fall in and around the crater area. The yellowish volcanic plume reached a height of 600m and trailed off to a distance of 10km. From late December the fumarolic activity whitened and decreased in volume. In June, 1978, the bottom part of the fume became transparent, occasionally brightening in bluish-white in the night. The activity gradually subsided, returning to normal in 1979.

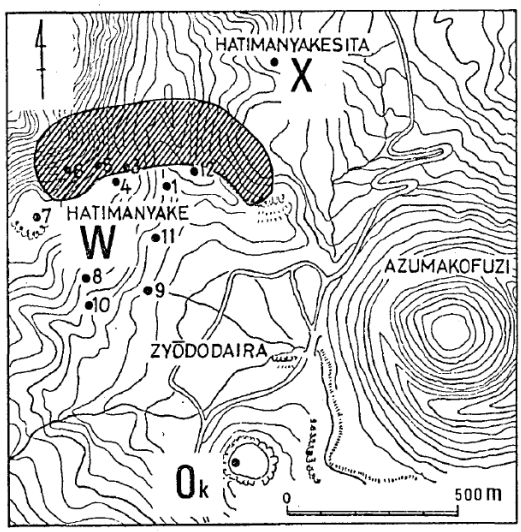


図２　噴出土砂の分布

●：測点，▨：土砂飛散範囲（面積は約0.1 ㎢・色は 1tGy　と mGy），測定：11月8日16時，噴出場所：噴気孔№6

Figure 34-4

Distribution of ejected mud and lapillis (hatched area) observed in October, 1977, by the Japan Meteorological Agency..

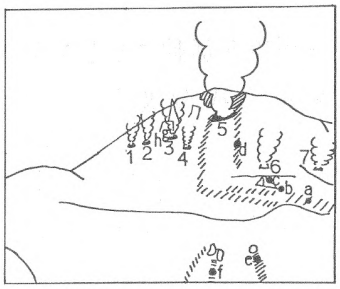


図２　吾妻山一切経山山頂見取図
1～7：噴気孔　　a～g：湧出水

表１．吾妻山一切経山の噴気孔温度の変遷 ℃

噴気孔 No.	1977 −10：29	1978 −7：31	1978 −11：4	1979 −5：24	1979 −10：11
1	92.3	97.0	118.	118.5	108.5
2	—	95.0	94.0	105.5	—
3	—	—	110.	107.5	—
4	—	133.	94.0	—	104.0
5	—	(400)	280.	93.9	—
6	99.5	99.0	100.	—	95.8
7	97.0	94.0	95.	95.2	94.3

表２．吾妻山一切経山の湧出水の温度

湧泉 No.	測定 年月日	温度 ℃
	1977	
a	−10：29	21.0
b	〃	31.0
c	〃	54.2
d	〃	22.9
e	〃	91.2
f	〃	94.3
	1978	
g	−11：4	94.2
h	〃	86.1

Figure 34-5 Temperatures of fumaroles and emitted water at Azumayama Issaikyozan (1977 to 1979) reported by Ozawa et al.

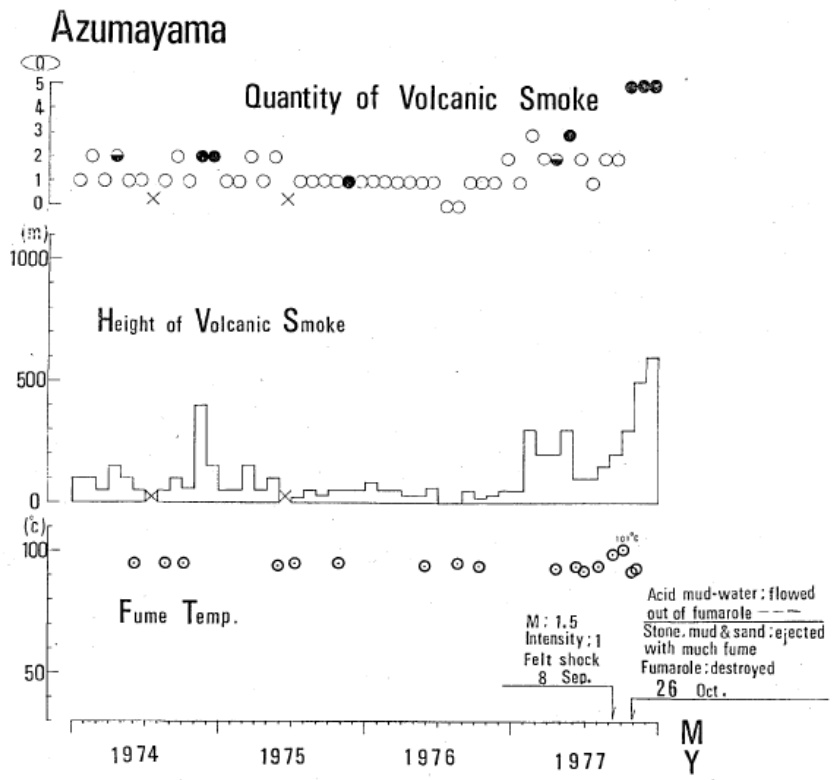


図6　吾妻一切経山の噴煙（量・高さ）と噴気温度推移
（1974年1月－1977年12月）

○：白色噴煙，◒：乳白色・灰白色噴煙，●白色・乳白色・灰白色以外の噴煙，×：不明，
M：月，Y：年，1977年12月7日：微噴火。

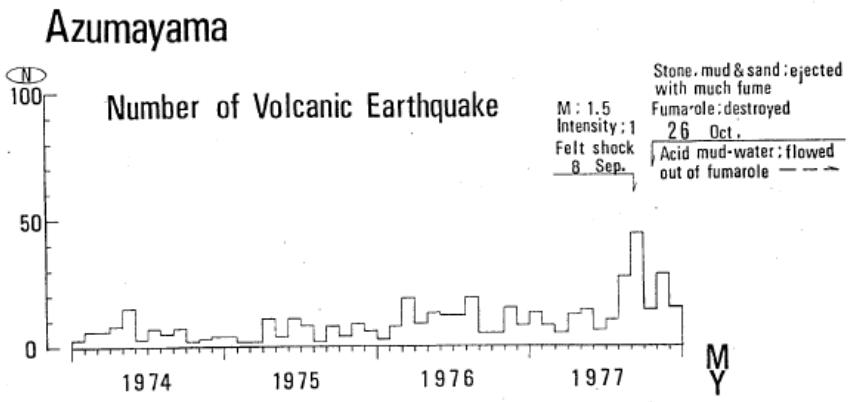


Figure 34-6 Temporal changes of Issaikyozan volcanic plume, fume temperature (top), and number of earthquakes per month (bottom) from January, 1974, to December, 1977 (after Japan Meteorological Agency).

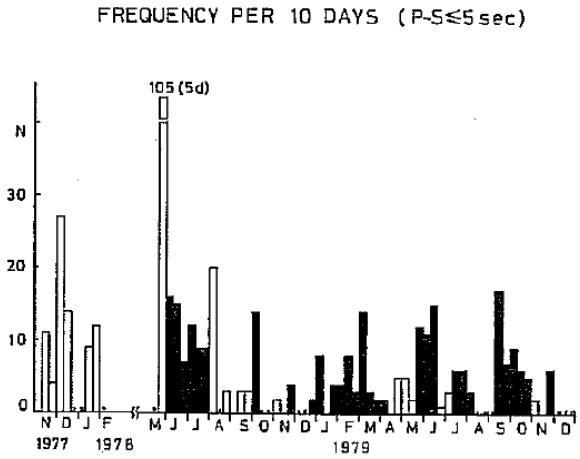


Figure 34-7 Number of earthquakes every 10-day period (November, 1977, to November, 1979) observed by Tohoku University.

Precursory Phenomena

Geothermal activity gradually increased at Jododaira and the Issaikyozan Oana crater for about 10 months before the 1977 phreatic eruption. Inflation and increases in seismic activity in the shallow area directly below Issaikyozan have occurred repeatedly since 1998, and then fumarolic activity increased in 2008, but they did not culminate in an eruption.

Recent Volcanic Activity

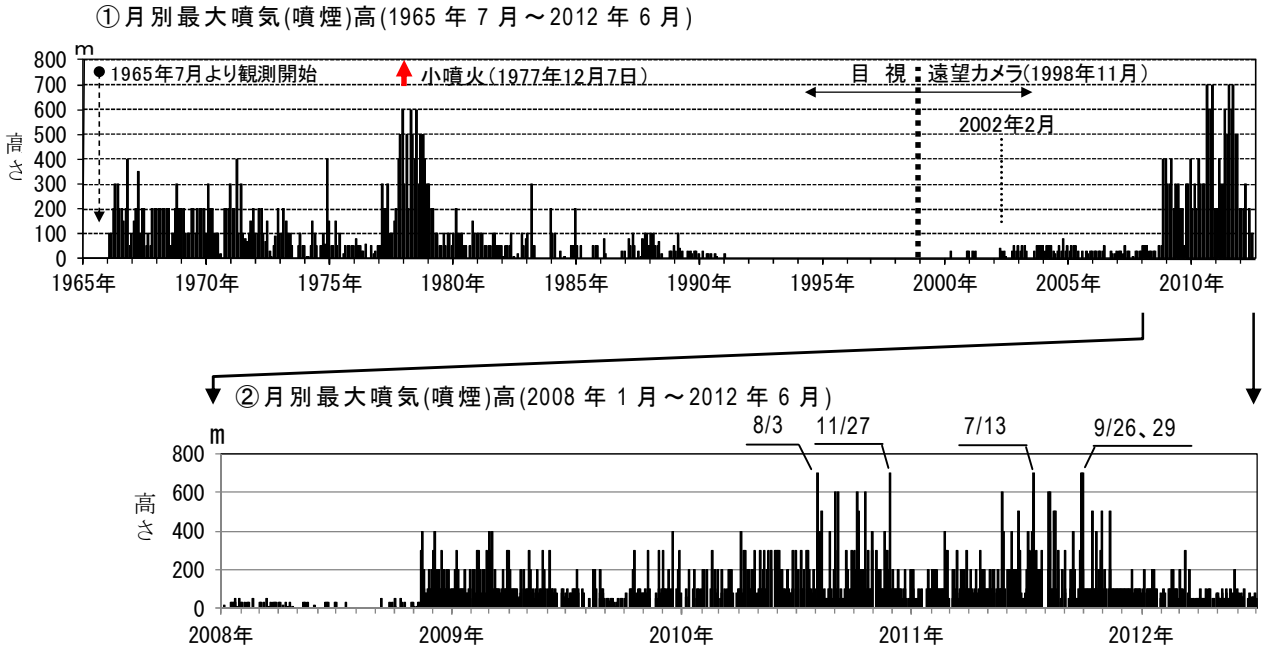


Figure 34-8 Temporal change in height of fumes. Top: Maximum fume height per month (July, 1965, to June, 2012). Bottom: Maximum fume height per day (January 1, 2008, to June 30, 2012). On November 11, 2008, a new fume appeared at the Oana crater, with fumes reaching a maximum height of 700m. The fumarolic activity remained relatively high after that. Measurements before 1998 were visual observations from the Fukushima Local Meteorological Observatory (approximately 20 km east-northeast of the Oana crater). Measurements since 1998 were performed by a visual camera located approximately 14km east-northeast of the Oana crater.

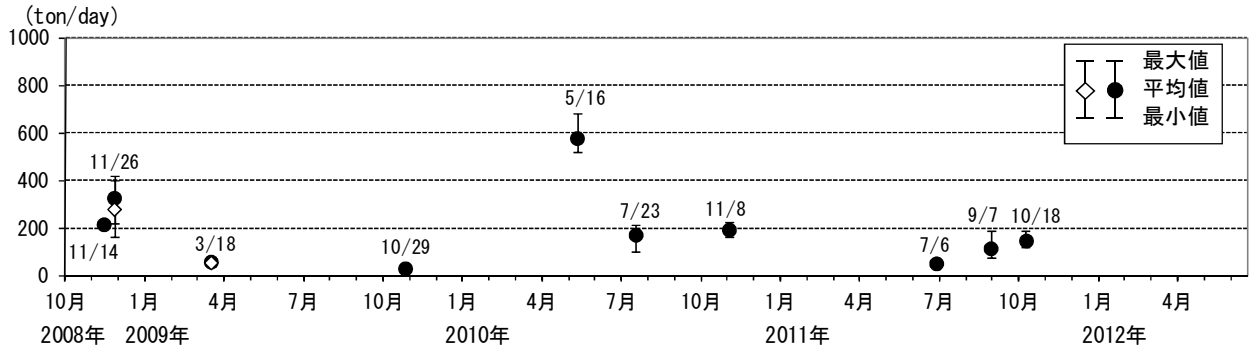
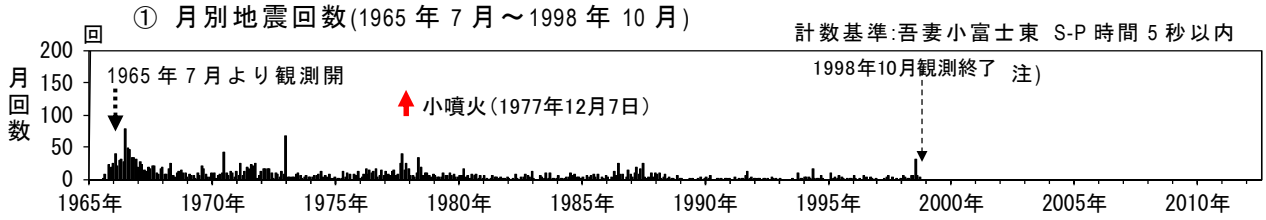
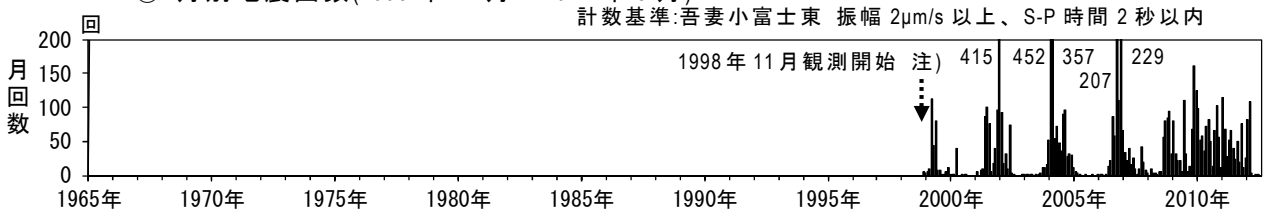


Figure 34-9 Volume of discharged sulfur dioxide (●: Traverse method, ◊: Panning method).

① 月別地震回数(1965 年 7 月～1998 年 10 月)

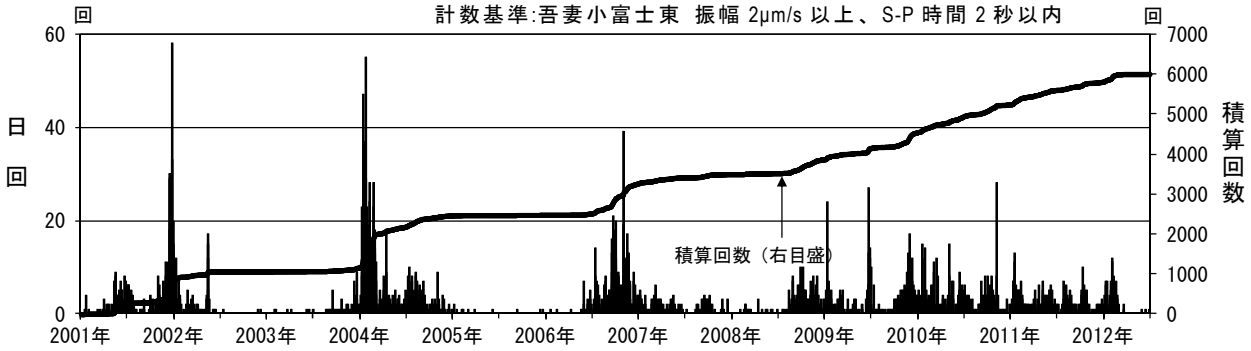


② 月別地震回数(1998 年 11 月～2012 年 5 月)

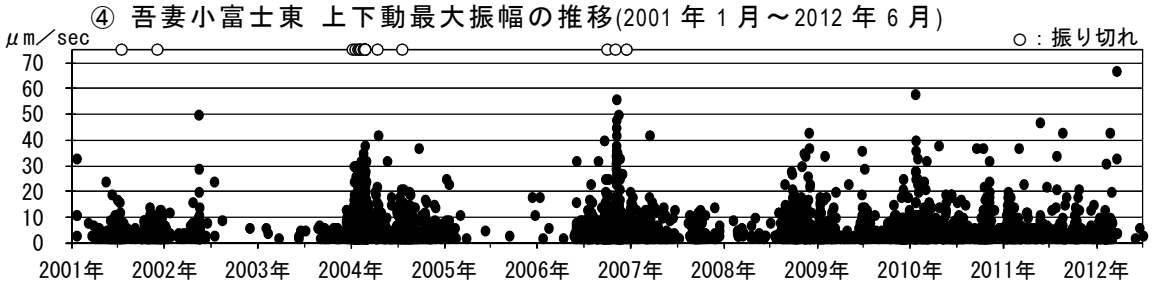


注)1998 年 11 月に吾妻小富士東を大穴火口の北東約 6km から東南東約 2km へ移設.

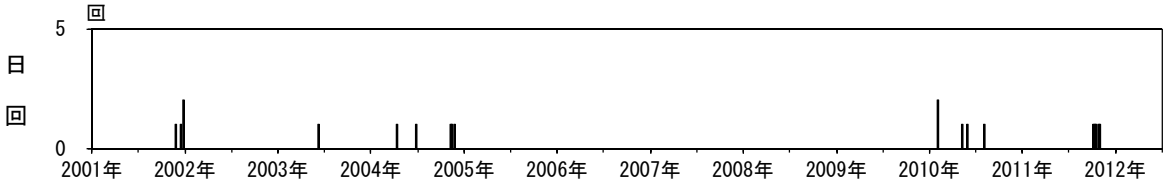
③ 日別地震回数(2001 年 1 月～2012 年 6 月)



④ 吾妻小富士東 上下動最大振幅の推移(2001 年 1 月～2012 年 6 月)



⑤ 日別微動回数(2001 年 1 月～2012 年 6 月)



⑥ 吾妻小富士東 微動の継続時間と上下動最大振幅(2001 年 1 月～2012 年 6 月)

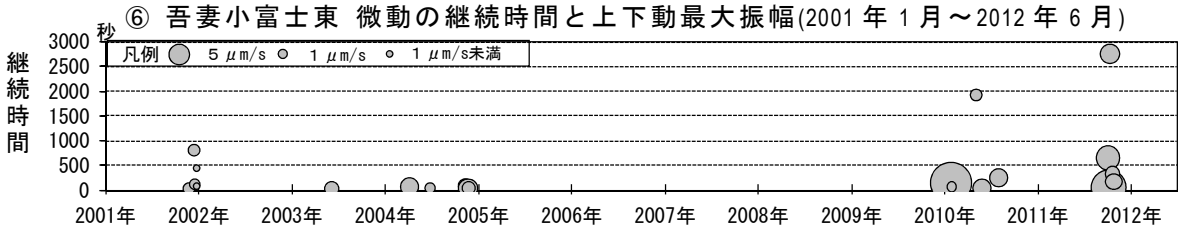


Figure 34-10 Seismic activities at Azuma volcano. Temporal changes in ① number of earthquakes per month (July, 1965, to October, 1998), ② number of earthquakes per month (November, 1998, to May, 2012), ③ number of earthquakes per day (January, 2001, to June, 2012), ④ maximum vertical amplitudes (January, 2001, to June, 2012), ⑤ number of volcanic tremor events per day (January, 2001, to June, 2012), ⑥ duration (vertical axis) and maximum vertical amplitude (circle radius) of tremor event (January, 2001, to June, 2012).

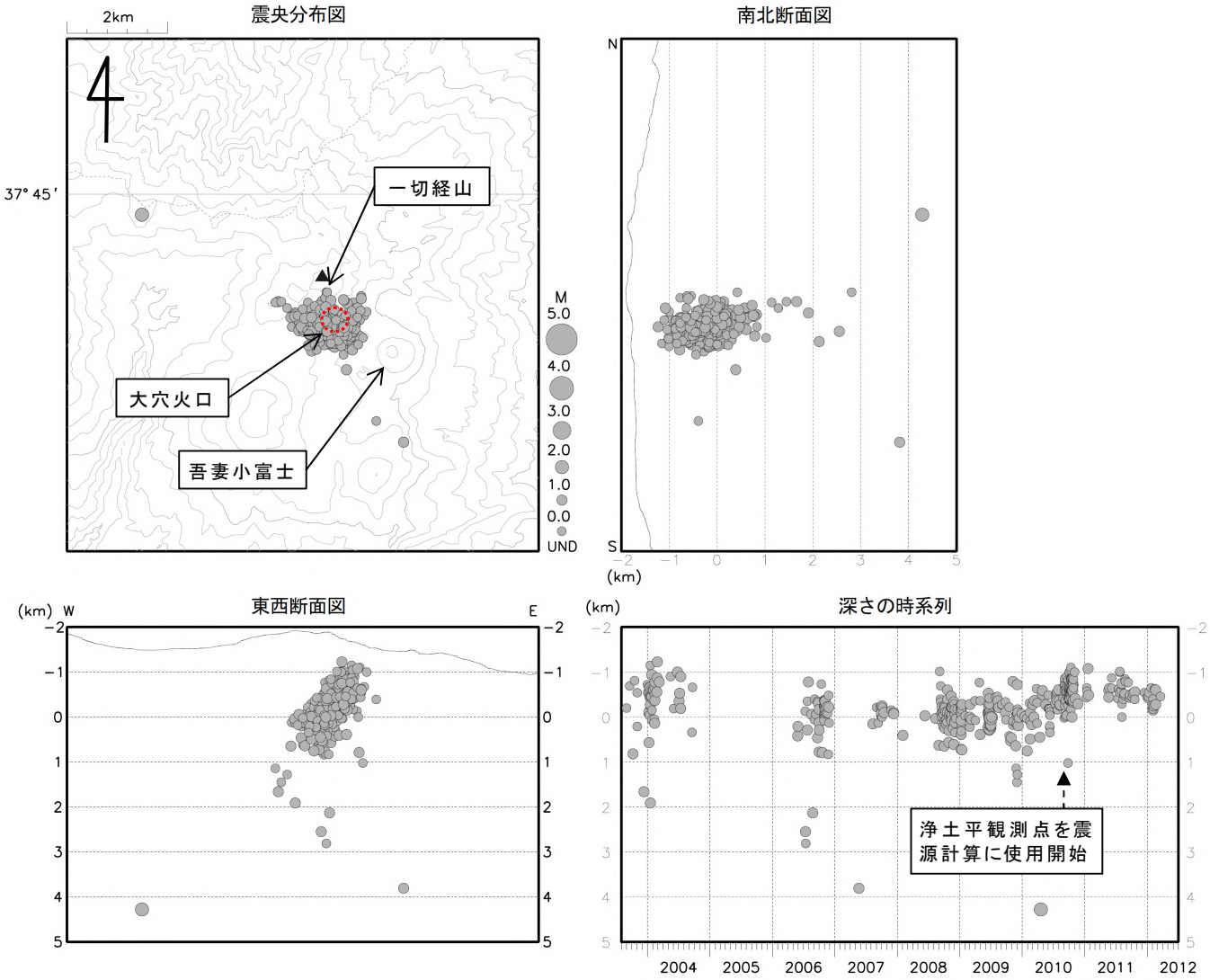


Figure 34-11 Distribution of volcanic earthquakes in and around Issaikyouzan (August 1, 2003, to June, 2012). Epicenter distribution (upper left), hypocenter distribution in a N-S cross-section (upper right), E-W cross-section (lower left) and depth-time plot (lower right).

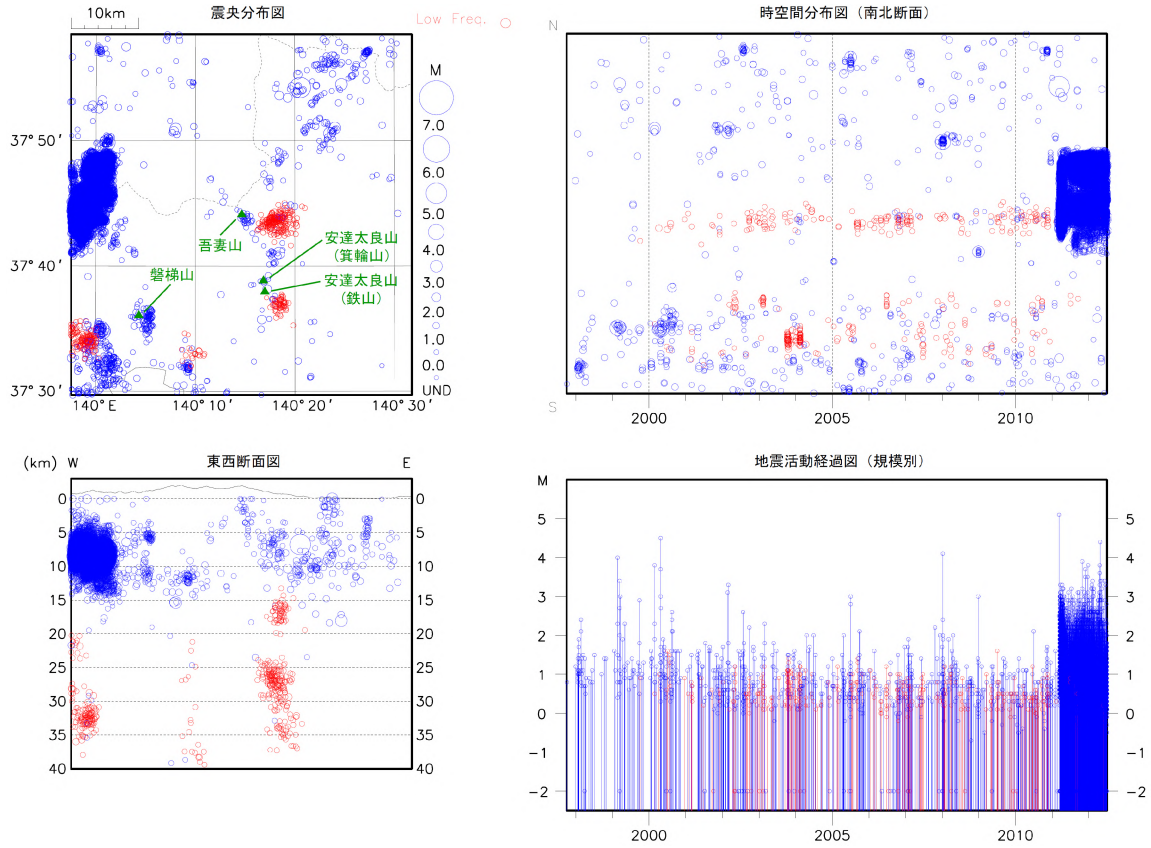


Figure 34-12 Activity of shallow VT earthquakes (blue circles) and deep low-frequenc y earthquakes (red circles) observed by a regional seismometer network (October 1, 1997, to June 30, 2012). Epicenter di stribution (upper left), space-time plot (N-S cross-sec tion) (upper right), E-W cross -section (lower left) and magnitude-time diagram (lower right).

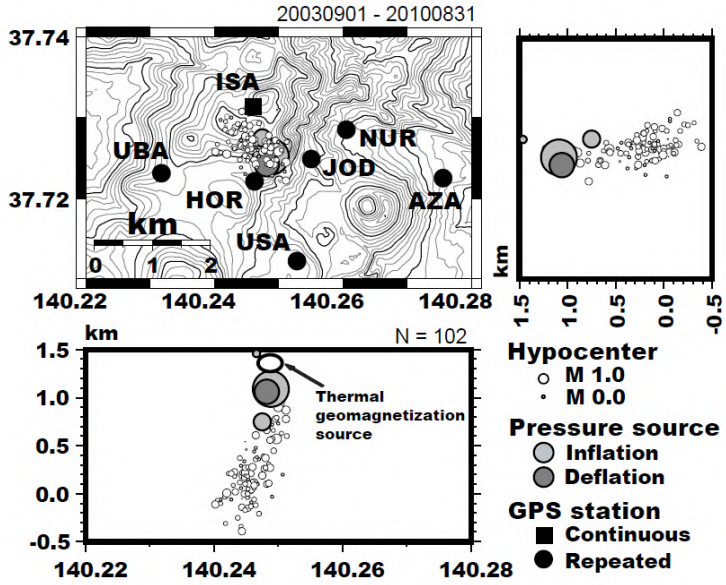


Figure 34-13 Locations of pressure sources during inflation and deflation periods determined from GPS measurement, thermal demagnetization sources estimated from geomagnetic total intensity observation and hypocenter distribution (Yoshida et al., 2012). Inflation periods: September, 2003, to November, 2004; May, 2006, to May, 2007; August, 2008, to November, 2008. Deflation period: October, 2004, to May, 2006. Hypocenters are shown for September, 2003, to August, 2010. Geomagnetic total intensity observation was performed from 2004 to 2009.

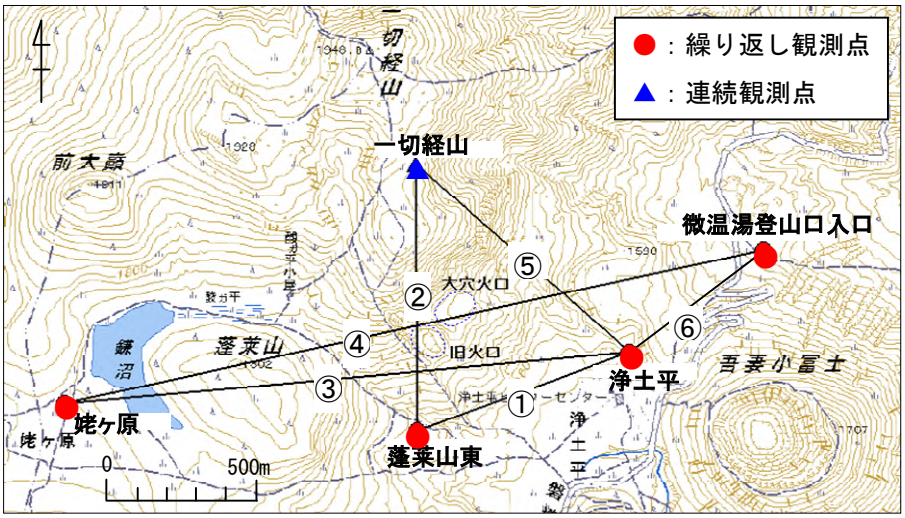


Figure 34-14 Map showing the locations of continuous (triangles) and repeated (circles) GPS monitoring points. The 1:25,000 Scale Topographic Map (Azumayama, Tsuchiyu Onsen) published by the Geospatial Information Authority of Japan was used to create this map.

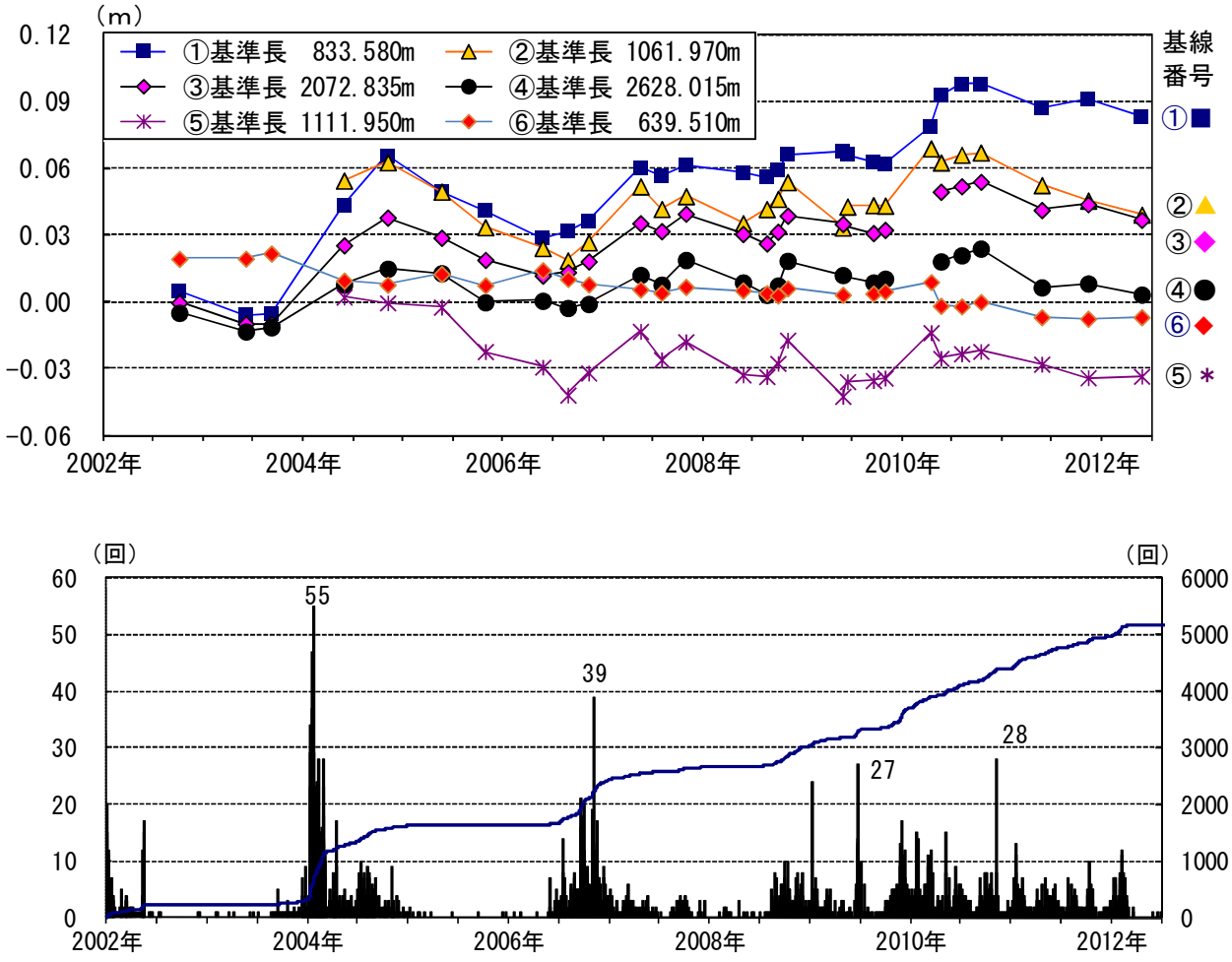


Figure 34-15 Changes in baseline length observed through continuous and repeated GPS measurements (top: September, 2002, to June, 2011) and number of earthquakes per day (bottom: January, 2002, to June, 2012). Baseline numbers (1) through (6) above correspond to GPS baselines (1) through (6) from Figure 34-14. In 2004, from 2006 to 2007, in 2008, and in 2020 minor ground deformations were observed, indicating localized inflation near the Oana crater, associated with the increase in the number of volcanic earthquakes.

Information on Disaster Prevention

①Hazard Map

Azumayama Volcano Disaster Prevention Map (Wide Area Version) January, 2002 - Published by Fukushima City, Inawashiro Town, and Kitashiobara Village. Editorial supervision by the Azumayama Volcano Disaster Prevention Coordinating Committee

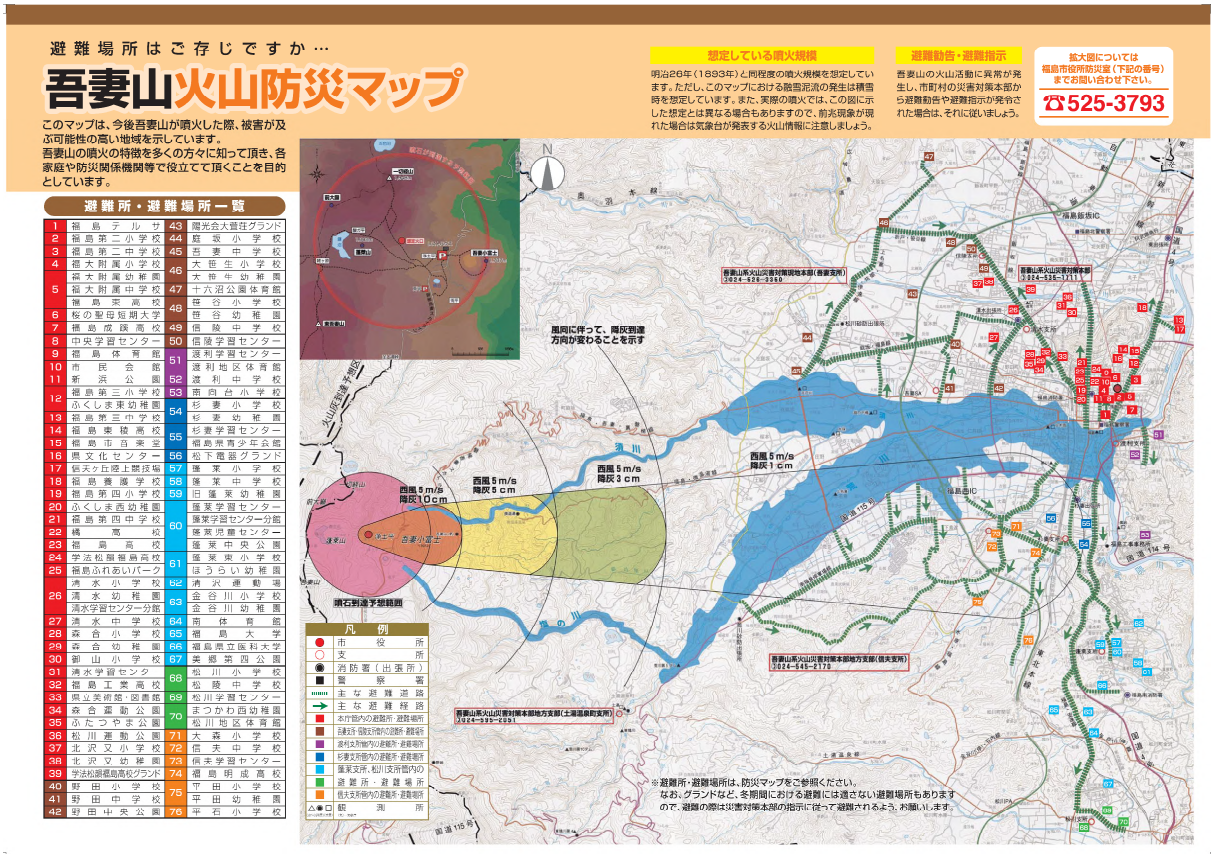
Source: Azumayama Volcano Disaster Prevention Map

Published: January, 2002

Created by: Fukushima City, Inawashiro Town, Kitashiobara Village

Editorial supervision: Azumayama Volcano Disaster Prevention Coordinating Committee

URL: http://www.city.fukushima.fukushima.jp/soshiki/8/600.html



②Volcanic Alert Levels (Used since December 1, 2007)

■吾妻山　噴火警戒レベルと規制範囲　＜大穴火口及び旧火口を想定火口とする場合＞

吾妻山の火山活動

1977（昭和52）年の2月頃から一切経山の大穴火口の噴気活動が次第に活発化し、10月頃からはさらに激しく噴出するようになった。その後、12月7日早朝に小規模な噴火があり、火口周辺に極少量の降灰が観測された。大穴火口からの噴気活動は翌年（1978年）まで盛んであった。

最近では、2001（平成13）年、2004（平成16）年、2007（平成19）年に地震活動がやや活発化となった。また、2008（平成20）年11月には、大穴火口からの噴気が、高さ400mに達するなど噴気活動がやや活発化している。

■この図は吾妻山の噴火警戒レベルに対応した主な規制範囲を示しています。

レベル1から3における規制は、以下に示す範囲において登山道、道路等の立入規制が行われます。

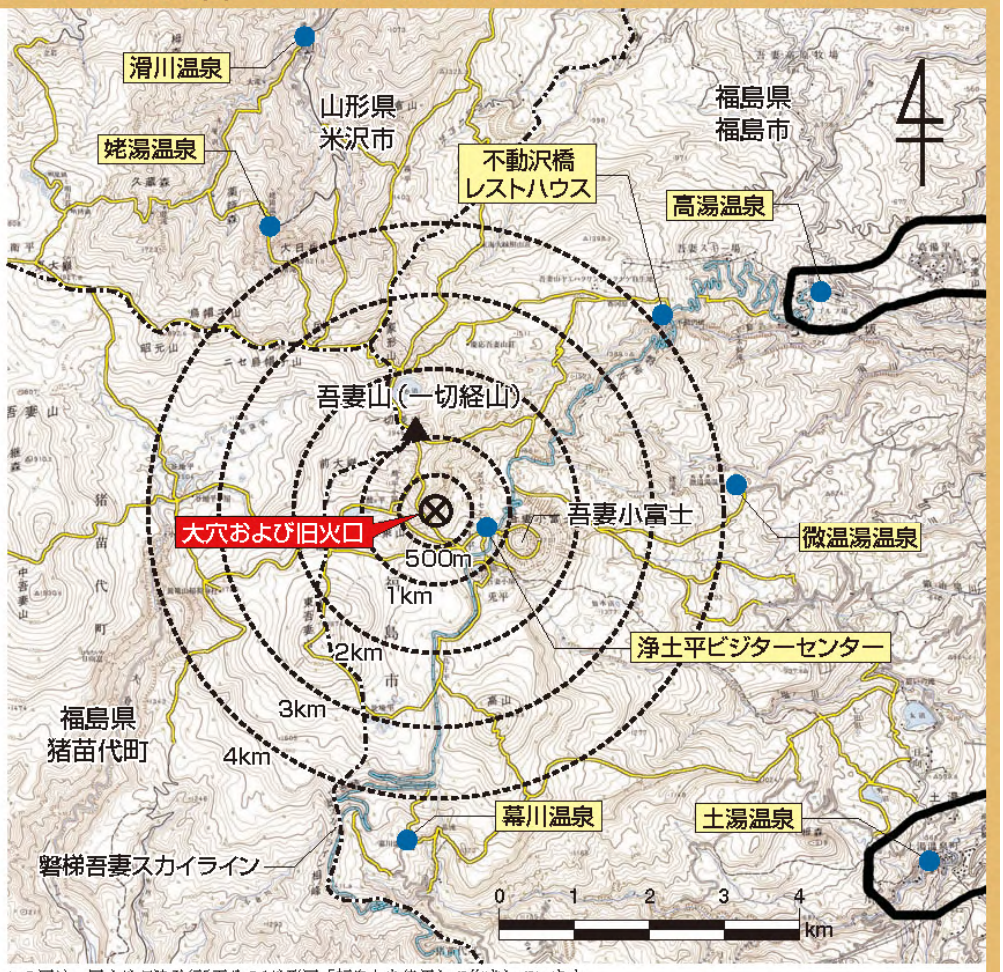
レベル3：
大穴火口及び旧火口から半径4km以内

レベル2：
大穴火口及び旧火口から半径500m以内

レベル1：
大穴火口及び旧火口内

凡　例

：居住区域
：規制道路
：登山道
※同心円（点線）は想定火口からの距離を表す



この図は、国土地理院発行5万分の1地形図「福島」を使用して作成しています。

■吾妻山の噴火警戒レベルは、地元自治体等と調整して作成しました。各レベルにおける具体的な規制範囲等については、地域防災計画等で定められていますので、詳細については、福島県福島市、猪苗代町、北塩原村、山形県米沢市にお問い合わせください。

Volcanic Alert Levels for the Azumayama Volcano (Valid as of December 1, 2007)

Warning and Forecast	Target Area	Levels & Keywords	Expected Volcanic Activity	Actions to be Taken by Residents and Climbers	Expected Phenomena and Previous Cases
Eruption Warning	Residential areas and areas closer to the crater	5 Evacuate	Eruption or imminent eruption causing significant damage to residential areas	Evacuate from the danger zone	●Eruption or imminent eruption, with lahar by melted snow flow reaching residential areas. Past Examples No observed examples in historical times.
		4 Prepare to evacuate	Possibility of eruption causing significant damage to residential areas (increased probability).	Those within the alert area should prepare for evacuation. Those requiring protection in the event of an disaster must be evacuated. Access restricted to all mountains.	●Possibility of melted snow volcanic lahar caused by eruption, extending to residential areas in case of continuation of eruption. Past Examples No observed examples in historical times.
Crater Area Warning	Non-residential areas near the volcano	3 Do not approach the volcano	Eruption or prediction of eruption causing significant damage to areas near residential areas (entering area is life threatening).	Residents can go about daily activities as normal. When necessary, evacuation preparations should be performed for those requiring protection in the event of a disaster. Access restrictions for dangerous areas, including mountain climbing and mountain access prohibitions, etc.	●Small to moderate eruption, with scattering of volcanic blocks within a distance of approximately 4 km from the crater. Past Examples 1950: Volcanic blocks were scattered approximately 1.2 km from the crater. 1893: Volcanic blocks were scattered approximately 1.5 km from the crater. ●Small to moderate eruption expected as a result of earthquake swarm and/or prominent ground deformation, etc. Past Examples No observed examples
	Crater area	2 Do not approach the crater	Eruption or prediction of eruption affecting area around crater (entering area is life threatening).	Residents can go about daily activities as normal. Access to crater area restricted, etc.	●Small eruption, with scattering of volcanic blocks within a distance of approximately 500m from the crater. Past Examples 1977: Small eruption 1952: Small eruption scattering volcanic blocks approximately 0.2 km from the crater. ●Small eruption expected as a result of increase in seismic activity and geothermal activity, etc. Past Examples 1966: Increase in seismic activity, including felt-earthquakes.
Eruption Forecast	Inside the crater	1 Normal	Little or no volcanic activity. Volcanic ash may be emitted within the crater as a result of volcanic activity (entering area is life threatening).	Access to interior of and area around crater restricted as necessary, etc.	●Little or no volcanic activity. Possibility of discharge which may affect summit crater interior.

Note 1) The volcanic blocks mentioned in this table refer mainly to blocks large enough that their trajectories are not affected by wind.

Note 2) Level 3 restrictions include access restrictions on some roads.

Note 3) Craters refer to both the Oana crater and the old crater.

Note 4) Moderate eruptions refer to reuptions scattering volcanic blocks over an area of roughly 2 to 4km.

Social Circumstances

①Populations

- Yamagata Prefecture

  Yonezawa City: 88,840 (as of April 1, 2011)

- Fukushima Prefecture

  Fukushima City:　287,941 (as of October 31, 2011)

  Inawashiro Town: 16,075 (as of October 31, 2011)

  Kitashiobara Village:　3,250 (as of November 1, 2011)

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

- Bandai-Asahi National Park - Azumayama

  Number of sightseers per year: 590,013 (according to Fukushima Prefecture sightseeing figures (2010))

  Number of mountain-climbers per year: 24,665 (according to Fukushima Prefecture sightseeing figures (2010))

  ditto　: Approximately 18,200 (according to 2010 Yamagata Prefecture sightseeing number survey)

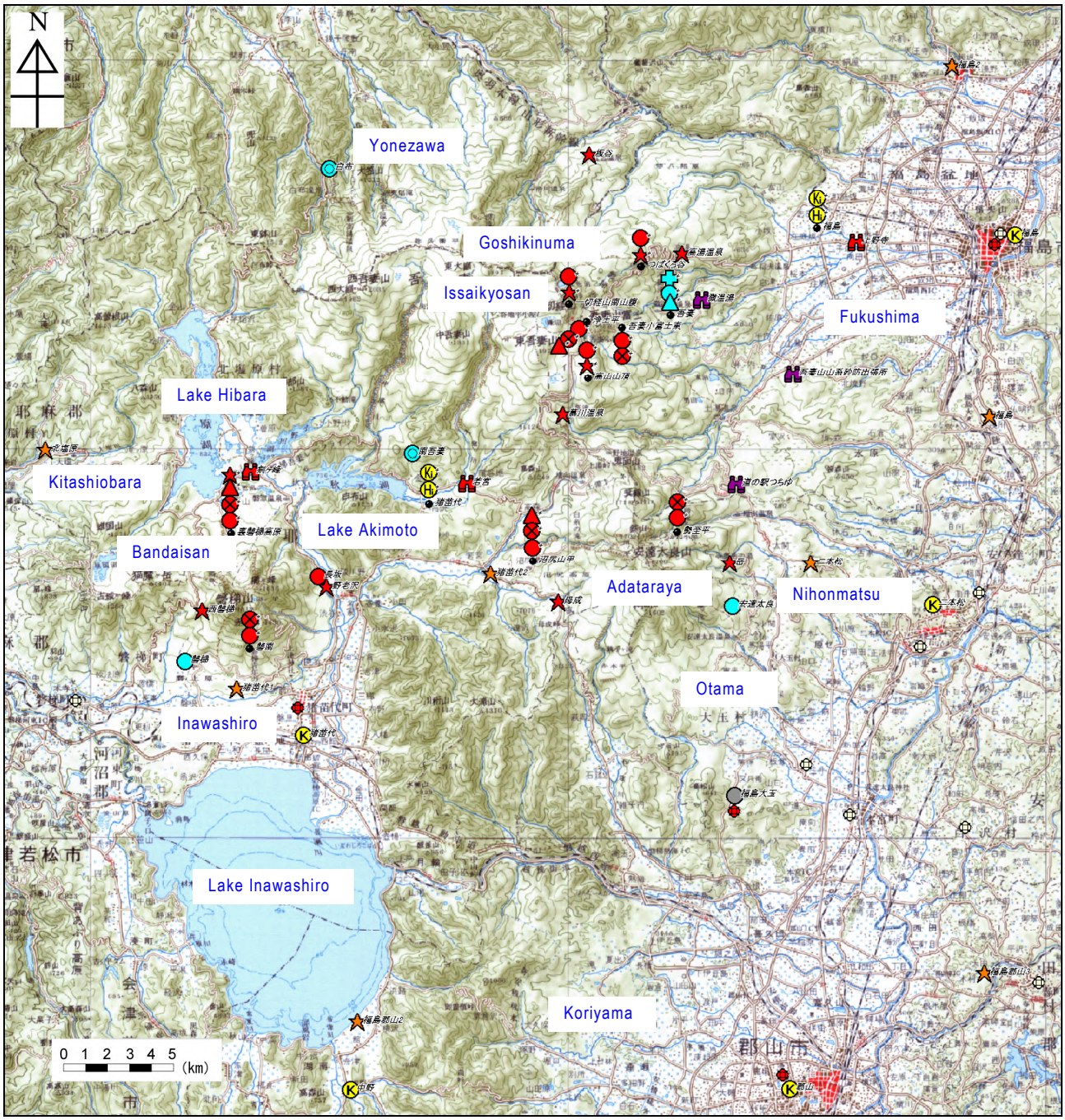
③Facilities

- Fukushima Prefecture, Fukushima
- Jododaira Shikotsu Visitor Center (Ministry of the Environment)
- Jododaira Rest House (Fukushima Prefecture)
- Fukushima Jododaira Astronomical Observatory (Fukushima City)

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 (Niigata and Fukushima) published by the Geospatial Information Authority of Japan were used.

Legend

(JMA)
- seismometer(SP)
- GPS
- tiltmeter
- infrasonic microphone
- visual camera
- seismic intensity meter
- seismometer(SP) (For earthquakes and tsunamis)

(GSI)
- GPS

(NIED)
- Hi-net
- K-NET
- KiK-net

(Tohoku Univ.)
- seismometer(SP)
- seismometer (broadband)
- tiltmeter
- thermometer

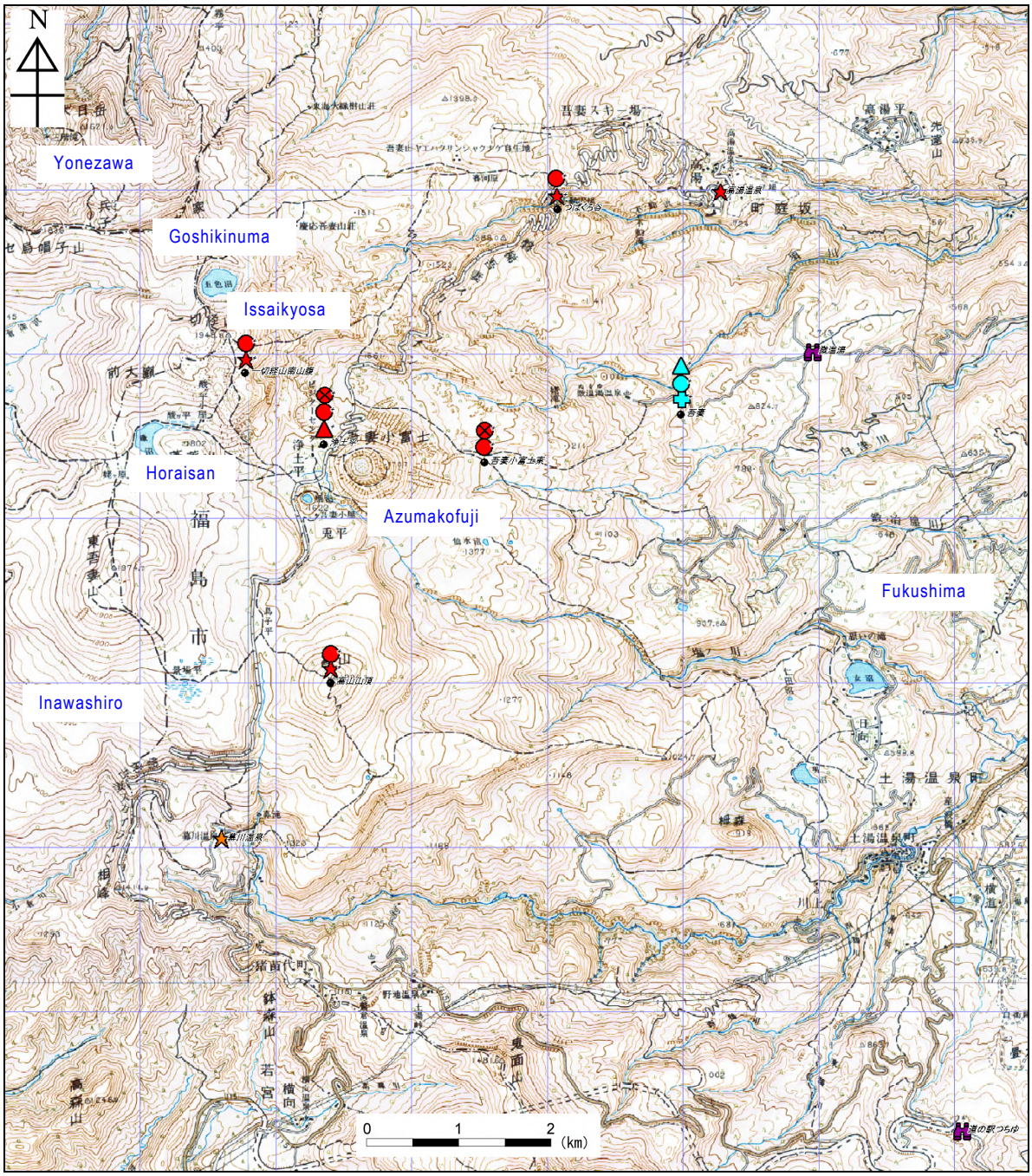
(MILT)
- visual camera

(Municipalities)
- seismic intensity meter

Figure 34-16 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 maps (Bandaisan, Nihonmatsu, Azumayama and Fukushima) published by the Geospatial Information Authority of Japan were used.

Legend

(JMA)
- seismometer(SP)
- GPS
- tiltmeter
- infrasonic microphone
- visual camera
- seismic intensity meter
- seismometer(SP) (For earthquakes and tsunamis)

(GSI)
- GPS

(NIED)
- Hi-net
- K-NET
- KiK-net

(Tohoku Univ.)
- seismometer(SP)
- seismometer (broadband)
- tiltmeter
- thermometer

(MILT)
- visual camera

(Municipalities)
- seismic intensity meter

Figure 34-17 Local monitoring network.

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(Kawanabe, Y., and Ueki, S.)