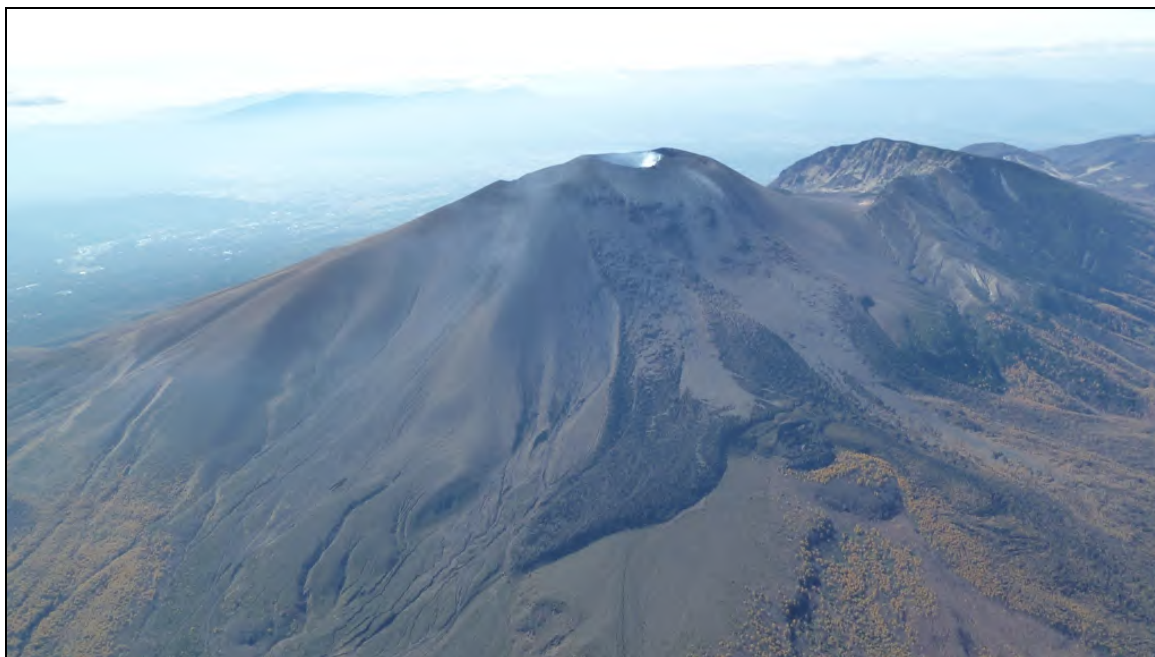


45. Asamayama

Continuously Monitored by JMA

Latitude: 36°24'23" N, Longitude: 138°31'23" E, Elevation: 2,568 m (Asamayama)
(Elevation Point)



Overview of Asamayama taken from northeast - Kamayama crater (top with smoking), Onioshidashi lava (from Kamayama crater to the lower right), Kurofuyama (top right) on November 2, 2010, by the Japan Meteorological Agency

Summary

Asamayama has a complex formation history. The oldest edifice is Kurofu volcano (an andesitic stratovolcano) and the second is Hotokeiwa volcano (a dacitic stratovolcano) (10,000 to 20,000 years ago), consisting of pumice fall deposits, lava flows (13,000 and 11,000 years ago), Koasama lava dome (20,000 years ago), and pyroclastic flow deposits). Approximately 10,000 years ago, activity at Maekake volcano began and Kamayama crater at the summit remains active by the present. Activity recorded historically occurred at Kamayama. The topography of Kamayama crater largely changed eruption by eruption and the present dimension is 500 m east-west and 440 m north-south, and particularly its depth changes greatly. Strong fumarolic activity is observed continuously inside Kamayama crater, and faint fumarolic activity is also in Jigokudani on the western flank of Kamayama. The volcano is popular in explosive (vulcanian) eruptions, which are frequently accompanied by pyroclastic flows (glowing clouds). Lava overflowed Kamayama crater in 1108 and 1783. Eruption precursor phenomena sometimes include frequent shallow earthquakes (B-type earthquakes) just below the crater. The SiO₂ content of the rock is between 53.5 and 74.0 wt %.

Photos



Small Eruption taken from the Karuizawa Weather Station on September 15, 2004 by the Japan Meteorological Agency.



Glowing taken from Asamaen on December 10, 2004 by the Japan Meteorological Agency.



Very Small Eruption taken from the Karuizawa Fire Department on February 9, 2009 by the Japan Meteorological Agency.



Small Eruption taken from Ozasa, Tsumagoi, on February 2, 2009 by the Japan Meteorological Agency.



Asamayama taken from Kurofuyama on October 12, 2012 by the Japan Meteorological Agency

Red Relief Image Map

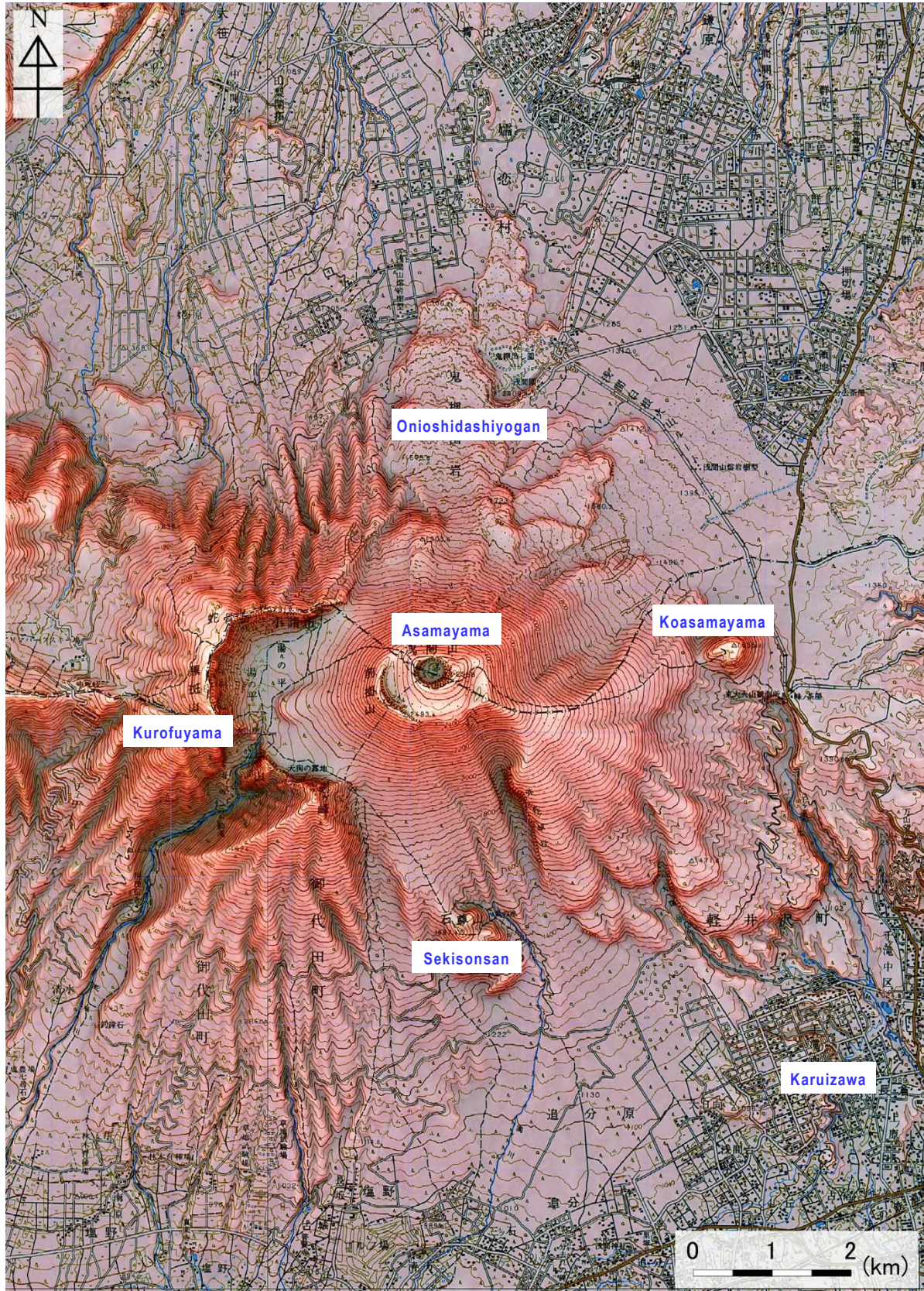


Figure 45-1 Topography of Asamayama.

1:50,000 scaled topographic maps (Komoro, Miyota, Ueda and Karuizawa) 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

The Maekake volcano has been active since approximately 10,000 years ago. Large eruptions over VEI 4 include eruptions of 8,000 and 5,000 years ago, and in the 4th century (Takahashi, 1998; Takahashi et al., 2007).

Period	Area of Activity	Eruption Type	Main Phenomena / Volume of Magma
13.3~12.9 ka	Maekakeyama area (Hotokeiwa volcano)	Magmatic eruption	Soja pumice eruption: tephra fall, pyroclastic flow, lava flow. Magma eruption volume = 0.44 km ³ DRE. (VEI 5)
13.3~9 ka	Maekakeyama	?	5 tephra fall events separated by some time.
13.3~9 ka	Maekakeyama	Magmatic eruption	Tephra fall.
9.4~9 ka	Maekakeyama	Magmatic eruption	Fujioka pumice eruption: tephra fall. Magma eruption volume = 0.19 km ³ DRE. (VEI 4)
9.4~7.3 ka	Maekakeyama	Magmatic eruption	Kumagawa pumice eruption: tephra fall. Magma eruption volume = 0.07 km ³ DRE. (VEI 4)
7.3~6 ka	Maekakeyama	Magmatic eruption	Tephra fall.
6.2~6 ka	Maekakeyama	Magmatic eruption	Kuni pumice eruption: tephra fall, pyroclastic flow. Magma eruption volume = 0.29 km ³ DRE. (VEI 4)
6.2~4.5 ka	Maekakeyama	Magmatic eruption	Miyota pumice eruption: tephra fall. Magma eruption volume = 0.13 km ³ DRE. (VEI 4)
6.2←→4.5 ka	Maekakeyama	Magmatic eruption	Sengataki pumice eruption: tephra fall. Magma eruption volume = 0.04 km ³ DRE. (VEI 4)
4.5 ka	Maekakeyama	Magmatic eruption	D-2 pumice eruption: tephra fall. Magma eruption volume = 0.13 km ³ DRE. (VEI 4)
4.5 ka	Maekakeyama	Magmatic eruption	D-1 pumice eruption: tephra fall. Magma eruption volume = 0.13 km ³ DRE. (VEI 4)
4.5~1.65 ka	Maekakeyama	Magmatic eruption	Two tephra fall events.
1.65 ka	Maekakeyama	Magmatic eruption	Asama C pumice eruption or mid-4 th century eruption: tephra fall, pyroclastic flow, lava flow. Magma eruption volume = 0.32 km ³ DRE. (VEI 4)

* Volcanic periods, areas of activity, and eruption types taken from the Active Volcano Database of Japan, AIST (Kudo and Hoshizumi, 2006). All years are noted in Western date notation. "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.
685 (Emperor Tenmu 14)	Eruption?	Tephra fall.
1108 (Tennin 1)	Large: Magmatic eruption	Tennin eruption and Asama B pumice eruptions: August 29; late August or early September; September 25 to October 11. Tephra fall, pyroclastic flow, lava flow. The eruptive activity occurred at Maekakeyama. Magma eruption volume = 0.62 km ³ DRE. (VEI 5)
1128 (Daiji 3)	Large: Magmatic eruption	Tephra fall. The eruptive activity occurred at Maekakeyama. Magma eruption volume = 0.28 km ³ DRE. (VEI 4)
1281 (Koan 4)	Eruption?	June 26.

Year	Phenomenon	Activity Sequence, Damages, etc.
1527 (Daiei 7)	Eruption?	May.
1528 (Kyoroku 1)	Eruption?	
1532 (Kyoroku 5)	Eruption, (lahar)	January 4. Tephra fall and lahar. The eruptive activity occurred in the summit area. Volcanic blocks fell over an area of 8 km from the crater, including the "Nanahiroishi" volcanic block over 25 m in diameter. The following day, ash fell as far as 120 km away, and lahar caused by mixing with rain and melted snow flowed down on the foot of the volcano, causing damages on roads and houses. Another eruption occurred within the same year (Tenbun 1). (VEI 2)
1534 (Tenbun 3)	Eruption	
1582 (Tensho 10)	Eruption	February 16 and July 3. Tephra fall.
1590 (Tensho 18)	Eruption	
1591 (Tensho 19)	Eruption	November 29. Tephra fall.
1595 (Bunroku 4)	Magmatic eruption?	Eruption? June 1. Tephra fall.
1596 (Keicho 1)	Moderate: Magmatic eruption	May 1 to 5; August 1 and 19; September. Tephra fall. Eruptive activity occurred in the summit area. Volcanic blocks fell on May 5, causing many deaths. Magma eruption volume = 0.004 km ³ DRE. (VEI 3)
1597 (Keicho 2)	Eruption	April 17. Ashl ash.
1600 (Keicho 4)	Eruption	January 14 to 25. Tephra fall.
1605 (Keicho 10)	Eruption	December 1605 to February 1606.
1609 (Keicho 14)	Eruption	April 5.
1644 (Shoho 1)	Eruption	February 20.
1645 (Shoho 2)	Eruption	May 21.
1647 (Shoho 4)	Eruption	February 18 and March 25.
1648 (Keian 1)	Eruption	March 20 and August 30. Over 1m thick of snow melted, washing away Oiwake Railroad Station.
1649 (Keian 2)	Eruption	August 18 and 19.
1650 (Keian 3)	Magmatic eruption?	June 4. Tephra fall.
1651 (Keian 4)	Eruption	April 12.
1652 (Joo 1)	Eruption	April 12. Fires at the foot of the volcano due to falling of volcanic blocks.
1655 (Meireki 1)	Eruption	November 25.
1656 (Meireki 2)	Eruption	December 10.
1657 (Meireki 3)	Eruption	November 25.
1658 (Manji 1)	Eruption	July 24.
1659 (Manji 2)	Rumbling	July 24. Tephra fall.
1660 (Manji 3)	Eruption	April 4.
1661 (Kanbun 1)	Eruption	April 4, 14, and 27; October 21.
1669 (Kanbun 9)	Eruption	
1695 (Genroku 8)	Eruption	June 23. Tephra fall.
1703 to 1704 (Genroku 16 to Hiei 1)	Eruption	Eruption in April. Tephra fall.
1706 (Hiei 3)	Eruption	November 20.
1708 to 1709 (Hiei 5 to 6)	Eruption	December 29; 1708; January 8, 1709. Tephra fall. Sand fell in Edo.
1710 (Hiei 7)	Eruption	April 13.
1711 (Shotoku 1)	Eruption	March 25; April 13. Tephra fall.
1713 (Shotoku 3)	Eruption	June 29. Eruption? Tephra fall.
1717 (Kyoho 2)	Eruption	September 23.
1718 (Kyoho 3)	Magmatic eruption?	September 26. Following rumbling, eruptive activity occurred in the summit area.
1719 (Kyoho 4)	Eruption	June 10 to 11. Tephra fall.
1720 (Kyoho 5)	Eruption	June 6.
1721 (Kyoho 6)	Small-scale: Eruption	June 22. Tephra fall. Volcanic blocks killed 15 climbers and seriously injured 1 climber. (VEI 1)
1722 to 1723 (Kyoho 7 to 8)	Eruption	November 18 to 21, December 4 and 23; 1722; February 5; 1723. Tephra fall.

Year	Phenomenon	Activity Sequence, Damages, etc.
1723 (Kyoho 8)	Eruption	August 20.
1728 (Kyoho 13)	Eruption	November 10.
1729 (Kyoho 14)	Eruption	November or December. Tephra fall. ¹⁰⁵
1732 (Kyoho 17)	Eruption	July 30.
1733 (Kyoho 18)	Eruption	July 30. Volcanic ballistics.
1752 (Horeki 2)	Eruption	September or October.
1754 (Horeki 4)	Eruption	Tephra fall. Several tephra falls, causing crop damage.
1776 (An'ei 5)	Eruption	September 5. Tephra fall.
1777 (An'ei 6)	Eruption	Several eruptions.
1783 (Tenmei 3)	Large: Magmatic eruption, (collapse, secondary explosion, lahar)	Tenmei eruption: May 8 to 10; June 25, 26; July 17, 21 to 31; August 1 to 5, 15. Tephra fall, pyroclastic flow, lava flow, lahar. Eruptive activity occurred at Kamayama crater. Volcanic activity continued from May 9 to August 5. On July 28 ash fell and doors with paper panes rattled in Edo. On August 2, Maekakeyama became incandescent due to volcanic lightning and hot volcanic blocks. On August 3 volcanic blocks fell at Gipayama, a minor forest fire broke-out at the foot of the volcano, and ash fell as far as Choshi in the eastern Kanto region. On August 4 the Agatsuma pyroclastic flow occurred at the northern foot of the volcano. Ash falling in the central Kanto area darkened sky like night. On the morning of August 5 a large explosion and the Kanbara pyroclastic flow and debris avalanche occurred, flowing to the northern foot of the volcano. Downstream it turned into lahars, blocking the Azuma River. This blockage collapsed soon, and abundant water rushed into the Tone River, washing away a village along it. Immediately after the Kanbara pyroclastic flow, the Onioshidashi lava flowed down the northern flank. 1,151 people were killed, 1,061 houses were swept away, 51 houses were burned down, and over 130 houses were destroyed. Total volume of ejecta = $4.5 \times 10^8 \text{ m}^3$. Magma eruption volume = $0.51 \text{ km}^3 \text{ DRE}$. (VEI 4)
1803 (Kyowa 3)	Eruption	July 4; November 7 and 20. Tephra fall. ¹⁰⁵ Ash fell on July 4. A tea house, called "Wakasari", was destroyed by falling of volcanic blocks on November 7. Ash fell in Edo on November 20.
1815 (Bunka 12)	Eruption	February 28. Tephra fall.
Roughly 1864 (Bunkyu 3)	Rumbling	Details unknown.
1866 to 1867 (Keio 2 to 3)	Volcanic plume, rumbling	Details unknown.
1867 (Keio 3)	Eruption	In August, Tephra fall.
1869 (Meiji 2)	Eruption	Eruption repeated from spring to October.
1875 (Meiji 8)	Eruption	On June 14, tephra fall.
1879 (Meiji 12)	Eruption	September 27 and 28.
1889 (Meiji 22)	Magmatic eruption?	On December 24, tephra fall. The eruptive activity occurred at the Kamayama crater. A minor forest fire was caused by falling of volcanic blocks. Rumbling.
1890 (Meiji 23)	Rumbling	Rumbling from around 21:00 on January 5: Over 10 events of rumbling, lasting until around 3:00 on January 6.
1894 (Meiji 27)	Magmatic eruption	Tephra fall. The eruptive activity occurred at the Kamayama crater. Several eruptions, tephra fall, and explosion sounds from April to June.
1899 (Meiji 32)	Eruption	Tephra fall. The eruptive activity occurred at the Kamayama crater. Eruptions in March, July, and August. On August 7 an explosion sound was heard and ash fell as far as the north of the Kanto region.
1900 to 1901 (Meiji 33 to 34)	Magmatic eruption	Tephra fall. The eruptive activity occurred at the Kamayama crater. Eruptions, loud explosion sounds, air-shocks, volcanic ballistics, and tephra fall over a wide area from January to April. Eruptions, tephra fall, and rumbling in July, August, November, and December. Eruptions and tephra fall from March to August and October 1901 (Meiji 34).
1902 (Meiji 35)	Eruption	August 5 and 20. Tephra fall. The eruptive activity occurred at the Kamayama crater. Rumbling and tephra fall.
1904 (Meiji 37)	Eruption	On August 4, Tephra fall. The eruptive activity occurred at the Kamayama crater. Tephra fall.

Year	Phenomenon	Activity Sequence, Damages, etc.
1905 (Meiji 38)	Rumbling	October 21 to 28.
1906 (Meiji 39)	Rumbling	April 6 and April 20.
1907 (Meiji 40)	Eruption	Tephra fall. The eruptive activity occurred at the Kamayama crater. Rumbling and tephra fall. January 18, March 28, August 24.
1908 to 1914 (Meiji 41 to Taisho 3)	Small-scale: Magmatic eruption	Rumbling or tephra fall. The eruptive activity occurred at the Kamayama crater. Activity was high, loud explosion sounds were heard, and ash fell over a wide area, frequently reaching the north and center of the Kanto region, from January to April 1911. Explosion sounds were particularly loud on January 18, heard from 100 to 150km to the east, and in Toyama Prefecture on April 3 and 4. On May 8 a large number of volcanic blocks were ejected, killing 1 person and injuring 2 others. Air shocks caused damage to houses, and the explosion sound could be heard 240 km away. Eruptions occurred occasionally from July to September, causing many deaths on August 15. On October 22 and December 3 explosion sounds could be heard over 100 km away. In 1912, eruptions occurred occasionally, explosion sounds were heard, and ash fell in January, February, April, and July. In October a continuous eruption occurred, and the crater floor became shallower. Eruptions continued in December. The crater floor became shallower, reaching almost to the crater rim. In February and from April to November 1913, a large number of eruptions occurred, loud explosion sounds were heard, blocks fell, and ash fell over a wide area. On May 29 one climber was killed, and 1 was injured. On June 17 tephra fall was observed in the coast of the Pacific Ocean to the east; Explosion sound was felt outside the explosion audibility. From January to June 1914, and from November to December 1914, a large number of eruptions occurred, loud explosion sounds were heard even in Tokyo, and ash fell over a wide area. Particularly strong infrasonic waves were observed on March 3, knocking paper panes off their door frames at the foot of the volcano. Magma eruption volume = 0.00013 km ³ DRE. (VEI 1)
1915 (Taisho 4)	Eruption	August 27. The eruptive activity occurred at the Kamayama crater. The activity weakened, but summit glowing occurred in May, June, and August.
1916 (Taisho 5)	Eruption	On September 8 and October 2, the eruptive activity occurred at the Kamayama crater.
1917 (Taisho 6)	Eruption	On May 17, the eruptive activity occurred at the Kamayama crater.
1918 (Taisho 7)	Rumbling	May, June.
1919 (Taisho 8)	Eruption	On March 14 and May 3, the eruptive activity occurred at the Kamayama crater. Ejection of volcanic blocks, and sand and tephra fall on March 14. Weak eruptions in May, July and August.
1920 to 1922 (Taisho 9 to 11)	Magmatic eruption	Tephra fall. The eruptive activity occurred at the Kamayama crater. Continuous volcanic block ejection and large amount of volcanic smoke emission. On December 14, 1920, a large number of volcanic blocks were ejected, causing a tea house at a pass to burn down. A forest fire covering over 200 ha occurred on December 22. A large amount of eruption activity occurred from January to June 1921. Air shocks on January 18 and June 4 damaged doors with paper panes at the foot of the volcano. Rumbling and tephra fall occurred. Volcanic block ejection and tephra fall occurred from January to April 1922. An explosion sound on January 14 could be heard even in Tokyo, and the air shock damaged doors with paper panes at the foot of the volcano.
1924 (Taisho 13)	Eruption	September 13 and October 29. Tephra fall. The eruptive activity occurred at the Kamayama crater. Tephra fall.
1927 to 1928 (Showa 2 to 3)	Magmatic eruption ^{17,18,105}	Tephra fall. The eruptive activity occurred at the Kamayama crater. September to December 1927. The amount of volcanic smoke increased from April. Rumbling began in September, and in October loud explosion sounds and tephra fall occurred. On February 23, 1928, a loud explosion sound occurred. The air shock damaged doors with paper panes at the foot of the volcano, and volcanic blocks were scattered over a wide area, burning down a tea house, called "Wakasari" and damaging many roofs. Multiple eruptions, rumbling, and tephra fall occurred in March. Multiple eruptions, rumbling, and tephra fall occurred in July as well.

Year	Phenomenon	Activity Sequence, Damages, etc.
1929 to 1932 (Showa 4 to 7)	Small-scale: Magmatic eruption	<p>Tephra fall. The eruptive activity occurred at the Kamayama crater. Felt-earthquakes at the summit on September 5, 1929: On September 18, volcanic blocks from 30 to 60 cm in diameter were scattered as far as 3 km, causing a forest fire. Paper screen doors at the foot of the volcano were damaged by an air shock. An outer zone of audibility of the explosion sound was confirmed. One eruption occurred in each of the months of April, October, and November. Several events of rumbling and a small amount of tephra fall occurred in April 1930. 4 or 5 eruptions occurred on June 11, with strong infrasonic waves occurred outside the sound audibility, and minor forest fires. Several events of rumbling and tephra fall occurred in July. A high number of eruptions, tephra fall, and volcanic block scattering occurred in August, killing 6 people near the crater on August 20. In September explosions with strong volcanic block ejections and tephra fall occurred over a wide area. An eruption occurred on October 17.</p> <p>Between one and several eruptions and tephra fall occurred in March, June, and July 1931. In August activity was high, with volcanic blocks, tephra fall, etc. On August 20, 3 people were stranded, and an outer zone of explosion sound audibility occurred. In the first half of September several eruptions, tephra fall, and volcanic block ejections occurred. Several eruptions occurred in October and December. On December 8 an air shock damaged windows at the foot of the volcano, an outer zone of explosion sound audibility occurred, and ash fell as far as the south of the Kanto region. Between 10 and several dozen eruptions occurred in February to July 1932. Some explosions were accompanied by loud sounds, and spread tephra fall over a wide area. Several eruptions, rumbling, and tephra fall also occurred in September.</p> <p>Magma eruption volume = 0.00012 km³ DRE. (VEI 1)</p>
1934 to 1937 (Showa 9 to 12)	Small-scale: Magmatic eruption	<p>Tephra fall. The eruptive activity occurred at the Kamayama crater. Small eruption in November 1934. Eruption occurred in January and February 1935. In April several eruptions occurred, and on April 20 an explosion sound and large air shock knocked doors with paper panes off their frames and broke windows at the foot of the volcano. Volcanic activity was high in May as well, and frequent minor forest fires. Several small eruptions occurred from June to November. From a few to several dozen eruptions occurred each month from February to April and July to November 1936. An explosion with sound outside audibility occurred on July 22. One mountain-climber was killed on July 29, and one on October 17. Several eruptions occurred during February to July 1937. On March 18 a large air shock damaged doors with paper panes of houses at the foot of the volcano. Tephra fall reached as far as the center of the Kanto region.</p> <p>Magma eruption volume = 0.00024 km³ DRE. (VEI 1.4)</p>
1938 to 1942 (Showa 13 to 17)	Small-scale: Magmatic eruption	<p>Tephra fall. The eruptive activity occurred at the Kamayama crater. Between several and several dozen eruptions occurred every month from March to December. On May 21 an explosion with the sound outside audibility occurred, and windowpanes were broken at the foot of the volcano. A large amount of ash fell on June 7. Total ejecta = 2x10⁵ m³. On July 16 several mountain-climbers were killed, and crops were damaged. On September 20 windowpanes were damaged at the foot of the volcano. On October 4, December 11, and 12, loud explosion sounds could be heard over a large area. On September 26 at 13:43 a volcanic plume reached a height of 8200 m. Several eruptions occurred in 1939. Loud explosion sounds were audible over a wide area on February 2 and 15. Several eruptions occurred from February, to June, and from September to November 1940. The number of eruptions increased from December. Ten and several dozen eruptions occurred every month in 1941. On April 1 an explosion sound was audible over a large area, and many windowpanes were broken at the foot of the volcano. On July 13 one person was killed and 2 were injured.</p> <p>Several to dozens eruptions occurred every month in 1942. An eruption which was extensively audible in May, associated with a minor forest fire, etc.</p> <p>Magma eruption volume = 0.0002 km³ DRE. (VEI 1.3)</p>

Year	Phenomenon	Activity Sequence, Damages, etc.
1944 to 1945 (Showa 19 to 20)	Eruption	Tephra fall. The eruptive activity at the Kamayama crater. A few to several dozen eruptions occurred each month from June to December 1944. A few to several dozen eruptions occurred each month from January to August and October to November 1945.
1946 (Showa 21)	Eruption	October 29 and 30. Tephra fall. The eruptive activity at the Kamayama crater. An eruption occurred on October 1.
1947 (Showa 22)	Small-scale: Magmatic eruption	July 6 and August 14. Tephra fall. The eruptive activity at the Kamayama crater. One eruption occurred every month from June to August. At 12:17 of August 14, volcanic blocks were thrown by an eruption with the volcanic plume of 12,000 m high, and 9 mountain-climbers were killed. Forest fire and tephra falling were associated. Magma eruption volume = 0.00004 km ³ DRE. (VEI 1)
1949 (Showa 24)	Magmatic eruption	Tephra fall. The eruptive activity at the Kamayama crater. Eruptions in March, April, and June to October. On August 15, 4 climbers were injured. Activity was especially high in September. Eruption on September 3 and 21 were with explosion sound outside of audibility on September 3 and 21.
1950 to 1951 (Showa 25 to 26)	Small-scale: Magmatic eruption	tephra fall. The eruptive activity at the Kamayama crater. The eruption at 04:37 on September 23 killed 1 climber, injured 6 others, damaged windowpanes at the foot of the volcano, and was associated with explosion sound outside audibility. A huge block, called "1,000 ton block" was ejected on the northern crater rim. Volcanic block ejection and tephra fall occurred in both October and December. One to several eruptions occurred each month from February to June 1951. Magma eruption volume = 0.00004 km ³ DRE. (VEI 1)
1952 (Showa 27)	Eruption	On June 7, 13, 14 tephra fall. ¹⁰⁵ The eruptive activity at the Kamayama crater. ¹⁰⁵ Three eruptions with tephra fall occurred in June.
1953 to 1955 (Showa 28 to 30)	Eruption	Tephra fall. The eruptive activity at the Kamayama crater. Six eruptions in December 1953. Several dozen events of ash eruption from January to July 1954. Eruptions continued excluding October. On June 24 tephra fall was observed the south of the Kanto area. On September 6 volcanic blocks and ash fell on extensive area. One to several eruptions occurred each month from January to June 1955. On June 11 an explosion with the sound outside audibility occurred.
1958 to 1959 (Showa 33 to 34)	Small-scale: Magmatic eruption	Tephra fall and pyroclastic flow. The eruptive activity at the Kamayama crater. 1958: Large number of eruptions during October to December. At 22:50 of November 10 an explosion whose sound was heard in an extensive area occurred. It ejected a large amount of volcanic blocks, generated pyroclastic flow, and fell ash. Total ejecta volume = 3.6x10 ⁵ m ³ . The air shocks caused damage to windowpanes and door with paper panes over a wide area at the foot of the volcano, and an explosion earthquake measuring 2 on the JMA seismic intensity scale occurred (Oiwake, Karuizawa-cho). In 1959 one to over a dozen eruptions occurred every month, with occasional tephra fall. On April 14 many minor forest fires were caused by volcanic block ejections, and ash fell on the southern Kanto area. Magma eruption volume = 0.00022 km ³ DRE. (VEI 1)
1961 (Showa 36)	Small-scale: Magmatic eruption	Tephra fall and pyroclastic flow. The eruptive activity at the Kamayama crater. Several and several dozens eruptions occurred every month from August to December. At 14:41 of August 18 an eruption occurred for the first time after 23 months. It scattered volcanic blocks and produced tephra fall over an extensive area, causing 1 person missed, and damaging agricultural land and pasture land. Total ejecta volume = 7x10 ⁴ m ³ . Magma eruption volume = 0.00004 km ³ DRE. (VEI 1)
1965 (Showa 40)	Phreatic eruption	On May 23, tephra fall. The eruptive activity at the Kamayama crater. A weak eruption with a black volcanic plume occurred in May. Seismic activity remained high during the following ~4 years.

Year	Phenomenon	Activity Sequence, Damages, etc.
1973 (Showa 48)	Moderate: Magmatic eruption, (lahar production)	Tephra fall, pyroclastic flow, and lahar. The eruptive activity at the Kamayama crater. Glowing was observed in the early morning of February 1. Earthquake swarms. At 19:20 of February 1, a large eruption occurred for the first time in 11 years and 3 months (excluding the weak eruption in May 1965), which continued until May 24. On February one sliding glass-door at the foot of the volcano was broken by the air shock. Three small pyroclastic flows occurred on February 1, 6, and March 10. Magma eruption volume = 0.00044 km ³ DRE. (VEI 2)
1981 (Showa 56)	Earthquake	During March 7-11 and August 10-12 earthquake swarms were observed.
1982 to 1983 (Showa 57 to 58)	Small-scale: Phreatic eruption, (lahar)	Tephra fall, pyroclastic flow, and lahar. The eruptive activity at the Kamayama crater. Earthquake swarm on January 17. At 02:25 of April 26, eruption generated small pyroclastic flow with tephra fall as far as the Boso Peninsula. Crop damage. Very small eruption on October 2: Very small amount of tephra fall in Naganohara, Gunma Prefecture. A pyroclastic flow and lahar occurred on April 26, 1982. At 07:59 of April 8, 1983, an eruption with an explosion sound, lightning and fire column above the crater, resulting in minor forest fire on the southern flank, and tephra fall reaching Nagano Prefecture, the north Kanto, and the Pacific coast of Fukushima Prefecture. (VEI 0.9)
1990 (Heisei 2)	Very small-scale: Phreatic eruption	Tephra fall. The eruptive activity at the Kamayama crater. Large number of earthquakes and tremors were observed in the eruption on July 20. Eruption in early morning of July 20. Very small amount of tephra fall near the crater to the eastern and southeastern foot of the volcano. (VEI 0)
1991 (Heisei 3)	Earthquake	Slightly large number of earthquakes. January to September.
1994 (Heisei 6)	Earthquake	During July to December, lightly large number of earthquakes. A M2.3 earthquake on November 24 (JMA scale seismic intensity 1 at Oiwake, Karuizawa).
1995 (Heisei 7)	Earthquake, volcanic plume	During July to December, slightly large number of earthquakes and relatively high volcanic plume.
1996 (Heisei 8)	Earthquake, volcanic plume	During May to December, slightly large number of earthquakes, and relatively high volcanic plume.
1997 (Heisei 9)	Earthquake, volcanic plume	During January to May, slightly large number of earthquakes and relatively high volcanic plume.
1999 (Heisei 11)	Earthquake	Earthquake swarms from early to mid-August. Slightly large number of earthquakes from November to early December.
2000 (Heisei 12)	Earthquake, volcanic plume	Earthquake swarms on April 17. Earthquake swarms from September 18 to 23. Slightly large number of earthquakes from late October to December and relatively high volcanic plume from late November to December.
2001 (Heisei 13)	Earthquake, volcanic plume	During January to April, slightly large number of earthquakes and relatively high volcanic plume.
2002 (Heisei 14)	Earthquake, volcanic plume, volcanic gas, glowing	Earthquake swarm on June 22. Slightly high large number of earthquakes from June to September, with high volcanic plume. Temperature at crater floor increased. Tree discoloration caused by volcanic gas at the foot of the volcano.. Weak glowing in September.
2003 (Heisei 15)	Very small-scale: Phreatic eruption	Tephra fall. The eruptive activity at the Kamayama crater. On February 6 ash fell in the crater area. On March 30 a small amount of ash fell from the summit to the volcano's flanks. Four eruptions occurred, scattering lapilli up to 4 cm across in the crater area (approximately 300 m from the crater rim). High volcanic plume activity. (VEI 0)

Year	Phenomenon	Activity Sequence, Damages, etc.
2004 (Heisei 16)	Small-scale: Magmatic eruption	<p>Tephra fall. The eruptive activity at the Kamayama crater. Volcanic plume activity was high from late July, with weak glowing. Temperature at crater floor increased. Tree discoloration on the flanks of the volcano caused by volcanic gas. Earthquake swarms began on the night of August 31. Explosive activity resumed at 20:02 on September 1 for the first time in 21 years. The explosion on September 1 excited an infrasonic wave (205 Pa at Oiwake, Karuizawa), issued volcanic blocks and showered lapilli up to 3 cm across as far as 6 km northeast of the summit. Ash fell in the prefectures of Gunma and Fukushima (furthest is Soma). From September 14 to 18 small eruptions were frequent, almost continuous from the early morning of September 16 to the evening of September 17. A large amount of ash fell in Karuizawa, and ash fell in the prefectures of Gunma, Saitama, Tokyo, Kanagawa, and Chiba (furthest Katsuura). New lava appeared on the crater floor about this time. At 19:44 on September 23, an explosion occurred with a medium sized explosion sound and infrasonic wave. The explosion earthquake measured 1 on the JMA seismic intensity scale at Miyota. Lapilli up to 3 cm across fell 4 km north-northeast of the summit, and ash fell in the prefectures of Gunma, Niigata, and Yamagata to the north-northeast (furthest is Higashine). At 12:27 on September 29, an explosion occurred with a weak explosion sound and infrasonic wave. The explosion earthquake was measured to be 1 on the JMA seismic intensity scale at Oiwake, Karuizawa and at Miyota. Lapilli up to 4 cm across fell 4 km north of the summit, and ash fell from the north to the north-northeast at Tsumagoi, Naganohara, and Kusatsu. An explosion occurred at 20:59 on November 14. A loud explosion sound and medium-sized infrasonic wave occurred. Lapilli 4 to 5 cm (some as large as 7.5 cm) across fell 4 km east of the summit, and ash fell in the prefectures of Nagano, Gunma, and Tochigi.</p> <p>Magma eruption volume = 0.00006 km³ DRE. (VEI 1)</p>
2008 (Heisei 20)	Magmatic eruption	<p>Tephra fall. The eruptive activity at the Kamayama crater. A very small eruption at 02:37 on August 10, 2008. Volcanic plume was 400m high, and drifted to the southeast. A very small eruption at 20:50 on August 11, 2008, with 200 m high volcanic plume drifted to the south. Another very small eruption at 07:59 on August 14, 2008. Volcanic plume was 400 m high, and drifted to the southeast.</p>

Year	Phenomenon	Activity Sequence, Damages, etc.
2009 (Heisei 21)	Small-scale: Phreatomagmatic explosion?	<p>Tephra fall. The eruptive activity at the Kamayama crater.</p> <p>A very small eruption occurred during 01:51 to 08:00 on February 2. A 2,000 m-high volcanic plume stood and was drifted to the southeast. Volcanic blocks were issued approximately 1 km from the crater. Tephra fall was confirmed in the Kanto region.</p> <p>A very small eruption from 06:34 to 10:15 on February 9 sent a 400 m-high volcanic plume which was drifted to the east. A very small amount of ash fell in Karuizawa.</p> <p>Small eruptions occurred from 11:30 on February 9 to 08:00 on February 12.</p> <p>Around 17:10 on February 9, plume height of 1,000 m, drifted to northeast.</p> <p>Around 04:50 on February 10, plume height of 1,400 m, drifted to southeast.</p> <p>Around 02:50 on February 11, plume height of 1,000 m, drifted to east.</p> <p>Faint ash fell in Karuizawa.</p> <p>A very small eruption around 06:34 on February 12. A 300 m-high volcanic plume, drifted to southeast.</p> <p>A very small eruption around 18:07 on February 12. A 400 m-high volcanic plume, drifted to southeast.</p> <p>A very small eruptions around 21:02 and 22:12 on February 12. A 500m-high volcanic plume, drifted to southeast.</p> <p>A very small eruption from approximately 13:00 to 14:00 on February 16. A 400m-high volcanic plume, drifted to east.</p> <p>A very small eruption around 16:35 on February 16. The volcanic plume height was unknown due to clouds.</p> <p>Faint tephra fall was confirmed at the Asama volcano observatory, Univ. of Tokyo.</p> <p>A very small eruption around 18:33 on February 17. A 400 m-high volcanic plume, drifted to east.</p> <p>A very small eruption around 23:48 on March 15. A 200 m-high volcanic plume, drifted to east.</p> <p>A very small eruption around 07:32 on April 14. A 400 m-high volcanic plume, drifted to northeast.</p> <p>A very small eruption around 20:02 on April 30. A 500 m-high volcanic plume, drifted to northeast.</p> <p>A very small eruption around 03:20 on May 3. A 400 m-high volcanic plume, drifted to northeast.</p> <p>A very small eruption around 01:41 on May 27. Volcanic plume stood up to 600 m above the crater.</p> <p>Magma eruption volume = 0.00001 km³ DRE. (VEI 1)</p>
2011 (Heisei 23)	Earthquake	<p>After the 2011 Earthquake off the Pacific coast of Tohoku (March 11, 2011) the seismic activity increased in the area south and southeast of the summit crater. On April 19 there was an M1.6 earthquake (JMA scale seismic intensity of 1 at Oiwake of Karuizawa).</p>

Reference documents have been appended with reference to the Active Volcano Database of Japan, AIST (Kudo and Hoshizumi, 2006) for volcanic periods, areas of activity, eruption types, and eruption events.

Table 45-1 Monthly Number of Eruptions at Asamayama (1868 to 2012)

Year	Month												total
	1	2	3	4	5	6	7	8	9	10	11	12	
1868													
1869					1			1	1	1			4
1870													
1871													
1872													
1873													
1874													
1875						1							1
1876													
1877													
1878													
1879									2				2
1880													
1881													
1882													
1883													
1884													
1885													
1886													
1887													
1888													
1889												1	1
1890													
1891											1	4	5
1892													
1893													
1894				8	3	5	2	1	2	2			23
1895													
1896													
1897													
1898													
1899			1			1	5	2					9
1900	2	6	13	2		2		2	2		2	2	33
1901			1	2	2	2	1	15		1			24
1902		1						1					2
1903					1	1							2
1904								1					1
1905													
1906				1									1
1907	1		1					1					3
1908		2						2	1				5
1909	1	1		1	1		1	1			1	1	8
1910		1			1		2			1	1	4	10
1911	16	6	3	8	1		2	6	2	1		1	46
1912	2	4		2			1			6		1	16
1913		1		3	3	6	7	5	1	3	10		39
1914	7	3	6	2	3	1					4	4	30
1915								1					1
Year	1	2	3	4	5	6	7	8	9	10	11	12	total
	Month												

Year	Month												total
	1	2	3	4	5	6	7	8	9	10	11	12	
1916					1		1	1	1	2			6
1917					1								1
1918													
1919			2		1		1	1					5
1920												23	23
1921	5	4	1		9	4							23
1922	1	1	1	1									4
1923													
1924													
1925													
1926													
1927			1	1			2		2	1		3	10
1928		1	9				3						13
1929									5				5
1930				1		1	1	9	7	1			20
1931			1			5	4	29	6	4		3	52
1932		13	27	12	26	26	35		3				142
1933													
1934													
1935	1	1		3	16	1	2	6	3	3	1		37
1936		7	9	3			18	2	2	4	1		46
1937		1	5	5	2	17	1						31
1938			1	6	19	12	23	20	20	32	7	11	151
1939	5	7	6	1	1	5	5	4	3	8	4	1	50
1940		3		5	1	2			4	1	9	21	46
1941	106	127	17	13	17	7	10	11	16	42	18	14	398
1942	30	36	29	44	26	8	10	42	30	20	2	2	279
1943													
1944						1	4	7	23	24	29	14	102
1945	21	52	20	15	3	3	6	2		2	3		127
1946										1			1
1947						1	1	1					3
1948													
1949			33	2			8	90	113	15			261
1950									3	1		1	5
1951		4	1	5	1	1							12
1952						3							3
1953												6	6
1954	70	83	36	25	26	10	20	7	1		6	3	287
1955	1	2	2	24	9	8							46
1956													
1957													
1958										26	114	123	263
1959			1	3	10	6	17	3					40
1960													
1961								3	27	17	42		89
1962													
1963													
1964													
1965					1								1
Year	1	2	3	4	5	6	7	8	9	10	11	12	total
	Month												

Year	Month												total
	1	2	3	4	5	6	7	8	9	10	11	12	
1966													
1967													
1968													
1969													
1970													
1971													
1972													
1973		55	5	10	18								88
1974													
1975													
1976													
1977													
1978													
1979													
1980													
1981													
1982				1						1			2
1983				1									1
1984													
1985													
1986													
1987													
1988													
1989													
1990							1						1
1991													
1992													
1993													
1994													
1995													
1996													
1997													
1998													
1999													
2000													
2001													
2002													
2003		1	1	2									4
2004									1946 ^{※4}	8	5	1	1960
2005													
2006													
2007													
2008								3					3
2009		9	1	2	2								14
2010													
2011													
2012													
Year	1	2	3	4	5	6	7	8	9	10	11	12	total

Note 1. Blank fields indicate no eruptions.

2. Data from 1868 to 1965 were from "Volcano Observations" by H. Sekiya.

3. The scale of eruption was classified into large, medium, small, and very small by the Karuizawa Weather Station by February 2002, based on eruption earthquake amplitudes, volcanic ejecta distribution areas, and the extent of damage caused by air shocks. The number of the above table shows that of eruptions for a month.

4. The data for September 2004 include small strombolian eruptions accompanying infrasonic waves.

Major Volcanic Activity

Volcanic Activity in 1958

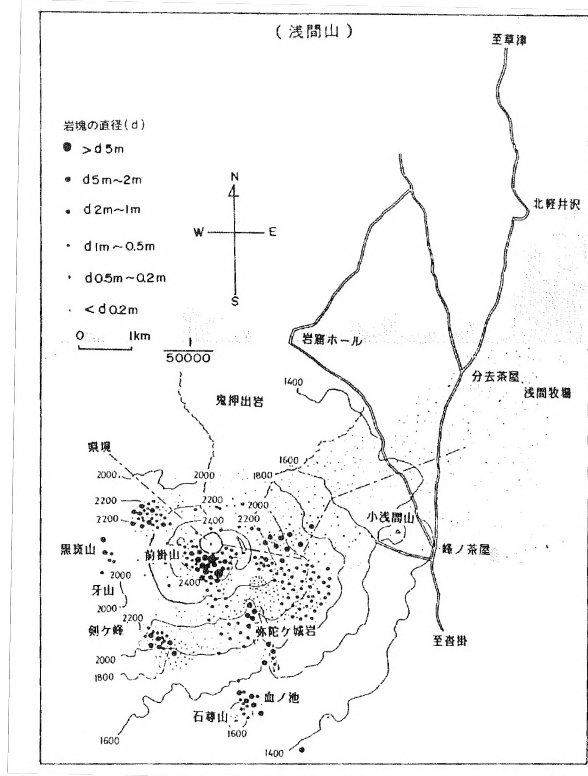


Figure 45-3 Distribution of ballistics in the November 10, 1958 eruption (Karuizawa Weather Station, 1958).

A volcanic block of 6m wide and 4 m high was ejected on the southern crater rim. Volcanic blocks were thrown about 3.7 km south-southeast from the crater, near Chinotaki.

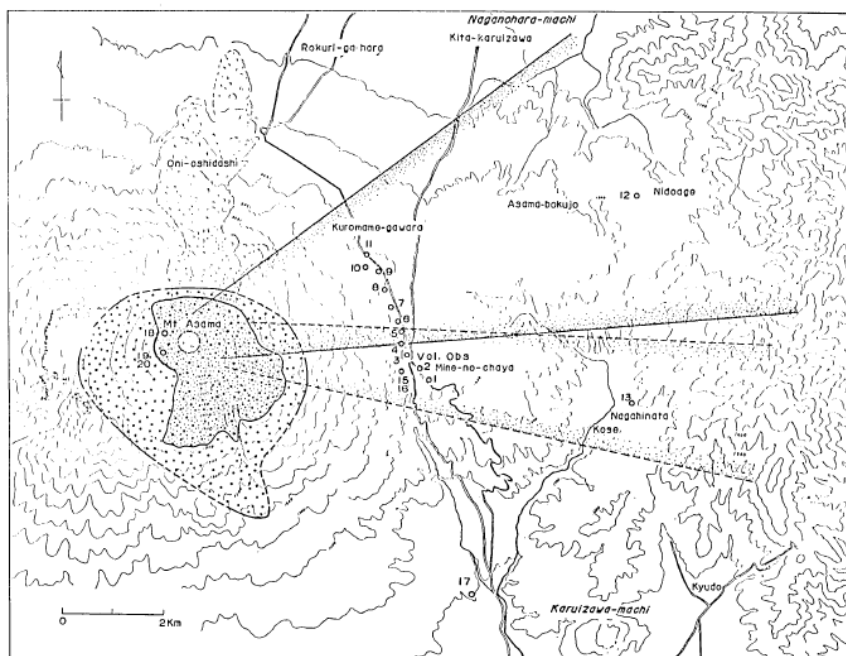


Figure 45-4 Distribution of pyroclastic flow deposits in the November 10, 1958 eruption (Murai and Hosoya, 1964).

A dotted area around the crater indicates the distribution of pyroclastic flow deposits. The areas sandwiched by solid and dashed lines indicate the area of ash fall by the eruptions on November 10 and November 11.

▪ Volcanic Activity in 1973

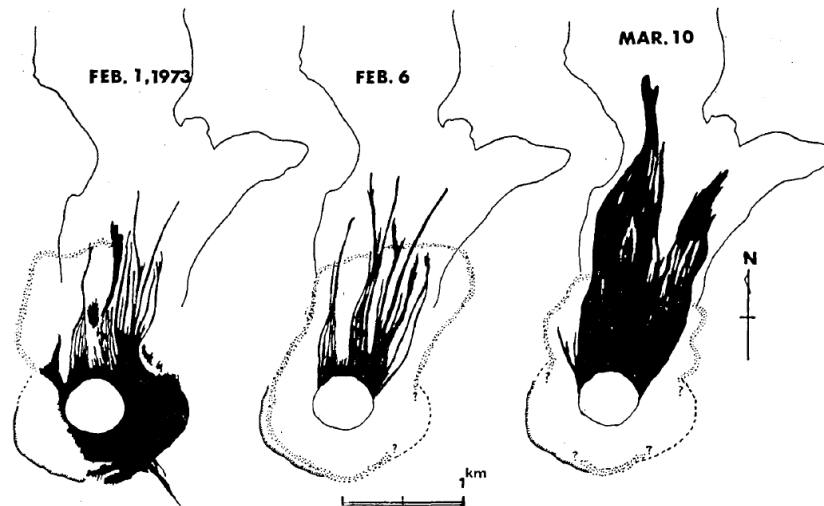


Figure 45-5 Distribution of pyroclastic flow deposits in the 1973 eruption (Murai, 1974).

Black areas indicate the distribution of pyroclastic flow and lahar deposits. The areas enclosed in broad thick line indicate the area of Nuees ardentes distribution. The areas enclosed in solid lines indicate margins of the Onioshidashi lava flow of the 1783 eruption.

▪ Volcanic Activity in 1982

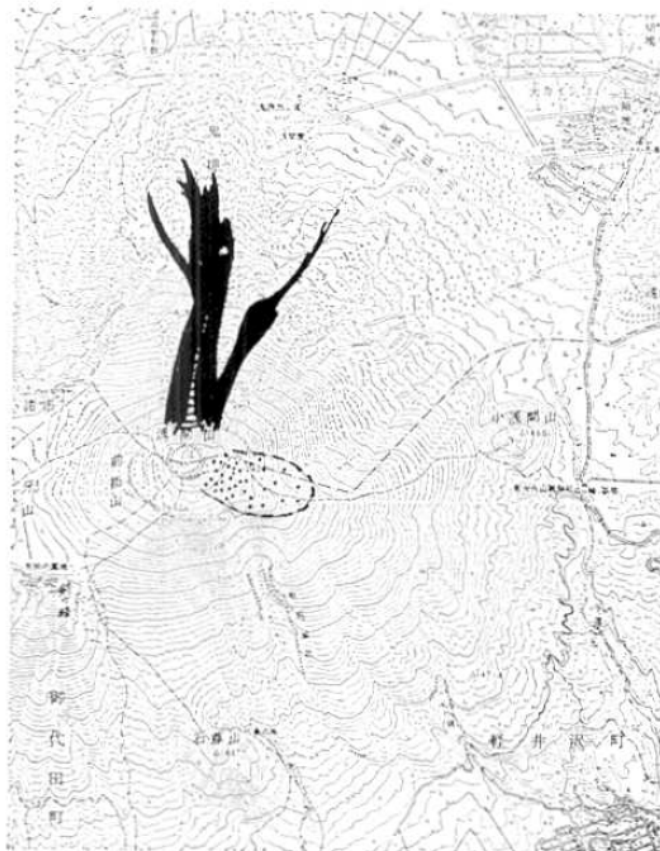


Figure 45-6 Distribution of pyroclastic flow deposits of the 1982 eruption (Shimozuru et al., 1982).

Black area in the north of the summit indicates the distribution area of pyroclastic flow and lahar deposit. The area enclosed in dotted line in the east of the summit represents the distribution of volcanic blocks.

▪ Volcanic Activity in 2004

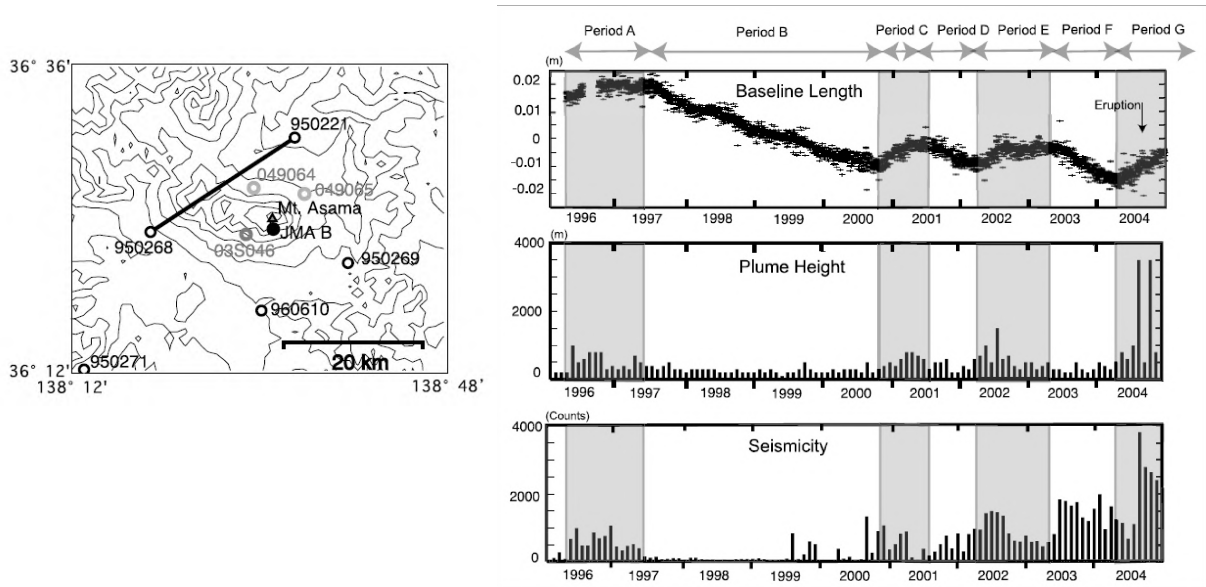


Figure 45-7 Changes in the baseline length between Tsumagoi (950221) and Tobu (950268), plume height and volcanic, and monthly number of earthquakes (Murakami, 2005).

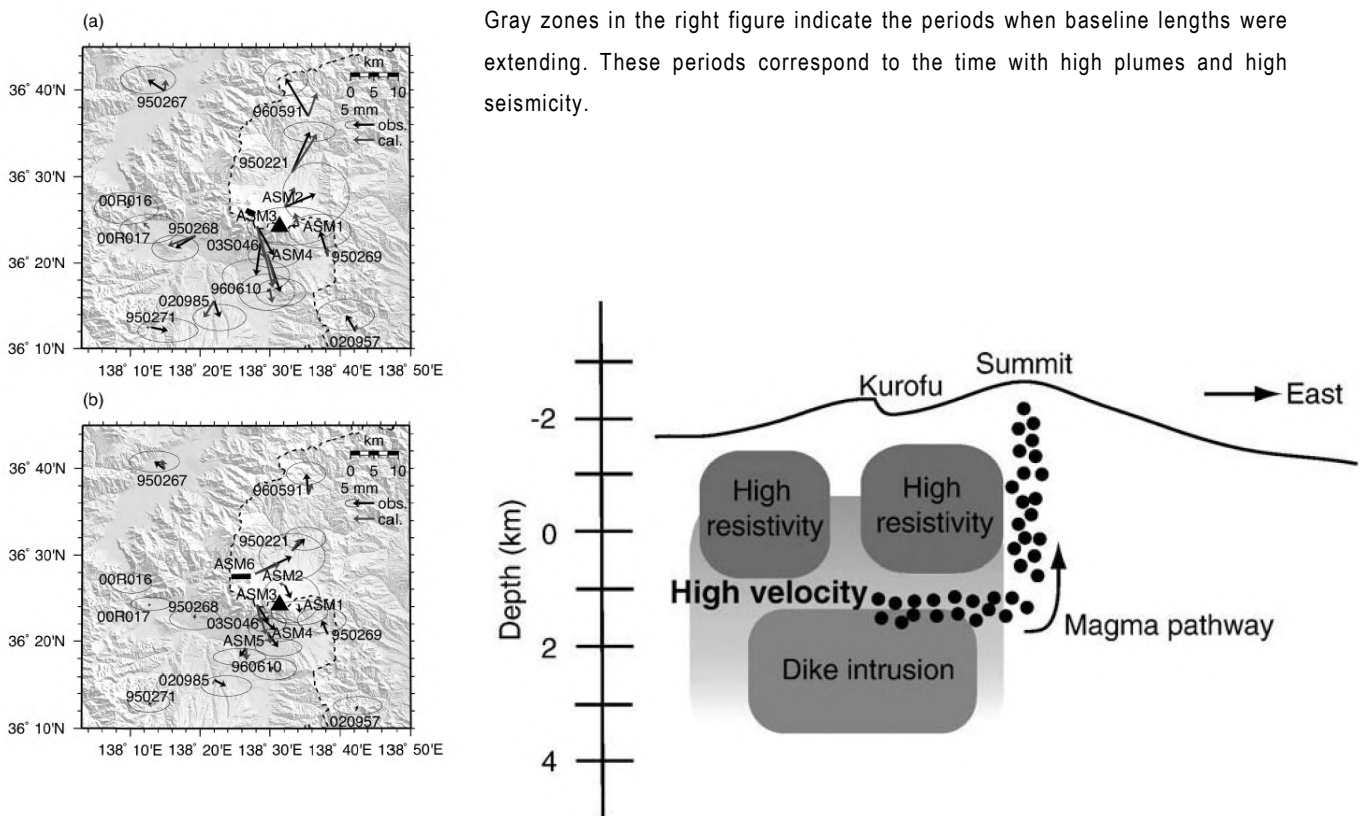


Figure 45-8 (Left) Crustal deformation by GPS and the best-fit pressure sources before and after the 2004 eruption (Aoki et al., 2005). (Right) Schematic view showing locations of magma intrusion and seismic activity (Aoki et al., 2009). The left figure (a) is for the activity from July 2004 to March 2005. The right figure (b) is for November 2004 to March 2005.

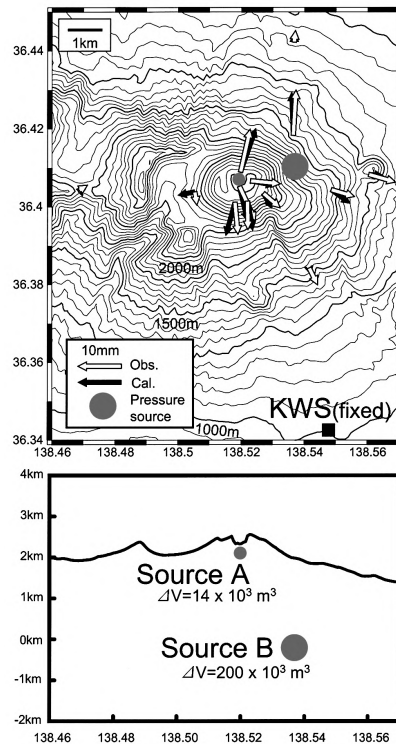


Figure 45-9 Distribution of pressure sources estimated from the lateral displacement based on the GPS campaign observation during April to July in 2004 (Takagi et al., 2005).

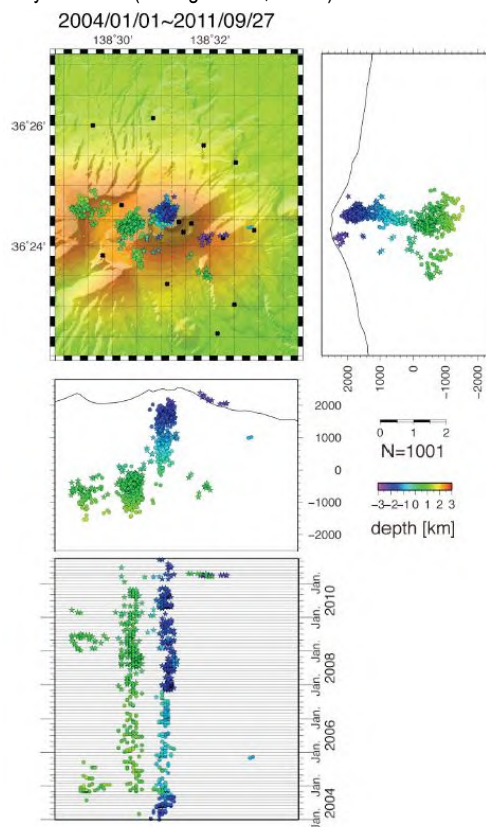


Figure 45-10 Distribution of hypocenters of earthquakes during the period from January 2004 through September 2011 (Earthquake Research Institute, 2011).

Data from the networks of Earthquake Research Institute, the University of Tokyo, and Japan Meteorological Agency were used, and the hypocenter distributions were determined with the Double Difference method.

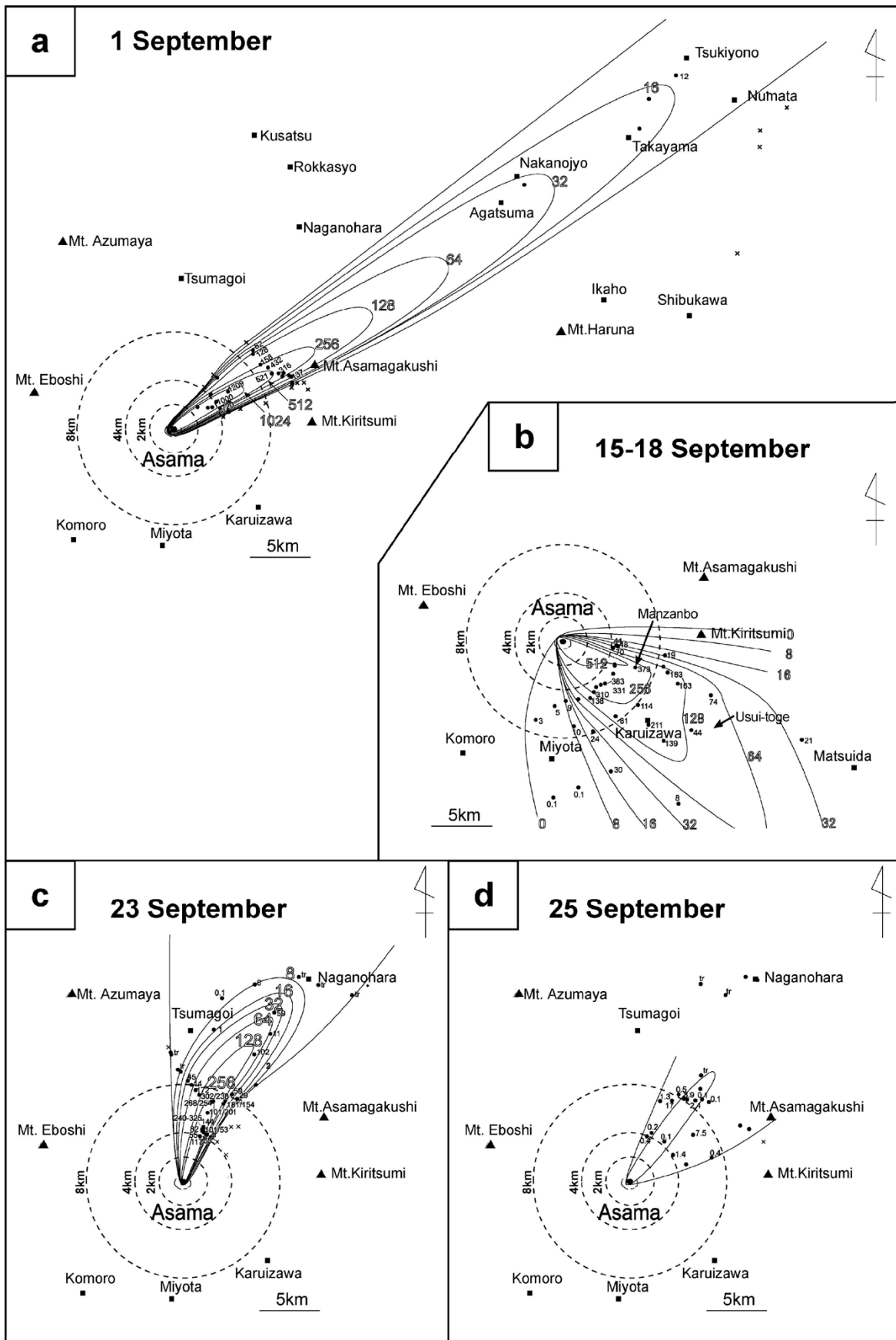


Figure 45-11 Distribution of tephra in the eruptions on September 1, 15-18, 23, and 25, 2004 (Yoshimoto et al., 2005).

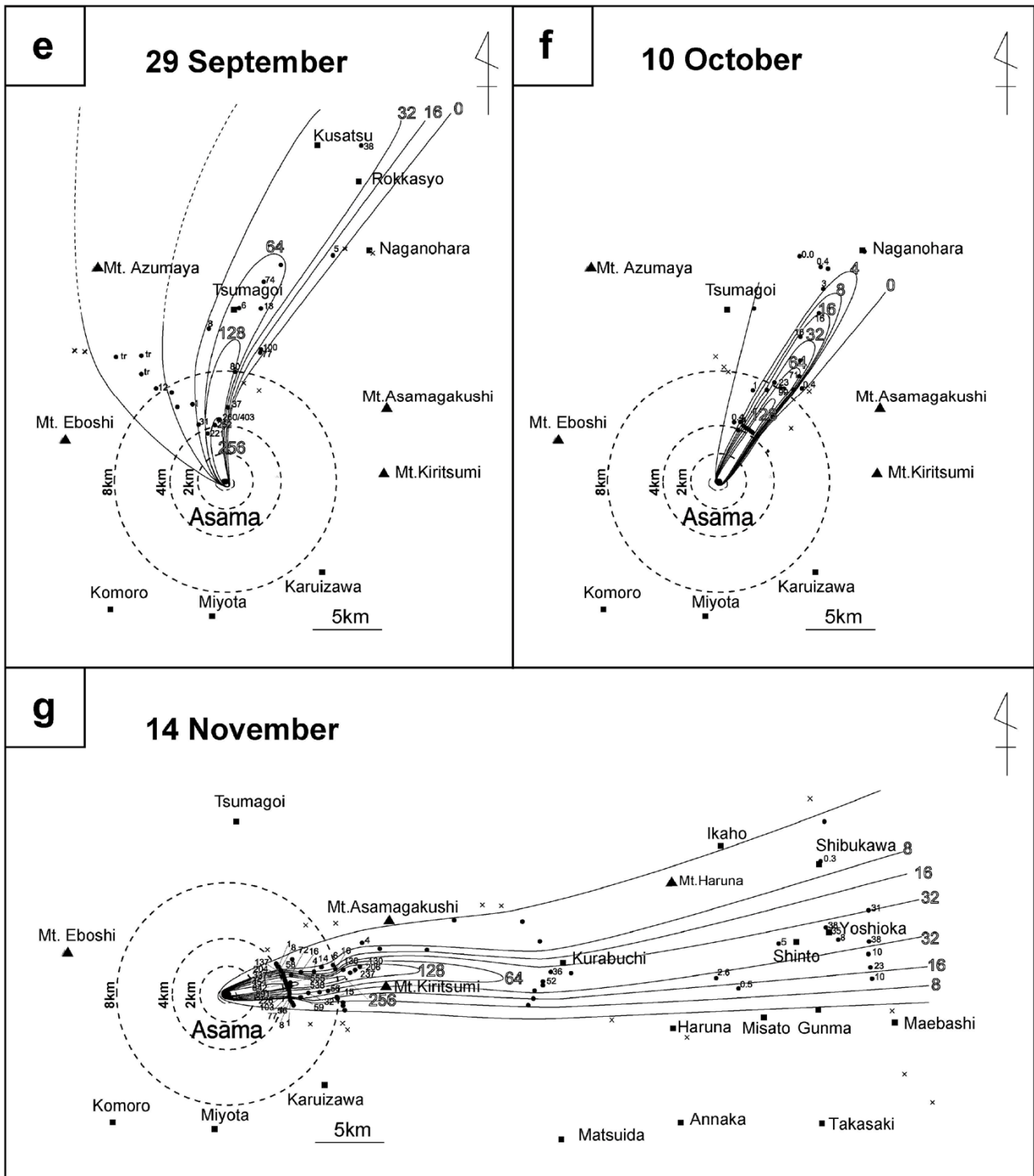


Figure 45-12 Distribution of tephra in the eruptions on September 29, October 10, and November 14, 2004 (Yoshimoto et al., 2005).

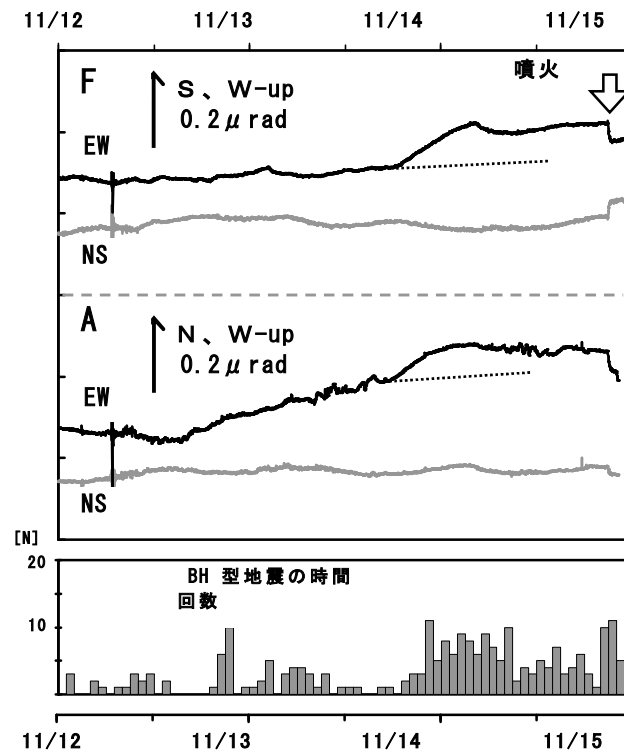


Figure 45-13 Tilt changes and hourly number of BH-type earthquakes preceding an explosive eruption on November 14, 2004 (Churei and Katayama, 2006).

A tilt-change of west-up was observed from 19:00 on November 13 in the Onioshiage observation point (old F point), and a large number of BH-type earthquakes began simultaneously. “F” and “A” indicate the Onioshiage, and Chinotaki observation points, respectively.

Airborne SAR Images Illuminated from the North

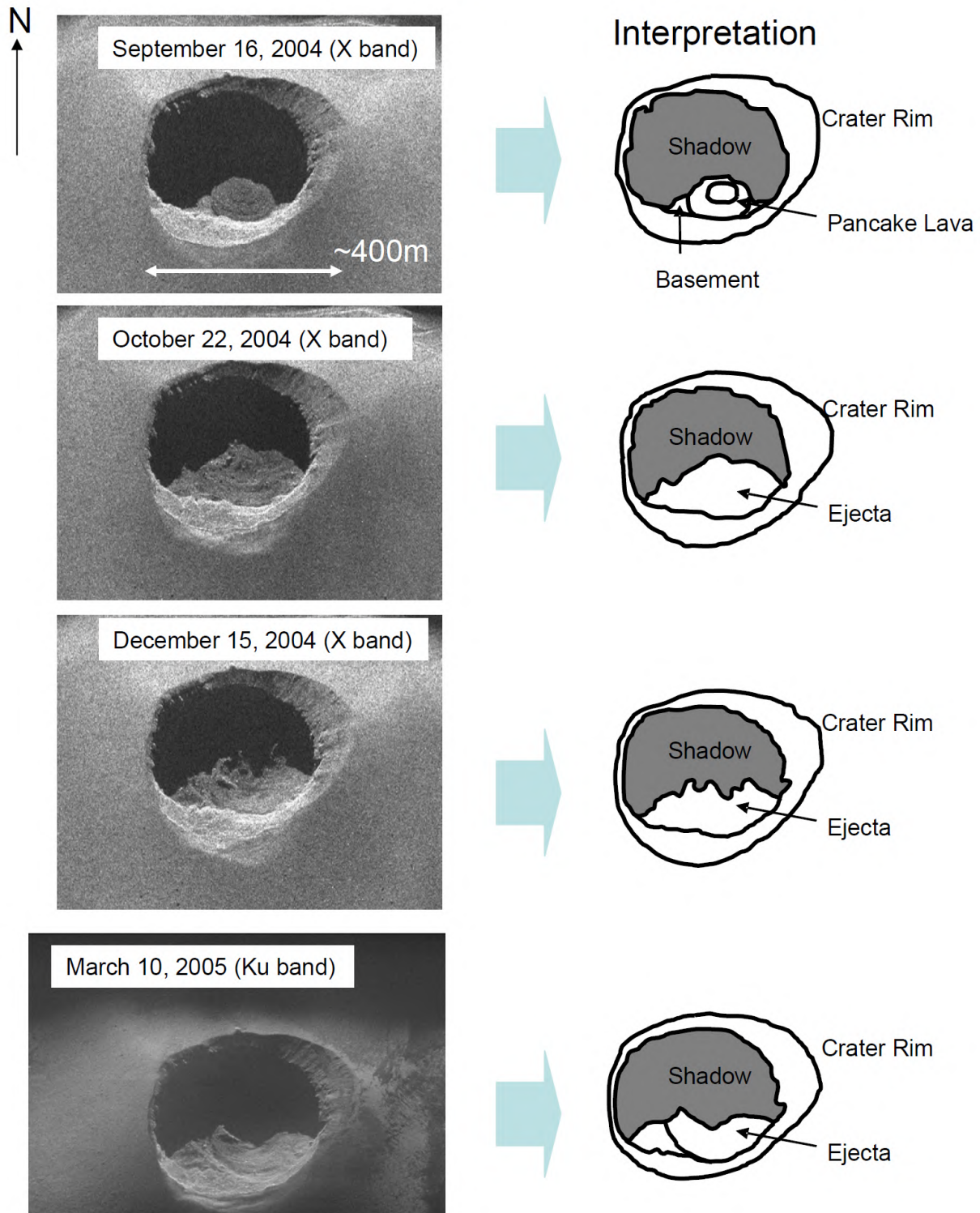


Figure 45-14 Airborne SAR intensity images and interferometric images around the summit of Asama Volcano (left) and the interpretation (right) (Oki et al., 2005).

The September 16 image shows a round-shaped mound with a diameter of approximately 150 m inside the crater (pancake-like lava). Images on October 22 show that the mound disappeared, and a hollow of 50 m deep and 20 m deep was observed. Comparison both of December 15 and March 10, 2005 indicates subsidence of the crater floor.

▪ Volcanic Activity in 2009

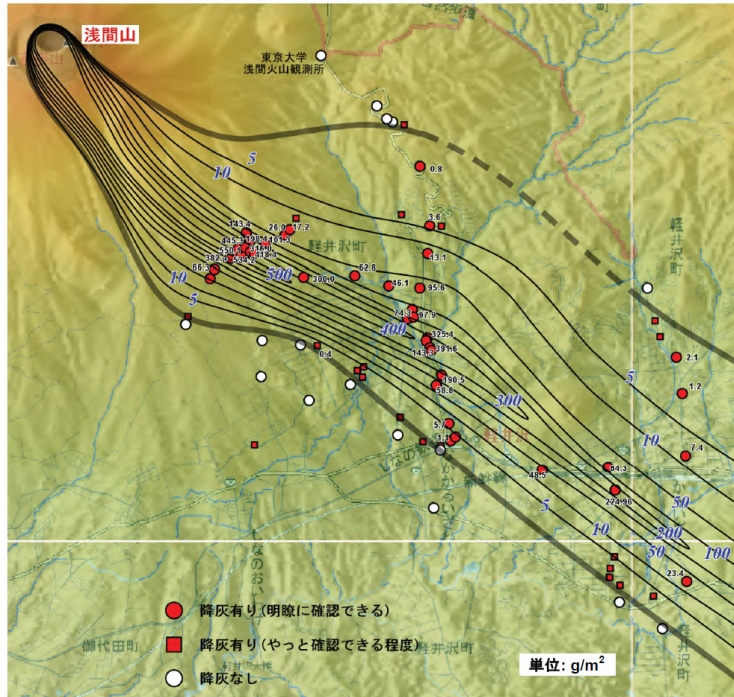


Figure 45-15 Distribution of tephra of the eruption on February 2, 2009 (Earthquake Research Institute, Univ. Tokyo, Japan Meteorological Agency, and National Institute of Advanced Industrial Science and Technology, 2009).

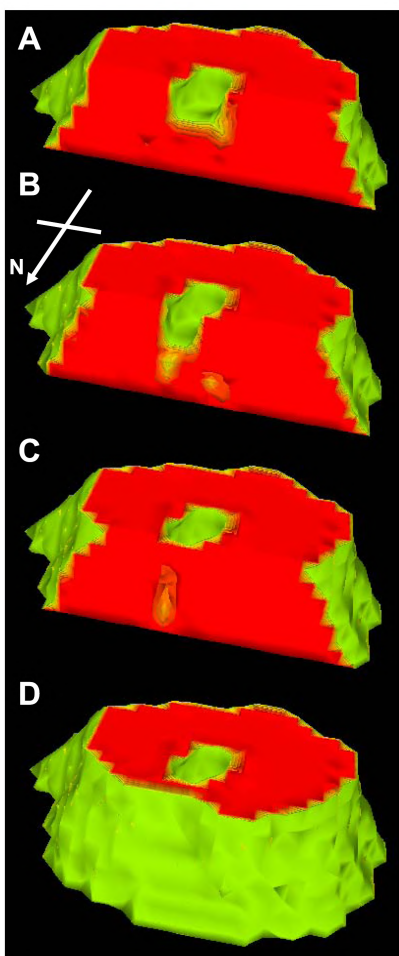


Figure 45-16 Interior structure of Asamayama, in term of the density distribution by “muon” (Tanaka et al, 2010).

Diagrams show sliced blocks of the summit part below 2470 m.

(A) EW cross-section through the crater, (B) EW cross-section 100 m north of the crater, (C) EW cross-section 200 m north of the crater, and (D) Section of the 2470 m altitude. Low density part extends to the north below the crater floor.

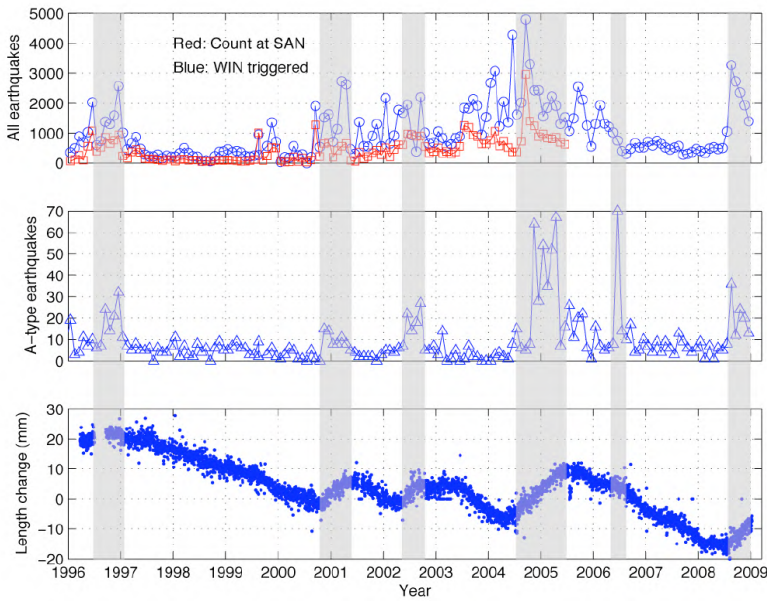


Figure 45-17 Relationship between seismic activity and baseline-length (Tsumagoi to Tobu) changes by GPS during the period from 1996 to 2009 (Earthquake Research Institute, Univ. Tokyo, 2009).

The GPS data from Geospatial Information Authority of Japan GEONET. The periods with high activity of A-type earthquakes (gray zones) correspond to the inflation of the volcanic edifice.

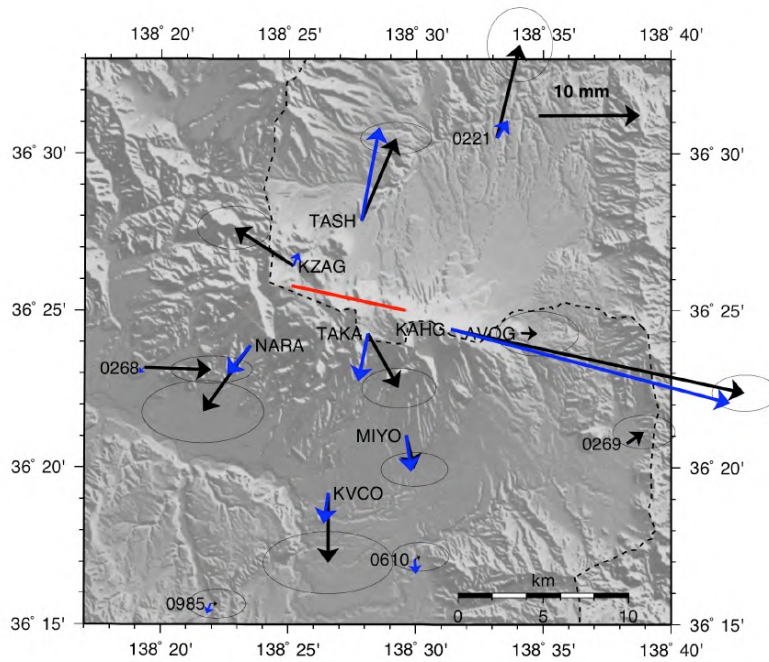
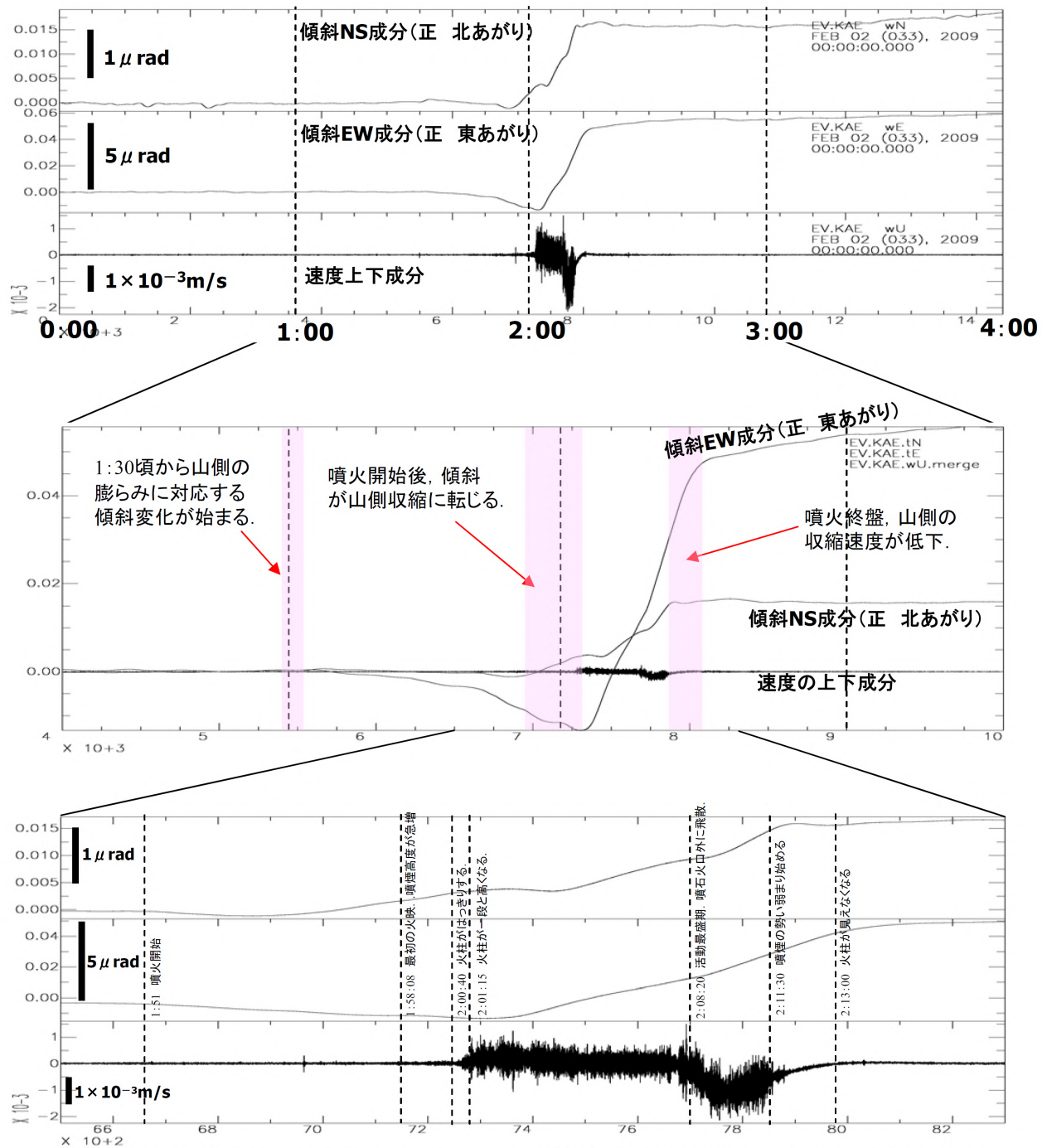


Figure 45-18 Comparison of lateral displacement of observation (black vectors) and analysis (blue vectors) with GPS. A dike intrusion in the western side of the summit was modeled (Earthquake Research Institute, Univ. Tokyo, 2009).

The reference point of the Geospatial Information Authority of Japan (950272) is about 30 km south of Asamayama.

浅間山山頂 火口東観測点で観測された傾斜変化と地震動



広帯域地震計の固有周期より長周期側のレスポンスは加速度の微分に比例している。これを積分することにより長周期側の加速度記録、すなわち傾斜記録が得られる。上図は、火口東に設置した広帯域地震計から得られた傾斜記録と、上下動の速度記録を並べたものである。噴火前の膨張、噴火後の減圧が明瞭に見られる。

Figure 45-19 Tilt changes and seismic activity observed at the observation site east of the Asamayama summit crater (Earthquake Research Institute, 2009).

▪ Interior Structure

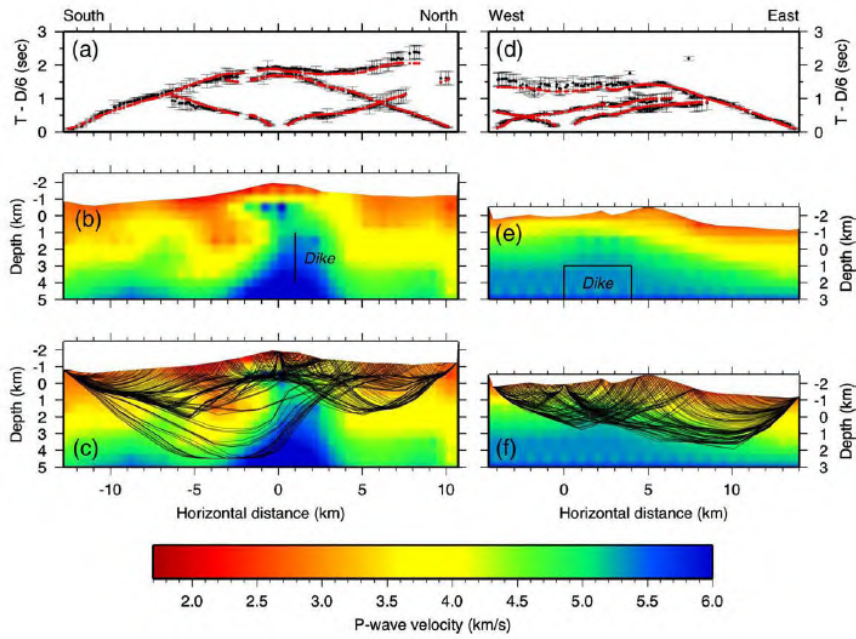


Figure 45-20 P-wave velocity structure deduced in the seismic exploration analysis (Aoki et al., 2009).

The figures in left and right show a north-south cross-section approximately 5km west of the summit and an east-west cross-section through the summit, respectively. (Top) Comparison of observed theoretical (black) and calculated travel time (red). (Middle) P-wave velocity structure. (Bottom) Ray paths

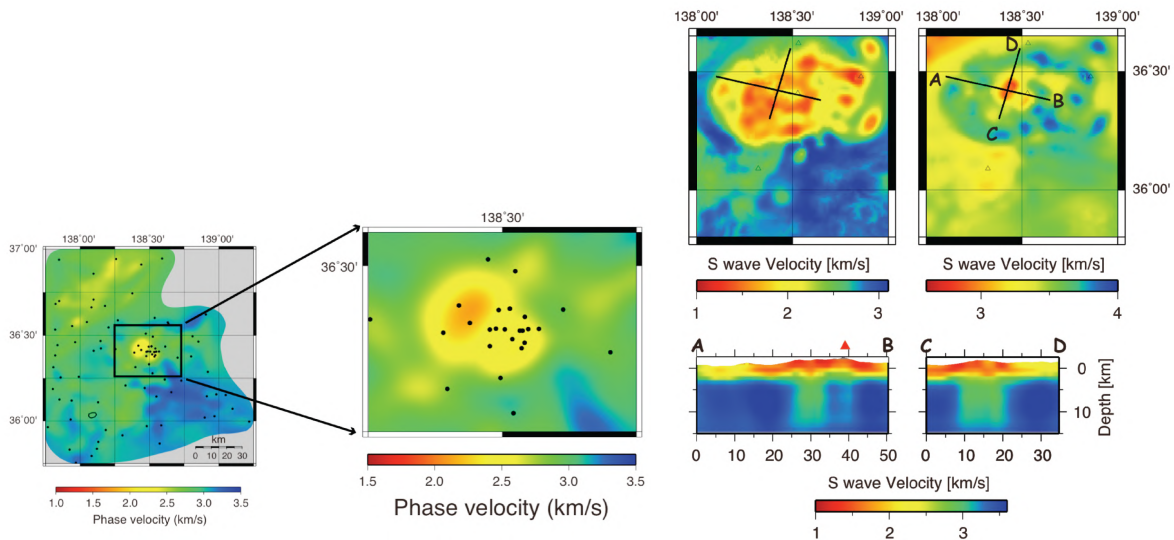


Figure 45-21 Distribution of S-wave velocities at sea level and 5km below the sea level, and distribution of S-wave velocities in A-B and C-D cross-sections (Nagaoka et al., 2012).

The red triangle indicates the summit of Asamayama.

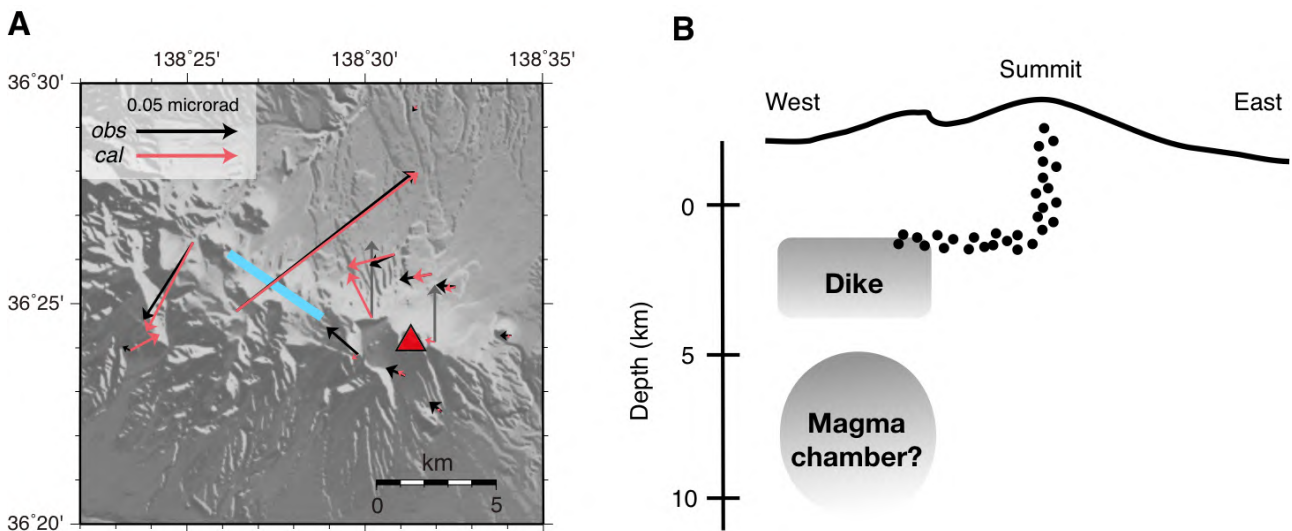


Figure 45-22 Magma supply-path at Asamayama, estimated based on seismic wave velocity structure and crustal deformation (Nagaoka et al., 2012).

(Left) Tilt-changes and location of pressure sources estimated from the data immediately after the eruption on February 2, 2009

(Right) Schematic view showing locations of magma chamber, dike, and hypocenters.

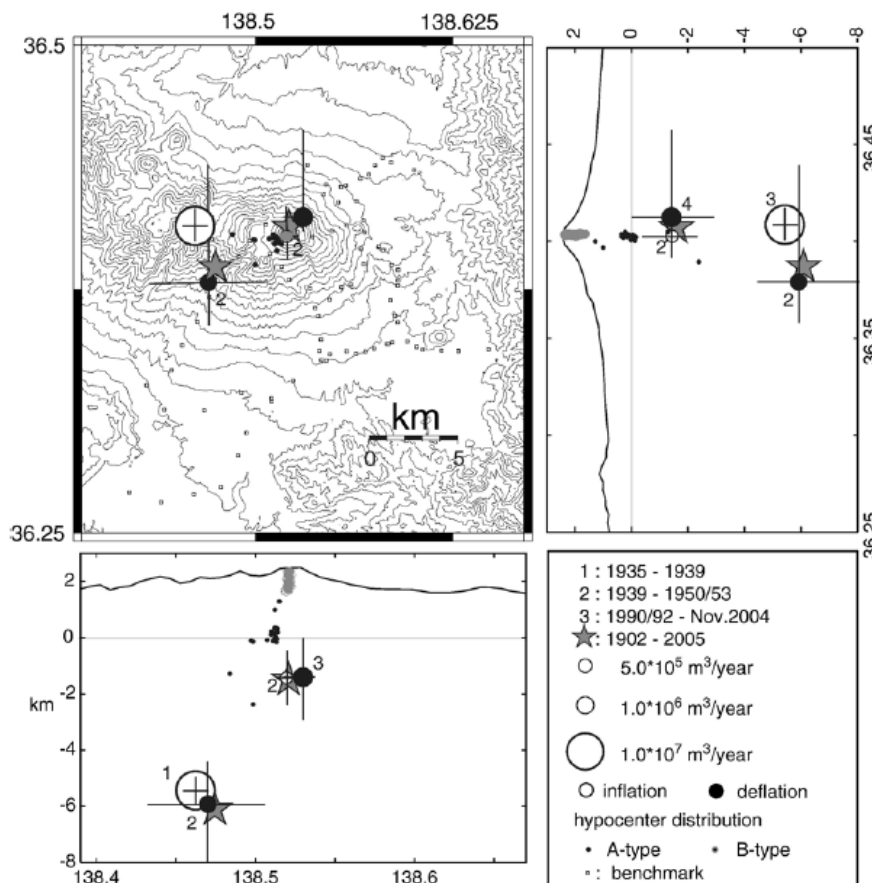


Figure 45-23 Cross-sections showing locations of estimated source sources of crustal deformation (1 to 3), based on the precise leveling survey over these 100 years (Murase et al., 2007).

Hypocenters of earthquakes are also shown (Oikawa et al., 2006). Deformation sources were determined 4 km west of the summit of Asamayama at a depth of 6 km, and also directly below the summit at a depth of 2 km.

Precursory Phenomena

Small and moderate eruptions since the beginning of the 20th Century were preceded by high volcanic plume activity, a large number of volcanic earthquakes (B-type) and glowing phenomenon. Recent eruptions were associated by inflation and increase of A-type earthquake several months beforehand. Abundant long-period earthquakes may have occurred about one month before an eruption, which was associated with slight inflation of the shallow part of the volcano and abundant BH-type earthquakes.

Recent Volcanic Activity

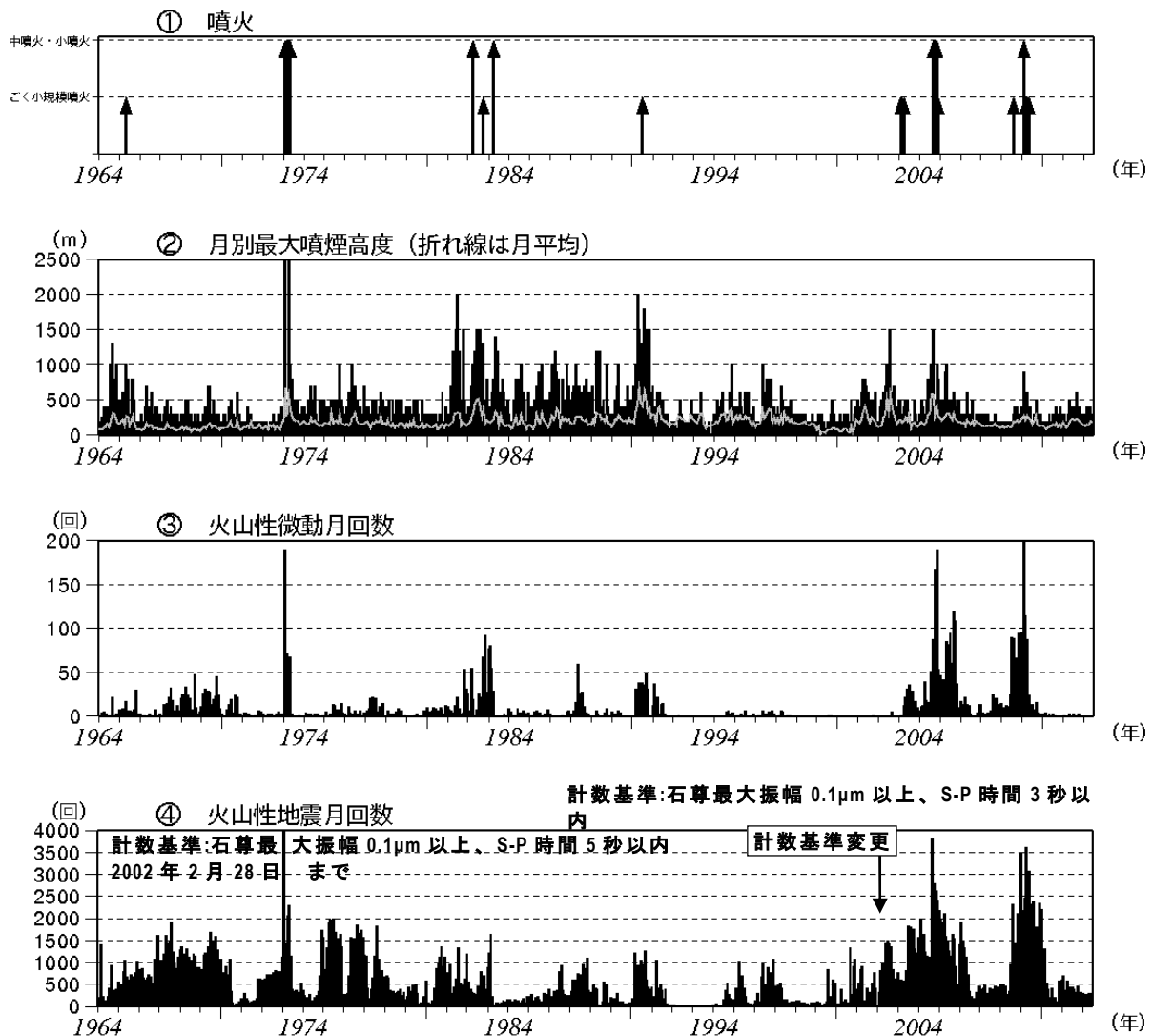


Figure 45-24 Volcano activity during January 1964 to September 2011).

Frequencies of earthquakes and rumbling had increased before and after eruptions. After the eruption on May 27, 2009, the seismicity had remained high, and declined a little since April 2010.

- ① Eruptions
- ② Maximum volcanic plume height per month (white line in the graph is the monthly average)
- ③ Number of volcanic tremors per month
- ④ Number of volcanic earthquakes per month

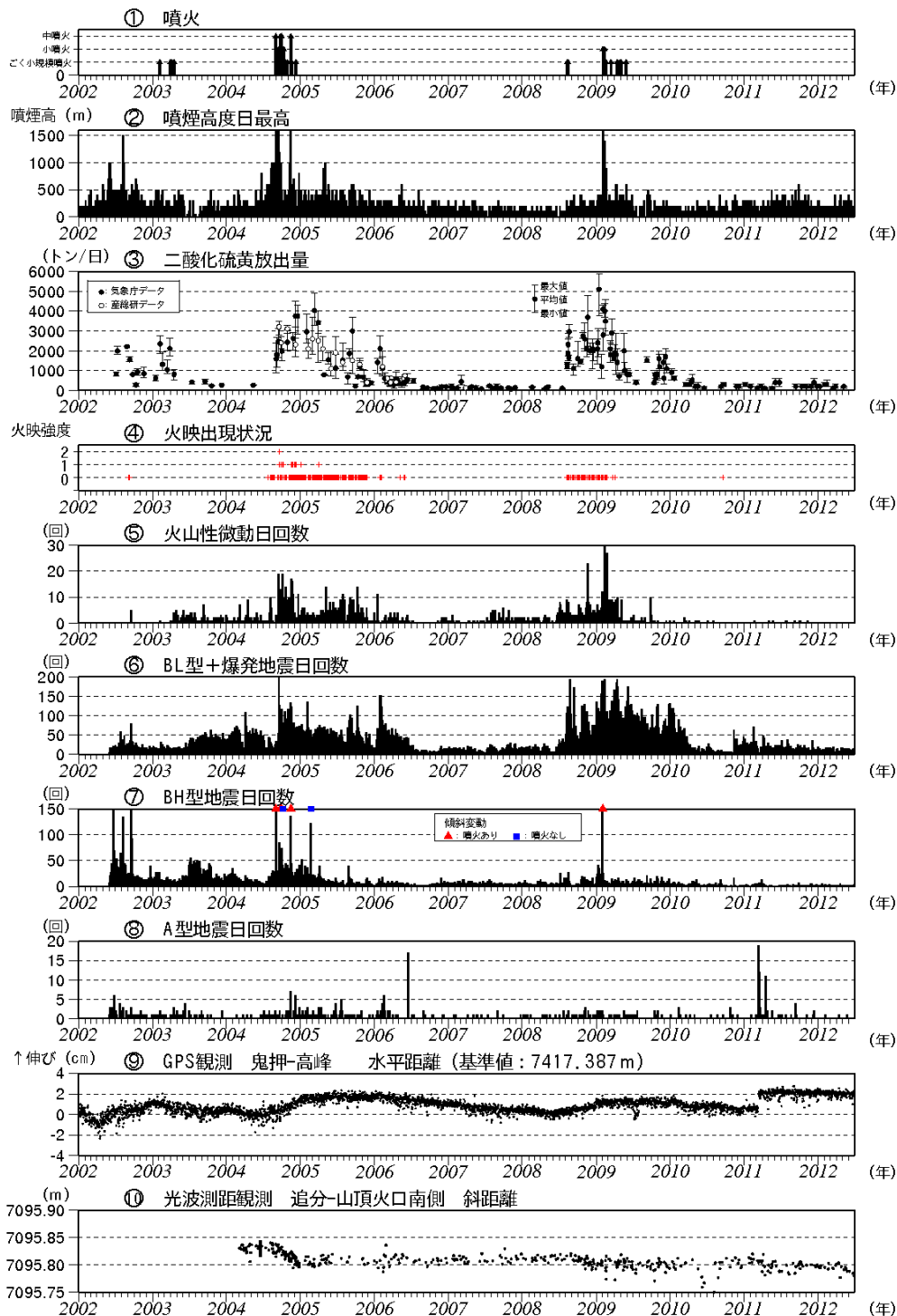


Figure 45-25 Volcano activity during January 1, 2002, to June 30, 2012.

The sulfur dioxide emission graph ③ includes the data by the National Institute of Advanced Industrial Science and Technology.

The electronic distance in ⑩ is based on the data by the Asamayama Volcano Disaster Prevention Liaison Office, which were adjusted by the method of Takagi et al. (2010).

- ① Eruptions
- ② Maximum volcanic plume height per month
- ③ Amount of sulfur dioxide emitted
- ④ Dates of observed glowing

- ⑤ Number of volcanic tremors per day
- ⑥ Number of BL-type earthquakes and explosive earthquakes per day
- ⑦ Number of BH-type earthquakes per day
- ⑧ Number of A-type earthquakes per day
- ⑨ Baseline length between Onioshi-Takamine observed by GPS
- ⑩ Baseline length between the southern side of summit crater ("Oikwake") and the Karuizawa weather station, observed by electronic distance measurement

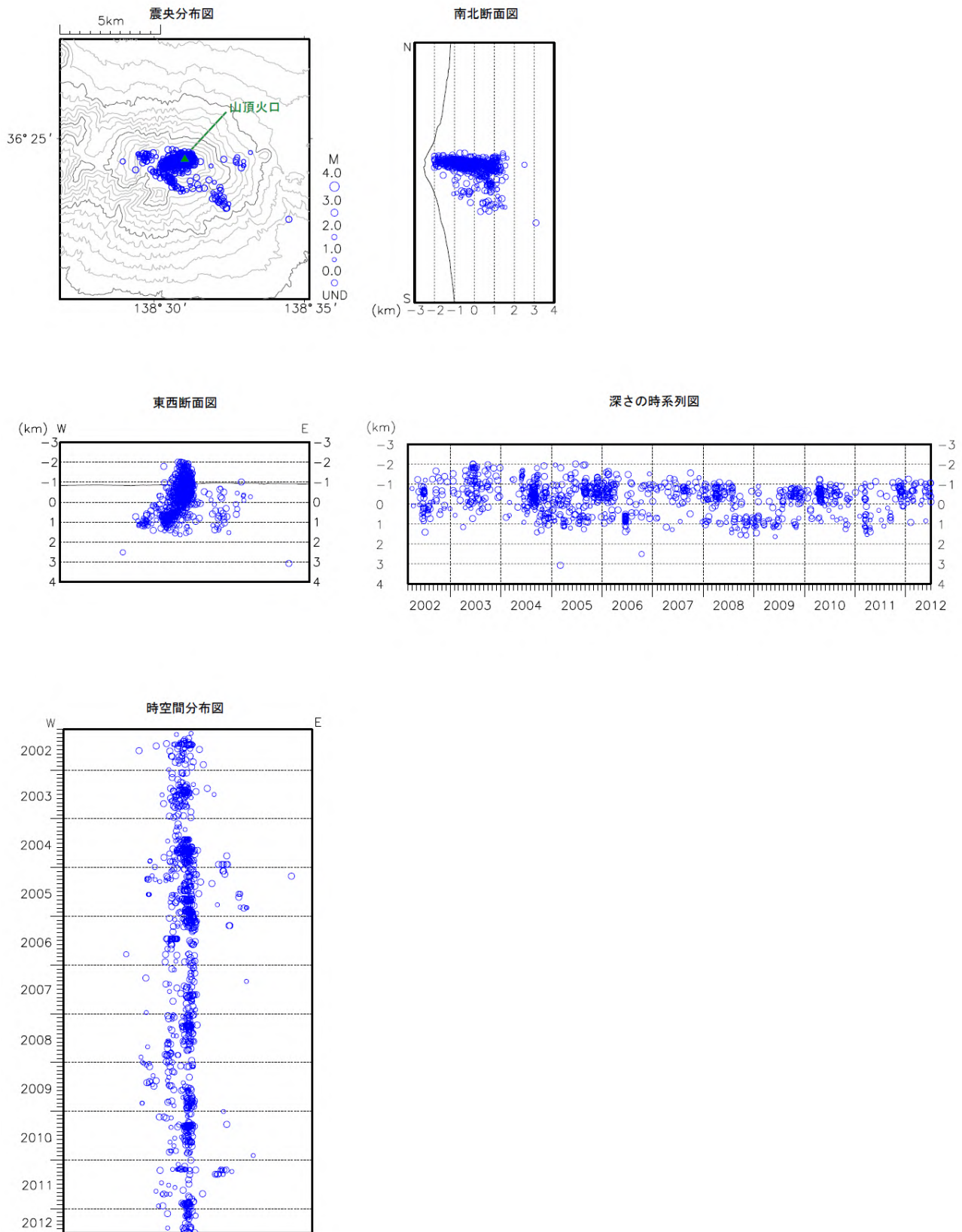


Figure 45-26 Distribution of hypocenters for volcanic earthquakes during 2002 to 2012. From February, 2005, the data collected at the observation station of Earthquake Research Institute, Univ. Tokyo, was used in addition.

- ① Epicenter distribution, ② NS cross-section, ③ EW cross-section,
- ④ Depth time series, ⑤ Space-time plot

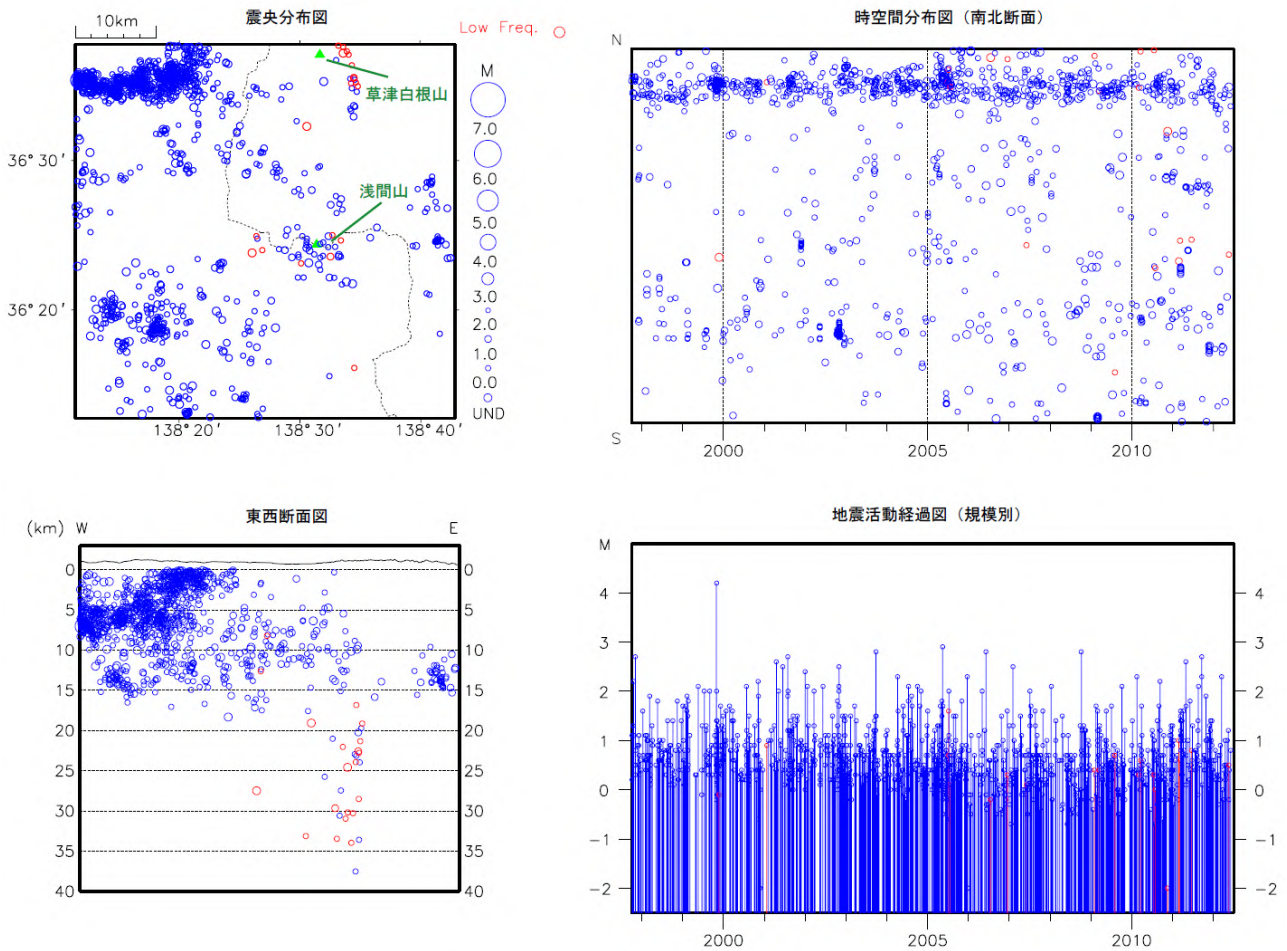


Figure 45-27 Activity of shallow VT earthquakes (blue circles) and deep low-frequency earthquakes (red circles) observed by a regional seismometer network (October 1, 1997 to June 30, 2012). Epicenter distribution (upper left), space-time plot (NS cross-section) (upper right), E-W cross-section (lower left) and magnitude-time diagram (lower right).

Information on Disaster Prevention

① Hazard Map

- Disaster Prevention Map of Asamayama Volcano at "Karuzawa Website"

<http://www.town.karuzawa.nagano.jp/>

Disaster Prevention Map of Asamayama Volcano, published March 1, 2010, by the Disaster Prevention Measure Liaison Committee, Asamayama Volcano, and Komoro City, Miyota Town, Karuzawa Town, Saku City, Tsumagoi Village, Naganohara Town.

Planned by Tone River Water Erosion Control Office of the Ministry of Land, Infrastructure, Transport and Tourism in Gunma and Nagano Prefectures

Created by the Sabo and Landslide Technical Center

浅間山火山防災マップ

軽井沢町版

噴火警戒レベル1~3の時

- 浅間山の活動状況に応じて、気象庁は5段階の噴火警戒レベルを発表します。この火山防災マップは、噴火警戒レベル1~3の時の注意事項や登山道・道路の規制状況を説明しています。レベル4~5が発表されたら、自治体からの指示に従ってください。
- 噴火警戒レベル1~3では居住地域には大きな危険が及ばないため避難する必要はありません。浅間山への登山は噴火警戒レベルに応じて規制されるため、決められた登山道を利用してください。
- 噴火活動は急に変化することもあるため、市町村の防災無線やテレビなど公共機関を通じて伝えられる情報に十分注意してください。

浅間山の噴火警戒レベル

噴火警戒レベルは、気象庁から予報・警報により発表され、5段階で表示されます。レベルは、噴火に伴い直接人命に危険が及ぶ範囲や火山現象をあらかじめ想定し、住民の方々にとっていただく対応の段階を示しています。

レベルとキーワードに注目
 キーワードは、レベルに応じた防災対応を示します。

噴火警戒レベル4~5

噴火警戒レベル4~5では、居住地域まで被害が及ぶ恐れがあるため、避難準備や避難をする必要があります。レベル4~5が発表された場合は、地元防災機関(市町村・警察・消防)の指示に従ってください。

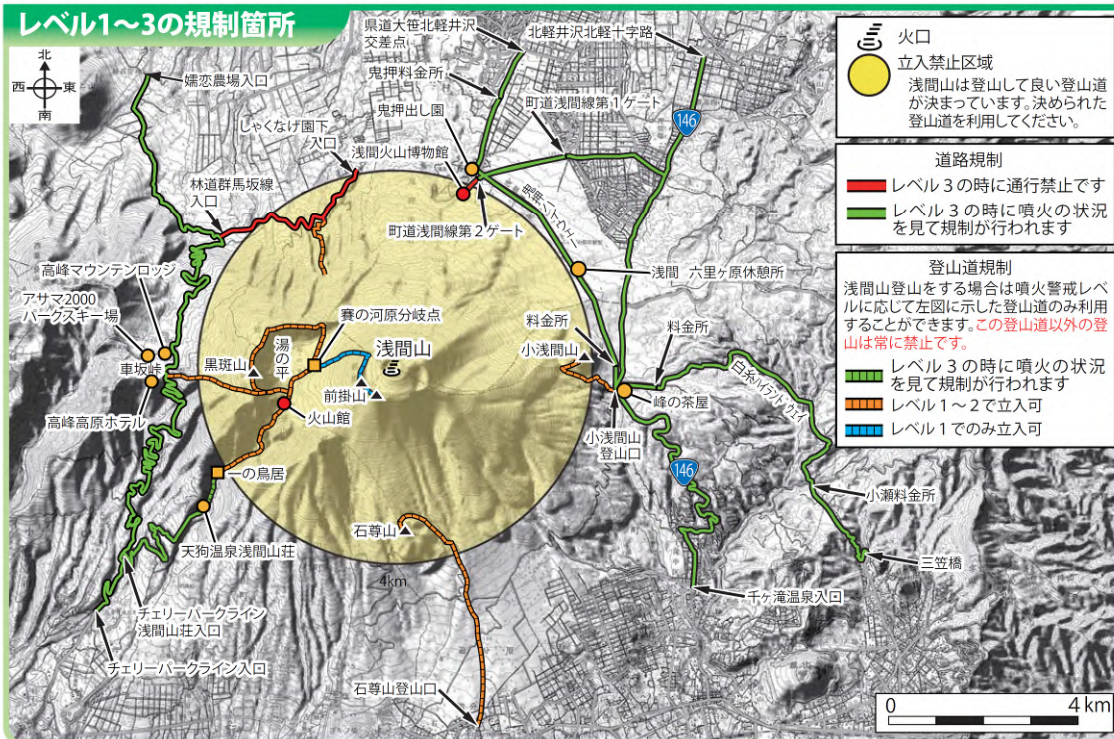
噴火警戒レベル1~3

噴火警戒レベル1~3では登山道の規制地点が変わります。
 ● 規制範囲内では、噴火に伴い直接人命に危険が及ぶ火山現象が発生する恐れがあります。
 ● 一時的に道路を規制することがあります。

注・積雪期には噴火によって火砕流が発生した場合、雪が融けて火山灰とともに流れ下る泥流が発生する恐れがあります。
 ● 浅間山を源流とする沢涔いでは特に注意が必要です。
 ● 居住区域の住民避難が必要になることがあります。
 ● 地元防災機関(市町村・警察・消防)の指示に従ってください。

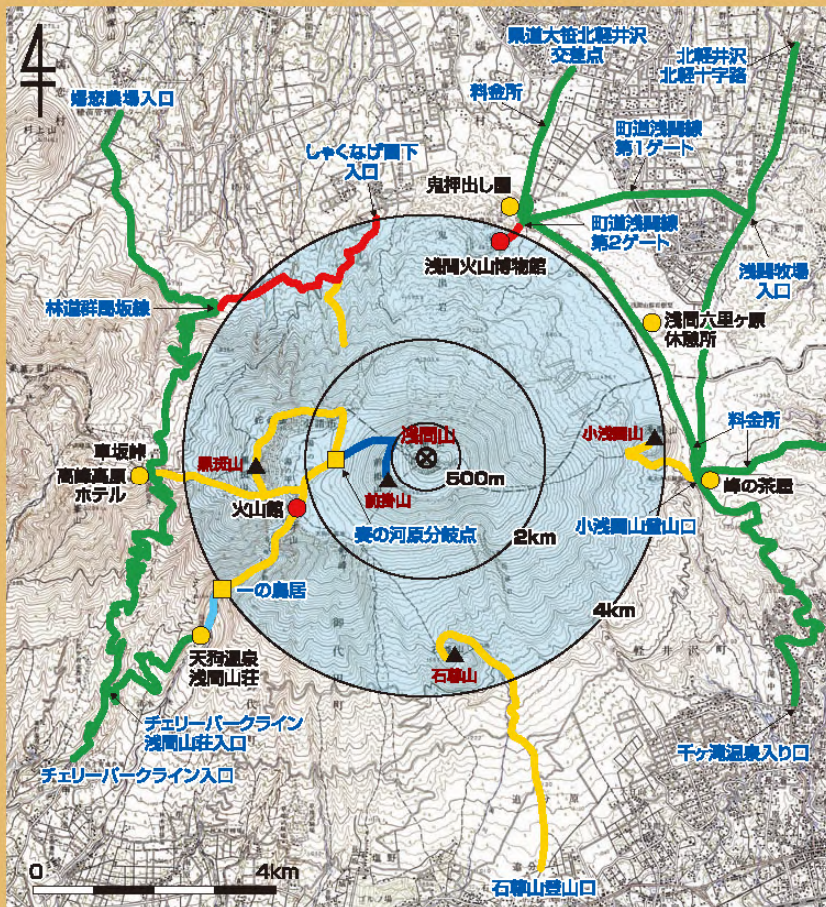
噴火警戒レベル				
予報、警報の略称	対象範囲	レベル	キーワード	注意事項
噴火警報	居住地域	5	避難	地元防災機関(市町村・警察・消防)からの指示に従い、避難をしましょう。 【天明規模の噴火*の発生または切迫】
		4	避難準備	地元防災機関(市町村・警察・消防)の指示に従い、いつでも避難できる準備をしましょう。避難に時間がかかる方は避難をしましょう。 【天明規模の噴火*の発生が予想される】
火口周辺警報	火口から居住地域近くまで	3	入山規制	火口から4km以内に入ってははいけません(下の地図の黄色い円の中)。噴火が切迫している場合や4kmより遠くに噴石(岩塊)が飛ぶような噴火が発生した場合は、一時的に道路を規制することがあります。
	火口周辺	2	火口周辺規制	火口から4km以内では下の図に示すオレンジ色の登山道のみ立入可です。
噴火予報	火口内等	1	平常	火口から4km以内では下の図に示すオレンジ色と青色の登山道のみ立入可です。(火口から500m以内立入禁止)

*天明規模の噴火:裏面「浅間山の噴火の特徴」参照



② Volcanic Alert Levels which was used since December 1, 2007. Revised on December 22, 2010.

■ 浅間山 噴火警戒レベル1～3に対応した規制範囲



この図は浅間山噴火警戒レベル導入に係わる防災対応についての申し合わせ書(平成19年11月11日 浅間山火山防災対策連絡会議)に基づき作成しています。
 浅間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、詳細については軽井沢町、御代田町、小諸市、佐久市、嬬恋村、長野原町にお問い合わせください。

【浅間山の特徴】

溶岩や火砕流、火山灰や軽石が堆積した安山岩質成層火山で、爆発的なブルカノ式噴火が多いのが特徴です。最近100年間では50回以上噴火を繰り返しており、火山灰や噴石、空振、小規模な火砕流などが発生しています。最近では2004年に中噴火しています。

この図は噴火警戒レベル1～3の時の規制範囲を示しています。
 なお、居住地域まで影響が及ぶ場合は、レベル4(避難準備)・レベル5(避難)となります。

● 噴火警戒レベル1～3で必要な防災対応

噴火警戒レベル (キーワード)	必要な防災対応
レベル3 (入山規制)	防災対応の範囲を拡大(4km)を超える範囲で注意喚起、一時規制等) 登山禁止(山頂火口から4km以内規制)
レベル2 (火口周辺規制)	火口周辺立入禁止(山頂火口から概ね2km立入禁止)
レベル1 (平常)	火口付近立入禁止(火口から500m以内規制)

凡例

⊗ 火口 ○ 立入禁止区域 (火口から4km以内)

道路：レベルにより規制されます。
 ● レベル3のときは通行できません。
 ● レベル2のときは状況により規制が行われます。

登山道：浅間山では登山して良い登山道が決められています。
 左図に示した登山道を利用してください。
 火口から500m以内は、レベル1でも立ち入り禁止です。

登山が可能な登山道(レベル別)

レベル3 (状況により規制される場合があります)
 レベル2
 レベル1

Volcanic Alert Levels for Asamayama Volcano which was valid as of December 1, 2007. Revised on December 22, 2010.

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	<ul style="list-style-type: none"> ● Tennen Tenmei-scale eruption, with pyroclastic flow, etc. reaching residential areas. Tenmei Eruption (1783) August 4 to 5: Agatsuma pyroclastic flow, Kanbara debris avalanche, Agatsuma lahar, Onioshidashi lava flow, etc. occurred ● Frequent moderate eruptions, and imminent Tennen Tenmei-scale eruption Tenmei Eruption (1783) August 1 to 3: Pumice eruptions occurred at shorter intervals, with longer durations ● Pyroclastic flow caused by moderate eruption occurs during periods when snow has accumulated, causing a melted snow volcanic lahar which reaches residential areas, or said lahar production is imminent Past Examples No observed examples
		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 a disaster must be evacuated.	<ul style="list-style-type: none"> ● Intermittent moderate eruptions, and possibility of Tennen Tenmei-scale eruption Tenmei Eruption (1783) July 26 to 31: Intermittent moderate eruptions occurred ● Tennen Tenmei-scale eruption expected as a result of felt-earthquakes and prominent crustal deformation, etc., during a continuous eruption Past Examples No observed examples ● A moderate eruption occurs during a period when snow has accumulated, and a possibility exists of a pyroclastic flow which would cause a lahar by melted snow which affects residential areas
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 activity 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.	<ul style="list-style-type: none"> ● A moderate eruption occurs at the summit crater, ejecting volcanic blocks and/or pyroclastic flow within a distance of approximately 4 km. The example of the 2004 Eruption September 1: Volcanic blocks were scattered approximately 2.7 km from the crater. February 1, 1973: Volcanic blocks were scattered approximately 2 km from the summit crater, a pyroclastic flow extended 1.5 km, and a lahar by melted snow extended 2 km November 10, 1958: Volcanic blocks were scattered approximately 3 km from the summit crater, and a pyroclastic flow extended approximately 3 km ● A moderate eruption is imminent Past Examples August 31, 2004: A tilt-change occurred, indicating inflation in the shallow area of the volcanic edifice, and a sudden increase in volcanic earthquakes February 1, 1973: Sudden increase in number of earthquakes
	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 activity as normal. Access to crater area restricted, etc.	<ul style="list-style-type: none"> ● A small eruption occurs at the summit crater, discharging volcanic blocks and/or pyroclastic flow within a distance of approximately 2 km. 1982 Eruption Example April 26: Volcanic blocks were scattered approximately 1km from the summit crater, and a pyroclastic flow extended approximately 1km ● Possibility of small eruption. 2004 Eruption Example Late July: Increase in volcanic plume and volcanic earthquakes
Eruption Forecast	Inside the crater	1 Normal	Little or no volcanic activity. Volcanic ash may be discharged 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.	<ul style="list-style-type: none"> ● Little or no volcanic activity. Possibility of discharge which may affect area within 500 m of summit crater.

Note 1) Volcanic blocks mentioned in this table are large enough not to be affected by wind.

Note 2) The distances from the craters listed in the table are approximate.

Note 3) Tennen and Tenmei-class eruptions produce pyroclastic flows and lahars, which reach residential areas and affect an extensive area.

Note 4) Moderate eruptions issue volcanic blocks roughly 4 km, and smaller blocks may be thrown more than 4 km from the crater.

Note 5) Small eruptions issue volcanic blocks over 2 km from the crater.

Social Circumstances

① Populations

- Gunma Prefecture

Tsumagoi Village: 10,401 (as of August 1, 2011)

Naganohara Town: 6,330 (as of April 1, 2011)

- Nagano Prefecture

Komoro City: 43,858

Miyota Town: 14,902

Karuizawa Town: 19,242

Saku City: 100,396

(Data on October 1, 2011 - according to Nagano Prefecture monthly population movement survey results)

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

- Gunma Prefecture: Joshinetsu Plateau National Park (including Kusatsu-Shiranesan, Asamayama, etc.)

Number of park visitors per year: Approximately 26,137,000 (Gunma Prefecture: 7,083,000 Niigata Prefecture: 3,711,000, Nagano Prefecture: 15,343,000)

- Nagano Prefecture: Joshinetsu Kogen National Park (Asama area)

Number of visitors per year: Komoro City (52,300: Asamayama), Karuizawa Town (7,758,900: Karuizawa Plateau)

Miyota City (330,000: Asama Plateau)

(according to the tourism and land-use statistical survey results in 2010: Nagano Prefecture -

Tourism Planning Division)

③ Facilities

- Gunma Prefecture

Tsumagoi Village

Tsumagoi Village Museum, Tsumagoi Rhododendron Garden, Naganohara Asama Garden (Asama Volcano Museum), Onioshidashi Garden, Asama Rokurigahara Rest House

Shibukawa City

Tone River Water Erosion Control Office, Kanto Regional Bureau, Ministry of Land, Infrastructure, Transport and

Tourism

- Nagano Prefecture

Komoro City

Takamine Kogen Visitor Center, Kazan-kan (Volcano Museum), Komoro Earthquake and Volcano Observatory, Earthquake Research Institute, Univ. Tokyo

Karuizawa Town

Karuizawa Museum of History and Culture, Oiwakejuku Museum of Local History, Asama Volcano Observatory, Earthquake Research, Univ. Tokyo

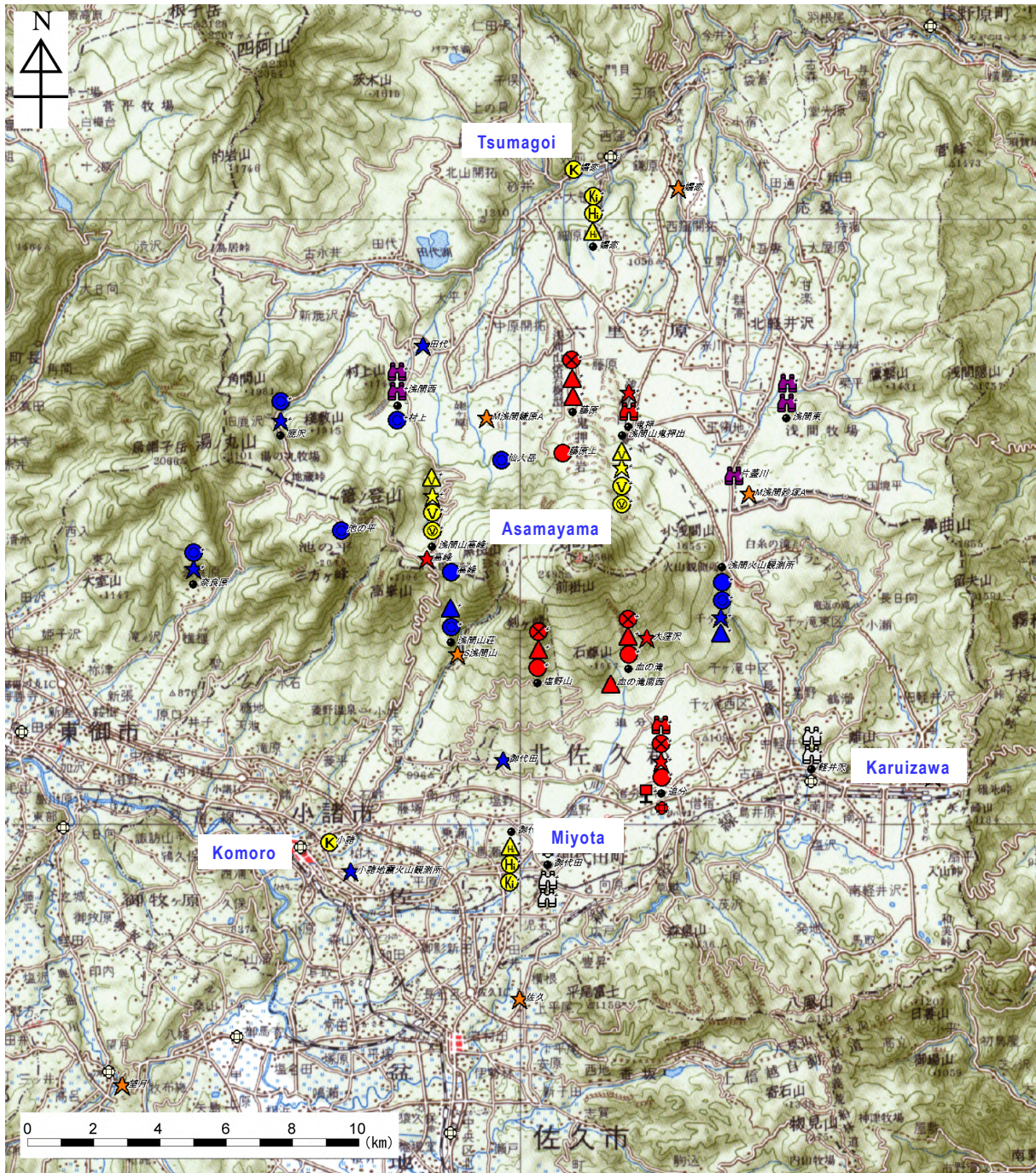
Miyota Town

- Asama Johmon Museum

Monitoring Network

Wide Area

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



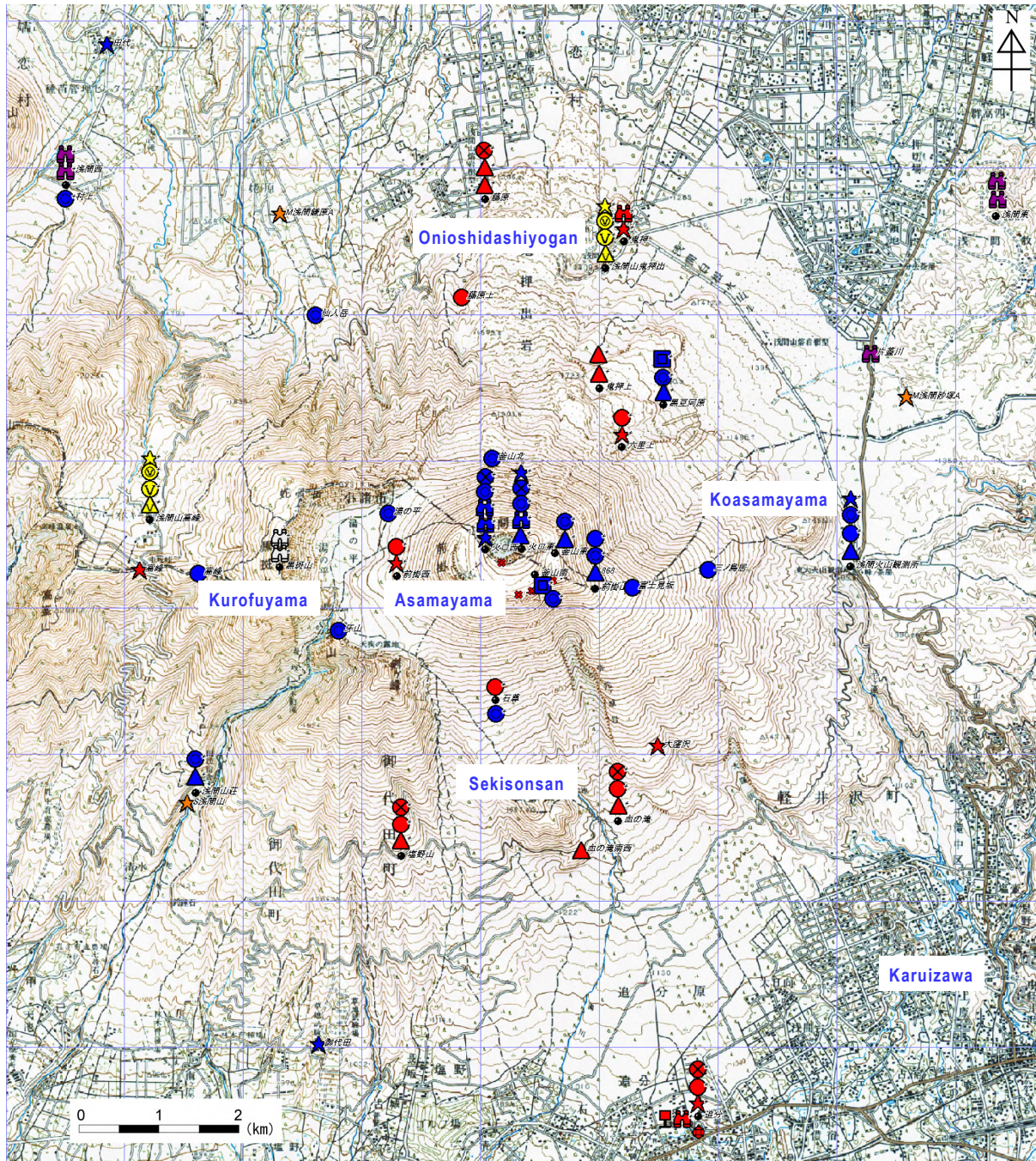
1:200,000 regional map (Nagano) published by the Geospatial Information Authority of Japan was used.

Legend				
(JMA)	(GSI)	(ERI)	(NIED)	(MILT)
● seismometer(SP)	★ GPS	● seismometer(SP)	● V-net(SP)	📷 visual camera
★ GPS		● seismometer (broadband)	● V-net(broadband)	
▲ tiltmeter		★ GPS	▲ V-net(tiltmeter)	(Nakano Pref.)
📏 EDM(reflector)		▲ tiltmeter	● Hi-net	📷 visual camera
📷 visual camera			● K-NET	
● seismic intensity meter			● KiK-net	(Municipalities)
			★ GPS	⊕ seismic intensity meter

Figure 45-27 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 Topographic maps (Komoro, Miyota, Ueda and Karuizawa) published by the Geospatial Information Authority of Japan were used.

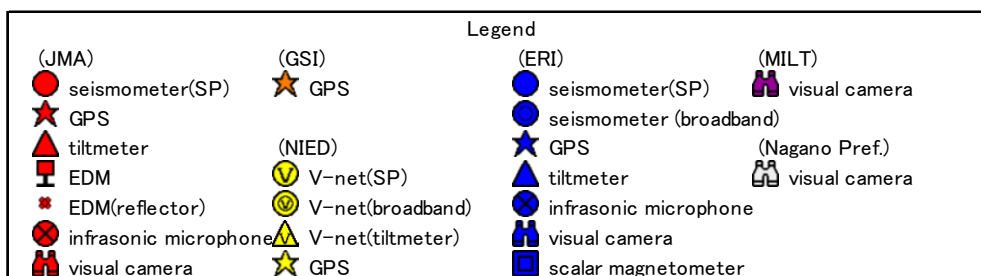


Figure 45-28 Local monitoring network.

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