



Bulletin of World Volcanism

Issue: May

2013

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BULLETIN INFORMATION

Writer (s); Lucas Wilson [Editor]

Promotion; Tom Pfeiffer

Partners with: VolcanoDiscovery

Contact: bulletinwv@hotmail.co.uk

For more information visit:

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WORLDWIDE MONTHLY VOLCANIC ACTIVITY

VOLCANOES ORGANISED BY THE CAVW/GVP VOLCANO NUMBER CODE

NAME: Heard

LOCATION: Indian Ocean (owned by Australia)

HEIGHT: 2745 M

TYPE: Stratovolcano

COORDINATES: 53.106°S 73.513°E

According to NASA Earth Observatory (EO) an image acquired on 7th April from the Advanced Land Imager (ALI) on NASA's EO-1 satellite showed that Mawson's Peak crater on Heard Island had filled and a lava flow had travelled down the SW flank. The lava flow was visible in an image acquired on 20th April and had slightly widened just below the summit.

NAME: Gaua

LOCATION: Vanuatu

HEIGHT: 797 M

TYPE: Stratovolcano

COORDINATES: 14.27°S 167.50°E

The Wellington VAAC reported on 29th April that a Qantas Airline pilot noticed a possible ash plume from Gaua volcano.

The Vanuatu Geohazards keeps the alert at 1 (on a scale of 0-4)

NAME: Papandayan

LOCATION: Indonesia (Western Java)

HEIGHT: 2665 M

TYPE: Stratovolcanoes

COORDINATES: 7.32°S 107.73°E

The CVGHM reported that during 1st April – 5th May soil temperatures around Papandayan's crater



Above; Gaua's Mt. Garat in eruption in June 2010.

fluctuated but increased overall. During 1st – 5th May seismicity increased, prompting CVGHM to raise the Alert level to 3 (on a scale of 1-4) on 5th May. Tourists and residents were reminded not to venture within 2 KM of the active crater.

NAME: Dieng Volcanic Complex

LOCATION: Indonesia (Central Java)

HEIGHT: 2565 M

TYPE: Complex Volcano

COORDINATES: 7.20°S 109.92°E

The CVGHM reported that on 28th March gas emissions continued to be elevated at Timbang, a cone that is part of the Dieng Volcanic Complex. Plumes containing carbon dioxide drifted 2 KM towards the S valley of Kali Sat, prompting a road closure until the early evening when the gas concentration decreased. On 30th March carbon dioxide gas emissions were not detected; however, white smoke rose at most 100 M above the crater. Hydrogen sulphide odours were very potent in areas 1 KM W and weak in areas 1.5 KM S. On 19th April sulphur dioxide odours were reported.

On 24th March Sileri Crater lake water changed from dark grey to brown. On 7th April white plumes rose 50 M and the water colour returned to normal. Diffuse white plumes rose 15 M on 20th April. Other craters had not exhibited any changes by 28th April.

NAME: Sangeang Api

LOCATION: Indonesia (Lesser Sunda Islands)

HEIGHT: 1949 M

TYPE: Complex Volcano

COORDINATES: 8.20°S 119.07°E

The CVGHM reported that during 1st – 19th May, diffuse white plumes rose 10 M above Sangeang Api's crater. Both the lava dome and surrounding areas showed no changes since November 2012.

Seismicity had increased on 26th April and remained high. The Alert Level was raised to 3 (on a scale of 1-4) on 19th May. Residents and tourists were advised not to approach the craters within a radius of 5 KM.

NAME: Gamkonora

LOCATION: Indonesia (Halmahera)



Above; eruption of Mayon, Philippines, on 7 May.

HEIGHT: 1635 M

TYPE: Stratovolcano

COORDINATES: 1.38°N 127.53°E

The CVGHM reported that on January 24th, a brief ash emission occurred from the volcano.

Observations from January 25th – 24th May showed a thin white steam plume from the summit of the volcano rising to heights of 100 – 300 M. From May 25th – 27th, the plumes were coloured grey with ash content and rose to heights of 200 – 500 M above the active crater rim.

Many small minor volcanic earthquakes (especially in April) preceded the eruptions in May. On 27th May, the Alert Level was raised to 3 (on a scale of 1-4).

NAME: Mayon

LOCATION: Philippines (Luzon Island)

HEIGHT: 2462 M

TYPE: Stratovolcano

COORDINATES: 13.257°N 123.685°E

The PHIVOLCS reported that a small phreatic eruption from Mayon occurred at 08:00 on 7th May and lasted for 2 minutes and 26 seconds. A grey-to-brown ash cloud rose 500 M above the crater and drifted WSW. Ash fell in areas WNW, affecting the barangays of Muladbucad (10 KM WSW), Guinobatan (11 KM SW), Nabonton (10 KM W), Nasisi (11 KM W), Basag (10 KM W), Tambo, Ligao City (19 KM WSW), Albay (19 KM SW), and areas upslope of these barangays. One rock fall was detected. Seismicity and gas emissions remained within background levels and indicated no intensification of activity. The Alert Level remained at 0 and the public was reminded not to enter the 6-km-radius Permanent Danger Zone (PDZ).

According to a news article, the eruption ejected large "room-sized rocks" towards about 30 climbers, killing five and injuring eight.

At 08:00 on 8th May, the PHIVOLCS reported that two rockfalls at Mayon had been detected within the previous 24 hours. Seismicity remained within background levels and indicated no increase in overall volcanic activity.

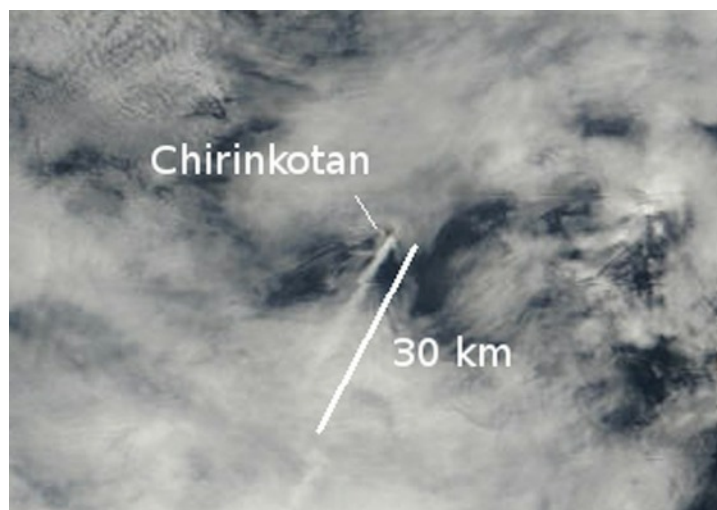
NAME: Chirinkotan

LOCATION: Kuril Islands (Russia)

HEIGHT: 724 M

TYPE: Stratovolcano

COORDINATES: 48.98°N 153.48°E



Above, steam plume from Chirinkotan on 24 May.

The SVERT reported that on 24th May, a MODIS satellite image showed a strong gas and steam plume from the volcano, possibly containing minor amounts of ash. The SVERT noted strong thermal anomalies at the volcano on 24th and 25th May.

VolcanoDiscovery reports that the possible eruption could extend back to May 7th when thermal anomalies at the volcano first began to be observed.

Activolcans.info suggests an April date for the eruption.

NAME: Cleveland

LOCATION: USA (Alaska)

HEIGHT: 1730 M

TYPE: Stratovolcano

COORDINATES: 52.825°N 169.944°W

The AVO reported that on 4th May the infrasound network detected three short-duration explosions from Cleveland at 05:00, 07:17, and 11:44. A small, low-altitude ash cloud along with high surface temperatures at the summit were observed in satellite images starting at 07:17. In a report posted at 18:22 AVO noted that both webcam and satellite images suggested continuous low-level emissions of gas, steam, and minor amounts of ash over the past several hours with a faint plume drifting E below 4.6 KM a.s.l. The Volcanic Alert

Level was raised to Watch and the Aviation Colour Code was raised to Orange.

On 5th May the amplitude of the Cleveland infrasonic tremor, as measured by the ground-coupled airwaves on the Okmok seismic network, 120 KM NE, decreased from its peak activity the evening before. Satellite images again detected continuous low-level emissions of gas, steam, and minor amounts of ash producing a faint plume that drifted E below 4.6 KM a.s.l. Explosions were detected at 11:23 on 5th May and 08:00 on 6th May. A thermal anomaly continued to be detected. A news article stated that some airplanes were diverted away from Cleveland.

The AVO reported that during 8th – 9th May no further explosions had been detected at Cleveland based on regional infrasonic data. Cloud cover prevented satellite observations of the crater. Clear satellite views revealed vigorous steam plumes during 10th – 11th May and thermal anomalies during 10th – 14th May. On 14th May, the AVO noted that analysis of recent satellite imagery revealed a 100-M-wide lava flow, breaching the SE rim of the summit crater, and extending about 1.5 KM down the SE flank.

The AVO reported that during 14th – 15th and 18th – 19th May elevated surface temperatures over Cleveland were observed in satellite images.

Clouds obscured views during 16th and 20th – 21st May. Satellite image analysis revealed that a small lava flow had breached the SE rim of the summit crater and travelled as far as 1.5 KM down the flank.

The AVO reported that during 22nd – 23rd May elevated surface temperatures over Cleveland were observed in satellite images. Clouds obscured views during 24th – 26th May. Slightly elevated surface temperatures, consistent with a cooling lava flow, were observed in several satellite images during 26th – 28th May.

NAME: Pavlof

LOCATION: USA (Alaska)

HEIGHT: 2519 M

TYPE: Stratovolcano

COORDINATES: 55.42°N 161.887°W

The AVO raised the Alert Level from GREEN to ORANGE on 13th May after high seismicity began to be registered at the volcano and an intense thermal anomaly was noted on satellite images.



Above; ash emission from Pavlof on May 18. The steam cloud below it results from the interaction between the hot rock and the ice covering the volcano.

The AVO reported that on 14th May a diffuse ash plume from Pavlof drifted about 160 KM NE at an altitude of 4.6 KM a.s.l. before dissipating. Pilot reports and photographs indicated that the lava flow extending down the NW flank was still active and generated debris-laden flow deposits, presumably from the interaction of hot lava with the snow and ice on the flank. Light ash fall was reported the evening of 14th May in a mining camp 80 KM NE of the volcano. No other nearby communities had reported ash fall.

During 14th – 15th May elevated seismicity persisted and steam-and-ash clouds observed with a web camera occasionally rose up to 6.1 KM a.s.l. Residents in Cold Bay (37 KM SW) observed incandescence from the summit during the night. On 15th May a pilot reported a dark ash cloud drifting ENE at an altitude of 6.1 KM a.s.l.

On 16th May lava fountaining at the summit was observed and photographed, and a continuous ash, steam, and gas cloud extended downwind 50 – 100 KM at an altitude of about 6.1 KM a.s.l. Satellite images showed persistent elevated surface temperatures at the summit and on the NW flank, commensurate with the summit lava fountaining and resulting lava flow.

During 18th – 19th May a narrow plume of steam, ash, and gas, occasionally rising up to 6.7 KM a.s.l., and drifting southeast, was visible in satellite images. Pilot reports indicated that lava fountaining and ash emission continued. Overnight, trace amounts of ash fell on the community of Sand Point. During the afternoon on 19th May pilots reported that ash plumes rose to altitudes of 4.6 – 6.7 KM a.s.l. Trace amounts of ash fell in Nelson Lagoon, 78 KM NNE, during 19th – 20th May.

A news article stated that on 20th May a regional airline cancelled about a dozen flights to several remote communities, including Sand Point. Another regional airline cancelled a few flights, but mostly re-routed flights. On 21st May, the AVO reported that a low-level plume of steam, gas, and ash occasionally rose to an altitude of 6.1 KM a.s.l. and drifted NNE. Trace amounts of ash again fell in Nelson Lagoon. The AVO reported that seismic tremor at Pavlof markedly declined around 11:00 on 21st May, and was followed through 23rd May by the detection of small discrete events, likely indicative of small explosions, by pressure sensors. Although cloud cover prevented satellite observations, elevated surface temperatures at the vent were detected. On 22nd May both a pilot report and photographs indicated weak steam-and-gas emissions containing little to no ash. The eruption continued but at a lower level during 24th – 26th May. Neither evidence of elevated surface temperatures nor a plume were observed in partly clear satellite images during 24th – 25th and 27th May. Clouds obscured views on 26th May. The Volcanic Alert Level was lowered to Advisory and the Aviation Colour Code was lowered to YELLOW on 28th May.

NAME: Turrialba
LOCATION: Costa Rica
HEIGHT: 3340 M
TYPE: Stratovolcano
COORDINATES: 10.025°N 83.767°W

On 18th April, 150 earthquakes per day began to occur. Increased gas emissions took place on 20th May, producing a blue gas plume which rose above the crater, harmonic tremor began on 07:20. On 21st May at around 08:30 (local time) strong ash venting took place at 2 vents in the crater of the volcano (1 one the west wall, which opened in 2010, and 1 one the east wall, which opened in 2012). The eruptions produced ash plumes which rose 500 M above the crater. The emissions ceased at around 12:00 (local time). The eruptions produced ash fall on the outskirts of San Jose (around 35 KM E) and Heredia (38 KM W) of Ipís de Guadalupe, Goicoechea (28 KM WSW), la Fazio, Zetillal (43 KM W), San Isidro-San Pedro de Coronado, and San Luis de Santo Domingo (28 KMW) and Picada (N).



Above; the two erupting vents of Turrialba on 21 May. The eruptions were captured by a webcam.

NAME: Sabancaya
LOCATION: Peru
HEIGHT: 5967 M
TYPE: Stratovolcanoes
COORDINATES: 15.78°S 71.85°W

On 10th May, the Instituto Geofísico de Perú (IGP) reported that results of an interferogram of Sabancaya provided by a collaborator at Cornell University showed that an area of deformation (subsidence of 7 cm centered at 6 KM NE of the crater) was coincident with the main area of seismicity. Volcano-tectonic (VT) earthquakes continued to dominate the seismic signals, although long-period (LP) events continued to be detected. There was also an increase of hybrid events. On 10th May an M 4 VT event occurred 15 KM W and fumarolic activity increased, with plumes rising 1.2 KM high.

CONTINUING ACTIVITY

NAME: Etna
LOCATION: Italy (Sicily)
HEIGHT: 3330 M
TYPE: Stratovolcanoes
COORDINATES: 37.734°N 15.004°E

Sezione di Catania - Osservatorio Etneo reported that the thirteenth lava-fountaining episode of 2013 began at Etna's New Southeast Crater (NSEC) on 27th April. Activity increased on 21st April and was characterized by Strombolian explosions and frequent ash emissions. Eruptive activity and the volcanic tremor amplitude gradually increased in the evening of 26th April. Just after sunset on 27th April lava fountains rose 300 – 500 M, and lava flows from the SE and NE flanks of the NSEC cone and from the saddle between

the two Southeast Crater (SEC) cones travelled S and N.

NAME: White Island
LOCATION: New Zealand
HEIGHT: 321 M
TYPE: Stratovolcanoes
COORDINATES: 37.52°S 177.18°E

On 29th April GeoNet Data Centre reported that activity at White Island remained at a persistently low level, characterized by tremor and degassing. No mud or ash eruptions had been observed since early April. A volcanologist visited the island the previous week and observed that increased rainfall had caused the two lakes to merge together into one larger lake. The temperature of the lake was 62 degrees Celsius and the lava-dome temperature was 200 degrees. The lower level of activity prompted GeoNet to reduce the Aviation Colour Code to Green (indicating no active eruption).

NAME: Yasur
LOCATION: Vanuatu
HEIGHT: 361 M
TYPE: Stratovolcano
COORDINATES: 19.53°S 169.442°E



Above; the characteristic strombolian ejections in the crater of Yasur Volcano.

On 28th May, the Vanuatu Geohazards Observatory reported that activity at Yasur continued to increase slightly, and bombs fell around the summit area, the tourist walk, and the parking area. Ash venting and dense white plumes from the crater were observed. Photos included in the report showed ash emissions and ashfall on 5th and 8th May, and dense white plumes on 23rd and 24th May.

NAME: Manam
LOCATION: Papua New Guinea
HEIGHT: 1807 M

TYPE: Stratovolcano
COORDINATES: 4.080°S 145.037°E

The RVO reported that on 23rd April dense white vapour plumes occasionally rose from Manam's Southern Crater. During 25th – 28th April ash clouds rose from the new sub-terminal vent E of Southern Crater inside southeast valley. The ash clouds rose 600 M and drifted NW. Loud booming noises were heard each day; however, between 07:00 and 19:00 on 27th April the noises became frequent, louder, and explosive in nature, and were heard at Bogia, 25 – 30 KM SSW of Manam on the N coast of the mainland. Strong explosions vibrated structures on the island. The RVO reported that during 29th April – 16th May activity at Manam was low, characterized by white, and sometimes blue, vapour plumes rising from Southern Crater. White vapour plumes also rose from Main Crater. Seismicity fluctuated but remained high until 1st May; seismicity then declined to a low on 4th May where it stayed for the rest of the period. RVO reminded people to stay away from the four main radial valleys, and especially the SE and SW ones where most products from the activity at Southern Crater were channelled.

NAME: Rabaul
LOCATION: Papua New Guinea (New Britain)
HEIGHT: 688 M
TYPE: Pyroclastic Shield
COORDINATES: 4.271°S 152.203°E

The RVO reported that during 24th – 28th April white vapour plumes sometimes containing ash rose at most 200 M from Rabaul caldera's Tavurvur cone and drifted SE. Roaring and rumbling noises also continued but the intensity was low.

The RVO reported that during 29th April – 16th May white vapour plumes sometimes containing fine ash rose at most 200 M from Rabaul caldera's Tavurvur cone and drifted NW. Ashfall was reported in areas downwind including Rabaul town (3 – 5 KM NW). Roaring and rumbling noises also continued. Seismicity was low.

NAME: Bagana
LOCATION: Papua New Guinea (Bougainville Autonomous Territory)
HEIGHT: 1750 M
TYPE: Lava Cone
COORDINATES: 6.140°S 155.195°E

The Darwin VAAC reported that during 5th – 6th May ash plumes from Bagana rose to an altitude of 2.1 KM a.s.l. and drifted 75 – 85 KM W.

The Darwin VAAC reported that on 24th May an ash plume from Bagana rose to an altitude of 2.1 KM a.s.l. and drifted over 35 KM NW and N.

NAME: Paluweh
LOCATION: Indonesia (Lesser Sundra Islands)
HEIGHT: 875 M
TYPE: Stratovolcano
COORDINATES: 8.32°S 121.708°E

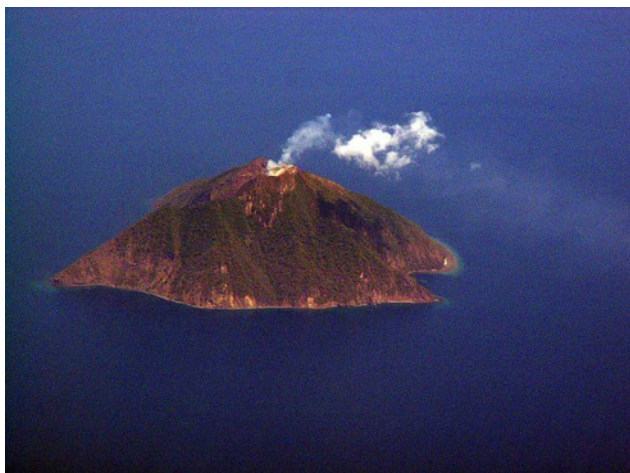
The Darwin VAAC reported that during 29th – 30th April ash plumes from Paluweh rose to altitudes of 2.1 – 3 KM a.s.l. and drifted 35 – 110 KM NW and W. The Darwin VAAC reported that during 4th – 5th May ash plumes from Paluweh rose to an altitude of 2.1 KM a.s.l. and drifted 45 – 55 KM SW and W.

The Darwin VAAC reported that on 13th May ash plumes from Paluweh rose to an altitude of 2.1 KM a.s.l. and drifted over 90 KM WNW and NW.

The Darwin VAAC reported that during 21st – 22nd and 24th May ash plumes from Paluweh rose to altitudes of 2.1 – 3 KM a.s.l. and drifted 25 – 55 KM NW, W, and E.

NAME: Batu Tara
LOCATION: Indonesia (Lesser Sundra Islands)
HEIGHT: 748 M
TYPE: Stratovolcano
COORDINATES: 7.792°S 123.579°E

The Darwin Volcanic Ash Advisory Centre (VAAC) reported that during 24th – 30th April



Above; steaming Batu Tara, Indonesia

ash plumes from Batu Tara rose to altitudes of 1.5 – 2.1 KM a.s.l. and drifted 35 – 110 W, WNW, and NW.

The Darwin Volcanic Ash Advisory Centre (VAAC) reported that during 1st and 6th – 7th May, ash plumes from Batu Tara rose to an altitude of 2.1 KM a.s.l. and drifted 45 – 55 KM NW and W.

NAME: Lokon-Empung
LOCATION: Indonesia (Sulawesi)
HEIGHT: 1580 M
TYPE: Stratovolcano
COORDINATES: 1.358°N 124.792°E

An explosion on the evening of 5th May ejected incandescent bombs 200 M above the crater. Explosions were heard 6 KM away.

NAME: Dukono
LOCATION: Indonesia (Halmahera)
HEIGHT: 1335 M
TYPE: Complex Volcano
COORDINATES: 1.68°N 127.88°E

A large SO₂ plume was noted from the volcano on a NOAA satellite image. This is probably due to increased strombolian activity at the volcano.

NAME: Sakura-Jima
LOCATION: Japan (Kyushu)
HEIGHT: 1117 M
TYPE: Stratovolcano
COORDINATES: 31.585°N 130.657°E

The JMA reported that during 22nd – 25th April, four explosions from Sakura-jima's Showa Crater ejected tephra at most 1.3 KM from the crater. Crater incandescence was occasionally detected at night. Based on a pilot report, the Tokyo VAAC reported that ash plumes drifted NE and SE at altitudes of 2.7 – 3 KM a.s.l. during 24th – 25th April. Explosions on 26th and during 28th – 29th April produced plumes that rose to altitudes of 1.8 – 2.1 KM a.s.l. and drifted SE and NE.

The Tokyo VAAC reported that during 1st – 6th April explosions from Sakura-jima generated ash plumes that rose to altitudes of 1.8 – 3 KM a.s.l. and drifted E and SE. A pilot observed an ash plume that rose to an altitude of 2.4 KM a.s.l. on 3rd April. Another ash plume observed by a pilot rose to an altitude of 3.4 KM a.s.l. and drifted S on 5th May.

The JMA reported that during 7th – 10th May, eight explosions from Sakura-jima's Showa Crater ejected tephra that fell at most 1.8 KM from the crater. Crater

incandescence was occasionally detected at night. The Tokyo VAAC reported that on most days during 8th – 14th May explosions produced plumes that rose to altitudes of 2.1 – 4.3 KM a.s.l. and drifted in multiple directions. During 9th and 13th -14th May pilots observed ash plumes rising to altitudes of 2.4 – 3 KM a.s.l. and drifting N, NW, and W.

The JMA reported that during 13th – 17th May Sakura-jima's Showa Crater had 13 explosions ejecting tephra that fell at most 1.8 KM from the crater. Crater incandescence was occasionally detected at night. The Tokyo VAAC reported that during 15th, 17th – 18th, and 20th – 21st May explosions produced plumes that rose to altitudes of 1.2 – 3.7 KM a.s.l. and drifted E and W. On 21st May a pilot observed an ash plume that rose to an altitude of 3.4 KM a.s.l. and drifted E.

The JMA reported that during 20th – 24th May Sakura-jima's Showa Crater had eight explosions, ejecting tephra that fell at most 1.3 KM from the crater. Crater incandescence was occasionally detected at night. The Tokyo VAAC reported that during 23rd – 26th May explosions produced plumes that rose to altitudes of 1.8 – 2.4 KM a.s.l. and drifted E, SW, and W. On 24th May a pilot observed an ash plume that rose to an altitude of 3 KM a.s.l.

NAME: Chirpoi
LOCATION: Kuril Islands (Russia)
HEIGHT: 742 M
TYPE: Caldera
COORDINATES: 46.525°N 150.875°E

The SVERT reported that a weak thermal anomaly over Snow, a volcano of Chirpoi, was detected in satellite images on 24th and 26th April.

NAME: Karymsky
LOCATION: Kamchatka (Russia)
HEIGHT: 1536 M
TYPE: Stratovolcano
COORDINATES: 54.05°N 159.45°E

The KVERT reported that satellite data showed a thermal anomaly on Karymsky on 26th April. Two streaks of ash deposits near the volcano were observed during 1st – 2nd May: about 15 KM to the W and about 30 KM to the NW of the volcano. Technical problems prevented seismic data collection during 26th April – 3rd May. The



Above; young Karymsky stratovolcano sits in the old Karymsky Caldera. Akademia Nauk caldera to the right last erupted in 1996.

KVERT reported that satellite data showed a thermal anomaly on Karymsky during 21st – 22nd May. Technical problems prevented seismic data collection during 17th – 24th May.

NAME: Kizimen
LOCATION: Kamchatka (Russia)
HEIGHT: 2376 M
TYPE: Stratovolcano
COORDINATES: 55.130°N 160.32°E

The KVERT reported that during 19th – 26th April moderate seismic activity continued at Kizimen. Video and satellite data showed that lava continued to extrude from the summit, producing incandescence, strong gas-and-steam activity, and hot avalanches on the W and E flanks. Cloud-free satellite images detected a thermal anomaly over the volcano.

The KVERT reported that during 26th April – 3rd May moderate seismic activity continued at Kizimen. Video and satellite data showed that lava continued to extrude from the summit, producing incandescence, strong gas-and-steam activity, and hot avalanches on the W and E flanks. A thermal anomaly was detected daily in satellite images.

The KVERT reported that during 3rd – 10th May moderate seismic activity continued at Kizimen. Video and satellite data showed that lava continued to extrude from the summit, producing incandescence, strong gas-and-steam activity, and hot avalanches on the W and E flanks. A thermal anomaly was detected daily in satellite images.

The KVERT reported that during 10th – 16th May moderate seismic activity continued at Kizimen. Video and satellite data showed that lava continued to extrude from the summit, producing incandescence, strong gas-and-steam activity, and hot avalanches on the W and E

flanks. A thermal anomaly was detected daily in satellite images.

The KVERT reported that during 17th – 24th May moderate seismic activity continued at Kizimen. Video and satellite data showed that lava continued to extrude from the summit, producing incandescence, strong gas-and-steam activity, and hot avalanches on the W and E flanks. A thermal anomaly was detected daily in satellite images.

NAME: Tolbachik

LOCATION: Kamchatka (Russia)

HEIGHT: 3682 M

TYPE: Shield Volcano

COORDINATES: 55.830°N 160.330°E

The KVERT reported that the S fissure along the W side of Tolbachinsky Dol, a lava plateau on the SW side of Tolbachik, continued to produce very fluid lava flows during 19th – 26th April that travelled to the W, S, and E sides of the plateau. Cinder cones continued to grow along the S fissure. Gas-and-ash plumes rose to an altitude of 3 KM a.s.l. and drifted in multiple directions. A large thermal anomaly on the N part of Tolbachinsky Dol was visible daily in satellite imagery.

The KVERT reported that the S fissure along the W side of Tolbachinsky Dol, a lava plateau on the SW side of Tolbachik, continued to produce very fluid lava flows during 26th April – 3rd May that travelled to the W, S, and E sides of the plateau. Cinder cones continued to grow along the S fissure and gas-and-ash plumes were observed. A large thermal anomaly on the N part of Tolbachinsky Dol was visible daily in satellite imagery.

The KVERT reported that the S fissure along the W side of Tolbachinsky Dol, a lava plateau on the SW side of Tolbachik, continued to produce very fluid lava flows during 3rd – 10th May that travelled to the W, S, and E sides of the plateau. Cinder cones continued to grow along the S fissure and gas-and-ash plumes were observed. A large thermal anomaly on the N part of Tolbachinsky Dol was visible daily in satellite imagery.

The KVERT reported that the S fissure along the W side of Tolbachinsky Dol, a lava plateau on the SW side of Tolbachik, continued to produce very fluid lava flows during 10th – 16th May that travelled to the W, S, and E sides of the plateau. Cinder cones continued to grow along the S fissure and gas-and-ash plumes were observed. A large thermal anomaly on the N part of Tolbachinsky Dol was visible daily in satellite imagery.

The KVERT reported that the S fissure along the W side of Tolbachinsky Dol, a lava plateau on the SW side of Tolbachik, continued to produce very fluid lava flows during 17th – 24th May that travelled to the W, S, and E sides of the plateau. Cinder cones continued to grow along the S fissure and weak gas-and-steam plumes were observed. A large thermal anomaly on the N part of Tolbachinsky Dol was visible daily in satellite imagery.

NAME: Shiveluch

LOCATION: Kamchatka (Russia)

HEIGHT: 3283 M

TYPE: Stratovolcano

COORDINATES: 56.653°N 161.360°E

The KVERT reported that during 19-26 April a viscous lava flow effused on the NW flank of Shiveluch's lava dome, accompanied by hot avalanches, incandescence, and fumarolic activity. Satellite imagery showed a daily thermal anomaly on the lava dome.

The KVERT reported that during 26th April – 3rd May a viscous lava flow effused on the NW and NE flanks of Shiveluch's lava dome, accompanied by hot avalanches, incandescence, and fumarolic activity. Satellite imagery showed a daily thermal anomaly on the lava dome.

The Tokyo VAAC reported that on 5th May an ash plume rose to an altitude of 4.6 km a.s.l. and drifted E.

The KVERT reported that during 3rd – 10th May, a viscous lava flow effused on the NW and NE flanks of Shiveluch's lava dome, accompanied by hot avalanches, incandescence, and fumarolic activity. Satellite imagery showed a daily thermal anomaly on the lava dome.

The KVERT reported that during 10th – 16th May, a viscous lava flow effused on the N flank of Shiveluch's lava dome, accompanied by hot avalanches, incandescence, and fumarolic activity. Satellite imagery showed a daily thermal anomaly on the lava dome.

The Tokyo VAAC reported that on 18th May ash plumes rose to an altitude of 5.5 KM a.s.l. and drifted NE.

The KVERT reported that during 17th – 24th May a viscous lava flow effused on the N flank of Shiveluch's lava dome, accompanied by hot avalanches, incandescence, and fumarolic activity. Satellite imagery showed a daily thermal anomaly on the lava dome.

NAME: Kilauea

LOCATION: USA (Hawaii)

HEIGHT: 1222 M

TYPE: Shield Volcano

COORDINATES: 19.421°N 155.287°W

During 24th – 30th April, HVO reported that the circulating lava lake periodically rose and fell in the deep pit within Kilauea's Halema'uma'u Crater. The plume from the vent continued to deposit variable amounts of ash, spatter, and Pele's hair onto nearby areas.

At Pu'u 'O'o Crater, glow emanated from three spatter cones, a small lava pond on the crater floor, and cracks in a recently emplaced lava flow on the crater floor. Small lava flows issued from the SW spatter cone on 24th April. On 28th April lava gushed from the N spatter cone for more than 2.5 hours, covering the N portion of the crater floor. A second flow was observed on 29th April. Peace Day activity, fed by lava tubes extending from Pu'u 'O'o, consisted of lava flows active above the pali SE of Pu'u 'O'o, on the pali, and on the coastal plain. Lava also entered the ocean at two or three locations spanning the National Park boundary.

During 1st – 7th May, HVO reported that the circulating lava lake occasionally rose and fell in the deep pit within Kilauea's Halema'uma'u Crater. The plume from the vent continued to deposit variable amounts of ash, spatter, and Pele's hair onto nearby areas.

At Pu'u 'O'o Crater, glow emanated from three spatter cones and a small lava pond on the E part of the crater floor. Small lava flows issued from the N spatter cone on 1st May and from the SW cone on 2nd May. The lava pond overflowed during 3rd – 4th and 6th – 7th May.

Peace Day activity, fed by lava tubes extending from Pu'u 'O'o, consisted of lava flows active above the pali SE of Pu'u 'O'o, on the pali, and on the coastal plain. Lava also entered the ocean in at least two locations spanning the National Park boundary. On 3 May a breakout on the top of the pali produced a lava flow that travelled down to the coastal plain in about 1 hour. Branches from the flow advanced during 4th – 6th May.

During 8th – 14th May, the HVO reported that the circulating lava lake occasionally rose and fell in the deep pit within Kilauea's Halema'uma'u Crater. The plume from the vent continued to deposit variable amounts of ash, spatter, and Pele's hair onto nearby areas.

At Pu'u 'O'o Crater, glow emanated from three spatter cones and a small lava pond on the E part of the crater floor. Lava from the E lava pond travelled down the N, NE, E, and S flanks, extending beyond the base of Pu'u 'O'o cone. During 10th – 11th May the SW spatter cone erupted lava, and during 11th – 12th May the SE spatter cone also produced flows.

Peace Day activity, fed by lava tubes extending from Pu'u 'O'o, consisted of lava flows active on the pali and on the coastal plain. Lava also entered the ocean in at least two locations spanning the National Park boundary.

During 15th – 21st May, the HVO reported that the circulating lava lake occasionally rose and fell in the deep pit within Kilauea's Halema'uma'u Crater. The plume from the vent continued to deposit variable amounts of ash, spatter, and Pele's hair onto nearby areas.

At Pu'u 'O'o Crater, glow emanated from three spatter cones and a small lava pond on the E part of the crater floor. Lava from base of Pu'u 'O'o cone travelled N and was named the Kahauale'a II flow. Peace Day activity, fed by lava tubes extending from Pu'u 'O'o, consisted of lava flows active on the coastal plain that were entering the ocean at a location outside the National Park boundary.

During 22nd – 28th May, the HVO reported that the circulating lava lake occasionally rose and fell in the deep pit within Kilauea's Halema'uma'u Crater. The plume from the vent continued to deposit variable amounts of ash, spatter, and Pele's hair onto nearby areas.

At Pu'u 'O'o Crater, glow emanated from three spatter cones and a small lava pond on the E part of the crater floor. The Kahauale'a II lava flows travelled N from the base of Pu'u 'O'o cone. The most distal front of the flow was 1.8 KM from its source at a spatter cone on the NE edge of Pu'u 'O'o's crater floor. At 07:40 on 26th May lava began to spill from the N side of the NE spatter cone, feeding a new breakout on the N flank of Pu'u 'O'o.

Peace Day activity, fed by lava tubes extending from Pu'u 'O'o, consisted of some breakout activity on the pali and coastal plain, but mainly flows entering the ocean at locations inside and outside the National Park boundary.

NAME: Popocatepetl

LOCATION: Mexico

HEIGHT: 5426 M

TYPE: Stratovolcanoes

COORDINATES: 19.023°N 98.622°W

The CENAPRED reported that during 24th – 27th April seismicity at Popocatépetl indicated continuing gas-and-steam emissions that sometimes contained ash. Incandescence from the crater was often observed at night. Gas-and-steam plumes rose 1 KM and drifted NE and ESE. On 24th April an explosion generated a steam-and-ash plume that rose 1.2 KM above the crater and drifted W; incandescent tephra ejected from the crater landed 500 M away on the N flank. On 25th April a dense steam-and-gas plume rose 1.5 KM and drifted W. The next day an explosion generated a gas-and-ash plume that rose 2 KM. Atmospheric clouds made observations difficult. On 28th April gas-and-ash plumes rose 1.2 KM and drifted NE, and on 29th April gas-and-ash plumes rose 1 KM; cloud cover continued to impede observations. On 30th April an explosion generated an ash plume that rose 300 M and drifted E. Ejected incandescent tephra landed 800 M away on the NE flank. Gas-and-vapour plumes rose 500 M.

CENAPRED reported that an episode of high-amplitude spasmodic tremor detected at Popocatépetl began between 1928 on 7 May and 0159 on 8 May. The seismic increase was accompanied by an ash plume that rose 3 km above the crater and drifted SE, producing ashfall in San Pedro Benito Juárez (10-12 km SE), San Juan Tianguismanalco (22 km SE), Atlixco (23 km SE), and in some areas of Puebla (~50 km to the E). Incandescent tephra ejected from the crater landed 500 m away on the NE flank. On 8 May an explosion produced an ash plume that drifted SE. Incandescence from the crater was observed at night. The next day gas-and-steam plumes drifted SE.

On 10th May steam, gas, and ash plumes were detected; one of two explosions produced an ash plume that drifted E. A series of ash emissions and periods of harmonic tremor occurred between 11:42 and 14:43; cloud cover prevented clear views of the ash plumes. On 11th May steam, gas, and ash plumes were again detected. An explosion produced an ash plume that rose 1 KM and drifted NE, and ejected incandescent tephra 500 M down the NE flank. Ash possibly fell in villages downwind. Gas-and-ash plumes rose 0.1 – 2 KM and drifted ENE and NE. During 11th – 12th May periods of spasmodic and harmonic tremor were detected, and activity increased overall.

On 12th May, CENAPRED noted that there had been an increase in activity during the previous two weeks, and another intensification that day

prompting the Alert Level to be raised to Yellow, Phase Three. Access to the crater within a 12-KM radius was prohibited. Stream-and-gas plumes with small amounts of ash rose from the crater. Sporadic ejections of incandescent tephra fell back into the crater and onto the NNE flank, 300 M from the crater rim. On 13th May steam-and-gas plumes were observed rising from the crater during periods of good visibility. On 14th May an explosive event generated an ash plume that rose 3 KM and ejected incandescent tephra that landed 600 M away on the NE flank. Cloud cover again obscured summit views. Seismicity remained elevated.

The CENAPRED reported that during 15th – 21st May, seismicity at Popocatépetl indicated continuing gas-and-steam emissions that contained variable amounts of ash; the plumes were sometimes visually confirmed although cloud cover often prevented observations. Incandescence from the crater was often observed at night.

At 09:56 on 14th May an explosion generated an ash plume that rose 3 KM above the crater and drifted NE, and ejected tephra onto the NE flank at a distance of 600 M. Volcanologists aboard an over flight observed a lava dome 350 M in diameter and 50 M thick, that had slightly deflated after the earlier explosion. An explosion at 01:46 on 15th May again generated an ash plume that rose 3 KM above the crater, and ejected incandescent tephra onto the flanks at a maximum distance of 1.5 KM. At 18:04 an explosion produced an ash plume that rose at least 3.5 KM and drifted N.

On 16th May gas-and-ash plumes rose 2 KM and drifted NE. Minor ashfall was reported in Paso de Cortés, 7 KM N. Incandescent tephra was ejected onto the N and NE flanks at a maximum distance of 400 M. The ejections corresponded with several periods of high-frequency, low-amplitude tremor detected between 20:20 and 23:08, and a swarm that began at 00:11 on 17th May. At 22:14 an intense explosion ejected incandescent tephra 1.5 KM from the crater, and generated an ash plume that rose over 3 KM and drifted NE.

At 00:28 on 17th May another strong explosion ejected incandescent tephra 1.5 KM from the crater, and generated an ash plume that rose over 4 KM and drifted NE. Later that day plumes of vapour and gas rose 1 KM and drifted SW. During an overflight on 18th May volcanologists observed a crater 200 M wide and 40 M deep in the dome's surface; the material was likely excavated by the explosions during 14th and 16th – 17th May. The rest of the dome

was covered with rock fragments. Gas-and-ash plumes rose 500 M and drifted SW.

During 19th – 20th May gas-and-ash plumes drifted E and SW and incandescent tephra was deposited mainly on the NE flanks 400 M away, although most ejected fragments fell back inside the crater. On 21st May steam-and-gas plumes rose a few meters then drifted SSE.

The CENAPRED reported that during 22nd – 28th May seismicity at Popocatépetl indicated continuing gas-and-steam emissions that contained variable amounts of ash; cloud cover occasionally prevented observations, especially during 26th – 27th May. Incandescence from the crater was often observed at night.

On 22nd May an ash plume rose 2 KM above the crater and drifted NE. Periods of tremor were accompanied by emissions of steam, gas, and sometimes ash. Two plumes rose 1.3 KM and drifted W. Overnight incandescent tephra was ejected 300 M above the crater and rolled down the flanks. Tremor amplitude increased on 23rd May, and ash emissions drifted SE, S, and SW. An explosion at 02:54 ejected large fragments that landed 1.5 KM away from the crater. At 12:40 an explosion generated a gas-and-ash plume that rose 2.5 KM. Later that day tremor decreased; periods of tremor continued to be detected through 27th May, accompanied by emissions of steam, gas and variable amounts of ash that rose 500 – 900 M and drifted SW.

On 25th May incandescent tephra were ejected onto the highest parts of the N and NE flanks, and a gas-and-ash plume rose 2 KM. An explosion at 05:47 ejected incandescent tephra 1.5 KM onto the NNE flank. An explosion at 10:40 on 26th May generated an ash plume that rose 2 KM. A small explosion was detected at 12:28. On 28th May an explosion at 05:03 produced an ash plume that rose more than 2 KM and drifted SW, and ejected incandescent tephra 1.5 KM onto the NE flank.

NAME: Santa Maria

LOCATION: Guatemala

HEIGHT: 3772 M

TYPE: Stratovolcano

COORDINATES: 14.756°N 91.552°W

The INSIVUMEH reported that on 23rd April two explosions were accompanied by white plumes that rose 800 M above Santa María's Santiaguito lava-dome complex and drifted SW. The next day

explosions produced ash plumes that rose 600 M and drifted SSW. Avalanches were generated by active lava flows on the SW flank. Explosions were heard on 25th April but cloud cover prevented visual confirmation.

On 28th April a small explosion generated a white plume that rose 500 M and drifted NE. Explosions on 29th April produced ash plumes that rose 800 M and drifted SE, causing ash fall in San Jose, La Quina, and areas near Calahuache.

The INSIVUMEH reported that on 16th May an explosion from Santa María's Santiaguito lava-dome complex produced an ash plume that rose 600 M and drifted 6 KM SE. Ashfall was reported in La Florida and Monte Claro. A lava flow on the NE lava dome travelled S. During 20th – 21st May a few explosions generated ash plumes that rose 500 – 700 M and drifted 10 KM W and SW.



Above; Explosion from Santa María's Santiaguito lava dome complex on May 1.

NAME: Fuego

LOCATION: Guatemala

HEIGHT: 3763 M

TYPE: Stratovolcano

COORDINATES: 14.473°N 90.880°W

The INSIVUMEH reported that during 23rd – 26th April, explosions from Fuego generated ash plumes that rose 250 – 600 M above the crater and drifted at most 10 KM W, SW, S, and SE. Incandescent material was ejected 100 – 200 M above the crater. In a special bulletin on 25th April INSIVUMEH noted that the energy of the explosions had increased, producing rumblings and shock waves that vibrated structures in Panimaché, Morelia, and Sangre de Cristo, as far as 10 KM S and SW. A 300-M-long lava flow was active on the S flank in the Trinidad drainage. On 26th April a lava flow in the Taniluya drainage (SW) travelled as far as 400 M. On 28th April activity again increased and 700-M-long lava flows were active in the Taniluya and Ceniza drainages. Incandescent block avalanches reached vegetated areas. Cloud cover prevented observations of the crater. On 29th April explosions

generated ash plumes that rose 550 M above the crater and drifted 10 KM SSW. Lava flows remained active.

The INSIVUMEH reported that during 16th – 17th May white plumes rose 300 M from Fuego's crater and drifted W and SW. Explosions during 17th and 19th – 21st May generated ash plumes that rose 350 – 650 M and drifted 6 KM W and SW. On 19th and 21st May explosions ejected incandescent material 100 M above the crater.

NAME: Pacaya

LOCATION: Guatemala

HEIGHT: 2552 M

TYPE: Complex Volcano

COORDINATES: 14.381°N 90.601°W

The INSIVUMEH reported that on 23rd April fumarolic plumes from Pacaya's MacKenney cone rose 100 M and drifted N. On 24th April tephra was ejected 25 M high by weak explosions.

Incandescence from the crater was observed through the night, and explosions were detected the next day. Incandescence and explosions were again detected on 29th April.

The INSIVUMEH reported that weak incandescence from Pacaya's MacKenney cone was observed through the night during 15th – 16th May. Blue and white plumes rose 800 M and drifted S.

On 17th May white plumes drifted W and NW. Incandescence from the crater was again observed at night during 19th – 21st May. On 20th and 21st May, Strombolian activity ejected material 25 M above the crater.

The INSIVUMEH reported that during 22nd – 23rd May, weak Strombolian activity at Pacaya's MacKenney cone was detected by the seismic network. On 24th May white plumes rose 600 M and drifted S. In a special bulletin on 25th May, INSIVUMEH noted that the eruptive pattern had changed during the previous few days. Explosions were more continuous and energetic, and were detected 3-5 minutes apart. Explosions ejected bombs and generated rumbles heard 4 km away.

Cloud cover mostly prevented views on 27th May, but blue gas plumes were observed. Occasional weak glow from the crater was observed on 28th May.

NAME: Galeras

LOCATION: Colombia

HEIGHT: 4276 M

TYPE: Complex Volcano

COORDINATES: 1.22°N 77.37°W

The INGEOMINAS reported that during 15th – 21st May seismicity at Galeras was at a low level; during 19th -20th May earthquakes with magnitudes 2.6 or less were concentrated in an area 3 KM SW at depths near 4 KM. Gas plumes rose 500 M above the crater and contained small amounts of ash during 15th – 16th and 20th – 21st May. Sulfur dioxide emissions were low.

NAME: Reventador

LOCATION: Ecuador

HEIGHT: 3562 M

TYPE: Stratovolcano

COORDINATES: 0.077°S 77.656°W

IG reported that on 1st May seismicity at Reventador was elevated, and an ash plume rose to an altitude of 7 KM a.s.l. A thermal anomaly was visible in satellite images. On 2nd May ash was not identified in images and seismicity decreased.

The IG reported that during the morning of 8th May incandescence from Reventador's crater was observed in addition to steam-and-ash plumes that rose 1 KM above the crater and drifted NW. Cloud cover prevented observations the rest of the day and most of the time during 9th – 14th May. At 17:00 on 10th May a steam plume with low ash content rose 1 KM above the crater, and on 11th May a vapour plume rose 500 M and drifted SW.

NAME: Tungurahua

LOCATION: Ecuador

HEIGHT: 5023 M

TYPE: Stratovolcano

COORDINATES: 1.467°S 78.442°W

The IG reported that during 24th – 26th April, activity at Tungurahua was low. On 27th April seismic activity increased; an ash plume rose 2 KM above the crater and drifted NW, causing ash fall in Juive (7 KM NNW). During the morning on 28th April steam-and-ash plumes rose 1 – 4 KM and drifted at least 100KM SW and W. Later that day several explosions produced ash plumes that rose as high as 3.5 KM and drifted W. Ash fall was reported in Baños (8 KM N), Chacauco (NW), Bilbao (8 KM W), Cusúa (8 KM NW), Juive, Pondoá (8 KM N), and Pillate (8 KM W). At 18:30 a steam-and-ash

plume rose 5 KM, and drifted SW and then W. Another explosion ejected incandescent blocks that fell on the flanks 400 M below the crater. During breaks in cloud cover on 29th April dark grey emissions were observed drifting ESE. Ash fall was reported in El Manzano (8 KM SW), Cahuají (8 KM SW), Puela (8 KM SW), Penipe (15 KM SW), and Riobamba (30 KM S). An explosion caused structures to vibrate. On 30th April explosions produced ash plumes that rose 1.5 – 2 KM and drifted WSW.

The IG reported that although cloud cover often prevented observations of Tungurahua during 1st – 7th May, ash plumes were observed almost daily. Seismicity remained at a moderate level, although it increased on 4th May.

On 1st May an explosion and rolling blocks were heard, and ash fall was reported in El Manzano (8 KM SW). The next day steam-and-ash plumes rose 1 – 1.5 KM above the crater and drifted W. Ash fall was reported in Cevallos (23 KM NW), Tisaleo (29 KM NW), Quero (20 KM NW), and Mocha (25 KM WNW). During 2nd – 4th May Strombolian activity was observed at night. On 3rd May several explosions produced ash plumes that rose 2 – 3 KM above the crater and drifted N and NW. Ash fell in Juive (7 KM NNW), Runtún (6 KM NNE), Pondoá (8 KM N), Baños (8 KM N), Patate (NW), Pelileo (8 KM N), Ambato (31 KM NW), Cevallos, and at the Tungurahua Observatory (OVT) in Guadalupe (14 KM N). On 4th May explosions rattled windows in Baños, and ash plumes rose 1 – 1.5 KM and drifted N and NW. Large lahars travelled down the La Pampa drainage on the S flank, while other lahars travelled down the Vazcún, Juive, and Mandur drainages on the N and NW flanks. Explosions on 5th May rattled windows in Ventanas, Pondoá, and Runtún. An ash plume rose 2 KM and drifted W. Ash fall was again reported in Cevallos, Tisaleo, Quero, and Mocha. A pyroclastic flow descended the NW flank 2 KM. On 6th May ash plumes drifted SW and ash fall was reported in Cevallos, Tisaleo, Quero, Mocha, Pillate (8 KM W), Choglontus (SW), and El Manzano. The next day ash plumes rose 3 KM and drifted SW. Ash fall was reported in Sabañag (15 KM WNW), Chazo, Ilapo, and Riobamba (30 KM S).

The IG reported that although cloud cover often prevented observations of Tungurahua during 8th – 14th May, ash plumes were observed almost daily. Seismicity remained at a moderate level. Explosions occasionally vibrated structures nearby and at the

Tungurahua Observatory (OVT) in Guadalupe (14 KM N). Strombolian activity was observed on most nights ejecting blocks sometimes 500 M above the crater; blocks that fell onto the flanks rolled as far as 1 KM. During 9th – 10th May lava fountains rose 700 M above the crater. During 8th – 11th May ash plumes rose 1 – 2.5 KM and drifted SW, W, and NW, producing ash fall in El Manzano (8 KM SW), Choglontus (SW), Quero (20 KM NW), Mocha (25 KM WNW), Pillate (8 KM W), Tisaleo (29 KM NW), and Penipe on 8th and 10th May, and in Santa Fe de Galán, Mocha, Sabañag (15 KM WNW), Tisaleo, and Quero (20 KM NW) on 11th May.

Ashfall was reported in Quero on 12th May. The next day explosions generated ash plumes that rose 2 – 3 KM and drifted NW and W, producing ashfall in El Manzano. Roaring and sounds resembling rolling blocks were reported. On 14th May ash fell in Choglontus, El Manzano, and Mocha.

The IG reported that during 15th – 20th May seismicity at Tungurahua remained at a moderate level and then decreased on 21st May. Visual observations were often limited due to cloud cover; steam plumes were observed rising from the crater on 17th and 19th May. A slight amount of ash fell in Choglontus (SW) on 15th May, and small lahars travelled down the Bilbao (W), Pingullo (NW), and La Pampa (S) on 20th May.

NAME: Sangay

LOCATION: Ecuador

HEIGHT: 5230 M

TYPE: Stratovolcano

COORDINATES: 2.002°S 78.341°W

The Washington VAAC reported that on 26th April two brief ash emissions from Sangay drifted SW and dissipated within 20 KM. A thermal anomaly was visible in infrared satellite images.

The Washington VAAC reported that on 23rd May an ash plume from Sangay drifted W at an altitude of 7.6 KM a.s.l. Weather clouds prevented satellite image views of the plume.

NAME: Copahue

LOCATION: Chile/Argentina Border

HEIGHT: 2997 M

TYPE: Stratovolcano

COORDINATES: 37.85°S 71.17°W

The OVDAS-SERNAGEOMIN raised the Alert Level for Copahue on 7th May, from GREEN to YELLOW after small new explosions were noted from the volcano. Incandescence was seen at night. A

steady steam and gas plume containing ash was seen rising 350 M above the crater.

The OVDAS-SERNAGEOMIN reported that a gradual increase of seismicity at Copahue had been detected since 15th May. A camera recorded periodic small explosions and corresponding ash emissions, along with nighttime incandescence. On 19th May satellite images detected increased sulfur dioxide emissions, which produced a plume that rose 300 M above the crater and drifted SE.

Images from 20th and 22nd May showed large plumes drifting 100 KM SE that appeared translucent grey, suggesting a significant presence of volcanic gases. On 23rd May the Alert Level was raised to ORANGE.

On 24th May cameras recorded white plumes that mostly rose 250 – 400 M; at 19:00 a plume rose 1.9 KM, and another drifted NE. Seismicity increased sharply during 24th – 25th May. The seismic network detected 8,556 low-magnitude earthquakes with an average of 356 events per hour, and a gap of a few seconds between events.

Seismicity increased again during 25th – 26th May, with an average of 455 events per hour, and then decreased to 269 events per hour during 26th – 27th May. An explosion on 26th May generated crater incandescence and a plume that rose 400 M. Weather conditions often prevented views during 25th – 27th May.

On 27th May OVDAS-SERNAGEOMIN noted that the intensity and type of seismicity observed in recent days, in conjunction with the deformation data, suggested the rise of a magmatic body to shallow depths. The Alert Level was raised to RED. According to ONEMI, the government ordered a precautionary evacuation of the 2,440 people living within a radius of 25 KM. During 27th – 28th May seismic signals were detected at an average rate of 130 events per hour. Cloud cover prevented visual observations. ONEMI noted that 44 people had evacuated by 28th May.

All volcano reports in this issue are subject to change. All reports in this issue were from the following sources.

Global Reports:

Activolcans: <http://activolcans.info/>

VolcanoDiscovery:

<http://www.volcanodiscovery.com/news.html>

Global Volcanism Program (Weekly Reports):

<http://www.volcano.si.edu/reports/usgs/>

Volcanolive - John Seach:

<http://www.volcanolive.com/index.html>

And Also the writers and commenters of Eruptions and VolcanoCafe.

Also Including:

CVGHM (See Acronyms and Abbreviations):

<http://www.vsi.esdm.go.id/>

Acronyms and Abbreviations

a.s.l - Above Sea Level

AVO - Alaska Volcano Observatory

CENAPRED - Centro Nacional de Prevencion de Desastres

CVGHM - Center of Volcanology and Geological Hazard Mitigation

HVO - Hawaii Volcano Observatory

IG - Instituto Geofisico

INSIVUMEH - Instituto Nacional de Sismologia, Vulcanologia, Meteorologia e Hidrologia

INGEMMET - Instituto Geológico Minero y Metalúrgico

JMA - Japanese Meteorological Agency

KVERT - Kamchatkan Volcanic Eruption Response Team

MODIS - Moderate Resolution Imaging
Spectroradiometer

PHIVOLCS - Philippine Institute of Volcanology
and Seismology

RVO - Rabaul Volcano Observatory

SERNAGEOMIN - Servicio Nacional de
Geología y Minería

SVERT - Sakhalin Volcanic Eruption Response
Team

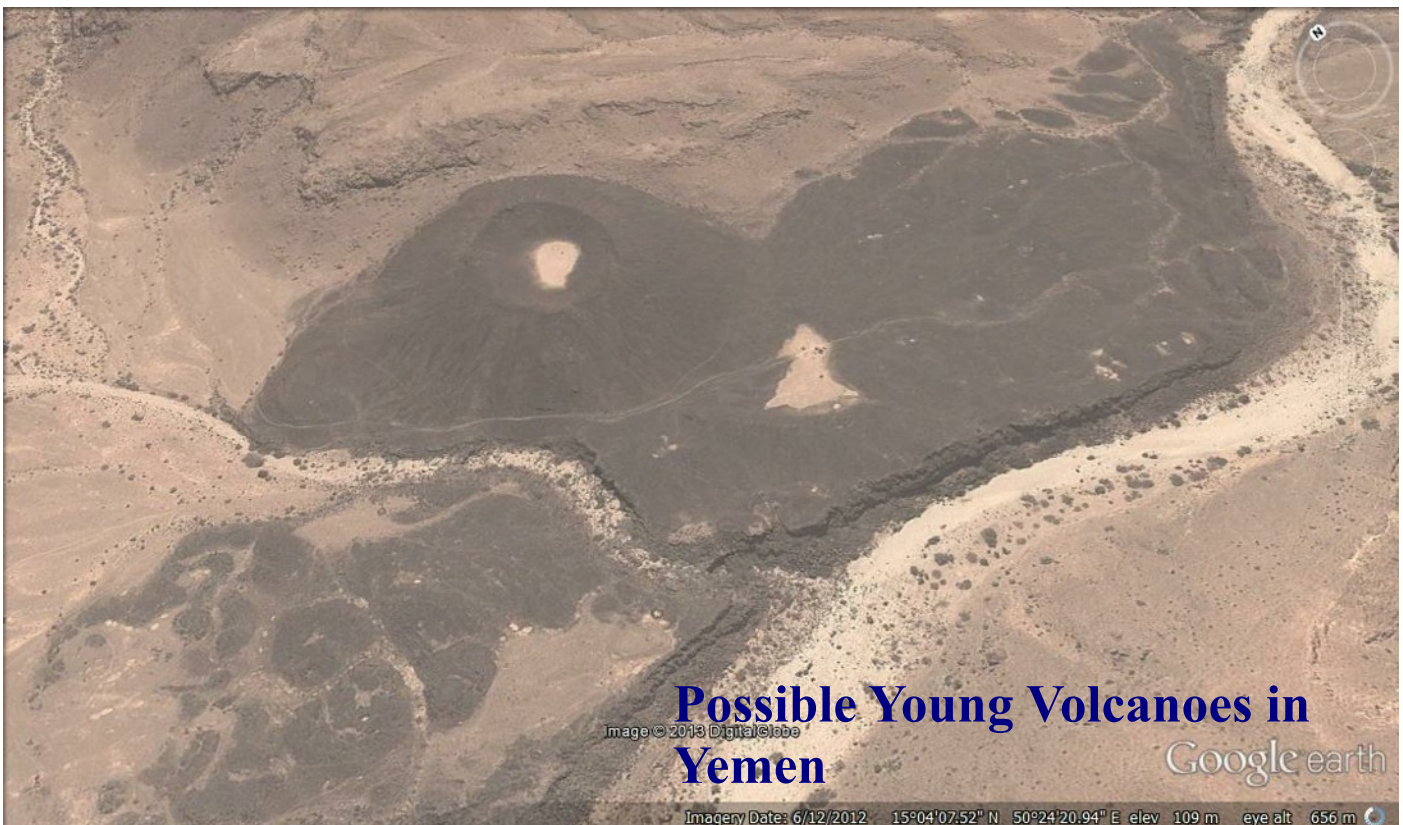
VAAC - Volcanic Ash Advisory Centre

The Latest in Volcanoes and Volcanic Eruptions

A Bulletin of World Volcanism magazine

www.volcanismbulletin.org

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Arabian volcanism is one of the poorest known areas of volcanic activity. It forms around the Arabian Shield, a piece of plate that has been uplifted by an underlying hot spot.

They mark the opening of a new rift which may, one day, become a new sea.

Volcanism in the area creates massive volcanic fields and shield volcanoes, the fields are long lived and some have activity dating back to the Pliocene and have continued active to the present, the last eruption being in 1937, near the town of Dhamar in Yemen.

Continued on page 19

Also in this Issue:

Historic Volcanic Activity in the Bering Sea

Key Figures in Volcanology: George Walker

And an earthquake swarm in 2009 at a volcanic field in Saudi Arabia is interpreted to be a stalled or failed eruption.

The fields form a line stretching from Turkey to Yemen. When the line of fields meets the Gulf of Aden (a body of water between Yemen and the African country of Somalia) the fields make a right turn and run along the coast of the Gulf.

Now far from the volumous fields of Saudi Arabia, as the fields run further and further along the coast of Yemen, the outpourings become less and less. It is possible this is because they are further away from the hot spot mentioned above that drives the volcanism.

Most of these 'minor' fields are found along the coast. But some are found in the remote highlands of Yemen and form a second line of volcanoes that run parallel to the coastal ones across Yemen.

These small fields are discussed here. Many of them are single cinder cones with associated lava fields.

These small volcanoes have probably not been mentioned in written literature before. So a brief account of their geology is given. The volcanoes have been organised east to west. Many other volcanoes in the same region are not mentioned.

Yemen Volcano 1

YV1 is one of the tiniest centres in the region. It is a ~ 60 M high pyroclastic cone (although it lies 310 M above sea level) that is breached to the SE. It sits in a 1 km wide V shaped valley, with part of the cone attached to the side of the N part of the valley.

A small lava flow travelled down the valley to another, much larger valley, with its length being about 1 km.

The 0.20 X 0.30 crater is wide and flat.

The volcano lies about 26 km from the coast. Because of the preserving conditions of a desert environment, a basic date for the volcano can't be obtained on purely morphological grounds. But a date around the Pleistocene for the cone seems reasonable.

Yemen Volcano 2

Around 8 km from YV1 lies YV2. It lies near the top of an unnamed non-volcanic mountain in an erosional valley. Above its basement height of around 370 m the volcano is just ~ 20 m high. Because of its position, its lava flow was able to travel much further, around 2 km from the vent. For reasons explained above, an absolute date is not possible, but the cone is very well preserved and may be Holocene in age.

Yemen Volcano 3

Of all the volcanoes mentioned here, YV3 is the closest to the sea (about 8 km away) . It forms a steep pyroclastic cone around ~ 100 M high with a small 0.1 X 0.1 km circular crater. It lies in a large river valley, with a small lava field that extends east of the cone. The cone may be Pleistocene - Holocene in age.

Yemen Volcano 4

Located 46 km inland, YV4 is a flat topped pyroclastic cone about 20 m high with a small lava field filling a valley to the W and a lava flow travelling over 1 km from the breached cone to the east. The volcano is one of few in the area to have what appears to be erosional gullies, so the volcano is probably Pleistocene.

Yemen Volcano 5

Formed on the slope of an eroded non-volcanic mountain, YV5 consists of a single, large pyroclastic cone, around ~ 60 m high above its basement. The volcano has a 0.20 X 0.20 elongate crater that has a minor breach to the south that sent two lava flows down the side of the valley. Another, much larger lava field is

present to the NE.

An interesting feature of the volcano is that the crater lies in a horseshoe shaped older crater, probably from an earlier phase of activity. The volcano lies over 40 km from the coast.

The volcano looks very fresh and may be Holocene in age.

Yemen Volcano 6

YV6 is the largest volcano mentioned, it consists of a triple-cratered cone located on a elevated volcanic plateau overlooking a river in a narrow V shaped valley. It is the largest volcano mentioned here and is located 8 km north from YV5 and nearly 50 km away from the Gulf of Aden.

The volcano rises perhaps 100 m high above its basement. Two lava fields extend over 1 km NE and NW from the cone.

The volcano is probably late Pleistocene in age.

Yemen Volcano 7

YV7 is tectonically significant, as it is the easternmost volcano in the country of Yemen. There is no known volcanism E of this volcano.

The volcano is located at the top of a non-volcanic mountain and is around ~ 55 km from the sea. The top of the cone reaches a height of around ~ 790 m, but the cone is only 60 m high. It has a 0.1 X 0.2 km wide crater which is breached to the west. The breach sent a lava flow down the slope of the non-volcanic mountain, but it is split into 2 by a piece of the mountain. The north flow travels around 60 m from the cone, where it ends at a small river valley. The west flow travels nearly 2 km from the cone, where it meets a large river valley. A tiny flow travelled east of the cone, but it is only ~ 20 m long.

The west flow travels nearly 2 km from the cone, where it meets a large river valley. A tiny flow travelled east of the cone, but it is only ~ 20 m long.

The volcano has a few erosional gullies, and is probably late Pleistocene in age.

Photos of the Volcanoes



Yemen Volcano 1.



Yemen Volcano 2.



Yemen Volcano 3



Yemen Volcano 4



Yemen Volcano 5



Yemen Volcano 6



Yemen Volcano 7

Historic Volcanic Activity In the Bering Sea

Much of the well known Alaskan Volcanism is those that form the Alaskan segment of the ring of fire. But very little is known of the tensional intraplate volcanism north of the Pacific plate in the Alaskan wilderness and the Bering sea between America and Russia.

Many of the volcanoes are poorly studied and the knowledge of their eruptive histories is virtually unknown.

Generally in sparsely populated lands the only known volcanism is those that have been seen by observers and native legends on the islands of the Bering Sea.

There are a few accounts in literature which may be down to volcanic activity. The following accounts should be seen as updates to the Catalog of the Active Volcanoes of the World and therefore follow the CAVW format.

Name: St. Paul Island

Synonyms: None

Type: Subaerial Monogenetic Volcanic Field

Location: Bering Sea in the Pribilof Island Group

Latitude, Longitude: 57.180° N -170.300° W

Elevation: 203 m

CAVW Number: 1104-01

Form and Structure

Sr. Paul is the emergent top of a lava shield built up out of many monogenetic eruptions and is the largest of the Pribilof island group. It is made up of many cones consisting of a central pyroclastic cone



Above; Map of the active volcanoes in Alaska

surrounded by a pahoehoe lava flow field.

The cones have heights ranging from 30 - 100 M high.

On average an eruption occurs at St. Paul every 5000 years and records on the island of volcanic activity go back to the Miocene.

Volcanic Activity

Winer et.al, (2004) reported that possible offshore eruptive activity was noted several km south of St. Paul island in the winter of 1943, although there is no physical evidence of the eruption.

Name: St. George

Synonyms: None

Type: Subaerial Monogenetic Volcanic Field

Location: Bering Sea in the Pribilof Island Group

Latitude, Longitude: 56.57° N -169.63° W

Elevation: 289 m

CAVW Number: 1104-11

Form and Structure

The second largest of the Pribilof island group, St. George is a mostly Pliocene-Pleistocene volcanic field. The interior of the

island is made up of eroded remnants of pyroclastic cones and maars. St. George is composed of alkali olivine basalt.

Volcanic Activity

Jagger (1931) reported that in 1815 a submarine eruption was recorded NE of St. George island, in the area where the submarine eruption is reported is a small series of circular shoals (probably the remnants of surtseyan eruptions). The shoals were reported to have a depth of 3 to 8 fathoms (about 5.4 to 14.6 metres) in depth.

Name: Unnamed Submarine volcano num.1

Synonyms: None

Type: Submarine Volcano?

Location: Bering Sea, north of the Pribilof Island Group

Latitude, Longitude: Unknown

Depth: 100 m?

CAVW Number: 1104-12

Form and Structure

Unknown. Depth of around 100 m as it lies on a low submarine plateau that surrounds the Pribilof islands.

Volcanic Activity

Jagger (1931) reports that flames have said to have been seen rising NE of the Pribilof Islands. Since the historical record of the region is only around 300 years, if a submarine vent exists in the reported area, it implies a recent eruption.

Most of these accounts are probably false reports. Although one (NE of St. George) may represent a submarine eruption as there is physical evidence to back up the report.

References:

Jagger T A, 1931d. St. Paul Island in the Pribilof Group *in* Fiske RS, Simkin T, EA Nielsen (eds.), 1987. The Volcano Letter.

Winer G S, Feeley T C, Cosca M A, 2004. Basaltic volcanism in the Bering Sea: geochronology and volcanic evolution of St. Paul Island, Pribilof Islands, Alaska. *J Volc Geotherm Res*, 134: 277-301

Wood C A, Kienle J (eds), 1990. *Volcanoes of North America*. Cambridge, England: Cambridge Univ Press, 354 p

Key Figures in Volcanology: George Walker

George Walker (born 1926, died 2005) was one of the best and most highly revered volcanologists of his time, so much so he received a medal from the Icelandic Government that is an equivalent to a knighthood in England.

Early Life

Brought up in London during World War 2, George as a teenager realised he knew nothing about Botany or Geology, and bought a book on both subjects. He became captivated by the latter.

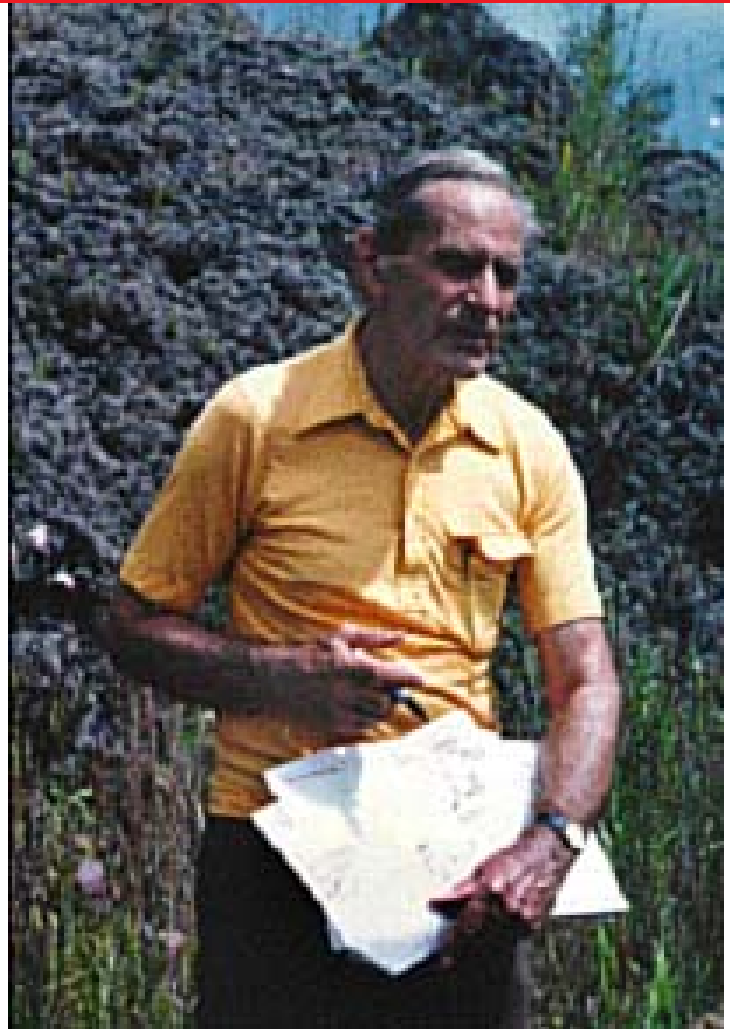
He then studied for a Bachelors degree in Geology in 1948 and a Masters degree in 1949 at Queens University, Belfast, Northern Island.

Initially he was interested in Mineralogy and his first assignment (at Leeds University, where he completed his Ph.D. in 1956) was studying amygdale filling minerals (basically minerals that fill gas bubbles in volcanic rocks) in old volcanic rocks on the Antrim Plateau, Northern Island.

Interest in Volcanology

When studying the Antrim Plateau, he easily discovered types of rock and what time they were buried under others. He then used these observations to reconstruct the old volcanoes of Northern Ireland and Scotland.

He then moved his attention to the eastern part of the volcanically active country of Iceland. Where he mapped large basalt lava flows and used the method of 'zeolite zonation' (distribution of zeolite minerals which tell people a lot about crust deformation over long periods of time) to provide geological evidence to the proposed theory of Plate Tectonics.



Above; George Walker

Focus on Younger Volcanism

In 1963 he got the opportunity to see the eruption on the new island of Surtsey and his focus moved to the more younger spectrum of volcanism.

Throughout the 1970's he studied many young volcanic areas. One of his most important works was the criteria for classification of pyroclastic deposits from volcanoes, as well as different eruption styles, which are still used today. Two of his students at this time of his life were Steve Self and Steve Sparks, who are both highly praised volcanologists today.

In 1970's he was fed up of UK science scene and in 1977 took the opportunity to move to New Zealand when he was awarded a forth James Cook medal and in 1978 he sold his place at Imperial College, London and moved with his family to Auckland, New Zealand.

With the move came a chance to study the volcanic areas of New Zealand's North Island.

He moved his attention to the Taupo Volcanic Zone and studied the major volcanic eruptions at the Okataina and Taupo volcanoes (mostly using deposits).

He became particularly interested in Taupo caldera (largely filled by Lake Taupo) and using ash fall deposits found evidence of major volcanic eruptions in the area, included the worlds youngest VEI 8 eruption.

He then went to study the products of an unusual historic volcanic eruption in New Zealand, the 1886 eruption of Okataina. It was unusual because unlike most plinian (highly explosive) eruptions, it was a basaltic explosive eruption, which are not common.

Move to Hawaii

He then moved to Hawaii to become the head of volcanology. There he studied the active lavas of Kilauea volcano and discovered of how the inflation of active lavas help their emplacement. He also studied the large caldera volcano of Toba, Indonesia where he established the vent areas of its 3 climatic eruptions.

He held he post at Hawaii until his retirement in 1996.

In nearly 50 years of work he had established many theory's and made some very important discoveries. And he was alos an excellent teacher who inspired many geologists. He will always be remembered as the man who turned Volcanology into a quantitative science.

In 2009, a book comemrating his life was released by the IAVCEI, a review of the book will appear in the next issue.

Website of the Month

Aster Volcano Archive (AVA)

The Aster Volcano Archive is a very simple idea: high quality satellite images of volcanoes around the world. Every single volcano in the Global Volcanism Program's website is available.

As a regular user of Google Earth for satellite imagery of volcanoes, I'm often disappointed when the image is cloudy and sometimes a decade old (enough time for a volcano's landscape to change considerably). With the AVA, the photos are updated regularly and at least one of the photographs is clear. It is well worth a look.

<http://ava.jpl.nasa.gov/index.php>