Lessons learned from North Pacific Volcanoes: AVO, KVERT and SVERT

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Alaska Volcano Observatory - AVO

http://avo.alaska.edu/

• Joint Program
  – United States Geological Survey (USGS)
  – Geophysical Institute of the University of Alaska Fairbanks (UAFGI)
  – State of Alaska Division of Geological & Geophysical Surveys (ADGGS)

• Formed in 1988

• Three primary components:
  – Geophysics/Geology/Remote Sensing
Kamchatka Volcanic Eruption Response Team - KVERT

- Established 1993

- IVS FEB RAS, KBGS along with AVO

- Uses webcam, seismic and satellite remote sensing data

- Responsible for N. Kuriles since 1998

- 700+ information statements

Sakhalin Volcanic Eruption Response Team - SVERT

• Established in 2004

• Share timely data on active volcanoes in the Kurile chain

• Satellite and seismic data used for monitoring

• Issues daily and weekly summaries as well as VONAs

http://www.avd.alaska.edu/activity/svert.php
The communications pathways - Alaska
NOPAC VAAC’s
VO – VAAC - MWO

• Alaska
  – AVO → Tokyo, Anchorage, Montreal, Washington VAACs
  – AVO → MWO (Anchorage office of NWS)
• Kamchatka
  – KVERT → AVO, Tokyo, Anchorage, Washington VAACs
  – KVERT → MWO (this is Yelizovo Airport Met. Center)
• Sakhalin
  – SVERT → AVO, KVERT, Tokyo, Anchorage, Washington VAACs
  – SVERT → MWO and ATCC in Sakhalin
VOLCANO OBSERVATORY NOTICE FOR AVIATION (VONA)

Issued: 20130308/1940Z
Volcano: Cleveland (CAVW# 1101-24-)
Current Color Code: YELLOW
Previous Color Code: orange
Source: Alaska Volcano Observatory
Notice Number: 2013/A4
Volcano Location: N 52 deg 49 min W 169 deg 56 min
Area: Aleutians Alaska
Summit Elevation: 5676 ft (1730 m)
Volcanic Activity Summary:
The summit lava dome extruded in late January 2013 has remained unchanged since the last color code change on February 6, 2013. Anomalous surface temperatures prevalent in late January through mid-February declined and the last thermal anomaly observed in satellite imagery was reported on February 26. Although satellite viewing conditions at Cleveland are typically cloudy, clear views between March 1 and 5 indicate no change has occurred in the summit dome and thermal anomalies no longer are present. Therefore, the Aviation Color Code and Volcano Alert Level for Cleveland is lowered to YELLOW/ADVISORY.

The last confirmed explosion at Cleveland occurred in November, 2012. The presence of a lava dome in the summit crater means that explosions of blocks and ash could occur with little or no warning. Ash clouds, if produced, could exceed 20,000 feet above sea level. If a large ash-producing event occurs, nearby seismic, infrasound, or volcanic lightning networks should alert AVO staff. However, for some events, a delay of several hours is possible. There is no real-time seismic monitoring network on Mount Cleveland and AVO is unable to track activity in real time.

Volcanic cloud height: Unknown
Other volcanic cloud information: Unknown

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Next Notice:
A new VONA will be issued if conditions change significantly or alert levels are modified. While a VONA is in effect, regular updates are posted at http://www.avochicago.edu

In Russia, KVERT, on behalf of the Institute of Volcanology and Seismology (IVS) FED RAS, is responsible for providing information on volcanic activity to international air navigation services for the airspace users.
VENIAMINOF VOLCANO
56°11'52" N 159° Current Volcano A Current Aviation Conditions

Seismic activity has been mostly elevated and a column of hot gas, steam, and ash was observed by clouds. Activity increased up to 100 km (62 mi) a.s.l. and was last reported on October 22. A plume extended to 100 km (62 mi) a.s.l. on October 22.

Pauses in activity were mostly observed in the past 3 days. Activity is variable and may continue to be elevated in the future.

Mount Veniaminof, south of Adak, has erupted 180 mi (280 km) and Strombolian activity occurred on October 20. Activity increased up to 100 km (62 mi) a.s.l. and was last reported on October 22. A plume extended to 100 km (62 mi) a.s.l. on October 22.

Satellite and web (pressure sensor)

OTHER ALASKA

Seismic activity is elevated 1

A second event of the volcanic activity occurred on October 20. Activity increased up to 100 km (62 mi) a.s.l. and was last reported on October 22. A plume extended to 100 km (62 mi) a.s.l. on October 22.

Move to the web for updates and more information.
Data and technologies

• Real-time data
  – Seismic
    • Not at all volcanoes, telemetry can be a problem
  – GPS
    • Campaign datasets as well as some continuous
  – Infrasound
    • Used in Alaska for remote volcanoes

Okmok volcano

OKNC station relative to AV09 base station
Veniaminof, Oct 30, 2013

Webcam from FAA

24 hrs RSAM

Web recorder – 24 hrs
Data and technologies

• Real-time data
  – Webcams
    • Used by all three organizations
  – Remote Sensing
    • Joint UAF-GI/USGS operational facilities, 1988 - 2013
    • Internalized to USGS – May 2013
Data and technologies

- Confirmation, confirmation, confirmation
- Cleveland Volcano, June 19 2012
  - Webcam at 22:30 UTC
  - Satellite at 23:32 UTC, but now detached
  - Nikolski broadband seismic station
    - Seismic & ground-coupled air wave
    - Air wave ~ about 200 s after the seismic wave.
    - The seismic wave gives an origin time of about 22:03:30 UTC
- VATD model showed 7 km ASL (used seismic/infrasound for start time)
Example events: Kliuchevskoi – October 2013

• KVERT sent VONA on Oct. 17 at 23:15 UTC
• Tokyo VAAC on Oct 17 at 20:18 UTC to FL330
• Tokyo again at 23:34 UTC

Volcanic Ash Advisory Text

FVFB01 RJTD 172018
VA ADVISORY
DTG: 20131017/2018Z
VAAC: TOKYO
VOLCANO: KLIUCHEVSKOI 1000-26
PSN: N5603 E1603
AREA: RUSSIA
SUMMIT ELEV: 4835M
ADVISORY NR: 2013/31
INFO SOURCE: MTSAT-2 KBOS
AVIATION COLOUR CODE: NIL
OBS VA CLD: VA NOT IDENTIFIABLE FM SATELLITE DATA WIND FL330 050/19KT
FCST VA CLD = 6 HR: NO VA EXP
FCST VA CLD = 12 HR: NO VA EXP
FCST VA CLD = 18 HR: NO VA EXP
RMK: WE WILL ISSUE FURTHER ADVISORY IF VA IS DETECTED IN SATELLITE IMAGERY. HEIGHT OF ASH ESTIMATED BY SEISMIC RECORD.
NXT ADVISORY: NO FURTHER ADVISORIES=

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Example events: Kliuchevskoi – October 2013

- Tokyo VAAC sends out VAA
  - Oct 18 at 05:58, 11:51, 18:00, 21:38, 23:59
  - Oct 19 at 00:54, 04:45, 06:03, 12:03 17:54, 23:51
  - Oct 20 at 05:58, 12:01, 18:00
  - Oct 21 at 00:00

- KVERT sent VONA
  - Oct 18 at 08:22, 06:07, 08:38, 21:57
  - Oct 19 at 00:31, 03:50, 23:48
  - Oct 20 at 21:40

- Anchorage VAAC sends out VAA
  - Oct 18 at 05:14, 12:55, 18:06, 21:55
  - Oct 19 at 02:20, 04:15, 10:15, 16:15, 21:34
  - Oct 20 at 03:36, 04:00, 09:15, 14:40, 19:45
  - Oct 21 at 00:19, 03:30, 09:20
Example events: Kliuchevskoi – October 2013
Anchorage VAAC

October 19, 2013 at 02:20 Z
Summary

- Communication is the key
- Collaborations outside events so focused when event occurs
- JKASP – brings together community in the region
- Web-based products so can be working together
- Collaborative research
  - Kamchatka/Katmai field school
  - Joint projects to do fieldwork
- Common reporting from VO’s → consistent data stream to VAAC’s