The Importance of Information from Volcano Observatories and Meteorological Watch Offices in preparation for the Volcanic Ash Advisory, Graphic and Forecast

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ICAO Seminar on Volcanic Ash Products and Communications for the NAM/CAR/SAM Regions
October 24-26, 2012
Washington VAAC: Officially designated by the International Civil Aviation Organization (ICAO) on November 1, 1997, is one of nine global centers to detect, track and advise air traffic on information regarding volcanic ash.
Washington VAAC Customers

- Other VAACs
- MWOs
- NWS/WFOs
- ACCs, FAA
- VAACs

Other U.S. government agencies including AWC, DoD (AFWA), FEMA, VOs

Abbreviations:

VAAC = Volcanic Ash Advisory Center
MWO = Meteorological Watch Office
NWS = National Weather Service
WFO = Weather Forecast Office
AWC = Aviation Weather Center
FAA = Federal Aviation Administration
DoD = Department of Defense
AFWA = Air Force Weather Agency
FEMA = Federal Emergency Management Agency
ACC = Area Control Center
VO = Volcano Observatory
The Cost and Danger of Volcanic Ash for the Aviation Industry

When a volcano erupts, it can spew volcanic ash tens of thousands of feet into the air, and into the flight path of airplanes. Volcanic ash is an aviation hazard since planes flying into volcanic ash suffer engine and other damage.

When even just one large plane flies into volcanic ash, the damage can be tens of millions of dollars. (For example, a Boeing 747 encountered ash from Mount Redoubt in Alaska and sustained $80 million in damage).*

In the past 15 years, the aviation industry has suffered $250 million in airplane damage due to planes flying into volcanic ash.

Besides the direct damage caused by the ash, there are indirect costs due to flight delays, displacement of the routes and inconvenience to passengers.

* Steenblik, J.W., 1990 *Air Line Pilot* June/July pp 9-15
Three products disseminated by the Washington VAAC

• The Volcanic Ash Advisory (VAA)

• The Volcanic Ash Graphic (VAG)

• The Hybrid Single Particle Lagrangian Integrated Trajectory Model (HYSPLIT)
The Volcanic Ash Advisory

FVXX20 KNES 291316
VA ADVISORY
DTG: 20120929/1316Z
VAAC: WASHINGTON
VOLCANO: FUEGO 1402-09
PSN: N1428 W09052
AREA: GUATEMALA
SUMMIT ELEV: 12346 FT (3763 M)
INFO SOURCE: GFS WINDS. INSIVUMEH. GOES-14
ERUPTION DETAILS: DISCREET PUFFS OF VA
OBS VA DTG: 29/1245Z
OBS VA CLD: SFC/FL160 N1428 W09106 - N1428 W09059 – N1423 W09058 - N1423 W09105 - N1428 W09106
FCST VA CLD +6HR: 29/1900Z SFC/FL160 NO ASH EXP
FCST VA CLD +12HR: 30/0100Z NO ASH EXP
FCST VA CLD +18HR: 30/0700Z NO ASH EXP
RMK: MORNING VISIBLE IMAGERY SHOWS DISCREET PUFFS OF VA MOVING W AND WSW FROM THE SUMMIT. INSIVUMEH REPORTS VA 500M TO 900M ABOVE SUMMIT WITH FINE ASHFALL. ...SCHWARTZ
NXT ADVISORY: WILL BE ISSUED BY 20120929/1915Z
Contribution from the Volcano Observatories for the Volcanic Ash Advisory and Graphic

- Time of the Eruption
- Height determination of ash plume
- Direction and speed of the ash plume
- Content of the plume (gases, water vapor, SO2, etc.)
- Additional information for the user in Remarks section
Washington Volcanic Ash Advisory Center

- The Hybrid Single Particle Lagrangian Integrated Trajectory Model (HYSPLIT)

Contribution from the Volcano Observatories for the HYSPLIT Forecast Run

- Duration of the eruption
- Height determination of ash plume
- Direction and speed of the ash plume
What is needed from the Volcano Observatories by the Washington VAAC

- Continuous updates of any change in activity. Daily reports (Special Reports) or possibly more than one report per day
- Weekly reports of volcanoes within an observatories region – even if no change. It’s good to know what is going on at all times
- Possible emails or phone calls on rapidly changing events during an eruption.
- Educated opinion of what the observatory thinks is going to happen based on past events
BOLETIN ESPECIAL VULCANOLOGICO

DEPARTAMENTO DE INVESTIGACION Y SERVICIOS GEOFISICOS
BOLETIN VULCANOLOGICO ESPECIAL BEVFO # 80  03-10-2012
Guatemala 03 de Octubre  2012, 14:45 horas (Hora Local)
VOLCÁN FUEGO (1402-09)

Tipo de actividad:  Vulcaniana  Morfología:  Estrato volcán compuesto
Localización geográfica:  14°28'54" Latitud N;  90°52'54" Longitud W.  Altura:  3,763msnm.

LAHAR BARRANCA CENIZA
El observatorio del volcán de Fuego reporta abundante precipitación pluvial en la parte alta del volcán, lo que origina en este momento corrientadas de lodo y escombros de origen volcánico LAHARES, por el río Ceniza caliente que acarrea con abundante material fino, bloques de diferentes tamaños, ramas y troncos de árboles. Estos lahares causaran daños en las vías de comunicación vial, principalmente a la carretera entre Siquinala y San Andrés Osuna.  Por otra parte la lluvia puede generar lahares por otros puntos como Las Lajas, El Jute y Pantaleón.

De acuerdo a la evolución de esta actividad INSIVUMEH recomienda:
A CONRED, Tomar las precauciones en la parte baja, principalmente en el paso vehicular entre Siquinala y San Andrés Osuna.
A la Dirección General de CAMINOS y COVIAL tomar en cuenta que la actividad volcánica de Fuego ha depositado abundante material volcánico dentro del cause de las barrancas Las Lajas, Ceniza y Pantaleón. Estos fenómenos laharicos se estarán generando en el trascurso de la temporada de lluvia y estas corrientadas pueden ocasionar daños a la red vial.
Good example of what is needed by the VAAC and the MWO September 8, 2012 eruption of San Cristobal

Nicaragüuense Terriotoriales Studies Institute (INETER)  
Directorate General of Geology and Geophysics  
Managua, September 8, 2012.

Bulletin #2 Volcano Volcano eruptive activity on San Cristobal. INETER reports that there have been three explosions accompanied by gas and ash in the San Cristóbal Volcano. To this day the observer INETER which lies at the foot of the volcano and fellow Civil Defense reported abundant emission Volcano, whose column reaches a maximum height of about 1500 meters above the crater rim. The wind speed is 9 km/hr in the direction from north to west in Chinandega. Affected communities are north of the volcano, the ash reached El Viejo, El Chonco, Villa and Rancheria July 15. More are expected emission and sporadic forms explosions. INETER is continuously monitoring the volcano's activity and report any important event.

Managua, September 8, 2012, 09:40 AM local time.

- Information received by the Washington VAAC
- VAA information later lead to a SIGMET Issued with same information
**New message for aviation being tested for ICAO by USGS**

*Volcano Observatory Notice for Aviation—VONA*

Customized format for aviation users. Issued by Volcano Observatory when significant volcanic activity occurs and/or when color code is changed (up or down). Sent by fax or email to ATC, VAAC, MWO, and airlines. More information at http://www.wovo.org/aviation-colour-codes.html/

| (1) | VOLCANO OBSERVATORY NOTICE FOR AVIATION (VONA) |
| (2) | Issued: |
| (3) | Volcano: |
| (4) | Current Aviation Color Code: |
| (5) | Previous Aviation Color Code: |
| (6) | Source: |
| (7) | Notice Number: |
| (8) | Volcano Location: |
| (9) | Area: |
| (10) | Summit Elevation: |
| (11) | Volcanic Activity Summary: **SIMPLE AND BRIEF** |
| (12) | Volcanic cloud height: |
| (13) | Other volcanic cloud information: |
| (14) | Remarks: |
| (15) | Contacts: |
| (16) | Next Notice: |
Contributions from the Meteorological Watch Office

- **Warning for eruption of Volcano and not delayed**
- Provides estimated height and direction of ash
- Provides possible ± 6 hour forecast of ash movement
- The ability to talk to the Volcano Observatory and other volcanic ash groups. Less language barriers and better updated information
What does the VAAC need from the MWO

• Most importantly we need the MWO to issue SIGMET for active volcanoes and in the correct format
• The VAAC needs for the MWO to have a better more communicative relationship with the Volcano Observatory and other groups within their region
• Working internet and email so that the MWO can receive the Washington VAAC advisories and Volcano reports from the Observatory.
• Most of All….Better Communication
What is needed from the Volcano Observatories by the MWO

- Information to be relayed to the MWO as soon as possible on initial eruption
- Continuous updates in order to make changes to the SIGMET
- Communication in order to get the best products out to the VAAC and the users.
**Examples of SIGMET from Guayaquil**

WVEQ31 SEGU 181946
SEGU SIGMET 01 VALID 181946/182246 SEGU-
GUAYAQUIL FIR VA TUNGURAHUA 1502-08 S01 28.00 W078
26.3
ACFT MPH068 SPIM/KMIA OBS AT 1940Z VA CLD FL165/280=

WVEQ31 SEGU 132039
SEGU SIGMET 09 VALID 132039/132339 SEGU-
GUAYAQUIL FIR VA TUNGURAHUA 1502-08 S01 28.00 W078
26.3
WASHINGTON VAAC OBS AT 1945Z VA CLD FL160/300 8NM
WID
BTN S0116 W078 46-S0128 W07827 MOV NW TO 10KT=

WVEQ31 SEGU 131745
SEGU SIGMET 07 VALID 131745/132045 SEGU-
GUAYAQUIL FIR VA TUNGURAHUA 1502-08 S01 28.00 W078
26.3
INST. GEOFISICO OBS AT 1715Z VA CLD FL165/300 MOV W=

**Examples of SIGMET from Tegucigalpa**

WVHO31 MHTG 202200
MHTG SIGMET A3 VALID 212330/210530 MHTG-
CENTROAMERICA FIR VA SANTA MARIA LOC N1444 W09134 VA
CLD OBS 161554Z ASH DISPERSED AT SW
SFC/FL100 MOV N 10KT NC=

WVHO31 MHTG 131745
MHTG SIGMET 07 VALID 131745/132045 MHTG-
CENTROAMERICA FIR VA SANTA MARIA LOC N1444 W09134 VA
CLD OBS 121801Z NOTAMR A0652/09 ASH DISPERSED AT W ACFT
EXER CTN RDO 05NW SFC/FL110 MOV S 05KT
Examples of SIGMET from PIARCO

WVCA31 TTPP 030200
TTZP SIGMET 1 VALID 030200/030800 TTPP-
SOUFRIERE HILLS MONTSERRAT N1642 W06210
PIARCO FIR OBS VA CLD SFC/FL080 20NM WID LINE BTN N1831 W06142
N1738 W06220 N1646 W06213 MOV N AT 10KT
FCST VA CLD +6HR....SFC/FL080 20NM WID LINE BTN N1817 W06311 N1646 W06216=

WVCA31 TTPP 281230
TTZP SIGMET 1 VALID 281230/281830 TTPP-
SOUFIRERE HILLS MONTSERRAT LOC N1642 W06210PIARCO FIR OBS VA CLD
OBS VA CLD: SFC/FL070 10NM WID LINE BTN N1727 W06301 - N1643 W06210. MOV NW 5-10KT
FCST VA CLD +6HR: 28/1800Z SFC/FL070 N1816 W06346 - N1656 W06210 - N1641 W06210 - N1634 W06243 –
N1725 W06343 - N1816 W06346
OTLK VA CLD +12HR: 29/0000Z SFC/FL070 25NM WID LINE BTN N1637 W06349 - N1643 W06212

WVCA31 TTPP 030800 TTZP
SIGMET 2 VALID 030800/031400 TTPP –
SOUFRIERE HILLS MONTSERRAT N1642 W06210 PIARCO FIR FCST VA CLD
SFC/FL080 20NM WID LINE BTN N1817/W06311 N1646/W06216...LTL CHNG=
Examples of SIGMET from Mexico City

WVMX31 MMEX 220229
MMEX SIGMET 1 VALID 220229/220829 MMMX-
MMEX MEXICO FIR/UIR/SRR VA POPOCATEPETL 01901.2N 09837.2W OBS AT 220212Z EXTD
10NM NE BTN FL1700 TO FL240 FM SUMMIT MOV NE 30KT WKN. OUTLK 220800
SEPARATED 180NM FM SUMMIT BTN FL160 FL250=

WVMX31 MMEX 281704
MMEX SIGMET 1 VALID 281704/282304 MMMX-
MMEX MEXICO FIR/UIR/SRR VA POPOCATEPETL 01901.2N 09837.2W OBS AT 281704Z VA
EXD 10MN BTN SFC FL150 MOV NE 20KT WKN. OUTLK 282300 NO VA EXPCTD=
Soufriere Hill Eruption: February 10, 2010
What Information do we need from the Soufriere Hill Eruption: From Observatories and MWO:

- We need eruption time: For the VAA and the Forecast model runs
- We need heights and ash speeds: For the VAA and Forecast model runs
- We need constant updates for the VAA

This Information provides better VAAC products for our users
Examples in the upcoming slides of confusing facts the Washington VAAC and our users may notice.
FVXX20 KNES 291316
VA ADVISORY
DTG: 20120929/1316Z
VAAC: WASHINGTON
VOLCANO: FUEGO 1402-09
PSN: N1428 W09052
AREA: GUATEMALA
SUMMIT ELEV: 12346 FT (3763 M)
ADVISORY NR: 2012/059
INFO SOURCE: GFS WINDS. INSIVUMEH. GOES-14
ERUPTION DETAILS: DISCREET PUFFS OF VA
OBS VA DTG: 29/1245Z
FCST VA CLD +6HR: 29/1900Z SFC/FL160 NO ASH EXP
FCST VA CLD +12HR: 30/0100Z NO ASH EXP
FCST VA CLD +18HR: 30/0700Z NO ASH EXP
RMK: MORNING VISIBLE IMAGERY SHOWS DISCREET PUFFS OF VA MOVING W AND WSW FROM THE SUMMIT.
INSIVUMEH REPORTS VA 500M TO 900M ABOVE SUMMIT WITH FINE ASHFALL. ...SCHWARTZ
NXT ADVISORY: WILL BE ISSUED BY 20120929/1915Z

Confusing information to the Washington VAAC and our users by the MWO.
WVEQ31 SEGU 201426
SEGU SIGMET A1 VALID 201426/201726 SEGU-
SEGU GUAYAQUIL FIR TUNGURAHUA 1502-08 S01 28.00 W078 26.3
ACFT AEE628 OBS AT 1416Z VA CLD FL220

• Needs an Outlook section and possible remarks

WVMX31 MMEX 282241
MMEX SIGMET 1 VALID 282231/290431
MMMX- MMEX MEXICO FIR/UIR/SRR VA POPOCATEPETL 01901.2N 09837.2W
OBS AT 282231Z VA CLD EXTDN 6MN NE BTN SFC/FL280 MOV NE 6KT WKN.
OUTLK AT 290430 UTC VA CLD DISSPTD.
What the VAAC needs both from the MWO and the Volcano Observatory in terms of administrative needs

- **Update phone and fax numbers** – numbers that go to the operational unit

- **Email** – operational and not the highest ranking official of the MWO and Observatory. Email is the cheapest way to transmit information.
Overall, the Washington VAAC has two main goals

1. Save lives through efficient and easy to read advisories, graphics and forecast
2. Save money for the airlines through better forecast for flight planning purposes

Two main things the Washington VAAC needs from the Observatory and MWO

1. Continuous updated reports from the Observatory and MWO
2. Better communication between all three groups along with updated phone, fax and email
Questions??

Thanks

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