

**HANDBOOK
ON THE
INTERNATIONAL AIRWAYS
VOLCANO WATCH (IAVW)**

**OPERATIONAL PROCEDURES
AND CONTACT LIST**

SECOND EDITION — 2004



*Approved by the Secretary General
and published under his authority*

INTERNATIONAL CIVIL AVIATION ORGANIZATION

DOCUMENT CHANGE RECORD ON THE WEB

Parts 1 to 4

DATE	SECTION PAGES AFFECTED
12.07.10	Part 2: Updated Wellington (New Zealand) area of responsibility text Replaced VAAC Map Part 4: New paragraph 4.3.3
8.07.10	Part 4: Replaced Appendix E with updated version Appendix F (new) was added
14.5.10	Part 2: Change to Toulouse VAAC area of responsibility
14.4.10	Part 4: VAAC Tokyo
26.11.09	Part 3: Amendment to the URL address for New Zealand VAAC
25.9.09	Part 3: Amendment to the URL address for Buenos Aires VAAC Part 4: URL address for the eruption source parameters for volcanoes of the world; and introduction of information regarding the availability of ESP
29.5.09	Part 4: Guidance regarding the transmission of information to aviation by selected State observatories Update regarding the distribution (addresses) of ASHTAM/NOTAM for VA.
14.5.09	Part 4: Introduction of new heading "4.7 Action to be taken by pilots in the event of entry into a SO ₂ cloud" and "Table A4-3 – Volcanic ash advisory bulletin headers"
12.3.09	Part 4: Update to Table 4-2. VAAC contact numbers
25.2.09	Parts 3 and 4: Amendment to the URL for Toulouse VAAC Part 4: Introduction of new sub-paragraphs 4.5.1 h) recommended practice for "gradual" advisory cessation and 4.6 on standard format of the VA advisories and VA SIGMET used for test purposes
15.12.08	Parts 3 and 4: New web page for VAAC Montreal
24.11.08	Part 4, pages 4-12 and 14: Update of VAAC Buenos Aires AFTN address
19.11.08	Part 2, page 2-10: Wellington Part 4, page 4-13: Indonesia
22.5.07	Part 4: Buenos Aires
5.11.07	Part 4: Buenos Aires
6.8.07	Part 2: Part 4: Introduction of changes resulting from the IAVWOPSG/3 Meeting Appendices:

DATE	SECTION PAGES AFFECTED
30.7.07	Part 4: Update of AFTN addresses to be used for sending air-reports, SIGMETs and volcanic ash advisories to London WAFC and SADIS
16.6.07	Part 4: Updated volcano level of alert colour code
14.11.06	Part 4: Introduction of relevant aspects of the Hyogo framework
9.6.06	Part 2: Editorials Part 3: Update of VAAC Tokyo homepage Part 4: Editorials
2.5.06	Part 4: VAAC Tokyo
24.4.06	Part 2: New format – inclusion of location indicators for MWOs and ACCs Part 4: Deletion of WMO abbreviated headers for ASHTAM and NOTAMs, introduction of Appendix C on back-up procedures and update to VAACs London and Wellington
31.1.06	Part 2: VAACs areas of responsibility
28.11.05	Part 5: Ecuador , Panama
1.11.05	Part 5: Argentina, Chile, Paraguay
30.6.05	Part 5: El Salvador
25.4.05	Part 4: VAAC Buenos Aires Part 5: Peru
24.2.05	Part 4: Introduction of Appendix A — Sample letter of Agreement between the ATS, MET authorities and vulcanological authorities and procedures on the transmission of information related to aircraft encounters with volcanic ash (Former Appendix A renumber as B)
29.10.04	Part 4: Introduction of Appendix A on operational procedures for the coordination and transfer of responsibility between VAACs for volcanic ash events
25.10.04	Part 4: AFTN address for ASHTAMs/NOTAMs
14.9.04	Part 3: VAAC Montreal
1.9.04	Part 2: VAAC Toulouse
16.8.04	Part 2: VAACs Anchorage, London and Toulouse
29.7.04	Part 2: VAACs Buenos Aires, Tokyo and Washington; Part 3, 3.3; Part 5: Canada, Russian Federation
19.4.04	Parts 3 and 4: VAACs London and Tokyo
3.3.04	Part 2: VAAC Toulouse; Part 5: Argentina
22.1.04	Parts 3 & 4: VAAC Tokyo

DATE	SECTION PAGES AFFECTED
22.1.04	Parts 3 & 4: VAAC Tokyo

TABLE OF CONTENTS

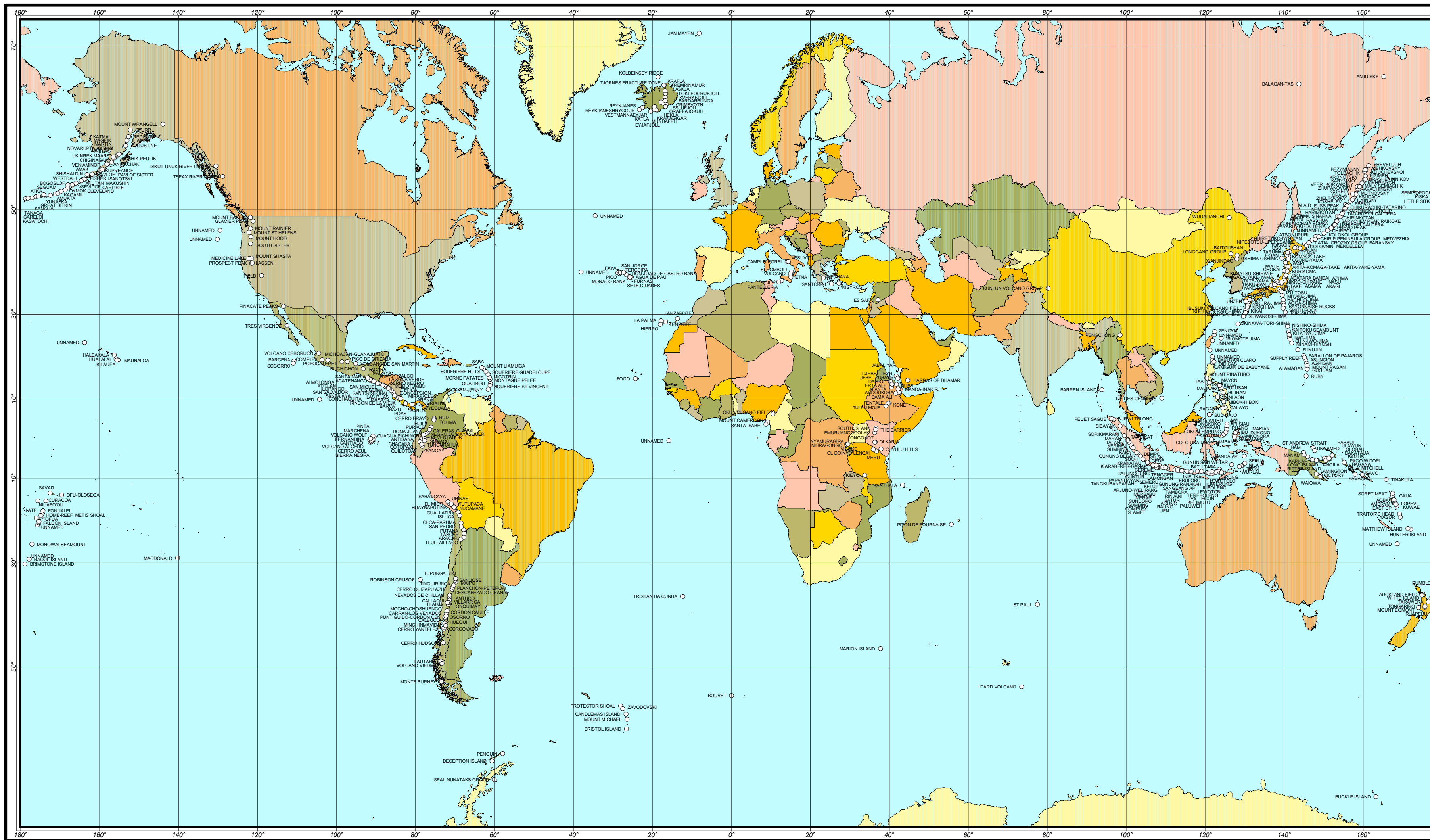
	<i>Page</i>
Part 1. Volcanoes active during the last 10 000 years	1-1
Part 2. Volcanic ash advisory centres (VAACs) designated by ICAO and their responsibilities	2-1
Part 3. Useful web sites	3-1
3.1 Volcanic ash advisory centres	3-1
3.2 Worldwide weekly volcanic activity reports	3-1
3.3 Other sites.....	3-2
Part 4. International Airways Volcano Watch — Operational procedures for the dissemination of information on volcanic eruptions and associated volcanic ash clouds in areas which could affect routes used by international flights, and necessary pre-eruption arrangements	4-1
4.1 Pre-eruption procedures	4-1
4.2 Action to be taken by the ACC in the event of a volcanic eruption	4-2
4.3 Action to be taken by the NOF in the event of a volcanic eruption	4-5
4.4 Action to be taken by the MWO in the event of a volcanic eruption	4-7
4.5 Action to be taken by VAACs in the event of a volcanic eruption	4-9
4.6 Action to be taken by VAACs or MWOs regarding volcanic ash test procedures.....	4-12
4.7 Action to be taken by pilots in the event of entry into a SO ₂ cloud	4-12
Table 4-1. WMO abbreviated headers for NOFs to use to send ASHTAMs or NOTAMs on volcanic activity to their associated VAAC.....	4-12
Table 4-2. VAAC contact numbers	4-15
Table 4-3. Volcanic ash advisory bulletin headers	4-21
Appendix A – Sample letter of Agreement between the ATS, MET and Vulcanological Authorities	A-1
Appendix B – AFTN addresses to be used to promulgate special air reports, SIGMETs and volcanic ash advisories to London WAFS and SADIS.....	B-1

Appendix C – Operational procedures for the coordination and transfer of responsibility between VAACs for volcanic ash events	C-1
Appendix D – Back-up procedures for volcanic ash advisory centres	D-1
Appendix E – Format of Volcano Observatory Notice for Aviation (VONA).....	E-1
Appendix F – Guidance to Pilots on the Direction of Sulphurous Gases on the Flight Deck.....	F-1

Part 5. International airways volcano watch contact list.....	5-1
5.1 Alphabetical listing	5-1
5.2 List of States by ICAO Region	5-2

Part 1

VOLCANOES ACTIVE DURING THE LAST 10 000 YEARS



Volcanoes with Eruptions During the Last 10,000 Years
Prepared in 1995 by Roland Pool, Smithsonian Institution,
Global Volcanism Program, NHB MRC 119, Washington, DC 20560

VOLCANOES OF THE WORLD
3000 0 3000 Km
Mercator Projection

A 101x147 cm map, This Dynamic Planet, showing these volcanoes, earthquake epicenters, impact craters, plus tectonic and physiographic data is available from: US Geological Survey, Map Distribution Center, Box 25256, Federal Center, Denver, CO 800225 (800) USA-MAPS

Part 2

VOLCANIC ASH ADVISORY CENTRES (VAACs) DESIGNATED BY ICAO AND THEIR RESPONSIBILITIES

(Note. — VAACs maintain a 24-hour watch)

EXPLANATION OF THE TABLE

Column

1. Location of the volcanic ash advisory centre (VAAC).
2. ICAO location indicator of VAAC (for use in the WMO heading of advisory bulletin).
3. Area of responsibility for the preparation of advisory information on volcanic ash by the VAAC in Column 1.
4. MWOs to which the advisory information on volcanic ash should be sent.
5. ICAO location indicator of the MWOs in Column 4.
6. ACCs to which the advisory information on volcanic ash should be sent.
7. ICAO location indicator of the ACCs in Column 6.

VOLCANIC ASH ADVISORY CENTRE	ICAO LOCATION INDICATOR	AREA OF RESPONSIBILITY	MWOs TO WHICH ADVISORY INFORMATION IS TO BE SENT		ACC TO WHICH ADVISORY INFORMATION IS TO BE SENT	
			Name	ICAO LOCATION INDICATOR	Name	ICAO LOCATION INDICATOR
1	2	3	4	5	6	7
Anchorage (United States)	PAWU	Anchorage Oceanic Anchorage continental Anchorage Arctic and west to E150 north of N60	Anadyr	UHMA	Anadyr	UHMA
			Anchorage	PAWW	Anchorage	PAZA
			Chaybukha	UHMG	Chaybukha	UHMG
			Chersky	UESS	Chersky	UESS
			Chokurdakh	UESO	Chokurdakh	UESO
			Edmonton	CWEG	Edmonton	CZEG
			Fairbanks	PAWU	Fairbanks	PAFA
			Kansas City	KKCI	Boston	KSBW
					Chicago	KORD
					Cleveland	KZOB
					Denver	KZDV
					Minneapolis	KZMP
					New York	KZNY
					Salt Lake	KZLC
					Seattle	KZSE
					Washington	KZDC
			Mys Shmidt	UHMI	Mys Schmidt	UHMI
Buenos Aires (Argentina)	SABM	South of S10 between W10 and W90	Pevek	UHMP	Pevek	UHMP
			Seymchan	UHMS	Seymchan	UHMS
			Tiksi	UEST	Tiksi	UEST
			Tokyo	RJTD	Tokyo	RJTG
			Zyryanka	UESU	Zyryanka	UESU
			Amazónica	SBEG	Amazónico	SBAZ
			Antofagasta	SCFA	Antofagasta	SCFZ
			Asunción	SGAS	Asunción	SGFA
			Brasilia	SBBR	Brasilia	SBBS
			Buenos Aires (Aeroparque)	SABE	Ezeiza	SAEF/SAEU
			Comodoro Rivadavia	SAVC	Comodoro Rivadavia	SAVF/SAVU
			Córdoba	SACO	Córdoba	SACF/SACU
			Curitiba	SBCT	Curitiba	SBCW
			La Paz	SLLP	La Paz	SLLF
			Lima-Callao	SPIM	Lima	SPIM
			Mendoza	SAME	Mendoza	SAMF/SAMV
			Montevideo	SUMU	Montevideo	SUEO
			Puerto Montt	SCTE	Puerto Montt	SCTZ
			Punta Arenas	SCCI	Punta Arenas	SCCZ
			Recife	SBRF	Recife Atlantico	SBRE SBAO
			Resistencia	SARE	Resistencia	SARR/SAEU
			Santiago	SCEL	Santiago	SCEZ

VOLCANIC ASH ADVISORY CENTRE	ICAO LOCATION INDICATOR	AREA OF RESPONSIBILITY	MWOs TO WHICH ADVISORY INFORMATION IS TO BE SENT		ACC TO WHICH ADVISORY INFORMATION IS TO BE SENT	
			Name	ICAO LOCATION INDICATOR	Name	ICAO LOCATION INDICATOR
1	2	3	4	5	6	7
Darwin (Australia)	YPDM	Southward from N10 and from E100 to E160, and the Perth FIR between E100 and E75, Colombo FIR, and those parts of the Kuala Lumpur, Bangkok, Chennai, Yangon and Calcutta FIRs lying within N10 E100 to N20 E100 to N20 E82 to N10 E82 to N6 E78 to S2 E78 to S6 E75	Adelaide	YPRM	Adelaide	YPAD
			Bangkok	VTBD	Bangkok	VTBB
			Brisbane	YBRF	Brisbane Cairns	YBBN YBCS
			Chennai	VOMM	Chennai	VOMF
			Darwin	YDRM	Darwin	YPDN
			Gia Lam	VVGL	Hanoi Ho-Chi-Minh	VVNB VVTS
			Hobart	YMHF	Hobart	YMHB
			Honiara	AGGH	Honiara	AGGH
			Jakarta	WIII	Jakarta	WIIF
			Kota Kinabalu	WBKK	Kota Kinabalu	WBFC
			Kuala Lumpur	WMKK	Kuala Lumpur	WMFC
			Manila	RPLL	Manila	RPHI
			Melbourne	YMRF	Melbourne	YMMM
			Perth	YPRF	Perth	YPPH
			Port Moresby	AYPY	Port Moresby	AYPM
			Singapore	WSSS	Singapore	WSJC
			Sydney	YSRF	Sydney	YSSY
			Townsville	YBTL	Townsville	YBTL
			Ujung Pandang	WAAA	Ujung Pandang	WAAF
			Yangon	VYYY	Yangon	VYYF
London (United Kingdom)	EGRR	Bodø Oceanic, Reykjavik, Shanwick Oceanic, London, Scottish, Shannon	Amsterdam	EHDB	Amsterdam	EHAA
			Bodø	ENVN	Bodø Oceanic	ENOB
			Bordeaux	LFBD	Bordeau	LFBB
			Bremen	EDZM	Bremen	EDWW
			Brest	LFRN	Brest	LFRR
			Brussels	EBBR	Brussels	EBBU
			Edmonton	CWEG	Edmonton Gander	CZEG CZQX
			Exeter	EGTE	Exeter	EGTT
			København	EKMI	København	EKDK
			Lisboa	LPPT	Lisboa	LPPC
			London	EHHR	London Oslo Paris	EGTT ENOR LFFF
			Reykjavik	BIRK	Reykjavik Rovaniemi Scottish	BIRD EFPS EGPX
			Shannon	EINN	Shannon Stravanger	EISN ENSV
			Tromsø	ENVN	Tromso	ENTC
			Trondheim	ENVA	Trondheim	ENVA

VOLCANIC ASH ADVISORY CENTRE	ICAO LOCATION INDICATOR	AREA OF RESPONSIBILITY	MWOs TO WHICH ADVISORY INFORMATION IS TO BE SENT		ACC TO WHICH ADVISORY INFORMATION IS TO BE SENT	
			Name	ICAO LOCATION INDICATOR	Name	ICAO LOCATION INDICATOR
1	2	3	4	5	6	7
Montreal (Canada)	CWAO	Gander Oceanic Canadian Continental FIRs (including the Arctic Ocean) Reykjavik Søndre Strømfjord	Edmonton Reykjavik Søndrestrømfjord	CWEG BIRK BGSF	Edmonton Gander Moncton Montreal Reykjavik Søndrestrømfjord Toronto Vancouver Winnipeg	CZEG CZQX CZQM CZUL BIRD BGGL CZYZ CZVR CZWG
Tokyo (Japan)	RJTD	N60 to N10 – and from E90 to Oakland Oceanic and Anchorage Oceanic and Continental FIR boundaries	Bangkok Blagoveshchensk Beijing Bratsk Chita Gia Lam Guanzhou Hong Kong Incheon Irkutsk Khabarovsk Kirensk Kunming Lanzhou Magadan Magdagachi Manila Nikolayevdsk-na- Amure Okha Okhotsk Petropavlovsk- Kamchatsky Phnom-Penh Pyongyang Sanya Shanghai	VTBD UHBB ZBAA UIBB UIAA VGLL ZGGG VHHH RKSI UIII UHHH UIKK SPPP ZLXY UHMM UHBI RPLL UHNN UHSH UHOO UHPP VDPP ZKYP ZJSY ZSSS	Bangkok Blagoveshchensk Beijing Hohhot Taiyuan Bratsk Chita Hanoi Ho-Chi-Minh Guandzhou Changsha Guillin Nanning Hong Kong Incheon Irkutsk Khabarovsk Kirensk Kunming Chengdu Chongqing Lanzhou Xi'an Magadan Magdagachi Manila Nikolayevdsk-na- Amure Okha Okhotsk Petropavlovsk- Kamchatsky Phnom-Penh Pyongyang Sanya Shanghai Hefei Jinan Nanchang Nanjing Qingdao	VTBB UHBB ZBPE ZBHH ZBYN UIBB UIAA VVNB VVTs ZGZU ZGCS ZGKL ZGNN VHHH RKRR UIII UHHH UIKK ZPKM ZUDS ZUCK ZLHW ZLSN UHMM UHBI RPHI UHNN UHSH UHOO UHPP VDPP ZKKK ZJSY ZSHA ZSOF ZSTN ZSCN ZSNJ ZSQD

VOLCANIC ASH ADVISORY CENTRE	ICAO LOCATION INDICATOR	AREA OF RESPONSIBILITY	MWOs TO WHICH ADVISORY INFORMATION IS TO BE SENT		ACC TO WHICH ADVISORY INFORMATION IS TO BE SENT	
			Name	ICAO LOCATION INDICATOR	Name	ICAO LOCATION INDICATOR
1	2	3	4	5	6	7
			Shenyang	ZYTX	Xiamen Shenyang Dalian Hailar Harbin	ZSAM ZYSH ZYTU ZBLA ZYHB
			Taibei	RCTP	Taibei	RCTP
			Tokyo	RJTD	Tokyo Fukuoka Naha Saporo	RJTG RJDG RORJ RJCG
			Ulan-Bator	ZMUB	Ulan-Bator	ZMUB
			Urumqi	ZWWW	Urumqi	ZWUQ
			Vladivostok	UHMM	Vladivostok	UHWW
			Wuhan	ZHHH	Wuhan	ZHWH
			Yuzhno-Sakhalinsk	UHSS	Yuzhno-Sakhalinsk	UHSS
Toulouse (France)	LFPW	Santa Maria Oceanic, AFI Region to S60, EUR Region west of E90 (except for London, Scottish and Shannon FIRs) and MID Region: south of N71, west of E90	Abu Dhabi	OMAA	Abu Dhabi	OMAA
			Accra	DGAA	Accra	DGAC
			Addis Ababa	HAAB	Addis Ababa	HAAA
			Aktau	UATE	Aralsk	UATA
			Aktubinsk	UATT	Atyrau	UATG
			Alger	DAAG	Alger	DAAA
			Almaty	UAAA	Almaty	UAAA
			Amderma	ULDD	Amderma	ULDD
			Amilcar Cabral	GVAC	Amilcar Cabral/Sal	GVSC
			Amman	OJAC	Amman	OJAC
		ASIA Region (only Afghanistan)	Amsterdam	EHDB	Amsterdam	EHAA
			Ankara	LTAC	Ankara	LTAA
			Antananarivo	FMMI	Antananarivo	FMMM
			Arkhangelsk	ULAA	Arkhangelsk	ULAA
			Ashgabat	UTAA	Ashgabat	UTAA
			Asmara	HHAS	Asmara	HHAA
			Astana	UACC	Astana	UACC
			Astrakhan	URWA	Astrakhan	URWA
			Athinai	LGGG	Athinai	LGGG
			Atyrau	UATG	Aktau	UATE
			Baghdad	ORBB	Baghdad	ORBI
			Bahrain	OBBS	Bahrain	OBBI
			Baku	UBBB	Baku	UBBB
			Barcelona	LEBN	Barcelona	LECB
			Barnaul	UNBB	Barnaul	UNBB
			Beirut	OLBA	Beirut	OLBB
			Beograd	LYBE	Beograd	LYBA
			Bergen	ENNV	Bergen	ENTR
			Berlin	EDZB	Berlin	EDBB
			Beryozovo	USHB	Beryozovo	USHB

VOLCANIC ASH ADVISORY CENTRE	ICAO LOCATION INDICATOR	AREA OF RESPONSIBILITY	MWOs TO WHICH ADVISORY INFORMATION IS TO BE SENT		ACC TO WHICH ADVISORY INFORMATION IS TO BE SENT	
			Name	ICAO LOCATION INDICATOR	Name	ICAO LOCATION INDICATOR
1	2	3	4	5	6	7
			Bishkek	UAFM	Bishkek Osh	UAFM UAFO
			Bodo	ENVN	Bodø	ENOB
			Bordeaux	LFBD	Bordeaux	LFBB
			Bratislava	LZIB	Bratislava	LZBB
			Brazzaville	FCBB	Brazzaville	FCCC
			Bremen	EDZM	Bremen	EDWW
			Brest	LFRN	Brest	LFRR
			Brindisi	LIBR	Brindisi	LIBB
			Brussels	EBBR	Brussels	EBBU
			Bucuresti	LROM	Bucuresti	LRBB
			Budapest	LHBP	Budapest	LHBP
			Bujumbura	HBBA	Bujumbura	HBBA
			Cairo	HECA	Cairo	HECC
			Canarias	GCGC	Canarias	GCCC
			Casablanca	GMME	Casablanca	GMMM
			Chelyabinsk	USCC	Chelyabinsk	USCC
			Chennai	VOMM	Chennai (+Darwin)	VOMF
			Chisinau	LUKK	Chisinau	LUKK
			Dakar	GOOY	Dakar	GOOO
			Damascus	OSDI	Damascus	OSDI
			Dar-es-Salaam	HTDA	Dar-es-Salaam	HTDC
			De Bilt	EHDB	De Bilt	EHDB
			Delhi	VIDP	Delhi	VIDF
			Dhaka	VGZR	Dhaka (+Tokyo)	VGFR
			Dikson	UODD	Dikson	UODD
			Dushanbe	UTDD	Dushanbe	UTDD
			Dusseldorf	EDZE	Dusseldorf	EDDL
			Entebbe	HUEN	Entebbe	HUEC
			Essen	EDZE	Frankfurt	EDYY
			Gaborone/SSK	FBSK	Gaborone	FBGR
			Geneva	LSZH	Geneva	LSAG
			Gran Canaria	GCLP	Gran Canaria	GCGC
			Hamburg	EDZH	Hamburg	EDMM
			Harare	FVHA	Harare	FVHA
			Helsinki	EFHK	Helsinki	EFIN
			Istanbul	LTBA	Istanbul	LTBB
			Jeddah	OEJN	Jeddah	OEJD
			Johannesburg	FAJS	Cape Town Johannesburg Johannesburg Oceanic	FACA FAJA FAJO
			Kabul	OAKB	Kabul	OAKX
			Kaliningrad	UMKK	Kaliningrad	UMKK

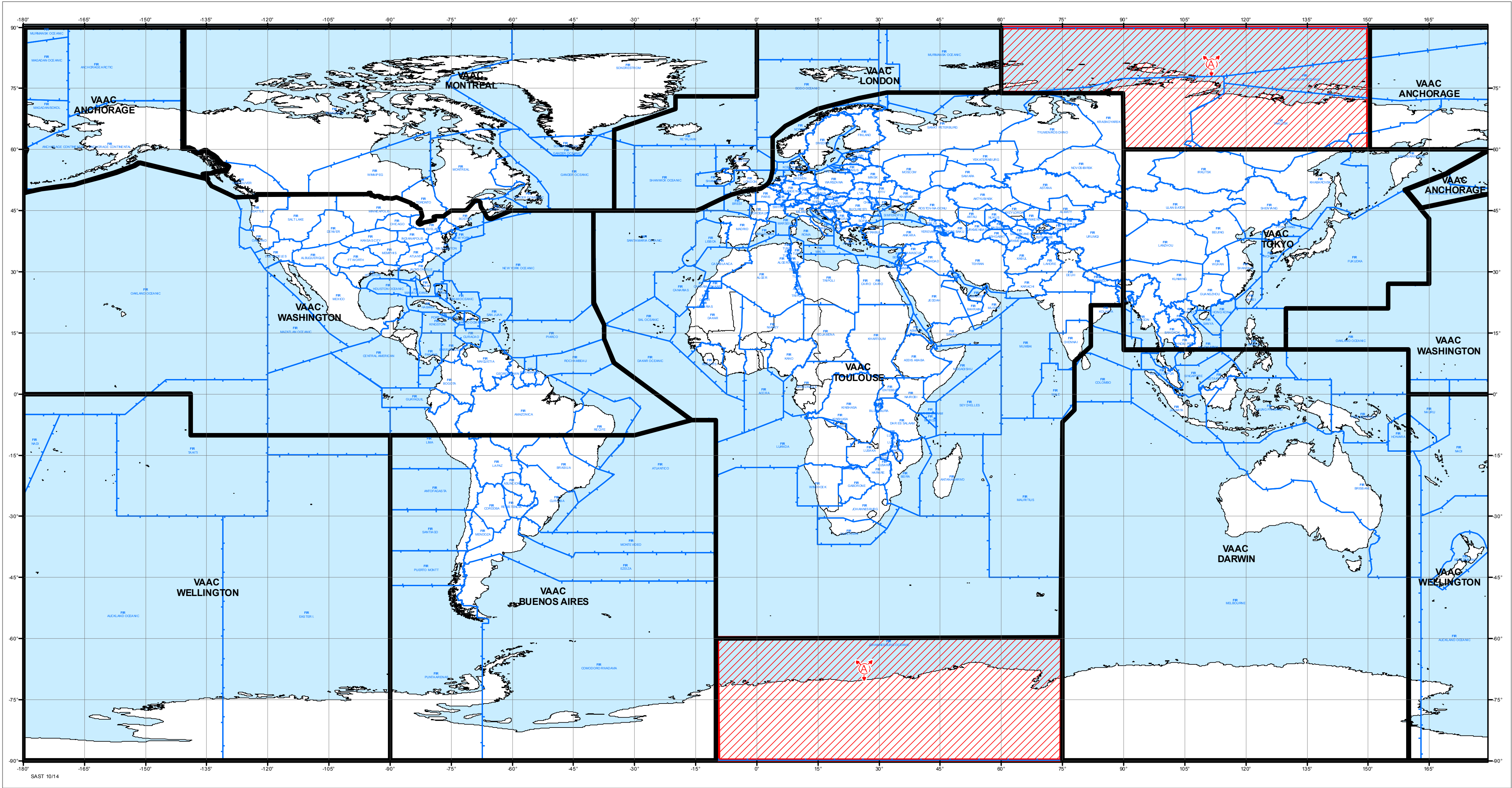
VOLCANIC ASH ADVISORY CENTRE	ICAO LOCATION INDICATOR	AREA OF RESPONSIBILITY	MWOs TO WHICH ADVISORY INFORMATION IS TO BE SENT		ACC TO WHICH ADVISORY INFORMATION IS TO BE SENT	
			Name	ICAO LOCATION INDICATOR	Name	ICAO LOCATION INDICATOR
1	2	3	4	5	6	7
			Kano	DNKN	Kano	DNKK
			Karachi	OPKC	Karachi	OPKR
			Kathmandu	VNKT	Kathmandu	VNSM
			Kazan	UWKD	Kazan	UWKD
			Khanty-Mansiysk	USHH	Khanty-Mansiysk	USHH
			Kharkiv	UKHV	Kharkiv	UKHH
			Khartoum	HSSS	Khartoum	HSSS
			Kigali	HRYP	Kigali	HRYP
			Kinshasa	FZAA	Kinshasa	FZAZ
			Kirov	USKK	Kirov	USKK
			København	EKMI	København	EKDK
			Kolkata	VECC	Kolkata (+Darwin)	VECF
			Kolpashevo	UNLL	Kolpashevo	UNLL
			Kostanay	UAUU	Kostanay	UAUU
			Kotlas	ULKK	Kotlas	ULKK
			Krasnoyarsk	UNKL	Krasnoyarsk (+Tokyo)	UNKL
			Kurgan	USUU	Kurgan	USUU
			Kuwait	OKBK	Kuwait	OKBK
			Kyiv	UKBB	Kyiv	UKBV
			Kyzylorda	UAOO	Kyzylorda	UAOO
			Lahore	OPLA	Lahore	OPLR
			Larnaka	LCLK	Nicosia	LCCC
			Lilongwe	FWLI	Lilongwe	FWLL
			Lisboa	LPPT	Lisboa	LPPC
			Ljubljana	LJLJ	Ljubljana	LJLA
			London	EGTE	London	EGTT
			Luanda	FNLU	Luanda	FNAN
			Lusaka	FLLS	Lusaka	FLFI
			L'viv	UKLL	L'viv	UKLL
			Madrid	LEMM	Madrid	LECM
			Mahe	FSIA	Seychelles	FSSS
			Male	VRMM	Male	VRMF
			Malmo	ESSA	Malmo	ESMM
			Malta	LMML	Malta	LMMM
			Mauritius	FIMP	Mauritius	FIMM
			Maputo	FQMA	Beira	FQBE
			Milano	LIMM	Milano	LIMM
			Minsk	UMMM	Minsk	UMMV
			Mogadishu	HCMM	Mogadishu	HCSM
			Monrovia	GLRB	Conakry	GUCY
			Moscow	UUWW	Moscow	UUWW
			Mumbai	VABB	Mumbai	VABF
			München	EDZW	München	EDMM

VOLCANIC ASH ADVISORY CENTRE	ICAO LOCATION INDICATOR	AREA OF RESPONSIBILITY	MWOs TO WHICH ADVISORY INFORMATION IS TO BE SENT		ACC TO WHICH ADVISORY INFORMATION IS TO BE SENT	
			Name	ICAO LOCATION INDICATOR	Name	ICAO LOCATION INDICATOR
1	2	3	4	5	6	7
			Murmansk	ULMM	Murmansk	ULMM
			Muscat	OOMM	Muscat	OOMS
			Mys- Kamenny	USDK	Mys-Kamenny	USDK
			N'Djamena	FTTJ	N'Djamena	FTTT
			Nairobi	HKJK	Nairobi	HKNA
			Niamey	DRRN	Niamey	DRRR
			Norilsk	UOOO	Norilsk	UOOO
			Novosibirsk	UNNT	Novosibirsk	UNNT
			Nukus	UTNN	Nukus	UTNN
			Odesa	UKOO	Odesa	UKOO
			Offenbach	EDZO	Offenbach	EDYY
			Ohrid	LWOH	Ohrid	LWSK
			Omsk	UNOO	Omsk	UNOO
			Orenburg	UWOO	Orenburg	UWOO
			Oslo	ENMI	Oslo	ENOS
			Palma de Mallorca	LEPA	Baleares	LECP
			Paris	LFPS	Paris	LFFF
			Pechora	UUYP	Pechora	UUYP
			Penza	UWPP	Penza	UWPP
			Perm	USPP	Perm	USPP
			Petrozavodsk	ULPB	Petrozavodsk	ULPP
			Praha	LKPR	Praha	LKAA
			Reims	LFML	Reims	LFEE
			Riga	EVRA	Riga	EVRR
			Rome	LIIB	Rome	LIRR
			Roberts	GLRB	Roberts	GLRB
			Rostov-na-donu	URRR	Rostov-na-donu	URRR
			Rovaniemi	EFRO	Rovaniemi	EFPS
			Salekhard	USDD	Salekhard	USDD
			Samara	UWWW	Samara	UWWW
			Samarkand	UTSS	Samarkand	UTSD
			Sana'a	OYSN	Sana'a	OYSC
			Sankt-Petersburg	ULLI	Sankt-Petersburg	ULLI
			Lisboa	LPPT	Santa Maria Oceanic	LPPO
			Sarajevo	LQSA	Sarajevo	LQSB
			Semipalatinsk	UASS	Semipalatinsk	UASS
			Seychelles	FSIA	Seychelles	FSSS
			Shymkent	UAIL	Shymkent	UAIL
			Surgut	USRR	Surgut	USRR
			Simferopol	UKFF	Simferopol	UKFF
			Skopje	LWSK	Skopje	LWSK
			Sofia	LBSF	Sofia	LBSR
			Stockholm	ESSA	Stockholm	??????

VOLCANIC ASH ADVISORY CENTRE	ICAO LOCATION INDICATOR	AREA OF RESPONSIBILITY	MWOs TO WHICH ADVISORY INFORMATION IS TO BE SENT		ACC TO WHICH ADVISORY INFORMATION IS TO BE SENT	
			Name	ICAO LOCATION INDICATOR	Name	ICAO LOCATION INDICATOR
1	2	3	4	5	6	7
			Syktvykar	UUYV	Syktvykar	UUYV
			Tallinn	EEMH	Tallinn	EETT
			Tarko-Sale	USDS	Tarko-Sale	USDS
			Tashkent	UTTT	Tashkent	UTTR
			Tehran	OIIX	Tehran	OIIX
			Tel Aviv	LLLL	Tel Aviv	LLTA
			Tbilisi	UGGG	Tbilisi	UGGG
			Tirana	LATI	Tirana	LAAA
			Toulouse	LFPW	Marseille	LFMM
			Tripoli	HLLT	Tripoli	HLLL
			Tromsø	ENVN	Stavanger	ENSV
			Trondheim	ENNV	Trondheim	ENTR
			Tunis	DTTA	Tunis	DTTC
			Turukhansk	UOTT	Turukhansk	UOTT
			Tyumen	USTR	Tyumen	USTR
			Ufa	UWUU	Ufa	UWUU
			Uralsk	UARR	Uralsk	UARR
			Urumqi	ZWWW	Urumqi (+Tokyo)	ZWUQ
			Varna	LBWN	Varna	LBWR
			Velikie Luki	ULOL	Velikie Luki	ULOL
			Vilnius	EYVI	Vilnius	EYVL
			Volgograd	URWW	Volgograd	URWW
			Vologda	ULWW	Vologda	ULWW
			Vorkuta	UUYW	Vorkuta	UUYW
			Warszawa	EPWA	Warszawa	EPWW
			Wien	LOWW	Wien	LOVV
			Windhoek	FYWH	Windhoek	FYWH
			Yekaterinburg	USSS	Yekaterinburg	USSS
			Yeniseisk	UNII	Yeniseisk (+Tokyo)	UNII
			Yerevan	UDYZ	Yerevan	UDDD
			Zagreb	LDZA	Zagreb	LDZO
			Zhekazgan	UAKD	Zhekazgan	UAKD
			Zurich	LSZH	Zurich	LSAZ
Washington (United States)	KNES	New York Oceanic, Oakland Oceanic and United States continental FIRs, North of S10 W140	Amazónico	SBEG	Amazónica	SBAZ
			Caracas	SVMI	Maiquetia	SVZM
			Cayenne	SOCA	Rochambeau	SOOO
			Darwin	YDRM	Darwin	YPDN
			Edmonton	CWEG	Edmonton Gander	CZEG CZQX
			Guayaquil	SEGU	Guayaquil	SEGU
			Habana	MUHA	Habana	MUFH
			Honolulu	PHFO	Honolulu Oakland Guam	PHZH KZOA PGZU

VOLCANIC ASH ADVISORY CENTRE	ICAO LOCATION INDICATOR	AREA OF RESPONSIBILITY	MWOs TO WHICH ADVISORY INFORMATION IS TO BE SENT		ACC TO WHICH ADVISORY INFORMATION IS TO BE SENT	
			Name	ICAO LOCATION INDICATOR	Name	ICAO LOCATION INDICATOR
1	2	3	4	5	6	7
			Kansas City	KKCI	Houston Oceanic Miami Oceanic Nassau San Juan	KZHU KZMA MYNA TJZS
			Kingston	MKJP	Kingston	MKJK
			Lima-Callao	SPIM	Lima	SPIM
			México	MMMX	Mazatlán México	MMZT MMEX
			Panamá	MPTO	Panamá	MPZL
			Port-au-Prince	MTPP	Port-au-Prince	MTEG
			Port-of-Spain	TTPP	Piarco	TTZP
			Recife	SBRF	Recife Atlantico	SBRE SBAO
			Santa Fé de Bogotá	SKBO	Barranquilla Bogotá	SKEC SKED
			Santo Domingo	MDSD	Santo Domingo	MDCS
			Tegucigalpa	MHTG	Central American	MHTG
			Timehri	STCJ	Georgetown	SYGC
			Tokyo	RJTD	Tokyo	RJTG
			Willemstad	TNCC	Curacao	TNCF
			Zandery	SMJP	Paramaribo	SMPM
Wellington (New Zealand)	NZKL	Southward from the Equator and from E160 to W140, and Southward from S10 and from W140 to W90	Brisbane	YBRF	Brisbane	YBBB
			Honiara	AGGH	Honiara	AGGH
			Honolulu	PHFO	Honolulu	PHZH
			Melbourne	YMRF	Melbourne	YMMM
			Nadi	NFFN	Nadi	NFFF
			Tahiti	NTAA	Tahiti	NTTT
			Wellington	NZKL	Auckland Christchurch	NZZO NZZC

CURRENT STATUS OF ICAO VOLCANIC ASH ADVISORY CENTRES (VAAC) - AREAS OF RESPONSIBILITY
SITUATION ACTUELLE DES CENTRES OACI D'AVIS DE CENDRES VOLCANIQUES (VAAC) - ZONES DE RESPONSABILITÉ
ESTADO ACTUAL DE LOS CENTROS DE AVISOS DE CENIZAS VOLCÁNICAS (VAAC) DE LA OACI - ÁREAS DE RESPONSABILIDAD
СУЩЕСТВУЮЩЕЕ РАСПРЕДЕЛЕНИЕ КОНСУЛЬТАТИВНЫХ ЦЕНТРОВ ИКАО ИО ВУЛКАНИЧЕСКОМУ ПЕПЛУ (VAAC) - РАЙОНЫ ОТВЕТСТВЕННОСТИ



Part 3

USEFUL WEB SITES

Note.— These addresses are included for back-up information only, and it should be clearly understood that operational reliance on volcanic ash information obtained from web sites cannot be assured.

3.1 VOLCANIC ASH ADVISORY CENTRES

Anchorage:	http://aawu.arh.noaa.gov/vaac.php
Buenos Aires:	http://www.smm.gov.ar/?mod=vaac&id=1
Darwin:	http://www.bom.gov.au/info/vaac
London:	http://www.metoffice.gov.uk/aviation/vaac/index.html
Montreal:	http://meteo.gc.ca/eer/vaac/index_e.html (English) http://meteo.gc.ca/eer/vaac/index_f.html (French)
Tokyo:	http://www.jma.go.jp/jma/jma-eng/jma-center/vaac/index.html
Toulouse:	http://www.meteo.fr/vaac/
Washington:	http://www.ssd.noaa.gov/VAAC/washington.html
Wellington:	http://www.vaac.metservice.com

Note.— The homepage of each VAAC normally contains hyperlinks to the homepages of the other VAACs.

3.2 WORLDWIDE WEEKLY VOLCANIC ACTIVITY REPORTS

Smithsonian Institution:	http://www.volcano.si.edu/gvp
United States Geological Survey:	http://volcanoes.usgs.gov

Note.— These sites provide excellent up-to-date reports on active volcanoes.

3.3 OTHER SITES

Alaska Volcano Observatory:	http://www.avo.alaska.edu
Canadian Meteorological Centre:	http://www.msc-smc.ec.gc.ca/cmc/index_e.html
Caribbean Disaster Emergency Response Agency:	http://www.cdera.org
Global Volcanism Network Bulletin:	http://www.nmnh.si.edu/gvp/ http://www.osei.noaa.gov/TOMS/ http://toms.gsfc.nasa.gov http://www.geo.mtu.edu/~boris/ETNA_news.html
Institute of Volcanic Geology and Geochemistry FED RAS	http://www.kcs.iks.ru/ivgig/index.html
Kamchatkan Volcanic Eruption Response Team (KVERT)	http://www.kcs.iks.ru/ivgig/kvert/index.html http://geopubs.wr.usgs.gov/fact-sheet/fs064-02/
Current information release from KVERT	http://www.avo.alaska.edu/avo4/updates/kvertweekly.htm
Michigan Technical University:	http://www.geo.mtu.edu/volcanoes
Puff Tracking Model	http://puff.images.alaska.edu/index.html
VAFTAD:	http://www.ssd.noaa.gov/VAAC/vaftad.html
WAFS Internet:	http://weather.noaa.gov/fax/wafsfax.shtml
World Organization of Volcano Observatories (WOVO)	http://wovo.org http://www.wovo.org/dir-contents.htm (contacts)
Preliminary spreadsheet of eruption source parameters for volcanoes of the world	http://pubs.usgs.gov/of/2009/1133/

Note.— Useful background information on volcanic ash and its impact on aviation may be found in the Manual on Volcanic Ash, Radioactive Material and Toxic Chemical Clouds (Doc 9691). ICAO documents are available from the Document Sales Unit at sales_unit@icao.int.

Part 4
INTERNATIONAL AIRWAYS
VOLCANO WATCH

**OPERATIONAL PROCEDURES FOR THE
DISSEMINATION OF INFORMATION ON
VOLCANIC ERUPTIONS AND ASSOCIATED
VOLCANIC ASH CLOUDS IN AREAS
WHICH COULD AFFECT ROUTES USED BY
INTERNATIONAL FLIGHTS, AND NECESSARY
PRE-ERUPTION ARRANGEMENTS**

4.1. PRE-ERUPTION PROCEDURES

4.1.1 In order to permit efficient application of the measures noted in 4.2, 4.3, 4.4 and 4.5, States responsible for flight information regions (FIRs) in which there are active or potentially active volcanoes in proximity to routes used by international flights should make arrangements to ensure that:

- a) information on increasing volcanic activity, volcanic eruption or cessation thereof, or volcanic ash cloud in areas which could affect routes used by international flights, available from one or more observing sources, such as vulcanological, seismological, geological, meteorological, or the police/military networks and domestic aviation, is passed **immediately** to the area control centre/flight information centre (ACC/FIC) and the meteorological watch office (MWO) concerned;
- b) appropriate channels of communication are established between such sources of observation (especially vulcanological observing stations) and the nearest ACC/FIC and MWO to ensure that, in the event of an eruption, the information reaches the ACC/FIC/MWO as speedily as possible;
- c) access to information from available geostationary and polar-orbiting weather satellites and other sources, such as volcanic ash advisory centres (VAACs), is arranged through the national meteorological authority concerned in order to obtain, as far as practicable, information regarding the extent and trajectory of volcanic ash clouds (see 4.4.1 a));
- d) access to vulcanological advice is made available to the ACC/FIC and MWO and, in the Provider States concerned, to the VAAC, including 24-hour telephone contact numbers at which a vulcanologist can be contacted in an emergency;

Note.— A convenient forum to explore ways and means to implement the foregoing measures is the National Disaster Committee or any similar consultative body.

- e) the State international NOTAM office personnel are familiar with the issuance of ASHTAMs¹ (or NOTAMs for volcanic ash);
- f) information, preferably supplemented by charts, concerning volcanoes in the FIRs for which the State is responsible should be included in the State aeronautical information publication in accordance with Annex 15, Appendix 1, Section ENR 5.3.1; and
- g) ATM contingency arrangements in respect of volcanic ash are made and promulgated, as necessary, for air routes crossing FIRs for which the State is responsible, in coordination with adjacent FIRs.

4.1.2 Contracting States shall promulgate a requirement for pilots to make and transmit a special aircraft observation, in accordance with 5.5.1 g) and h) of Annex 3, in the event that pre-eruption volcanic activity or a volcanic eruption is observed or a cloud of volcanic ash is encountered or observed which may affect the safety of other aircraft operations, and to record a special air-report in accordance with of Annex 3, Chapter 5, 5.9. In addition, the International Air Transport Association (IATA), the International Federation of Air Line Pilots' Associations (IFALPA) and the International Council of Aircraft Owner and Pilot Associations (IAOPA) should bring this requirement to the attention of pilots and airline operating centres and highlight their significance for the IAVW and the importance of transmitting these observations in a timely manner.

Note.— Pre-eruption volcanic activity in this context means unusual and/or increasing volcanic activity which could presage a volcanic eruption.

4.1.3 It is essential that the foregoing arrangements be made in every State concerned and their efficacy continually maintained. In the case of volcanic ash, the hazard to jet transport aircraft is greatest within the first few hours following an eruption; hence speed of notification between all links in the chain of communication is critical. States may wish to consider drawing up letters of agreement between the parties involved, in particular, the civil aviation and meteorological authorities and the vulcanological agency, to record the agreed responsibilities of each party. Since Annex 3, paragraph 3.6 requires that selected State volcano observatories should send information about pre-eruption volcanic activity, a volcanic eruption and/or volcanic ash in the atmosphere to associated ACC, MWO and VAAC, the State concerned, may, if it so wishes, recover reasonable costs related to the transmission of such information.

1. The ASHTAM is a special series NOTAM specifically for volcanic activity.

4.1.4 In order to assist States in enhancing the coordination between the different States' authorities/agencies involved in the IAVW, at Appendix A is a sample letter of agreement covering the coordination and responsibilities between meteorological authorities, ATS authorities and vulcanological authorities for the provision and exchange of information relevant to volcanic ash.

Note. — In order to enhance stronger linkages, coherence and integration with States' disaster risk reduction units, Contracting States are encouraged to send back to States' volcano observatories any relevant information regarding volcanic ash to the extent and in a form agreed between the VAAC and the volcano observatory concerned. The sample letter of agreement could be used to document such agreements.

4.2 ACTION TO BE TAKEN BY THE ACC IN THE EVENT OF A VOLCANIC ERUPTION

In the event of significant pre-eruption volcanic activity, a volcanic eruption occurring or a volcanic ash cloud being reported in areas which could affect routes used by international flights, the ACC/FIC responsible for the FIR concerned, on receiving information of the occurrence, should take the following actions:

- a) Pass this information **immediately** to aircraft in flight which could be affected by the volcanic ash cloud and advise ACCs in relevant adjacent FIRs. Issue an ASHTAM or a NOTAM through the State International Notam Office (NOF), in accordance with Annex 15, Chapter 5, giving details of the pre-eruption activity, volcanic eruption and ash cloud, including the name and geographical coordinates of the volcano, the date and time of the eruption, the flight levels and routes or portions of routes which could be affected and, as necessary, routes temporarily closed to air traffic. Include in the address list for ASHTAMs or NOTAMs concerning volcanic activity the associated MWO (see Part 2 of this document), all VAACs and the SADIS **ISCS** gateway at EGZZVANW.

*Note 1.— In issuing an ASHTAM or a NOTAM concerning significant pre-eruption volcanic activity, or for volcanic eruptions **not** producing ash plumes, it is recommended that the ASHTAM or NOTAM text include the following actual wording, as appropriate:*

“INCREASED VOLCANIC ACTIVITY REPORTED FOR VOLCANO (NAME AND LAT/LONG) AIRCRAFT ADVISED TO EXERCISE CAUTION UNTIL FURTHER NOTICE AND MAINTAIN WATCH FOR ASHTAM/NOTAM/SIGMET FOR AREA”.

or

“VOLCANO (NAME AND LAT/LONG) ERUPTED (DATE/TIME UTC) BUT NO ASH PLUME REPORTED, AIRCRAFT ADVISED TO AVOID FLYING WITHIN ... KM OF THE VOLCANO UNTIL FURTHER NOTICE, MAINTAIN WATCH FOR ASHTAM/NOTAM/SIGMET FOR AREA”.

Use of such language in an ASHTAM or a NOTAM ensures that large volumes of airspace are not rendered unavailable to aircraft unnecessarily until such time as a volcanic ash plume/cloud is actually reported, or observed from satellite data.

Note 2.— In order to ensure speedy transmission of initial information to aircraft, the first ASHTAM or NOTAM issued may simply contain information that an eruption and/or ash cloud has been reported and the date/time and location. It is not necessary to await further detailed information; this may be included in subsequent ASHTAMs or NOTAMs as it becomes available.

Note 3.— A volcano level of alert colour code has been developed for aviation which may be used by some vulcanological agencies to report volcanic activity information to aviation. In those States where the colour code has been introduced by the vulcanological agency, it is useful to include the reported colour code in ASHTAMs or NOTAMs issued for volcanic activity. The aviation volcano level of alert colour code is:

Level of alert colour code	Status of activity of volcano
GREEN ALERT	Volcano is in normal, non-eruptive state. <i>or, after a change from a higher alert level:</i> Volcanic activity considered to have ceased, and volcano reverted to its normal, non-eruptive state.
YELLOW ALERT	Volcano is experiencing signs of elevated unrest above known background levels. <i>or, after a change from higher alert level:</i> Volcanic activity has decreased significantly but continues to be closely monitored for possible renewed increase.
ORANGE ALERT	Volcano is exhibiting heightened unrest with increased likelihood of eruption. <i>or,</i> Volcanic eruption is underway with no or minor ash emission [<i>specify ash-plume height if possible</i>].
RED ALERT	Eruption is forecasted to be imminent with significant emission of ash into the atmosphere likely. <i>or,</i> Eruption is underway with significant emission of ash into the atmosphere [<i>specify ash-plume height if possible</i>].

The colour code for the level of alert indicating the status of activity of the volcano and any change from a previous status of activity should be provided to the area control centre by the responsible vulcanological agency in the State concerned, e.g. "RED ALERT FOLLOWING YELLOW" OR "GREEN ALERT FOLLOWING ORANGE".

- b) Activate contingency arrangements, including the implementation of alternative routes bypassing the area likely to be affected by the volcanic ash cloud, in coordination with ACCs and FICs responsible for adjacent FIRs.
- c) Advise the associated MWO(s) and VAAC of the volcanic eruption and/or the existence of volcanic ash cloud (including the forwarding of all special air-reports in accordance with existing provisions in Annex 11, 4.2.3) and maintain continuous coordination with the MWO to ensure consistency in the issuance and content of ASHTAMs or NOTAMs and SIGMETs.
- d) Cancel the ASHTAM or NOTAM as soon as it is considered that the volcano has reverted to its normal state and the airspace is not contaminated by volcanic ash.

4.3 ACTION TO BE TAKEN BY THE NOF IN THE EVENT OF A VOLCANIC ERUPTION

4.3.1 In the event of significant pre-eruption volcanic activity, a volcanic eruption occurring, or a volcanic ash cloud being reported in areas which could affect airspace in the FIRs of the State in which the Notam Office (NOF) is designated, the NOF should issue an ASHTAM (or a NOTAM for volcanic activity) based on information provided by the ACC responsible for the FIR concerned. The ASHTAM or NOTAM must be cancelled, in consultation with the ACC, as soon as it is considered that the airspace is not contaminated by volcanic ash. Include in the address list for ASHTAM or NOTAM concerning volcanic activity the associated MWO (see Part 2 of this document), all VAACs and the SADIS gateway at EGZZVANW.

4.3.2 In addition to addressing the ASHTAM (or NOTAM) to other NOFs for whom the information is of direct operational significance, the NOF should include in the address list the VAAC responsible for the FIRs concerned. The States responsible for FIRs in which there are active volcanoes and the AFTN switching centres designated to receive NOTAM or ASHTAM are listed in Table 4-1.

As an example:

An ASHTAM issued by the Tegucigalpa NOF would be sent to the VAAC Washington as follows:

ZCZC
GG KWBCYMYX
170630 MHTGYNYX
VAMH0001 MHTG 04170630

ASHTAM

- A. CENTRAL AMERICAN FIR
- B. 04170555
- C. VOLCAN SAN CRISTOBAL.14004-02
- D. 124211N0870024W
- E. YELLOW ALERT
- F. SFC/11000FT
- G. E/SE
- H. VOR/DME MGA A317 TUKOR CNL
- I. VOR/DME MGA A317 TUKOR RTE AVBL. ALT RTE
MGA VOR/DME A502 BERTA GABOS A317.
VOR/DME/CAT/ABVL
- J. INSTITUTO NACIONAL DE ESTUDIOS TERRITORIALES. DPTO. DE
SISMOLOGÍA
- K. GNE AVIATION CTN WIND 60KM/H E/SE FM VOLCANO

NNNN

A similar example, this time showing a NOTAM issued by Guayaquil NOF, would be sent to the VAAC Washington as follows, showing the four sections of the message:

- | | | |
|---|--|-------------------------------|
| 1 | ZCZC
GG KWBCYMYX
151840 SEGUYNXX | USUAL AFTN HEADER
ENVELOPE |
| 2 | A0623/00 NOTAMN
Q) SEGU/QWWXX/IV/NBO/W/000
/250/0128S 07826W030
A) SEGU
B) 0002151830
C) 0002171830
E) SIGNIFICANT VOLCANIC ACT
TUNGURAHUA VA MOV W.
AWY RESTRICTIONS AND ALT
RTE NOTIFIED BY ATC | ACTUAL NOTAM |
| 4 | NNNN | USUAL AFTN ENDING
ENVELOPE |

4.3.3 In case of a need to issue a NOTAM regarding volcanic ash deposition at an aerodrome, the following guidelines are suggested:

- a) in cases when a forecast of impending ash deposition is available, a NOTAM should be issued stating the time period when ash is expected to commence at an aerodrome;
- b) a NOTAM should be issued when ash reaches an aerodrome or begins to accumulate on the ground at an aerodrome. The NOTAM should report if the aerodrome is still open for operation;
- c) a new NOTAM should be issued every 4 hours while deposition is occurring or present in the air at the aerodrome, or more frequently as needed for occurrence of heavy ash deposition. If a friction test of runway surfaces has been made with a mu-meter, that value and the time it was made should be reported; and
- d) a final NOTAM should be issued when clean-up activities are completed and operations have resumed.

4.4 ACTION TO BE TAKEN BY THE MWO IN THE EVENT OF A VOLCANIC ERUPTION

4.4.1 On receipt from the ACC/FIC of information concerning a volcanic eruption and/or the existence of a volcanic ash cloud, the MWO should take the following steps:

- a) notify the VAAC designated to provide advice on volcanic ash trajectories for the FIR for which the State is responsible that a volcanic eruption and/or ash cloud has been reported, provide available relevant details and request advisory information on the extent and trajectory of volcanic ash. In particular, special air-reports of pre-eruption volcanic activity, a volcanic eruption, volcanic ash cloud or aircraft encounter with volcanic ash received by MWOs should be transmitted to their associated VAACs, to the WAFC London SADIS at the address specified in Appendix B, according to the region containing the area affected, the WAFC Washington at KWBCYMYX, and the Vienna International OPMET Data Bank at LOZMMSS;

Note 1.— The area of responsibility of the VAACs and the MWOs to which volcanic ash advisory information is to be sent are given in the ICAO regional air navigation plans and in Part 2 of this document.

Note 2.— The contact numbers that the MWOs should use to notify volcanic eruptions/volcanic ash cloud to the VAAC are given in Table 4-2.

- b) as soon as practicable, advise the associated ACC/FIC whether or not the volcanic ash cloud is identifiable from satellite images/data and, if possible,

provide regular information based on advice received from the VAAC on the horizontal and vertical extent of the cloud and the trajectory of the cloud; and

- c) issue a SIGMET message for volcanic ash for a validity period of 6 hours in alphanumerical message format and, if in a position to do so, in graphical format based on the advisory information provided by the VAAC concerned. Update SIGMET information at least every 6 hours. Include in the SIGMET address all VAACs (see 4.4.1 a)), the WAFC London at the address specified in Appendix B, according to the region containing the area affected, the WAFC Washington at KWBCYMYX, the Vienna International OPMET Data Bank at LOZZMMSS and the Regional OPMET Data Bank(s) responsible. Maintain continuous coordination with the associated ACC/FIC to ensure consistency in the issuance and content of SIGMETs, and ASHTAMs or NOTAMs. SIGMET messages for volcanic ash issued outside the EUR Region to be transmitted to the EUR Region should be addressed in accordance to the EUR FASID Table MET 2B as follows:

Source	Responsible EUR Gateway and Address to be used	
AFI	France	LFZZMAFI
MID	Austria	LOZZMMID
ASIA	UK	EGZZMASI
CAR	UK	EGZZMCAR
NAM	UK	EGZZMNAM
NAT	UK	EGZZMNAT
PAC	UK	EGZZMPAC
SAM	UK	EGZZMSAM

Note 1.— The associated ACC/FIC should automatically be on the address list for all SIGMETs issued by the MWO.

Note 2.— In order to ensure speedy transmission of initial information to aircraft, the first SIGMET issued may simply contain information that an ash cloud has been reported and the date/time and location. It is not necessary to await further detailed information before issuing the first SIGMET. Such information may be included in subsequent SIGMETs as it becomes available.

4.4.2 In the event that the MWO becomes aware of the occurrence of pre-eruption activity, a volcanic eruption or ash cloud from any source other than its associated ACC/FIC, that information should be passed **immediately** to the associated ACC/FIC. The procedures in 4.4.1 should then be followed, as necessary.

4.4.3 In the event that a meteorological office becomes aware of the occurrence of pre-eruption activity, a volcanic eruption or ash cloud from any source, the information should be passed **immediately** to its associated MWO for onward transmission to the ACC/FIC.

4.5 ACTION TO BE TAKEN BY VAACs IN THE EVENT OF A VOLCANIC ERUPTION

4.5.1 On receipt of information from an ACC or MWO or any other source² that a volcanic eruption has been reported and/or a volcanic ash cloud has been observed in the FIR for which the MWO is responsible, the VAAC should:

- a) initiate the volcanic ash computer trajectory/dispersion model in order to provide advisory information on volcanic ash trajectories to the MWOs, ACCs and, to the extent possible, to the airlines³ concerned;
- b) review satellite images/data of the area for the time of the event to ascertain whether a volcanic ash cloud is identifiable and, if so, its extent;
- c) prepare and issue advisory information on the extent and forecast trajectory of the volcanic ash cloud, in alphanumerical message format, as shown below, and (if in a position to do so), graphical format⁴, for transmission to the MWOs, ACCs and, to the extent possible, to the airlines³ concerned in the VAAC area of responsibility, to the WAFC London at the address specified in Appendix B, according to the region containing the area affected, the WAFC Washington at KWBCYMYX, the Vienna International OPMET Data Bank at LOZZMMSS and other VAACs. Advisory information on volcanic ash issued outside the EUR Region to be transmitted to the EUR Region should be addressed in accordance with EUR FASID Table MET 2B (see 4.4.1 c).

The volcanic ash advisory message should contain the following information:

message type

— VOLCANIC ASH ADVISORY

issue time, date and name of issuing VAAC

— time (UTC), day/month/year; volcanic ash advisory centre issuing advisory

name of volcano and volcano reference number

— volcano name (if known) and reference number (International Association

-
2. When initial notification of the eruption is received from a source other than an ACC/MWO, this information should be passed **immediately** by telephone to the relevant ACC and/or MWO. Thereafter, the procedures in a) to g) should be followed.
 3. Advisory information from VAACs is intended to assist MWOs in the preparation of the SIGMET. However, in order to provide airline operators with the earliest possible advance information on volcanic ash, an AFTN address (EGLLSITV) has been provided on the SITA network to which VAACs may send their advisories for onward distribution to airline operators by SITA. SIGMETs for volcanic ash will, of course, be disseminated in accordance with the relevant regional air navigation plan OPMET exchange tables.
 4. Volcanic ash advisories in graphical format will be included on the London and Washington satellite broadcasts. An example of the graphical format is given in the Appendix 1 to Annex 3.

of Volcanology and Chemistry of the Earth's Interior (IAVCEI))

the State or area in which the volcano is located and the latitude/longitude

— name of State or area (e.g. oceanic) and latitude/longitude of volcano

source(s) of information

— volcano agency or special AIREP, etc.

details of eruption

— time (UTC), day/month/year of the eruption

details of ash cloud

— vertical extent in flight levels and horizontal extent in kilometres (nautical miles) and boundary of ash cloud in degrees and minutes

trajectory of ash cloud

— indication of direction and speed of movement of ash cloud at selected flight levels in broad descriptive terms

forecast movement of ash cloud

— forecast boundaries of ash cloud in degrees and minutes at selected flight levels for 6, 12 and 18 hours following time of issuance of advisory message

next advisory

— expected time of issuance of next advisory.

In order for the VAAC to initiate the monitoring of volcanic ash from satellite data and the forecast of volcanic ash trajectories, MWOs are expected to notify the relevant VAAC immediately on receipt of information that a volcanic eruption has occurred or volcanic ash has been observed in the FIR for which they are responsible in accordance with 4.4.1 a). In particular, any special air-reports of pre-eruption volcanic activity, a volcanic eruption or volcanic ash cloud, received by MWOs, should be transmitted without delay to the associated VAAC and to other addresses in accordance with 4.4.1 a);

- d) monitor subsequent satellite information to assist in tracking the movement of volcanic ash cloud;
- e) continue to issue updated advisory information to MWOs, ACCs and airlines⁵ concerned at least at 6-hour intervals, and preferably more frequently, until such time as it is considered that the volcanic ash cloud is no longer identifiable from

5. Advisory information from VAACs is intended to assist MWOs in the preparation of the SIGMET. However, in order to provide airline operators with the earliest possible advance information on volcanic ash, an AFTN address (EGLLSITV) has been provided on the SITA network to which VAACs may send their advisories for onward distribution to airline operators by SITA. ~~SIGMETs for volcanic ash will, of course, be disseminated in accordance with the relevant regional air navigation plan FASID Table MET 2A.~~

satellite data, no further reports of volcanic ash are received from the area and no further eruptions of the volcano are reported;

Note. — If volcanic ash is not identifiable from satellite data and the VAAC has reasonable doubts about the existence of volcanic ash in the atmosphere, it should be indicated in the REMARKS section of the volcanic ash advisory.

- f) maintain regular contact with other VAACs, as necessary, and the Smithsonian Institution Global Volcanism Network, in order to keep up to date on the activity status of volcanoes in the VAAC area of responsibility. In the specific case of reception of information regarding an aircraft encounter with volcanic ash (Annex 3, Chapter 5, 5.9 refers), the information should be sent to the Smithsonian Institution Global Volcanism Network and to ICAO in order to keep up to date the database for encounters between aircraft ash clouds (Doc- 9691, Appendix I refers). To that end the following mail addresses should be used:

gyn@volcano.si.edu
iavwopsgsec@icao.int

- g) in cases where volcanic ash cloud crosses the boundary between VAAC areas of responsibility, the first VAAC should retain responsibility for the issuance of advisories until such time as the handover of responsibility has been agreed between VAACs. Standardized operational procedures for the coordination and transfer of responsibility between VAACs for volcanic ash events are at Appendix C.

Note.— This means that, while the volcanic ash cloud straddles the common boundary, only one VAAC will issue advisories at any one time, and these advisories must be sent by each VAAC to MWOs and ACCs in their respective areas of responsibility.

VAACs should insert a note in their “last”/“first” advisory of the message and graphical series that the “handover”/“takeover” will take place at that message/graphic number.

- h) to facilitate VAACs’ rapid access to volcanic ash advisories issued by other VAACs, Table 4.3 provides a listing of the WMO bulletin headers, for each product (volcanic ash in the advisory in the alphanumeric and graphical format, respectively) being used by the VAACs.
- i) in the event of long-lived volcanic ash clouds no longer being identifiable on satellite imagery, the VAAC may choose to use the method of “gradual” advisory cessation by extrapolating forecast ash boundaries such that the previous 6-, 12- and 18-hour forecasts become the current analysis position in 6— and 12-hour forecasts respectively, with no ash boundary specified for the 18—hour forecast.

Note. — The above procedure (which is reducing the outlook period of 6 hours at each issue) should be applied unless remote sensing data or air-reports suggest there has been an error in the forecasts issued.

- j) to provide rapid access to eruption source parameters (ESP) data for immediate use by forecasters in ash transport and dispersion models a preliminary spreadsheet of eruption ~~service~~ parameters of the world is available at <http://www2.icao.int/en/anb/met-aim/met/iavsopsg/>.

4.5.2 In the event of interruption of operation of one VAAC, its functions should be carried out by another VAAC or another meteorological centre, as designated by the VAAC Provider State concerned. The back up procedures agreed by the VAACs given in Appendix D should be applied in order to provide the VAAC services as needed.

4.5.3 For those VAACs which have not yet implemented a computer volcanic ash dispersion forecast model, on receipt of information from an MWO, or from any other source in its area of responsibility, that a volcano has erupted and/or volcanic ash cloud has been reported from the FIR for which the MWO is responsible, the VAAC should immediately contact the VAAC Washington at the following 24-hour contact numbers:

Tel.: +1 (301) 763-8444
Fax: +1 (301) 763-8333

to request initiation of the United States Volcanic Ash Forecast Transport and Dispersion (VAFTAD) model and the provision of the necessary trajectory forecasts. Alternatively, VAACs may interactively run a dispersion model via the Internet at the following web site: <http://www.arl.noaa.gov/vaftad.html>. This site also contains a number of model runs of hypothetical volcanic eruptions, generally of recently active volcanoes or those suspected to become active. If for any reason the VAAC Washington is unable to respond, or contact cannot be achieved, recourse should be made to the VAACs London, Montreal or Toulouse at the 24-hour contact numbers given in 4.4.1 to run their dispersion models.

4.6 ACTION TO BE TAKEN BY VAACs OR MWOs REGARDING VOLCANIC ASH TEST PROCEDURES

4.6.1 When a volcanic ash test/exercise is carried out to check the IAVW procedures, the following should be applied:

- a) the VAAC concerned should issue a volcanic ash (VA) advisory test message highlighting that the advisory refers to a test message by using “VA TEST” or “VA EXERCISE” (followed by the name of the exercise if wished) in elements 9, 11 and 17 of the VA advisory message (Annex 3, Table A2-1 refers) as part of the element description. The VA advisory message will emphasize that the message refers to a test/exercise by repeating “VA TEST” or “VA EXERCISE” as many as practicable in element 17;
- b) the MWO concerned should issue a volcanic ash SIGMET highlighting that the

SIGMET refers to a test message by including “VA TEST” or “VA EXERCISE” (followed by the name of the exercise, if wished) in element “Phenomenon” of SIGMET message (Annex 3, Table A6-1 refers).

4.7 ACTION TO BE TAKEN BY PILOTS IN THE EVENT OF ENTRY INTO A SO₂ CLOUD

4.7.1 There is a possible association between volcanic ash and sulphur dioxide gas (SO₂). The following paragraphs provide guidance and recommended actions to be taken by pilots in the event of entering in a SO₂ cloud, with the understanding that they constitute only examples and do not necessary cover all the practices being applied by operators.

4.7.2 The presence of a sulfurous gas, (SO₂) at altitude is the result of volcanic activity. SO₂, best described as a sulfur odor similar to a struck match will only be detectable for a short period because of the olfactory fatigue resulting in lose of the ability to smell the odor of SO₂. Sensitivity to odors while in-flight is paramount to the safety of flight. “Electrical Smoke and Fire” and SO₂ are two odors that are described as somewhat similar requiring a means to verify which odor is present.

4.7.3 After determining there are no secondary indications that would result from and indicate an electrical fire, the crew should continue to determine the source of the odor. The first decision by the crew is to establish whether the odor is generated from inside or outside the aircraft. In order for the crew to make this determination and confirm if the odor is transient or not, at the direction of the captain, a crew member should don an oxygen mask and breathe 100% oxygen for the period of time that results in a complete change of air within the cockpit.

4.7.4 The crew member should breathe 100% oxygen for the length of time determined in 4.6.2 to regain the ability to smell the SO₂. After the appropriate time period, the crew member should remove their oxygen mask and determine if the odor is still present. If the crew member affirms the continued presence of SO₂, it is recommended the captain report their findings to the controlling ATC facility and company dispatch as soon as practicable.

4.7.5 It is recommended the reporting pilot use the Volcanic Activity Report form (VAR) Section 1, Items 1-8. Following the submission of the VAR, the crew should remain vigilant for signs of inadvertent entry into a volcanic ash cloud. The crew should also request periodic updates of any volcanic activity along their route of flight from the controlling ATC facility and company dispatch.

**Table 4-1. Addresses for NOFs to use to send
ASHTAMs or NOTAMs on volcanic activity to their associated VAAC**
(4.3.2 refers)

Argentina	– sent to SAZZMAMX EGZZVANW
Cameroon	– sent to LFPWYMYX EGZZVANW
Canada	– sent to CWAQYMYU EGZZVANW
Cape Verde	– sent to LFPWYMYX EGZZVANW
Chile	– sent to SAZZMAMX EGZZVANW
China	– sent to RJTDYMYX EGZZVANW
Colombia	– sent to KWBCYMYX EGZZVANW
Comoros	– sent to LFPWYMYX EGZZVANW
Costa Rica	– sent to KWBCYMYX EGZZVANW
Democratic Republic of the Congo	– sent to LFPWYMYX EGZZVANW
Ecuador	– sent to KWBCYMYX EGZZVANW
El Salvador	– sent to KWBCYMYX EGZZVANW
Eritrea	– sent to LFPWYMYX EGZZVANW
Ethiopia	– sent to LFPWYMYX EGZZVANW

France (île de la Réunion)	– sent to LFPWYMYX EGZZVANW
French Antilles (France)	– sent to KWBCYMYX EGZZVANW
Greece	– sent to LFPWYMYX EGZZVANW
Guatemala	– sent to KWBCYMYX EGZZVANW
Guyana	– sent to KWBCYMYX EGZZVANW
Iceland	– sent to EGRRYMYX EGZZVANW
Indonesia	– sent to YPDMYMYX EGZZVANW
Italy	– sent to LFPWYMYX EGZZVANW
Japan	– sent to RJTDYMYX EGZZVANW
Kenya	– sent to LFPWYMYX EGZZVANW
Mexico	– sent to KWBCYMYX EGZZVANW
Montserrat (United Kingdom)	– sent to KWBCYMYX EGZZVANW
New Zealand	– sent to NZKLYMYX EGZZVANW
Nicaragua	– sent to KWBCYMYX EGZZVANW
Papua New Guinea	– sent to YPDMYMYX EGZZVANW

Peru	– sent to KWBCYMYX SAZZMAMX EGZZVANW
Philippines	– sent to RJTDYMYX YPDMYMYX EGZZVANW
Portugal	– sent to LFPWYMYX EGZZVANW
Russian Federation	– sent to KWBCYMYX RJTDYMYX EGZZVANW
Solomon Islands	– sent to NZKYMYX YPDMYMYX EGZZVANW
Spain	– sent to LFPWYMYX EGZZVANW
Trinidad and Tobago	– sent to KWBCYMYX EGZZVANW
Vanuatu	– sent to NZKYMYX EGZZVANW

Table 4-2. VAAC contact numbers*(4.4.1 a) refers)*

Note.— E-mail addresses are provided as back-up. Telephone/fax numbers should always be used first.

VAAC Anchorage

Tel.:	Operational	+1 (907) 266-5110
	Administrative	+1 (907) 266-5116
Fax:		+1 (907) 266-5169
AFTN:		via KWBCYMYX
E-mail:	Operational	a-vaac@noaa.gov
	Administrative	Tony.Hall@noaa.gov
		Eugene.M.Petrescu@noaa.gov
		Jeffrey.Osiensky@noaa.gov
Homepage:		http://vaac.arh.noaa.gov
		http://aawu.arh.noaa.gov

VAAC Buenos Aires

Tel.:	Operational	+(54 11) 5167 6767, Ext. 18238/18233/18103
		+(54 11) 5167 6705
	Administrative	+(54 11) 5167 6767, Ext. 18235
		+(54 11) 5167 6707
Fax:		+(54 11) 5167 6709
AFTN:		SAZZMAMX
E-mail:	Operational	vmsr@smn.gov.ar
		bue.vaac@smn.gov.ar
		sovaacbue@smn.gov.ar
	Administrative	metaer@smn.gov.ar
		cbenitez@smn.gov.ar
Homepage:		http://www.ssd.noaa.gov/VAAC/OTH/AG/messages.html

VAAC Darwin

Tel.:	Operational	+61 (8) 8920 3830 (PABX)
		+61 (8) 8927 9189 (direct)
	Administrative	+61 (8) 8920 3867
Fax:		+61 (8) 8920 3829
AFTN:		YPDMYMYX
E-mail:	Operational	darwin.vaac@bom.gov.au
	Administrative	darwin.vaac.admin@bom.gov.au
Homepage:		http://www.bom.gov.au/info/vaac/

VAAC London

Tel.:	Operational	+44 1392 884167
	Administrative	+44 1392 886095
Fax:	Operational	+44 1392 884549
	Administrative	+44 1392 884549
AFTN:		EGZZVANW
E-mail:	Operational	vaac@metoffice.gov.uk
	Administrative	nigel.gait@metoffice.gov.uk
Homepage:		http://www.metoffice.gov.uk/aviation/vaac/index.html

VAAC Montreal

Tel.:	Operational	+1 (514) 421 4635
	Administrative	+1 (514) 421 4704
Fax:	Operational	+1 (514) 421 4639
	Administrative	+1 (514) 421 4679
AFTN:		CWAOYMYU
E-mail:	Operational	vaac@ec.gc.ca
	Administrative	rene.servranckx@ec.gc.ca
		dov.bensimon@ec.gc.ca
Homepage:		http://meteo.gc.ca/eer/vaac/index_e.html

VAAC Tokyo

Tel.:	Operational	+81 (3) 3212 6203
	Administrative	+81 (3) 3284 1749
Fax:		+81 (3) 3212 6446
AFTN:		RJTDYMYX
E-mail:	Operational	vaac@eqvol2.kishou.go.jp
	Administrative	vaac-adm@eqvol2.kishou.go.jp
Homepage:		http://ds.data.jma.go.jp/svd/vaac/data/index.html

VAAC Toulouse

Tel.:	Operational	+33 (5) 61 07 82 30 or 07 85 10
	Administrative	+33 (5) 61 07 82 37/82 39
Fax:	Operational	+33 (5) 61 07 82 54
	Administrative	+33 (5) 61 07 82 09
AFTN:		LFPWYMYX or LFPWYMCR
E-mail:	Operational	vaac@meteo.fr
	Administrative	philippe.husson@meteo.fr
Homepage:		http://www.meteo.fr/vaac/

VAAC Washington

Tel.:	Operational	+1 (301) 763-8444/8298
	Administrative	+1 (301) 763 8444
Fax:		+1 (301) 763 8333/8592
AFTN:		KWBCYMYX
E-mail:	Operational	w-vaac@noaa.gov
	Administrative	Grace.Swanson@noaa.gov
	Additional information	davida.streett@noaa.gov
Homepage:		http://www.ssd.noaa.gov/VAAC/

VAAC Wellington

Tel.:	Operational	+64 (4) 470 0816 (24/7 helpline)
	Administrative	+64 (4) 470 0731
Fax:		+64 (4) 470 0801
AFTN:		NZKLYMYX
E-mail:	Operational	vaac@metSERVICE.com
		duty.avfcstr@metSERVICE.com
	Administrative	matt.ruglys@metSERVICE.com
	Additional information	ray.thorpe@metSERVICE.com
Homepage:		http://www.vaac.metSERVICE.com

Table 4-3. Volcanic ash advisory bulletin headers
(4.5.1 h) refers)

VAAC	Back-up VAAC	Bulletin Headers		Remarks
		VAA	VAG	
Anchorage		FVAK21 PAWU FVAK22 PAWU FVAK23 PAWU FVAK24 PAWU FVAK25 PAWU	PFXD21 PAWU PFXD22 PAWU PFXD23 PAWU PFXD24 PAWU PFXD25 PAWU	
	Washington			
Buenos Aires		FVAG01 SABM		
Darwin		FVAU01 ADRM FVAU02 ADRM FVAU03 ADRM FVAU04 ADRM FVAU05 ADRM FVAU06 ADRM	PFXD01 ADRM PFXD02 ADRM PFXD03 ADRM PFXD04 ADRM PFXD05 ADRM PFXD06 ADRM PFXD07 ADRM PFXD08 ADRM PFXD09 ADRM PFXD10 ADRM	
	Tokyo Wellington	FVFE01 RJTD FVPS01 NZKL		
London		FVXX01 EGRR FVXX02 EGRR FVXX03 EGRR	PFXD01 EGRR PFXD02 EGRR PFXD03 EGRR	
	Toulouse	FVXX05 EGRR	PFXD05 EGRR	
Montreal		FVCN01 CWAO to FVCN04 CWAO	VAG available only at the VAAC website	
	Washington	FVCN03 CWAO FVCN04 CWAO		

VAAC	Back-up VAAC	Bulletin Headers		Remarks
		VAA	VAG	
Tokyo		FVFE01 RJTD	VAG available only at the VAAC website	
			QHVA10 RJTD QHVA15 RJTD	Graphical format chart of VA observation Graphical format chart of VA forecast
Toulouse		FVXX01 LFPW FVXX02 LFPW FVXX03 LFPW FVXX04 LFPW	PFXD01 LFPW to PFXD04 LFPW PFXD06 LFPW to PFXD09 LFPW	(T4 format) (png format) [where PFXDnn and PFXDnn+5 are the same VAG in T4 and png]
	London	FVXX05 EGRR	PFXD05 EGRR	(png format)
Washington		FVXX20 KNES FVXX21 KNES FVXX22 KNES FVXX23 KNES FVXX24 KNES FVXX25 KNES FVXX26 KNES FVXX27 KNES	PFXD20 KNES PFXD21 KNES PFXD22 KNES PFXD23 KNES PFXD24 KNES PFXD25 KNES PFXD26 KNES PFXD27 KNES	
Wellington		FVPS0 NZKL1	To be provided in due time	

APPENDIX A

Sample Letter of Agreement between the Air Traffic Services (ATS), Meteorological Authorities and Vulcanological Authorities

*Directives for coordination between area control centres (ACCs),
meteorological watch offices (MWOs) and vulcanological observatories and responsibility
for the
provision/exchange of information relevant to volcanic ash*

Effective date:

1. OBJECTIVE

1.1 The objective of this Letter of Agreement between the [ATS authority]¹, the [meteorological authority]² and the [vulcanological authority]³ is to establish the directives for the necessary coordination between ATS units, meteorological watch offices and vulcanological observatories to ensure the provision of specific information on pre-eruption volcanic activity, volcanic eruptions and volcanic ash cloud required for civil (international and national) air navigation, in accordance with international agreements (see 1.4) and [national air navigation regulatory documents].

1.2 This Letter of Agreement provides guidelines on the responsibilities of ATS units, meteorological watch offices and vulcanological observatories in relation to the mutual exchange of information related to volcanic ash.

1.3 This Letter of Agreement is in accordance with the Standards and Recommended Practices and Procedures of ICAO, contained in Annex 3 — *Meteorological Service for International Air Navigation*, Annex 11 — *Air Traffic Services*, Annex 15 — *Aeronautical Information Services* and in the *Procedures for Air Navigation Services - Air Traffic Management* (PANS-ATM, Doc 4444), as well as the provisions contained in the relevant regional air navigation plan publications and in the aeronautical information publication of [State]⁴ (AIP-[State]). This Letter of Agreement is also based on the guidance material in the *Manual on Coordination between Air Traffic Services, Aeronautical Information Services and Aeronautical Meteorological Services* (Doc 9377), the *Aeronautical Information Services Manual* (Doc 8126) and the *Handbook on the International Airways Volcano Watch (IAVW) — Operational Procedures and Contact List* (Doc 9766).

1.4 This Letter of Agreement includes _____⁵ Appendices, regarding detailed national directives and arrangements pertaining to the use of the aviation volcano colour code, the ASHTAM format, abbreviations, list of contact points and means of communication, stations/offices and contact numbers, etc.

2. REVISIONS

2.1 When, for special or unforeseen reasons, a significant change in the coordination between the three parties involved or the services mentioned in this Agreement becomes necessary, the respective officers-in-charge, through mutual agreement, may effect temporary changes or amendments, provided that these changes are not intended to last more than _____⁶ days.

-
1. Name of the ATS authority.
 2. Name of the meteorological authority
 3. Name of the vulcanological authority.
 4. Name of the State concerned.
 5. Number of appendices agreed upon by the three parties to the letter of Agreement,
 6. Figure to be agreed locally: six days appears to be a suitable period.

2.2 Permanent revisions to the Letter of Agreement may be made by the authorities who approve and sign this Agreement. This LOA is to be reviewed annually. A complete cancellation of this Letter of Agreement may be made, in writing, by the parties to the agreement within a notice period of _____⁷ days.

3. GENERAL

3.1 In order to contribute to the efficiency and safety of international air navigation in [State] the [ATS authority]¹, the [meteorological authority]² and the [vulcanological authority]³ will collaborate to ensure fast and efficient coordination to minimize the impact of the presence of volcanic ash in the atmosphere.

3.2 The [MWOs][ACCs][volcanic ash advisory centres (VAACs) and selected volcano observatories] concerned shall make suitable arrangements in order to facilitate vulcanological briefings as well as inter-agency consultations and to establish reliable communications to undertake an effective coordination.

4. RESPONSIBILITIES

4.1 Responsibilities of [the meteorological authority] and the meteorological watch offices

4.1.1 General

4.1.1.1 FASID Table MET 3C identifies the selected State volcano observatories which are to notify VAAC, MWOs and ACCs on volcanic pre-eruption, volcanic eruption and volcanic ash.

4.1.1.2 The [meteorological authority], through the [meteorological watch office (MWO)]⁸ included in the FASID Table MET 3C of [ANP]⁹, is responsible for issuing SIGMET(s) on volcanic ash, i.e. providing up-to-date information on existing and forecasted volcanic ash clouds, and forecasted trajectories at different flight levels based on the latest information received from vulcanological observatories or from the corresponding VAAC to those area control centres that need it in order to carry out their functions. The provision of any information related to volcanic activity and the presence of volcanic ash clouds in the atmosphere should be in accordance with the guidelines provided in the attachment to this Letter of Agreement.

4.2 Responsibilities of [the ATS authority] and area control centres (ACCs)

4.2.1 [The MET Authority], through the [ACC]¹⁰ included in the FASID Table MET 3C of [ANP], is responsible to provide up-to-date information on existing volcanic ash clouds and trajectory forecasts at different flight levels to pilots and airline operation centers..This information should be based on the latest information received from:

- a) vulcanological observatories;
- b) the associated VAAC; or

7. Figure to be agreed locally: 180 days appears to be a suitable period.

8. Name(s) of the meteorological watch office(s).

9. Title of corresponding ANP.

10. Name of the area control centre.

- c) the associated MWO.

and passed immediately to aircraft in flight that could be affected by the volcanic ash, and to the adjacent ACCs.

4.2.2 The ACC should also issue an ASHTAM or NOTAM through the State International NOTAM Office (NOF) in accordance with Annex 15, Chapter 5, giving details of the pre-eruption activity, volcanic eruption and ash cloud, including name and geographical coordinates of the volcano, date and time of eruption, flight levels and routes affected and, if necessary, routes to be closed to air traffic. The provision of any information related to volcanic activity and the presence of volcanic ash clouds in the atmosphere should be in accordance with the guidelines provided in the attachment to this Letter of Agreement.

4.3 Responsibility of the vulcanological authority

4.3.1 [*The vulcanological observatory*] included in the FASID Table MET 3C of the[*ANP*] is responsible for the provision of up-to-date information on existing and forecasted volcanic activity and volcanic ash clouds based on the latest information received from direct or remote observation sources to the [*ACC*], the [*MWO*] and the [*VAAC*] concerned. The necessary vulcanological information will be supplied in accordance with the guidelines stipulated in the attachment to this Letter of Agreement.

4.3.2 The vulcanological information provided will, as far as possible, be in the format described in step 1 of the attachment in order to facilitate easy interpretation by ATS personnel.

5. ATS UNITS, MWOs AND VULCANOLOGICAL OBSERVATORIES COORDINATION MEETINGS

Regular and/or ad hoc coordination meetings between the chiefs of the ATS units, chiefs of meteorological watch offices and chiefs of vulcanological observatories, and other interested parties, aimed at improving the services provided to aircraft, will be convened as deemed necessary to ensure the safety of air navigation in accordance with the provisions as identified in 1.3.

6. COURSES FOR METEOROLOGISTS, AIR TRAFFIC CONTROLLERS AND VULCANOLOGISTS

6.1 Courses or on-the-job training for meteorological, ATS personnel and vulcanologists will be organized periodically with the objective of familiarizing personnel with the activities performed by the other services.

6.2 Periods and dates for these courses will be agreed by [*the ATS authority*] , [*the meteorological authority*] and [*the vulcanological authority*] taking into account the availability of personnel and the necessary equipment.

Attachment**GUIDELINES IN HANDLING VOLCANIC ACTIVITY RELATIVE TO
AERONAUTICAL INFORMATION DISSEMINATION**

*(Complementary to Part 4 of the Handbook on the
International Airways Volcano Watch (IAVW) —
Operational Procedures and Contact List (Doc 9766)*

STEP 1**1.1 Action to be taken by the vulcanological observatory**

1.1.1 The vulcanological observatory shall immediately provide information on significant pre-eruption volcanic activity, volcanic eruptions or the presence of volcanic ash clouds to the relevant ACCs [*list the centres*], [VAAC] and the associated MWOs [*list the offices*]. The information provided should be in accordance with the format of the Volcano Observatory Notice for Aviation (VONA) given at Appendix E.

STEP 2**2.1 Action to be taken by the ACC**

2.1.1 The ACC concerned shall immediately pass the reported information to the aircraft in flight that could be affected by the volcanic ash cloud and to the relevant ACCs in the adjacent flight information regions (FIRs).

2.1.2 On the reception of special air-reports for volcanic ash by an ACC, the following action should be taken:

- a) the information should be transmitted immediately to all aircraft concerned;
and
- b) the information should be forwarded to the associated MWO.

The special air reports for volcanic ash should be disseminated to aircraft for a period of 60 minutes after their issuance or until the issuance of a SIGMET from the associated MWO. The ACC shall verify that a SIGMET has been issued before discontinuing the transmission of the special air report.

2.1.3 The ACC concerned shall ensure that the content of the ASHTAM is consistent with any SIGMET issued for their FIR. Further, the ACC shall ensure that any ASHTAM or NOTAM issued follows the guidance of Annex 15.

2.1.4 The ACC concerned shall activate contingency arrangements, including implementation of alternative routes.

2.1.5 Transmit special air reports for volcanic ash received by voice communications and those received by data link communication to the associated MWO, and World Area Forecast Centres (WAFCs) London and Washington.

2.2 Action to be taken by the MWO

2.2.1 The MWO shall immediately forward special air-reports for volcanic ash received to its associated VAAC, WAFCs London and Washington and to the Washington, Brazilia, and Vienna International OPMET data bank.

2.2.2 The MWO shall ensure the reception of information from its associated VAAC on the extent and trajectory of volcanic ash.

2.2.3 The MWO shall immediately inform the ACC whether or not the volcanic ash cloud is identifiable from satellite images based on advice received from the VAAC.

2.2.4 The MWO shall issue SIGMETs in accordance with Annex 3 based on information received from the VAAC and/or vulcanological observatory and/or ACC. However, during critical conditions where an initial volcanic eruption already poses a danger to aviation, the MWO shall immediately provide to the ACC a trajectory forecast of volcanic ash based, inter alia, on the forecasts of numerical models used by the aeronautical MET service.

STEP 3

3.1 Action to be taken by ACC

3.1.1 The ACC shall submit a request for the promulgation of an ASHTAM/NOTAM for volcanic ash to its associated NOTAM Office (NOF)/ Aeronautical Information Service (AIS). The request shall contain the following:

- a) date and time of volcanic activity or eruption, or presence of ash clouds;
- b) name and number of the volcano (Smithsonian Tables);
- c) coordinates (latitude/longitude expressed in whole degrees) of the volcano and/or the radial and distance of the volcano from a navigational aid (NAVAID);
- d) aviation colour code for level of alert indicating volcanic activity, if available (Annex 15);
- e) horizontal and vertical extent of volcanic ash cloud initially based on the special air report and subsequently based on the MWO, aeronautical MET service or VAAC report;
- f) forecast direction of movement of the ash cloud at selected levels based on the advice from the MWO, the aeronautical MET service or the VAAC report;
- g) air routes or portions of air routes and flight levels affected or expected to become affected;
- h) closure of airspace, air routes or portions of air routes, and availability of alternate routes;
- i) source of information (air report and or vulcanological observatory and/or MWO, aeronautical MET service and/or VAAC) indicating whether an eruption has actually occurred or ash cloud reported, or not; and
- j) additional information.

Note.— Initially items a), b), c), and d) shall be disseminated immediately pending receipt of additional information from units concerned.

3.2 Action to be taken by NOF/AIS

3.2.1 The NOF shall promulgate an ASHTAM/NOTAM for volcanic activity based on information provided by the ACC and in accordance with ICAO format (see Annex 15, Appendices 3 and 6), and transmit to other NOFs for which the information is of direct operational significance.

3.2.2 The NOF shall compile a separate message to be transmitted, via AFTN, to [the associated VAAC] which shall be encapsulated within a dummy WMO abbreviated heading (see example in the *Handbook on the International Airways Volcano Watch (IAVW) — Operational Procedures and Contact List* (Doc 9766), Table 4-1). This enables

the receiving AFTN or MET switching centre to forward the ASHTAM/NOTAM for volcanic activity to the VAAC concerned on internal MET communications circuits.

Note. — Significant changes in the activity of the volcano shall be reported accordingly.

3.3 The ACC concerned shall, upon receipt of significant information relating to volcanic activity, request the NOF to revise or cancel the ASHTAM.

— — — — —

APPENDIX B

**AFTN ADDRESSES TO BE USED TO PROMULGATE
SPECIAL AIR REPORTS, SIGMETs and VOLCANIC ASH ADVISORIES
TO LONDON WAFC AND SADIS**

Region	Address
EUR	EGZZWPXX
NAM	EGZZMNAM
NAT	EGZZMNAT
CAR	EGZZMCAR
SAM	EGZZMSAM
PAC	EGZZMPAC
ASIA	EGZZMASI
MID	EGZZMMID
AFI	EGZZMAFI

APPENDIX C

OPERATIONAL PROCEDURES FOR THE COORDINATION AND TRANSFER OF RESPONSIBILITY BETWEEN VAACs FOR VOLCANIC ASH EVENTS

1. As soon as one of the VAACs learns of an eruption (for a volcano erupting within 5° degrees latitude of the VAACs boundary) or when an ash cloud is expected to come within 5° (latitude) of the VAACs and/or FIR boundary, an information /coordination phone call will be made. The possibility of a hand-off will be discussed, if appropriate.

2. Hand-off of operational responsibility shall be coordinated by the lead VAAC with adjacent affected VAACs and MWOs when the ash cloud is not less than 5° (latitude) from a VAAC and/or FIR boundary. In the rare situation of large or persistent ash emissions, adjacent responsible VAACs, upon coordination, may agree to divide the operational forecast responsibility.

3. Once a hand-off has been decided, the last volcanic ash advisory issued by the lead VAAC before hand-off will include the following at the end of the message (in the REMARKS):

“THE RESPONSIBILITY FOR THIS ASH EVENT IS BEING TRANSFERRED TO VAAC **aaaa** THE NEXT ADVISORY WILL BE ISSUED BY VAAC **aaaa** BY **xxxx** UTC UNDER HEADER **bbbb**.”

Where:

aaaa is the name of the VAAC taking over

bbbb is the bulletin header that will be used by the VAAC taking over (FVCN01 CWA0, FVXX21 KWBC, FVAK20 PANC, etc.)

xxxx is the time in UTC

Example:

“THE RESPONSIBILITY FOR THIS ASH EVENT IS BEING TRANSFERRED TO VAAC MONTREAL. THE NEXT ADVISORY WILL BE ISSUED BY VAAC MONTREAL BY 2200 UTC UNDER HEADER FVCN01 CWA0.”

4. The first volcanic ash advisory issued by the VAAC that has taken over responsibility will include the following:

“VAAC **cccc** HAS TRANSFERRED RESPONSIBILITY OF THIS EVENT TO VAAC **dddd**. THIS ADVISORY UPDATES MESSAGE **eeee**.”

Where:

cccc is the name of the VAAC which had the lead before the hand-off

dddd is the name of the VAAC which has taken over

eeee is the full bulletin header (e.g FVAK PANC 261200) of the last message issued by the VAAC which had the lead before the hand-off.

Example:

“VAAC ANCHORAGE HAS TRANSFERRED RESPONSIBILITY OF THIS EVENT TO VAAC MONTREAL. THIS ADVISORY UPDATES MESSAGE FVAK20 PANC 261200.”

5. When the lead VAAC is issuing messages covering a portion of another VAAC's area of responsibility, or an ash cloud is approaching (within 5 degrees of latitude) the area of responsibility of a non-lead VAAC, the non-lead VAAC should issue a volcanic ash advisory directing the user to the correct product. The following wording is suggested:

“PLEASE SEE **ffff** ISSUED BY VAAC **gggg** WHICH DESCRIBES CONDITIONS OVER OR NEAR THE VAAC **hhhh** AREA OF RESPONSIBILITY.”

Where:

ffff is the full bulletin header of the message issued by the lead VAAC

gggg is the name of the lead VAAC

hhhh is the name of the VAAC re-broadcasting the lead VAAC message

Example of rebroadcast message issued by VAAC Montreal:

PLEASE SEE FVAK20 PANC 121200 ISSUED BY VAAC ANCHORAGE WHICH DESCRIBES CONDITIONS OVER OR NEAR THE VAAC MONTREAL AREA OF RESPONSIBILITY”

6. For situations in which two or more distinct ash clouds would be present (different eruptions or one eruption for which the ash cloud has divided in two or more distinct parts), the “hand-off” only applies to the ash cloud approaching or crossing VAAC boundaries.
7. The ending of an advisory for a volcanic ash event shall be performed by the lead VAAC, upon coordination with the adjacent affected VAACs and MWOs.
8. Only the lead VAAC shall issue volcanic ash advisories in graphical format on ISCS or SADIS.

— — — — —

APPENDIX D

BACK-UP PROCEDURES FOR VOLCANIC ASH ADVISORY CENTERS

The following guidelines on back-up procedures should be followed by VAACs:

- a) a back-up site should be established;
- b) back-up sites should have the full capability of the primary site, i.e. the ability to monitor ash dispersal, run atmospheric dispersion models, produce and distribute the volcanic ash advisory;
- c) the back-up site should be chosen as to maximize efficiency, e.g. this will normally be at an alternative 24/7 production facility with pre-existing facilities for the VAAC capability;
- d) back-up sites should maintain up-to-date contact lists as per the VAAC;
- e) in the event of the back-up site becoming operational, volcanic ash advisories issued by the back-up VAAC will contain information giving the origin of the message; and
- f) the back-up arrangements should be tested at least annually.

Editorial Note.— Most of the VAACs already have a nominated back-up site. This back-up site may be another meteorological centre in the same Contracting State or it may be another VAAC. Details about the back-up sites and their contact details together with examples will also be included in the Handbook (Doc 9766) by the Secretariat in due course.

— — — — —

APPENDIX E

FORMAT OF VOLCANO OBSERVATORY NOTICE FOR AVIATION (VONA)

Explanation of the format of a Volcano Observatory Notice for Aviation (VONA) which is issued by a VO when a colour code changes (up or down) or within a colour-code level when an ash-producing event or other significant change in volcanic behaviour occurs.

(1) VOLCANO OBSERVATORY NOTICE FOR AVIATION--VONA

- | | |
|--|--|
| (2) Issued: | Universal (Z) date and time
(YYYYMMDD/HHMMZ). |
| (3) Volcano: | Name and number (per
Smithsonian database at
http://www.volcano.si.edu/world/) |
| (4) Current Aviation Colour Code: | GREEN, YELLOW,
ORANGE, OR RED in upper
case bold font |
| (5) Previous Aviation Colour Code: | Lower case font, not bold |
| (6) Source: | Name of Volcano Observatory
(volcanological agency) |
| (7) Notice Number: | Create unique number that
includes year |
| (8) Volcano Location: | Latitude, longitude in
NOTAM format (N or S deg
min W or E deg min) |
| (9) Area: | Regional descriptor |
| (10) Summit Elevation: | nnnnn FT (nnnn M) |
| (11) Volcanic Activity Summary: | Concise statement that
describes activity at the
volcano. If known, specify
time of onset and duration
(local and UTC) of eruptive
activity. |
| (12) Volcanic Cloud Height: | Best estimate of ash-cloud top
in nnnnn FT (nnnn M) above
summit or AMSL (specify
which). Give source of height
data (ground observer, pilot
report, radar, etc.).
“UNKNOWN” if no data
available or “NO ASH
CLOUD PRODUCED” if
applicable. |
| (13) Other Volcanic Cloud information: | Brief summary of relevant
cloud characteristics such as
colour of cloud, shape of
cloud, direction of movement,
etc. Specify if cloud height is
obscured or suspected to be
higher than what can be
observed clearly.
“UNKNOWN” if no data |

-
- available or “NO ASH
CLOUD PRODUCED” if
applicable.
- (14) Remarks: Optional; brief comments on
related topics such as
monitoring data, observatory
actions, volcano’s previous
activity, etc.
- (15) Contacts: Names, phone numbers (voice
and fax), email addresses.
- (16) Next Notice: “A new VONA will be issued
if conditions change
significantly or the colour
code is changes.” Indicate if
final notice for an event.
Include URL of Web site
where latest volcanic
information is posted.
- — — — —

APPENDIX F

GUIDANCE TO PILOTS ON THE DETECTION OF SULPHUROUS GASES ON THE FLIGHT DECK

In the *Handbook on the International Airways Volcano Watch (IAVW)* —
Operational Procedures and Contact List (Doc 9766) replace paragraph 4.7 by the
following:

4.7.1 The following paragraphs provide explanatory material and guidance about recommended actions to be taken by Flight Crew in the event of smelling sulphur gases during flight, with the understanding that the guidance constitutes examples and does not necessarily cover all practices being applied by operators.

4.7.2 Volcanic eruptions emit various gases along with magma, including sulphur dioxide (SO₂) and hydrogen sulphide (H₂S). Volcanoes are the only sources of large quantities of sulphur gases at cruise altitudes, and both SO₂ and H₂S are detectable by smell. Thus, the smell of sulphur gases in the cockpit may indicate volcanic activity that has not yet been detected or reported and/or possible entry into an ash-bearing cloud. In some cases when sulphur gases are smelled, there may be little ash in the cloud owing to ash fallout during prior dispersion of the cloud, but Flight Crew do not have the means to determine directly that the cloud is non-hazardous and thus should seek to exit the cloud.

4.7.3 SO₂ is identifiable as the sharp, acrid odour of a freshly struck match. H₂S, also known as sewer gas, has the odour of rotten eggs. Sulphur gases may be detectable only for a short period of time because of ‘olfactory fatigue’ (temporary loss of the ability to smell a particular odour).

4.7.4 Inhalation of SO₂, even at low concentrations (<5 ppm), can cause respiratory tract irritation especially in people with asthma and chronic obstructive pulmonary disease. When SO₂ gas combines with water in the atmosphere, a sulphate aerosol primarily composed of dilute sulphuric acid is formed. Flying through sulphuric acid aerosols has caused crazing of acrylic windows, fading of exterior paint, and accumulation of sulphate deposits in engines. SO₂ gas is colourless, but under certain conditions of reflection and refraction of sunlight, a sulphuric acid aerosol may be a visible atmospheric feature, such as a layer of haze of variable colour (brownish, yellowish, bluish, or whitish). Ash particles likely will be present in aerosol haze but possibly in minor or trace amounts.

4.7.5 “Electrical Smoke and Fire” and SO₂ are two odours described as somewhat similar. After determining there are no secondary indications that would result from and indicate an electrical fire, the Flight Crew must establish whether the sulphur odour is transient or not. This is best achieved by Flight Crew donning oxygen mask(s) and breathing 100% oxygen for the period of time that results in a complete change of air within the cockpit and also allows the sense of smell to be regained. After the appropriate time period, the Flight Crew should remove the oxygen mask and determine if the odour is still present.

4.7.6 If the Flight Crew affirms the continued presence of sulphur gas, the controlling Area Control Centre and Airline Operation Centres must be informed as soon as practicable to request information about any relevant volcanic activity and the whereabouts of possible volcanic clouds. It is recommended that the reporting pilot use the Volcanic Activity Report form (VAR) Section 1, Items 1-8, which is a Special AIREP. Upon landing the Flight Crew should complete VAR (items 9-16) and submit the VAR per the instruction on the VAR form to the Darwin VAAC.

— — — — —

Part 5

INTERNATIONAL AIRWAYS

VOLCANO WATCH CONTACT LIST

5.1 ALPHABETICAL LISTING

Antigua and Barbuda	Indonesia
Argentina	Italy
Australia	Jamaica
Bolivia	Japan
Brazil	Kenya
Cameroon	Mexico
Canada	Montserrat (United Kingdom)
Cape Verde	Netherlands Antilles (Netherlands)
Chile	New Zealand
China	Nicaragua
Colombia	Pakistan
Comoros	Panama
Costa Rica	Papua New Guinea
Cuba	Paraguay
Democratic Republic of the Congo	Peru
Dominican Republic	Philippines
Ecuador	Puerto Rico (United States)
El Salvador	Portugal
Eritrea	Russian Federation
Ethiopia	Saint Kitts and Nevis
France	Saint Lucia
France (Île de la Réunion)	Saint Vincent and the Grenadines
French Antilles	Solomon Islands
French Guiana (France)	Spain
Greece	Suriname
Grenada	Trinidad and Tobago
Guatemala	United States
Guyana	Uruguay
Honduras	Vanuatu
Iceland	Venezuela

5.2 LIST OF STATES BY ICAO REGION**AFI**

Cameroon
Cape Verde
Comoros
Democratic Republic of the Congo
Eritrea
Ethiopia
France (Île de la Réunion)
Kenya

French Antilles (France)
French Guiana (France)
Grenada
Guatemala
Guyana
Honduras
Jamaica
Mexico
Montserrat (United Kingdom)
Netherlands Antilles (Netherlands)
Nicaragua
Panama
Paraguay
Peru
Puerto Rico (United States)
Trinidad and Tobago
Saint Kitts and Nevis
Saint Vincent and the Grenadines
Saint Lucia
Suriname
Uruguay
Venezuela

ASIA/PAC

Australia
China
Indonesia
Japan
New Zealand
Pakistan
Papua New Guinea
Philippines
Solomon Islands
Vanuatu

EUR

France
Greece
Italy
Portugal
Russian Federation
Spain

CAR/SAM

Antigua and Barbuda
Argentina
Bolivia
Brazil
Chile
Colombia
Costa Rica
Cuba
Dominican Republic
Ecuador
El Salvador

NAM/NAT

Canada
Iceland
United States

DOCUMENT CHANGE RECORD

Part 5

DATE	SECTION PAGES AFFECTED
25.9.09	Update to Mexico
21.4.09	Update to Suriname
25.2.09	New entries: Cuba, Honduras, Jamaica and Puerto Rico (United States) Updates to: Dominican Republic, Mexico, Netherlands Antilles (Netherlands) and Trinidad and Tobago
16.12.08	New entry: Netherlands Antilles (Netherlands)
17.10.08	Update to Cameroon
8.9.08	New entry: Dominican Republic
26.8.08	Updates to: Cameroon, Cape Verde, Comoros, Dem. Rep. of Congo and CAR/SAM States
22.2.08	Portugal
5.11.07	Canada
16.4.07	Russian Federation
12.2.07	Guyana, Paraguay and Uruguay
4.12.06	Greece, Iceland, Italy, Portugal, Russian Federation and Spain
24.4.06	Canada and Peru
16.3.06	Kenya
3.3.06	Argentina, Brazil and Chile
28.11.05	Ecuador , Panama
1.11.05	Argentina, Chile, Paraguay
30.6.05	El Salvador
25.4.05	Peru

ANTIGUA AND BARBUDA

**Volcano
observatory
or authority**

FIR PIARCO

ACC Tel./Fax: +1 (268) 462 4703

MWO Tel.: +1 (268) 462 3229
Fax: +1 (268) 462 4606

ARGENTINA

Volcano observatory or authority	Servicio Geológico y Minero Argentino (SEGEMAR)	Tel./Fax: +54 (11) 4349 3176 E-mail: olapid@secind.mecon.gov.ar
---	---	--

FIR EZEIZA

ACC	Tel./Fax: +54 (11) 4480 2203 AFTN: SAEZZRZX E-mail:
------------	---

MWO	AEROPARQUE	Tel./Fax: +54 (11) 4514 1612 AFTN: SABEYMYX SAZZMAMX E-mail: omaaer@meteofa.mil.ar
------------	------------	---

FIR CORDOBA

ACC	Tel./Fax: +54 (351) 433 5350 AFTN: SACOZRZX E-mail: acccba@hotmail.com
------------	--

MWO	CORDOBA	Tel.: + 54 (351) 434 1479 AFTN: SACOYMYX SAZZMAMX E-mail: omacba@meteofa.mil.ar Fax: +54 (351) 475 6427
------------	---------	---

FIR MENDOZA

ACC	Tel./Fax: +54 (261) 448 7486 AFTN: SAMEZRZX E-mail: apelpumerillo@ciudad.com.ar
------------	---

MWO	MENDOZA	Tel./Fax: +54 (261) 448 7468 AFTN: SAMEYMYX SAZZMAMX E-mail: omadoz@meteofa.mil.ar
------------	---------	---

FIR RESISTENCIA

ACC	Tel./Fax: +54 (372) 244 0939 AFTN: SAREZRZX
------------	--

ARGENTINA

MWO	RESISTENCIA	Tel.:	+54 (372) 243 6278
		AFTN:	SAREYMYX SAZZMAMX
		E-mail:	omasis@meteofa.mil.ar
		Fax:	+54 (372) 243 6285
FIR	COMODORO RIVADAVIA		
ACC		Tel.:	+54 (297) 454 8375
		AFTN:	SAVCZRZX
MWO	COMODORO RIVADAVIA	Tel./Fax:	+54 (297) 454 8018
		AFTN:	SAVCYMYX SAZZMAMX
		E-mail:	omacrv@meteofa.mil.ar
NOF	EZEIZA	Tel./Fax:	+54 (11) 4480 2260
		AFTN:	SAEZYNYX
		E-Mail:	notamezeiza@yahoo.com.ar

AUSTRALIA

Volcano observatory or authority	Bureau of Meteorology HQ Melbourne	Tel.: +61 (3) 9669 4586 Fax: +61 (3) 9669 4695
	Australian Geological Survey Organization	Tel.: +61 (2) 6249 9377 E-mail: wjohnson@agso.gov.au Fax: +61 (2) 6249 9986
FIR	BRISBANE	
MWO		Tel.: +61 (8) 8920 3830 +61 (8) 8920 3833 AFTN: YPDMYMYX Fax: +61 (8) 8927 9276 +61 (8) 8920 3829
ACC		Tel.: +61 (7) 3866 3224 AFTN: YBBBZRZX Fax: +61 (7) 3866 3257
NOF	BRISBANE	AFTN: YBBBYNYX Fax: +61 (7) 3866 3553

BOLIVIA

**Volcano
observatory
or authority**

FIR	LA PAZ		
ACC		Tel./Fax:	+591 (2) 281 0203
		AFTN:	SLLPZRZX
MWO	LA PAZ	Tel.:	+591 (2) 2114232
		AFTN:	+591 (2) 212 4129
			SLLPYMYX
		E-mail:	ovmbolivia@yahoo.es
		Fax:	+591 (2) 231 6686
NOF	LA PAZ	Tel.:	+591 (2) 235 1305
			Ext. 152
		AFTN:	SLLPYNYX
		E-mail:	aisbolivia@yahoo.es
		Tel./Fax:	+591 (2) 237 0341

BRAZIL

Volcano observatory or authority

FIR AMAZONICA

ACC Tel.: +55 (92) 3652 5318
SBAZZRZX
AFTN: +55 (92) 3625 5425
Fax:

MWO MANAUS/CINDACTA IV Tel.: +55 (92) 652 5375
AFTN: SBMUYFTH
E-mail: cmvmanaus@bol.com.br

FIR BRASILIA

ACC Tel.: +55 (61) 3364 8404
AFTN: SBBRZRZX
Fax: +55 (61) 3365 4432

MWO BRASILIA/CINDACTA I Tel.: +55 (61) 3364 8358
AFTN: SBBSYMYX
E-mail: cmvbrasil@ig.com.br

FIR RECIFE

ACC Tel.: +55 (81) 3462 2742
AFTN: SBRFZRZX
Fax: +55 (81) 3462 4927

MWO RECIFE/CINDACTA III Tel.: +55 (81) 2129 8093
+55 (81) 2129 8094
AFTN: SBREYMYX
E-mail: cmvre@ig.com.br

FIR ATLANTICO

ACC Tel.: +55 (81) 3322 4107
AFTN: SBAOZRZX

MWO RECIFE/CINDACTA III Tel.: +55 (81) 2129 8093
+55 (81) 2129 8094
AFTN: SBREYMYX
E-mail: cmvre@ig.com.br

BRAZIL

FIR CURITIBA**ACC**Tel.: +55 (41) 3356 3475
+55 (41) 3356 5509
AFTN: SBCWZRZX
Fax: +55 (41) 3251 5484**MWO**

CURITIBA/CINDACTA II

Tel.: +55 (41) 3356 6216
+55 (41) 3356 5367
AFTN: SBCWYMYX
cmvct@softone.com.br
E-mail:**NOF**

BRASILIA

Tel.: +55 (61) 364 8353
AFTN: SBBRYNYX
E-mail: nofbrazil@cindactai.aer.mil.br
Fax: +55 (61) 3364 8354

CAMEROON

Volcano observatory or authority	Institut de recherches géologiques et mini res Yaoundé	Tel.: +237 22 210 316 E-mail: jhell@iccnet.cm irgm@iccnet.cm Fax: +237 22 210 316
	Contact: Dr. J. Hell	
FIR	BRAZZAVILLE	Tel.: +242 810 479 +242 815 151 AFTN: FCCCZQZX Fax: +242 810 459
ACC	DOUALA	Tel: +237 424 848 AFTN: FKKDYDYX
	DOUALA	Tel.: +237 33 428 850 AFTN: FKKDYMYX E-mail: camerounmto@asecna.org Fax: +237 33 427 117
MET		
MWO	BRAZZAVILLE	Tel: +242 282 00 50/282 00 51 +242 536 14 88/565 04 41 E-Mail: congomto@asecna.org Fax: +242 282 00 50/282 00 51
NOF	BRAZZAVILLE	AFTN: FCCCYNYX

CANADA

Volcano observatory or authority	Geological Survey of Canada Contact: Dr. Catherine Hickson	Tel.: +1 (604) 666 9772 General phone no.: +1 (604) 666 0529 E-mail: chickson@nrcan.gc.ca Fax: +1 (604) 666 7507
FIR	EDMONTON	
ACC		Tel.: +1 (780) 890 8397 AFTN: CZEGZQZX Fax: +1 (780) 890 8011
MWO		Tel.: +1 (780) 951 8904 AFTN: CWEGYMYX Fax: +1 (780) 951 8872
FIR	MONCTON	
ACC		Tel.: +1 (506) 867 7173 AFTN: CZQMZQZX Fax: +1 (506) 867 7180
MWO	Edmonton	Tel.: +1 (780) 951 8904 AFTN: CWEGYMYX Fax: +1 (780) 951 8872
FIR	MONTREAL	
ACC		Tel.: +1 (514) 633 3365 AFTN: CZULZQZX Fax: +1 (514) 633 3043
	Back-up (OSS)	Tel.: +1 (514) 633 3211 Fax: +1 (514) 633 2873
MWO	Edmonton	Tel.: +1 (780) 951 8904 AFTN: CWEGYMYX Fax: +1 (780) 951 8872
FIR	TORONTO	
ACC		Tel.: +1 (905) 676 4509 AFTN: CZYZZQZX Fax: +1 (905) 676 3121

CANADA

MWO	Edmonton	Tel:	+1 (780) 951 8904
		AFTN:	CWEGYMYX
		Fax:	+1 (780) 951 8872
FIR	WINNIPEG		
ACC		Tel.:	+1 (204) 983 8338
		AFTN:	CZWGZQZX
		Fax:	+1 (204) 984 0030
MWO	Edmonton	Tel:	+1 (780) 951 8904
		AFTN:	CWEGYMYX
		Fax:	+1 (780) 951 8872
FIR	VANCOUVER		
ACC		Tel.:	+1 (604) 586-4500
		AFTN:	CZVRZQZX
		Fax:	+1 (604) 586-4502
	Back-up (OSS)	Tel.:	+1 (604) 586-4590
		Fax:	+1 (604) 586-4597
MWO	Edmonton	Tel:	+1 (780) 951 8904
		AFTN:	CWEGYMYX
		Fax:	+1 (780) 951 8872
FIR	GANDER DOMESTIC AND OCEANIC		
ACC		Tel.:	+1 (709) 651-5207
		AFTN:	CZQXZQZX
		Fax:	+1 (709) 651-5234
MWO	Edmonton	Tel:	+1 (780) 951 8904
		AFTN:	CWEGYMYX
		Fax:	+1 (780) 951 8872
	Civil Aviation Contingency Operations (CACO)	Tel.:	+1 (613) 992 6853
			+1 (877) 992 6853
		AFTN:	CYHQYAYB
		Fax:	+1 (613) 993 7768
NOF	NAV CANADA	Tel:	+1 (613) 248-4087
		AFTN:	CYHQNOCX
		Fax:	+1 (613) 248-3983

CAPE VERDE

Volcano observatory or authority	Serviço Nacional de Meteorologia e Geofísica P.O. Box 76 Ilha do Sal	Tel.: +238 2411 658/241 1276 +238 2411371 AFTN: GVACYMYX E-mail: presimet@cvtelecom.cv Fax: +238 2411294
	Laboratório de Engenharia de Cabo Verde, Ministério de Infraestruturas e Transportes, Praia	Tel.: +238 261 5706
FIR	SAL OCEANIC	Tel.: +238 2433 3970 Fax: +238 2411730
ACC		Tel.: +238 2411970 +238 2411730 AFTN: GVSCZRZX Fax: +238 2411219
MWO		Tel.: +238 2411276 AFTN: GVACYMYX E-mail: presimet@cvtelecom.cv Fax: +238 2411294
NOF	SAL	AFTN: GVACYNYX Tel: +238 241 2502 Fax: +238 241 3336

CHILE

Volcano observatory or authority	Southern Andes Volcano Observatory (SAVO)	Tel.: +56 (45) 270 700 Mobile: 09 643 0245 E-mail: hmoreno@sernageomin.cl dvasualto@sernageomin.cl Fax: +55 (92) 625 0371
	SERNAGEOMIN, Santiago	Tel.: +56 (2) 737 5050 Mobile: 09 649 5377 E-mail: jnaranjo@sernageomin.cl josenaranjo@manquehue.net +56 (2) 737 9253 Fax:
FIR	ANTOFAGASTA	
ACC		Tel.: +56 (55) 227 944, E-Mail: Ext. 1425 appantofagasta@dgac.cl SCFAZRZX AFTN:
MWO	ANTOFAGASTA	Tel.: +56 (55) 227 944, Ext. 1421/1460/1466 AFTN: SCFAYMYX SCZZMAMX E-mail: cmrnorte@dgac.cl jaravena@dgac.cl.. Web: www.dimetchi.cl Fax: +56 (55) 225 022
FIR	SANTIAGO	
ACC		Tel.: +56 (2) 767 2001 +56 (2) 436 3004 AFTN: SCCLZRZX E-mail: cta.accu@dgac.cl Fax: cta_acol@dgac.cl +56 (2) 767 1636
MWO	SANTIAGO	Tel.: +56 (2) 601 9214 +56 (2) 436 3224 +56 (2) 436 3435 AFTN: SCZZMAMX

CHILE

			SCELYMYX
		E-mail:	metaer@meteo Chile.cl
			bcoopmet@meteo Chile.cl
		Fax:	+56 (2) 601 9214
FIR	PUERTO MONTT		
ACC		Tel.:	+56 (65) 486 234/6
		AFTN:	SCTEZRZX
		E-Mail:	evasquez@dgac.cl
		Fax:	+56 (65) 486 298
MWO	PUERTO MONTT	Tel.:	+56 (65) 486 225/6
		AFTN:	SCTEYMYX
			SCZZMAMX
		E-mail:	meteo zonatur@dgac.cl
		Fax:	+56 (65) 486 226
FIR	PUNTA ARENAS		
ACC		Tel/Fax:	+56 (61) 219 131,
			Ext. 5414, 5474
		AFTN:	SCCIZRZX
		E-mail:	fortiz@dgac.cl
MWO	PUNTA ARENAS	Tel.:	+56 (61) 219 131, Ext.
			5423/5464
		AFTN:	SCCIYMYX
		E-mail:	SCZZMAMX
		Fax:	meteoarenas@dgac.cl
			+56 (61) 219 131, Ext. 5464
NOF	SANTIAGO	Tel:	+56 (2) 436 3227
		AFTN:	SCELZPZX
		E-Mail:	operaciones_amb@dgac.cl
		Fax:	+56 (2) 601 9366

CHINA

Volcano observatory or authority	Heilongjiang Wudalianchi Volcanic Monitoring Observatory Beijing	Tel.: +86 (10) 8801 5518 Fax: +86 (10) 6821 0995 Telex: 085 222 351 SSB CN
---	---	--

FIR BEIJING

General Dispatching Office	Tel.: +86 (10) 6401 2907 AFTN: ZBBBZGZX Fax: +86 (10) 6513 5983
---	---

MWO	Tel.: +86 (10) 6459 2565 AFTN: ZBAAYMYX Fax: +86 (10) 6459 6414
------------	---

NOF	Tel.: +86 (10) 6733 7244 AFTN: ZBBBYNYX Fax: +86 (10) 6733 7244
------------	---

COLOMBIA

Volcano observatory or authority	INGEOMINAS, Manizales	Tel.: +57 (68) 843 020 E-mail: cgar/on@ingeomin.gov.co Fax: +57 (68) 843 018
	INGEOMINAS, Pasto	Tel.: +57 (27) 314 752 +57 (27) 310 514 +57 (27) 312 595 E-mail: ovt@ingeominas.gov.co Fax: +57 (27) 310 514
	INGEOMINAS, Popayán	Tel.: +57 (28) 242 341 +57 (28) 242 057 +57 (28) 240 210 Fax: +57 (28) 241 255
FIR	BARRANQUILLA	
ACC		Tel.: +57 (5) 334 8075 +57 (5) 334 8503 AFTN: SKBQZQZX E-mail: Maritza.lopez@aerocivil.gov.co Fax: +57 (5) 334 8503
MWO	BOGOTA	Tel.: +57 (1) 413 8792 +57 (1) 266 2481 AFTN: SKBOYMYX E-mail: fhidalgo@ideam.gov.co Fax: +57 (1) 413 8440
FIR	BOGOTA	
ACC		Tel.: +57 (1) 413 9998 +57 (1) 266 3460 +57 (1) 413 5445 AFTN: SKBOZQZX E-mail: jcramirez@aerocivil.gov.co Fax: +57 (1) 413 5376
MWO	BOGOTA	Tel.: +57 (1) 413 8792 +57 (1) 266 2481 AFTN: SKBOYMYX E-mail: fhidalgo@ideam.gov.co Fax: +57 (1) 413 8440

NOF	BOGOTA	Tel.:	+57 (1) 266 2552
		AFTN:	SKBOYNYX
		E-mail:	ais@aerocivil.gov.co
		Fax:	+57 (1) 413 8631

COMOROS

Volcano observatory or authority	Observatoire volcanologique du Karthala Moroni	Tel.: +269 744187 Fax: +269 744189
FIR	ANTANANARIVO	Tel: +261 2258113 AFTN: FMMIYKYX Fax: +261 2258125
ACC		Tel: +261 2258125 AFTN: FMMIZIX/FMMIZQZX
MET		Tel: +261 2258113 AFTN: FMMIYYMYX E-mail: meteoprevi@asecna.mg Fax: 261 2258115
NOF		Tel: +261 2258113 AFTN: FMMMYNYX E-Mail: bni@asecna.mg Fax: +261 2258115

COSTA RICA

Volcano observatory or authority	Observatorio Vulcanológico y Sismológico de Costa Rica (OVSICORI-UNA)	Tel.:	+506 261 0781
	Heredia		+506 261 0611
			+506 277 3304
			+506 277 3306
		E-mail:	ovsicori@una.ac.cr
		Fax:	+506 261 0303
	Observatorio Sismológico y Vulcanológico de Arenal y Miravalles	Tel.:	+506 257 4220
	San José	Fax:	+506 695 5033
	Chiripa Site	Tel.:	+506 695 6522
		E-mail:	gainduni@cariari.ucr.ac.cr
			(jefe)
			wtaylor@cariari.ucr.ac.cr
		Fax:	+506 695 5193

FIR CENTRAL AMERICAN

ACC*

Tel.:	+504 233 1503
AFTN:	MHTGZQZX
Fax:	+504 233 1219
Telex:	1523 Ho Cable Dirga
	1411 Cocesna Cahó

MWO*

Tel.:	+504 234 9499 (24 hrs)
	+504 233 1111 (24 hrs)
	+504 233 7114 (till 2200Z)
AFTN:	MHTGYMYX
Fax:	+504 233 8075 (till 2200Z)
	+504 234 9500 (24 hrs)
Telex:	1523 Ho

*Via National ATS/MET units of
Alajuela/Intl. Juan Santamaría
Airport
Meteorological Office:
Tel.: +506 441 2398
Fax: +506 442 7036
AFTN: MROCYYX

AIS
Tel.: +506 443 3170
AFTN: MROCYYX
Fax: +506 441 4781

COSTA RICA

NOF	TEGUCIGALPA	Tel.:	+504 233 1141/42/43 +504 233 1349 +504 234 2407
		AFTN:	MHTGYNXX
		Fax:	+504 233 1141 +504 233 1349

CUBA

**Volcano
observatory
or authority**

FIR

ACC

MWO

:

Tel/Fax: (53) 7 642 6168

AFTN: MUHAYMYX

E-mail: meteof@aeronav.ecasa.avianet.cu

NOF

DEMOCRATIC REPUBLIC OF THE CONGO

Volcano observatory or authority	Centre de Recherches en Sciences Naturelles (CRSN) Lwiro, Bukavu	Fax:	+243 (12) 884 6540
FIR	KINSHASA	Tel:	+243 0810086772
		AFTN:	FZABZIZX
ACC		Tel:	+243 0810086772 (12) 884 5363
		AFTN:	FZABZRZX
		Fax:	+243 (12) 884 6540
		Telex:	+243 (12) 111 3643
MWO	BRAZZAVILLE	AFTN:	FZAAYMYX
NOF	KINSHASA	AFTN:	FZAZYNYX
		E-mail:	regiedesvoiesaeriennes@yahoo.fr
		Fax:	+243 (12) 804 6540

DOMINICAN REPUBLIC

Volcano observatory or authority	Observatorio u Organismo de Vulcanologia	Tel: AFTN: E-mail: Fax:
FIR	SANTO DOMINGO	
ACC		Tel: +1 809 549 0692 AFTN: MDCSZQZX E-mail: dgta@idac.gov.do Fax: +1 809 549 0692
MWO		Tel: +1 809 549 1291/549 1310 Ext. 261 AFTN: MDSDYMYX E-mail: avionaila@yahoo.es Internet: www.ornamet.gob.do Fax: +1 809 549 0256
NOF	OFC NOTAM INTL	Tel: +1 809 549 0095 AFTN: MDSD YNYX E-mail: ais@idac.gov.do Fax: +1 809 549 0095

ECUADOR

Volcano observatory or authority	Instituto Geofisico, Quito	Tel.: +593 (2) 222 5655 +593 (2) 222 5627 E-mail: geofisico@igepn.edu.ec geofisico@accessinter.net http://www.igepn.edu.ec Fax: +593 (2) 256 7847
FIR	GUAYAQUIL	
ACC		Tel.: +593 (4) 228 2851 AFTN: SEGUZQZX E-mail: accye@dgac.gov.ec Fax: 593 (4) 239 6073
MWO	GUAYAQUIL	Tel.: +593 (4) 239 2712 AFTN: SEGUYMYX E-mail: meteorologiagye@dgac.gov.ec fmancero@dgac.gov.ec Fax: +593 (4) 228 3748
NOF	GUAYAQUIL	Tel.FAX: +593 (4) 228 5661 AFTN: SEGUYNXX E-mail: notam_intl_gye@hotmail.com

EL SALVADOR

Volcano observatory or authority	Servicio Nacional de Estudios Territoriales (SNET)	Tel.: +503 283-2246-2247-2284 Fax: +503 223-7791
---	--	---

FIR CENTRAL AMERICAN

ACC*	Tel.: +504 233 1503 AFTN: MHTGZQZX Fax: +504 233 1219 Telex: 1523 Ho Cable Dirga 1411 Cocesna Cahó
-------------	--

MWO*	Tel.: +504 234 9499 (24 hrs) +504 2 331 111 (24 hrs) +504 233 7114 (Till 2200Z) AFTN: MHTGYMYX Fax: +504 233 8075 (till 2200Z) +504 234 9500 (24 hrs) Telex: 1523 Ho
-------------	--

*Via national ATS/MET units of San Salvador/Ilopango Intl

OMA:	Tel.: +503 295 0304+503 295 0626 Fax: +503 295 0304 E-mail: dgrnr@es.com.sv
AIS:	Tel.: +503 295 0433
San Salvador/El Salvador Intl	
OMA:	Tel.: +503 339 9435 +503 339 9424 Fax: +503 339 9435
AIS:	Tel.: +503 339 9455

NOF	TEGUCIGALPA	Tel.: +504 233 1141/42/43 +504 233 1349 +504 234 2407 AFTN: MHTGYNYX Fax: +504 233 1141 +504 233 1349
------------	-------------	--

ERITREA

Volcano observatory or authority	University of Asmara Geophysics Section	Tel.: +291 1 161926 Fax: +291 1 162236
---	--	---

FIR ASMARA

ACC

Tel.: +291 1 182 752 Fax: +291 1 181 255 Telex: HHASZQZQ
--

MWO

Tel.: +291 1 182 933

NOF ASMARA

AFTN: HHASYNXX

ETHIOPIA

**Volcano
observatory
or authority**Geophysics Observatory
Addis Ababa UniversityTel.: +251 1 17253
Fax: +251 1 552112**FIR**

ADDIS ABABA

ACCTel.: +251 1 180789
AFTN: HAAAZQZX
Fax: +251 1 612533
Telex: 21162 Civilair Addis**MWO**Tel.: +251 1 180342
+251 1 512299
AFTN: HAABYMYX
Fax: +251 1 517066
Telex: 21474 T-MET-ET**NOF**

ADDIS ABABA

AFTN: HAABYNYX

FRANCE

Volcano observatory or authority	Observatoire volcanologique Institut de physique du globe de Paris	Tel.: +33 (1) 435 49126 +33 (1) 442 72400 +33 (1) 442 73467 Internet: http://volcano.ipgp.jussieu.fr E-mail: cheminee@ipgp.jussieu.fr Fax: +33 (1) 442 72401
---	--	--

UIR	FRANCE
------------	--------

ACC	Tel.: +33 (1) 69 57 66 61 AFTN: LFFFZQZX Fax: +33 (1) 69 57 66 69
------------	---

MWO	Tel.: +33 (5) 61 07 82 30 AFTN: LFPWYMYX Fax: +33 (5) 61 07 82 54
------------	---

FIR	BORDEAUX
------------	----------

ACC	Tel.: +33 (5) 56 55 62 52 AFTN: LFBBZQZX Fax: +33 (5) 56 55 62 57
------------	---

MWO	Tel.: +33 (5) 57 29 11 39 AFTN: LFBDYMYX Fax: +33 (5) 57 29 11 35
------------	---

FIR	BREST
------------	-------

ACC	Tel.: +33 (2) 98 37 34 36 AFTN: LFRRZQZX Fax: +33 (2) 98 37 34 94
------------	---

MWO	Tel.: +33 (2) 99 65 22 42 AFTN: LFRNYMYX Fax: +33 (2) 99 65 22 49
------------	---

FIR	PARIS
------------	-------

ACC	Tel.: +33 (1) 69 57 66 61 AFTN: LFFFZQZX Fax: +33 (1) 69 57 66 69
------------	---

MWO	Tel.: +33 (1) 45 56 72 45 AFTN: LFPSYMYX Fax: +33 (1) 45 56 72 46
------------	---

FIR	REIMS
------------	-------

FRANCE

ACC	Tel.: +33 (3) 26 84 62 32
	AFTN: LFEEZQZX
	Fax: +33 (3) 26 84 62 45

MWO	Tel.: +33 (3) 88 40 42 77
	AFTN: LFSTYMYX
	Fax: +33 (3) 88 67 84 84

FIR	MARSEILLE
------------	-----------

Tel.: +33 (4) 42 33 76 76
AFTN: LFMMZQZX
Fax: +33 (4) 42 33 79 89

MWO	Tel.: +33 (4) 42 95 90 43
	AFTN: LFMLYMYX
	Fax: +33 (4) 42 95 90 39

NOF	BORDEAUX	Fax: +33 (5) 57 92 57 99
------------	----------	--------------------------

FRANCE (ÎLE DE LA RÉUNION)

Volcano observatory or authority	Observatoire volcanologique du Piton de la Fournaise	Tel.: +262 275926 E-mail: Thomas.Staudacher@univ-reunion.fr Fax: 262 591204
FIR	ANTANANARIVO	
ACC		Tel.: +261 2022 48098, Ext. 302/303 Fax: +261 2022 32896 Telex: ASEMAD 22286
MWO		Tel.: +261 2022 48098, Ext. 312 Telex: ASEMAD 22286
FIR	MAURITIUS	
ACC		Tel.: +230 637 3531 +230 637 4014 AFTN: FIMPZTZX Fax: +230 637 3164 Telex: 4896 DCA MAU IW
MWO		Tel.: +230 686 1031 (office hours) +230 637 3530 (airport) AFTN: FIMPYMYX Fax: +230 686 1033 Telex: 4722 METEO IW
FIR	SAINT DENIS-RÉUNION	
ATS unit		Tel.: +262 930 000 AFTN: FMEEYAYX Fax: +262 930 013
MET unit		Tel.: +262 280 091 Fax: +262 211 972
	Main MET Office	Tel.: +262 931 100 AFTN: FMEEYMYX Fax: +262 931 148
NOF	ANTANANARIVO	AFTN: FMMMYNYX

FRENCH ANTILLES (FRANCE)

Volcano observatory or authority	GUADELOUPE Observatoire volcanologique de la Soufrière	Tel.: +590 991 133 E-mail: komorow@ipgp.jussieu.fr Fax: +590 991 134
	MARTINIQUE Observatoire volcanologique de la Montagne Pelée	Tel.: +596 784 141 E-mail: viode@ipgp.jussieu.fr Fax: +596 558 080
FIR	PIARCO	
ACC		Tel.: +1 (868) 669 4852 AFTN: TTZPZQZX Fax: +1 (868) 669 4259 Telex: CIVILAV TRINIDAD
MWO		Tel.: +1 (868) 669 4392 AFTN: TTPPYMYX Fax: +1 (868) 669 4727 Telex: 25311 WG
NOF	PIARCO	AFTN: TTPPYNYX

FRENCH GUIANA (FRANCE)

**Volcano
observatory
or authority**

FIR ROCHAMBEAU

ACC

Tel.: +594 35 93 06
AFTN: S000ZQZX
E-mail: gilles.esser@aviation-civile.gouv.fr
Fax: +594 35 93 98

MWO CVM Rochambeau

Tel.: +594 35 35 35
AFTN: SOCAVMYX
E-mail: philippe.livenais@meteo.fr
Fax: +594 35 60 89

NOF ROCHAMBEAU

Tel.: +594 35 93 08
AFTN: SOOYNYX
E-mail: gilles.esser@aviation-civile.gouv.fr
Fax: +594 30 41 24

GREECE

**Volcano
observatory
or authority**

SANTORINI

Prof. Michael Fytikas
Aristotle University of
Thessaloniki, Faculty of
Science, School of
Geology

Tel.: +30 (31) 998482
E-mail: fytikas@olymp.ccf.auth.gr
Fax: +30 (31) 998482

NISYROS

Dr. George Stavrakakis
Institute of Geodynamics
National Observatory of
Athens

Tel.: +30 10 3490195, +30 10
3490181
E-mail: g.stavr@gein.noa.gr
Fax: +30 10 3490180

NOF

ATHINAI

AFTN: LGGGYNYX

**Volcano
observatory
or authority**

MWO Tel.: +1 (473) 444-4142
Fax +1 (473) 444-1574

GUATEMALA

Volcano observatory or authority	INSIVUMEH Sección Vulcanología Ciudad de Guatemala	Tel.: +502 331 4967 +502 331 9183 +502 332 4741 Fax: +502 331 5005
---	--	---

FIR CENTRAL AMERICAN

ACC* Tel./Fax: +504 233 1503
AFTN: MHTGZQZX
Telex: 1523 Ho Cable Dirga
1411 Cocesna Caho

MWO* Tel.: +504 234 9499 (24 hrs)
+504 233 1111 (24 hrs)
+504 233 7114 (till 2200Z)
AFTN: MHTGYMYX
Fax: +504 233 8075 (till 2200Z)
+504 234 9500 (24 hrs,
request transmission to
MET office)
Telex: 1523 Ho

*Via national ATS/MET units of
Guatemala/La Aurora Intl
AIS: Tel.: +502 331 5484 (24 hours)
OMA: Tel.: +502 331 4897

NOF TEGUCIGALPA Tel.: +504 233 1141/42/43
+504 233 1349
+504 234 2407
AFTN: MHTGYNYX
Fax: +504 233 1141
+504 233 1349

GUYANA

Volcano observatory or authority	Guyana Geology and Mines Commission	Tel.: E-mail: Fax:	+592 (2) 53047 ggmc@sdnp.org.gy +592 (2) 53047
FIR	GEORGETOWN		
ACC	GEORGETOWN	Tel.: AFTN: Fax:	+592 261 2245 SYCJZQZX +592 261 2279
MWO	TIMEHRI	Tel.: AFTN: Fax: E-mail	+592 261 2216 SYCJYMYX +592 261 2284 s.h.williams@hydromet-gv
NOF	TIMEHRI	Tel.: AFTN: Fax: E-mail	+592 261 2269 SYCJYNYX +592 261 2279 ais@gcaa-gy.org

HONDURAS

Volcano
observatory
or authority

FIR

ACC

MWO

Tel: (504) 2331 111/2349 500
AFTN: MHTGYMYX
E-mail: met_aerohonduras@smn.gob.hn
joaquin_honduras@yahoo.com
Internet: www.smn.gob.hn

NOF

ICELAND

**Volcano
observatory
or authority**

Dr. Freysteinn Sigmundsson
Nordic Volcanological
Institute
Reykjavik

Tel.: +354 525 4492
E-mail: fs@norvol.hi.is
Fax: +354 562 9767

Dr. Ragnar Stefansson
Icelandic MET Office
Department of Geophysics
Reykjavik

Tel.: +3541 699 625
E-mail: ragnar@vedur.is
Fax: +354128 121

FIR

REYKJAVIK

ACC

Tel.: +354 569 4343
E-mail: atc@caa.is
Fax: +354 569 4200

MWO

Tel.: +354 522 6000
AFTN: BIRKMYX
E-mail: urgent@vedur.is
Fax: +354 522 6002

NOF

REYKJAVIK

Tel.: +354 569 4294
AFTN: BIRKYNXX
E-mail: notam@caa.is
Fax: +354 569 4200

INDONESIA

Volcano observatory or authority	Volcanological Survey of Indonesia, Bandung	Tel.: +62 22 72606 +62 22 771 402 E-mail: vsimvo@ibm.net Fax: +62 22 702761 Telex: 73 28337 SDM BD
FIR	JAKARTA	
ACC		Tel.: +62 21 550 6178 AFTN: WIIIZQZX Fax: +62 21 550 1129 Telex: 44946 PBSH IA
MWO		Tel.: +62 21 550 6116 AFTN: WIIIIYMYX
FIR	UJUNG PANDANG	
ACC		Tel.: +62 411 510 253 AFTN: WAAAZRZX Telex: 71434 PAPHND IA
MWO		Tel.: +62 411 510 252 AFTN: WAAAYMYX Fax: +62 411 510 587
NOF	JAKARTA	AFTN: WIIIXYNYX Fax: +62 21 550 1129

ITALY

Volcano observatory or authority	VESUVIUS	Tel.:	+39 (081) 6108 111
	Prof. Giovanni Macedonio		+39 (081) 6108 300
	Instituto Nazionale di Geofisica e Vulcanologia (INGV) Osservatorio Vesuviano Naples	E-mail:	macedonio@ov.ingv.it
		Fax:	+39 (081) 6100 811
	ETNA	Tel.:	+39 (095) 7165 800
	Dr. Alessandro Bonaccorso	E-mail:	bonaccorso@ct.ingv.it
	Instituto Nazionale di Geofisica e Vulcanologia (INGV) Catania	Fax:	+39 (095) 435 801
	STROMBOLI	Tel.:	+39 (06) 6518 601
	Instituto Nazionale di Geofisica e Vulcanologia (INGV) Rome	E-mail:	chiarabba@ingv.it amato@ingv.it
		Fax:	+39 (06) 6504 1181
FIR	ITALIA		
ACC		Tel.:	+39 (06) 7908 6260/6542
		AFTN:	LIRZRZX
		Fax:	+39 (06) 7908 6544
		Telex:	62 2680
MWO		Tel.:	+39 (02) 7390 4624
		E-mail:	cmrwatch@meteoam.it
		AFTN:	LIMMYMYX
		Fax:	+39 (02) 7390 4625
NOF	ROMA	Tel.:	+39 (06) 7989 7019
			+39 (06) 7934 0585
		E-mail:	nof@enav.it
		AFTN:	LIIAYNYX
		Fax:	+39 (06) 7989 7011
		Telex:	620136 NOF 1

JAPAN

Volcano observatory or authority	Seismological and Volcanological Department, Japan Meteorological Agency (JMA), Tokyo	Tel.: +81 (3) 3212 8341, Ext. 4532 E-mail: t-koizumi@met.kishou.go.jp Fax: +81 (3) 3212 3648
	Earthquake Research Institute, Tokyo	Tel.: +81 (3) 5841 2498 Fax: +81 (3) 3812 6979 Telex: 72 272 2148 ERI TOK
	Hydrographic Department, Japan Coast Guard, Tokyo	Tel.: +81 (3) 3541 4473 E-mail: ico@cue.jhd.go.jp Fax: +81 (3) 3541 0723
	Nansei-Toko Observatory for Earthquakes and Volcanology, Kagoshima	Tel.: +81 (99) 244 7411 Fax: +81 (99) 244 0145
	Geographical Survey Institute, Ibaraki	Tel.: +81 (298) 64 5978 Fax: +81 (298) 64 2655
	Shimabara Earthquake and Volcano Observatory, Nagasaki	Tel.: +81 (957) 62 6621 E-mail: shimizu@sevo.kyushu-u.ac.jp Fax: +81 (958) 63 0225
	Kusatsu-Shirane Volcano Observatory Gumma	Tel.: +81 (279) 88 7715 Fax: +81 (279) 88 7717
	Earthquake and Volcano Observatory Hirosaki	Tel.: +81 (172) 39 3651 Fax: +81 (172) 34 5325
	Sakurajima Volcano Research Center Kagoshima	Tel.: +81 (99) 293 2058 E-mail: svoffice@svo.dpri.kyoto-u.ac.jp Fax: +81 (99) 293 4024
	ASO Volcanological Observatory Kumamoto	Tel.: +81 (9676) 7 0022 E-mail: yas@aso.kugi.kyoto-u.ac.jp Fax: +81 (9676) 7 2153
	Asama Volcano Observatory, Nagano	Tel.: +81 (267) 45 7551 Fax: +81 (267) 45 7164 Telex: 72 272 2148 ERI TOK
	Kirishima Volcano Observatory, Miyazaki	Tel.: +81 (984) 33 1186 Fax: +81 (984) 33 5030

JAMAICA

Volcano
observatory
or authority

FIR

ACC

MWO

Tel: +1 (876) 924 8055
AFTN: MKJPYMYX
E-mail: metja.nmc@infochan.com
metoffice@cwjamaica.com
Internet: www.metservice.gov.jm
Fax: +1 (876) 924 8670

NOF

JAPAN

	Volcanology Section, Geological Survey of Japan, Ibaraki	Tel.: Fax:	+81 (298) 64 5978 +81 (298) 64 2655
	Research Center for Seismology and Volcanology, Nagoya	Tel.: Fax:	+81 (52) 789 3035 +81 (52) 789 3047
	Usu Volcano Observatory, Hokkaido	Tel.: Fax:	+81 (142) 66-4011 +81 (142) 66-4012
MWO	New Tokyo Aviation Weather Service Center, Narita	Tel.: AFTN: Fax:	+81 (47) 632 6612 RJAAJMYX +81 (47) 632 6613
FIR	TOKYO		
ACC		Tel.: AFTN: Fax:	+81 (42) 992 1317 RJTGZQZX +81 (42) 992 1195
	NAHA	Tel.: AFTN: Fax:	+81 (98) 858 7235 RORGZQZX +81 (98) 858 7419
NOF	TOKYO	AFTN: Fax:	RJAAJNYX +81 (476) 32 6421

KENYA

Volcano observatory or authority	Geology Department Nairobi University	Tel.: +254 (20) 444 9004 Fax: +254 (20) 444 9539
---	--	---

FIR NAIROBI

ACC	Tel.: +254 (20) 824 700 +254 (20) 824 566 AFTN: HKJKYNYX Fax: +254 (20) 824 719
------------	--

MWO	Tel.: +254 (20) 822 245 AFTN: HKJKYMYX Fax: +254 (20) 822 003
------------	---

NOF	NAIROBI	AFTN: HKJKYNYX Fax: +254 (20) 824 716
------------	---------	--

MEXICO

Volcano observatory or authority	Centro Nacional de Prevención de Desastres (CENAPRED)	Tel.: +52 (55) 5606 2043 E-mail: rqw@cenapred.unam.mx Fax: +52 (55) 5606 1608
	Centro Universitario de Investigaciones en Ciencias del Ambiente, Universidad de Colima	Tel.: +52 (312) 316 1137 E-mail: galindo@ucol.mx Fax: +52 (312) 316-1137
	Instituto de Geofísica, UNAM	Tel.: +52 (55) 5622-4098, Ext. 15 E-mail: sdelacrr@geofcu.unam.mx
	Observatorio Vulcanológico, Universidad de Colima	Tel.: +52 (312) 316-1134 E-mail: tonatiuh@cgic.ucol.mx Fax: +52 (312) 316-1134
ACC	MEXICO	Tel.: +52 (55) 5726 1671 AFTN: MMMXYMYT Fax: +52 (55) 5726 1674
MWO		Tel.: +52 (55) 5802 8520 AFTN: MMMXYMYX E-mail: capma@sct.gob.mx Internet: www.capma.com Fax:
ACC	MERIDA	Tel.: +52 (999) 946 1347 AFTN: MMMDXTYA Fax: +52 (999) 946-1327
ACC	MAZATLAN	Tel./Fax: +52 (669) 981 1063 AFTN: MMMZNMXO
ACC	MONTERREY	Tel./Fax: +52 (81) 8369 0883 AFTN: MMMYXTYA Fax: +52 *(81) 8369-0950
NOF	MEXICO	Tel./Fax: +52 (55) 5726 1526 AFTN: MMMXYNYX

NOF	MEXICO	Tel./Fax: +52 (55) 5726 1526
		AFTN: MMMXYNYX

MONTserrat (UNITED KINGDOM)

Volcano observatory or authority	Montserrat Volcano Observatory	Tel.: +1* (664)** 491 5647 +1 (664) 491 0002 E-mail: mvomail@mvo.ms Fax: +1 (664) 491 2423
	from 0600 to 1800 hrs — Bramble Airport	Tel.: +1 (664) 491 5647 Fax: +1 (664) 491 2423
	British Geological Survey	Tel.: +44 (115) 936 3100 E-mail: u.name@bgs.ac.uk Fax: +44 (115) 936 3200
	FIR	PIARCO
	ACC	Tel.: +1 (868) 669 4852 AFTN: TTZPZQZX Fax: +1 (868) 669 4259 Telex: CIVILAV TRINIDAD
MWO		Tel.: +1 (868) 669 4392 AFTN: TTPPYMYX Fax: +1 (868) 669 4727 Telex: 25311 WG
NOF	PORT OF SPAIN	Tel.: +1 (868) 669 4128 +1 (868) 625 9843 AFTN: TTPPYNYX Fax: +1 (868) 669 1716

* For Canada, United States and the Caribbean only.

** Or 868.

NETHERLANDS ANTILLES (Netherlands)

Volcano observatory or authority		Tel.: E-Mail: Fax:
FIR	CURACAO	Tel.: E-Mail: Fax:
MWO	WILLEMSTAD	Tel.: 599 9 839 3360/3361 599 9839 3361 AFTN TNCCYMYX E-Mail: cur-met@meteo.an Internet www.meteo.an Fax: 599 9 869 2699
NOF		Tel.: 599 9 839 3510 E-Mail: AISNA@naatc.an Fax: 599 9 868 3012

NEW ZEALAND

Volcano observatory or authority	Wairakei Research Centre	Tel.:	+64 (7) 374 8211
		Fax:	+64 (7) 374 8199

FIR NEW ZEALAND

ACC	Tel.:	+64 (3) 358 1694
	AFTN:	NZCHZRZX
	Fax:	+64 (3) 358 9192

MWO	Tel.:	+64 (4) 470 0816
	AFTN:	NZKLYMYX
	Fax:	+64 (4) 470 0801

FIR AUCKLAND OCEANIC

ACC	Tel.:	+64 (9) 275 9817
	AFTN:	NZZOZQZX
	Fax:	+64 (9) 275 3627

MWO	Tel.:	+64 (4) 470 0801
	AFTN:	NZKLYMYX
	Fax:	+64 (4) 470 0801

NOF	CHRISTCHURCH	Tel.:	+64 (3) 358 1688
		AFTN:	NZCHYNYX
		Fax:	+64 (3) 358 9192

NICARAGUA

Volcano observatory or authority	Dirección General del	Tel.: +505 (2) 492 757
	Instituto Nicaragüense de	+505 (2) 492 759
	Estudios Territoriales	+505 (2) 496 986
	(INETER), Managua	E-mail: ineter.disup@netport.com.ni Fax: +505 (2) 491 890
	Dirección de Meteorología	Tel.: +505 (2) 492 755 E-mail: metineter@ibw.com.ni Fax: +505 (2) 492 755
	Oficina MET (Aeropuerto)	Tel.: +505 (2) 331 321 E-mail: metsinop@ibw.com.ni aeronautica@met.ineter.gob.ni
	Dirección de Vulcanología	Tel.: +505 (2) 492 761 +505 (2) 496 987 Fax: +505 (2) 491 082

FIR CENTRAL AMERICAN

ACC*	Tel.: +504 233 1503
	AFTN: MHTGZQZX
	Fax: +504 233 1219
	Telex: 1523 Ho Cable Dirga 1411 Cocesna Caho
MWO*	Tel.: +504 233 1111 (24 hrs) +504 234 9499 (24 hrs) +504 233 7114 (till 2200Z)
	AFTN: MHTGYMYX
	Fax: +504 233 8075 (till 2200Z) +504 234 9500 (24 hrs)
	Telex: 1523 Ho
	*Via national ATS/MET units of Managua/Oma
	Tel.: +505 233 1925 +505 233 1321 (MET) Fax: +505 233 1610
	AIS (airport) Fax: +505 233 1765

NOF	TEGUCIGALPA	Tel.:	+504 233 1141/42/43 +504 233 1349 +504 233 2407
		AFTN:	MHTGYNXX
		Fax:	+504 233 1141 +504 233 1349

PAKISTAN

**Volcano
observatory
or authority**Director, Geophysical
CentreTel.: +92 (81) 853 032
Fax: +92 (81) 853 032International Airways
Volcano Watch OfficerTel.: +92 (21) 457 91300
+92 (21) 457 91302
Fax: +92 (21) 921 8282
+92 (21) 811 2885**NOF**

KARACHI

AFTN: OPKCYNXX
Telex: CIVILDROME KARACHI

PANAMA

Volcano observatory or authority	Instituto de Geociencias	Tel.: + (507) 523 2071 + (507) 523 2072 + (507) 269 5744 E-mail: igc2@ancon.up.ac.pa Fax: + (507) 263 7671
FIR	PANAMA	
ACC		Tel.: + (507) 501 9807 AFTN: MPPCICPX MPZLZQZX E-mail: mailto@aeronautica.gob.pa Fax: + (507) 501 9849
MWO	PANAMA	Tel: + (507) 238 2611/2650 AFTN: MPTOYMYX E-mail: meteortoc@aeronautica.gob.pa Fax: + (507) 238 4678
NOF	PANAMA	Tel. + (507) 238 2615./2616 AFTN: MPTOYNYX E-mail: aisnof@aeronautica.gob.pa Fax: + (507) 238 2617

PAPUA NEW GUINEA

Volcano observatory or authority	Rabaul Volcano Observatory	Tel.: E-mail: Fax:	+675 982 1699 rvo@global.net.pg +675 982 1004
FIR	PORT MORESBY		
ACC		Tel.: AFTN: Fax:	+675 325 0931 +675 325 2160 AYPMZRZX +675 325 4094
FIC		Tel.: AFTN: Fax:	+675 324 4821 +675 325 6787 AYPMYSYX +675 325 4094
MWO		Tel.: AFTN: E-mail: Fax:	+675 325 2788 +675 325 5544 +675 325 2755 AYPMYMYX facilities@pngmet.gov.pg +675 325 5201 +675 325 2740
NOF	PORT MORESBY	Tel: AFTN: Fax:	+675 324 4724 AYPMYNYX +675 323 9885

PARAGUAY

**Volcano
observatory
or authority**

FIR ASUNCIÓN

ACC

Tel.: +595 (21) 646 082
AFTN: SGASZRZX
SGZZMAMX
E-Mail: acc_sgas@dinac.gov.py
Fax: +595 (21) 646 081

MWO ASUNCIÓN

Tel.: +595 (21) 646 095
AFTN: SGASYMYX
SGZZMAMX
E-Mail: aeronautica_dmh@dinac.gov.py
Fax.: +595 (21) 646 095

NOF ASUNCIÓN

Tel.: +595 (21) 646 952
AFTN: SGASYNYX
SGZZMAMX
E-mail: ais.ad_nof@hotmail.com
Fax: +595 (21) 229 949

PERU

Volcano observatory or authority	Instituto Geofísico del Perú, Arequipa Contact: Mr. Orlando Macedo	Tel./Fax: +51 (54) 251 373 E-mail: omacedo@geo.igp.gob.pe
---	--	--

Instituto Geofísico del Perú, Lima Contact: Mr. Edmundo Norabuena	Tel.: +51 (1) 317 2325 E-mail: enorab@nazca.igp.gob.pe Fax: +51 (1) 317 2321
--	--

FIR LIMA-CALLAO

ACC	Tel.: +51 (1) 708 1157 +51 (1) 708 1158 AFTN: SPIMZQZX E-mail: acclima@corpac.gob.pe jmontalvo@corpac.gob.pe
------------	--

MWO	LIMA-CALLAO	Tel.: +51 (1) 708 1181 +51 (1) 708 1180 AFTN: SPZZMAMX SPIMYMYX E-mail: pronostico@corpac.gob.pe Fax: +51 (1) 708 1180
------------	-------------	---

NOF	LIMA-CALLAO	Tel./Fax: +51 (1) 414 1435 +51 (1) 708 1173 +51 (1) 708 1172 AFTN: SPIMYNYX SPIMYOYX E-mail: aisaro@corpac.gob.pe Fax: +51 (1) 414 1435
------------	-------------	---

PHILIPPINES

Volcano observatory or authority	Philippines Institute of Volcanology and Seismology	Tel.: +63 (2) 426 1468 to 1479 Fax: +63 (2) 926 3225 +63 (2) 929 8961
FIR	MANILA	
ACC		Tel.: +63 (2) 8799 180 to 183 +63 (2) 759 9643 Tel./Fax: +63 (2) 851 0639 AFTN: RPHIZRZX
FOBS		Tel./Fax: +63 (2) 832 3037 AFTN: RPLLYIYX
MWO	Aviation Meteorological Service Office (AMSO), Philippines Atmospheric, Geophysical and Astronomical Services Administration (PAGASA)	Tel./Fax.: +63 (2) 832 2927 +63 (2) 832 3023 +63 (2) 832 2596 AFTN: RPLLYMYX E-mail: pagasa.naia@pacific. net.ph
NOF	MANILA	AFTN: RPLLYNYX Fax: +63 (2) 832 3037

PORTUGAL

Volcano observatory or authority	AZORES Joao Luis Gaspar Observatório Vulcanológico da Universidade dos Açores	Tel.: +351 296 650147 E-mail: jlgaspar@notes.uac.pt Fax: +351 296 650142
---	---	--

FIR	ST. MARIA OCEANIC	Tel.: +351 296 886 299 +351 296 820 400 E-Mail: smaoacc@nav.pt Fax: +351 296 886 863 AFTN: LPPOZOZX
------------	--------------------------	---

FIR	LISBOA
------------	---------------

ACC	Tel.: +351 21 847 5018 Telex: 12936 OCTAL P
------------	--

MWO	Tel.: +351 21 848 3961 Telex: 12352 SIEMWR P
------------	--

NOF	LISBOA	AFTN: LPPPYNYX Fax: +351 (21) 847 1302
------------	---------------	---

PUERTO RICO (United States)

**Volcano
observatory
or authority**

FIR

ACC

MWO

Tel: +1 (787) 253 4586
AFTN: TJSJYMYX
E-mail: israel.matos@noaa.gov
Fax:

NOF

RUSSIAN FEDERATION

Volcano observatory or authority	KAMCHATKA AND NORTHERN KURILES Dr.Olga Girina Kamchatkan Volcanic Eruption Response Team (KVERT) Institute of Volcanology and Seismology FED RAS	Tel.: +7 (415)225 8627 Internet www.kscnet.ru/ivs/kvert/index.html E-mail: girina@kscnet.ru Fax: +7 (415) 225 8627
	KURILES Dr. Alexander Rybin Sakhalin Volcanic Eruption Response Team (SVERT)	Tel: +7 4242 791667 E-mail: rybin@imgg.ru Fax: +7 4242 791517
FIR	PETROPAVLOVSK-KAMC HATSKY	
ACC		Tel.: + 7 415 21 11 696 Fax: + 7 415 31 99 395 AFTN UHPPZRZX
MWO		Tel.: +1 (907) 271 5102
NOF	MOSKVA	AFTN: UUUUYNXX Telex: 411182 NOTAM

SAINT KITTS AND NEVIS

**Volcano
observatory
or authority**

FIR **PIARCO**

ACC Tel.: +1 (869) 472-2750
Fax: +1 (869) 465-9122

MWO Tel.: +1 (869) 469 2749
Fax: +1 (869) 465 9122

SAINT LUCIA

**Volcano
observatory
or authority**

FIR **PIARCO**

ACC

Tel.: +1 (758) 454 6343

Fax: +1 (758) 454 5146

MWO

Tel.: +1 (758) 454-6550

E-Mail: tomauguste@yahoo.com
director@slumet.gov.lc

Fax: +1 (758) 454-9705

SOLOMON ISLANDS

Volcano observatory or authority	Water and Mineral Resources Division, Ministry of Energy, Water and Minerals	Tel.: +677 27521/30867 Fax: +677 25811
FIR	HONIARA	
ATS		Tel.: +677 36430 +677 36106 +677 36326 AFTN: AGGHYSYX Fax: +677 36775
MWO		Tel.: +677 36309 +677 20046 AFTN: AGGHYMYX Fax: +677 36618
NOF	HONIARA	AFTN: AGGHYNYX

SPAIN

Volcano observatory or authority	CANARIAS	Tel.:	+34 (91) 394 4586
	Ricardo Vieira Diaz	E-mail:	vieira@iagmat1.mat.ucm.es
	Instituto de Astronomia y Geodesia CSIC-UCM		
	Nemesio Perez	Tel.:	+34 (922) 39 1000
	Institute of Technology and Renewable Energy (ITER)	E-mail:	nperez@iter.rcanaria.es
	Ramon Ortiz	Tel.:	+34 (91) 411 1328
	Equipo de Volcanologia y Geofisica Volcánica,	E-mail:	ramon@mncn.csis.es
	Museo Nacional de Ciencias Naturales CSIC,	Fax:	+34 (91) 564 4740
FIR	BARCELONA		
ACC		Tel.:	+34 (93) 4 79 71 38
		Fax:	+34 (93) 370 5250
MWO		Tel.:	+34 (91) 581 9751
			+34 (91) 581 9748
		Fax:	+34 (91) 581 9743
FIR	CANARIAS		
ACC		Tel./Fax:	+34 (928) 577 063
MWO		Tel.:	+34 (928) 430 603
		Fax:	+34 (928) 430 607
FIR	MADRID		
ACC		Tel.:	+34 (91) 678 5101
		Fax:	+34 (91) 656 2571
MWO		Tel.:	+34 (91) 581 9751
			+34 (91) 581 9748
		Fax:	+34 (91) 581 9743
NOF	MADRID	AFTN:	LEANYNYX

SURINAME

**Volcano
observatory
or authority**

FIR	PARAMARIBO		
ACC	PARAMARIBO	Tel.:	+597 325 203
		AFTN:	SMPMZRX
		E-Mail:	atssur@sr.net
		Fax:	+597 325 453
MWO	J.A. PENGEL INTL	Tel./Fax:	+597 325 206
		AFTN:	SMZZMAMX
		E-Mail:	meteoan@yahoo.com
NOF	J.A. PENGEL INTL	Tel./Fax:	+597 325 270
		AFTN:	SMJPYFYX
		E-Mail:	aislvd@surimail.sr

TRINIDAD AND TOBAGO

Volcano observatory or authority	Seismic Research Unit University of West Indies St. Augustine	Tel.: +1* (868) 662 4659 Internet: http://www.wow.net/ community/sru/ Homepage.htm E-mail: sru@wow.net Fax: +1 (868) 663 9293 Telex: 294 24520 WG
FIR	PIARCO	
ACC		Tel.: +1 (868) 669 4852 AFTN: TTZPQZX Fax: +1 (868) 669 4259 Telex: CIVILAV TRINIDAD
MWO		Tel.: +1 (868) 669 4392 AFTN: TTPPYMYX E-mail: synop@tstt.net.tt Internet: www.metoffice.gov.tt Fax: +1 (868) 669 4727
NOF	PORT OF SPAIN	Tel.: +1 (868) 669 4128 +1 (868) 625 9843 AFTN: TTPPYNYX Fax: +1 (868) 669 1716

* For Canada, United States and the Caribbean only.

UNITED STATES**Volcano
observatory
or authority****ALASKA**University of Alaska
Geophysical Institute
FairbanksTel.: +1 (907) 474 5530
Fax: +1 (907) 474 7290
Telex: 230 354 14 GEOPH INST FBKAlaska Volcano
Observatory
AnchorageTel.: +1 (907) 786 7443
Fax: +1 (907) 786 7450Alaska State Division
of Geological and
Geophysical Surveys
FairbanksTel.: +1 (907) 474 7430
Internet: <http://www.avo.alaska.edu>
Fax: +1 (907) 474 7290**CASCADES**Volcano Observatory
Vancouver, WashingtonTel.: +1 (206) 696 7693
Fax: +1 (206) 696 7866**HAWAII**Hawaiian Volcano
ObservatoryTel.: +1 (808) 967 7328
E-mail: donswan@liko.wr.usgs.gov
Fax: +1 (808) 967 8890**LONG VALLEY
CALDERA**Long Valley Caldera
Monitoring, USGSTel.: +1 (415) 329 4795
E-mail: hill@andres.wr.usgs.gov
Fax: +1 (415) 329 5163**NEW MEXICO**Mount Erubus Volcano
ObservatoryTel.: +1 (505) 835 5995
E-mail: kyle@nmt.edu
Fax: +1 (505) 835 6436**FIR/CTA**Oceanic Anchorage
Arctic, Continental and
OceanicTel.: Admin.:
+1 (907) 269 1119 (24 hrs)
+1 (907) 269 1103
AFTN: PAZARZX
Fax: Call 24-hour number and
advise fax incoming
+1 (907) 338 7230

UNITED STATES

MWO	Anchorage*	Tel.:	+1 (907) 271 5102
FIR	OCEANIC HOUSTON		
ACC	Houston	Tel.:	Admin.: +1 (713) 230 5300 (24 hrs) +1 (713) 230 5560
		AFTN:	KZINZQZX
		Fax:	Call 24-hour number and advise fax incoming +1 (713) 230 5561
MWO	Miami	Tel.:	+1 (305) 536 5547
FIR	OCEANIC NEW YORK		
ACC	New York	Tel.:	Admin.: +1 (516) 468 1003 (24 hrs) +1 (516) 468 1080
		AFTN:	KZNYZQZX
		Fax:	Call 24-hour number and advise fax incoming +1 (516) 468 1428
MWO	N of N30 Kansas City	Tel.:	+1 (816) 426 3646
	S of N30 Miami	Tel.:	+1 (305) 536 5547
FIR	OCEANIC OAKLAND		
ACC	Oakland	Tel.:	+1 (510) 797 3200, Ext. 331 (24 hrs) Admin.: Ext. 469
		AFTN:	KZAKZRZX
		Fax:	+1 (510) 797 6519
MWO	W of E160 Guam	Tel.:	+1 (671) 344 4125
	S of N30 Honolulu	Tel.:	Admin.: +1 (808) 734 6630 (24 hrs) +1 (808) 734 6667
		AFTN:	PHZHZRZX
		Fax:	+1 (808) 734 2130

*Also for MWOs Fairbanks and Juneau.

UNITED STATES

	N of N30 Kansas City	Tel.:	+1 (816) 426 3646
	S of N30 and E of W140 Miami	Tel.:	+1 (305) 536 5547
ACC	San Juan, Puerto Rico	Tel.:	+ 1 (787) 253 8719
		AFTN:	TJSJYFYX
		Fax:	+1 (787) 253 8718
			+1 (787) 253 8709
NOF	WASHINGTON	Tel.:	+1 (703) 904 4557
		AFTN:	KDCAYNYX (admin)
			KDZZNAXX (NOTAM)
		Fax:	+1 (703) 904 4437
		Telex:	892 562

URUGUAY

Volcano
observatory
or authority

FIR	MONTEVIDEO		
ACC		Tel.:	+598 (2) 6040295
		AFTN:	SUEOZQZX
		Fax:	+598 (2) 604 0298
		E-mail:	jopdta@adinet.com.uy
MWO	MONTEVIDEO	Tel.:	+598 (2) 200 1807
		AFTN:	SUMUYMYX
		Fax:	+598 (2) 604 0242
		E-mail:	dmae@adinet.com.uy
NOF	MONTEVIDEO	Tel:	+598 (2) 604 0067
		AFTN:	SUMUYNYX
		Fax:	+598 (2) 604 0067
		E-mail:	ais@adinet.com.uy

VANUATU

Volcano observatory or authority	Institut de Recherche pour le Developpement (IRD)	Tel.: 678 22268 E-mail: lardy@vanuatu.orstom.fr Fax: 678 23276 Telex: 1111 VANTEX NH
---	---	---

FIR NADI

ACC	Contact: Duty Oceanic ATC Officer	Tel.: 679 725 777, Ext. 4531/4515 AFTN: NFFNZRZX Fax: 679 724 600
------------	-----------------------------------	---

MWO	Contact: Principal Scientific Officer	Tel.: 679 724 888 AFTN: NFFNYMYX Fax: 679 720 190
------------	---------------------------------------	---

NOF NADI

VENEZUELA

Volcano
observatory
or authority

FIR MAIQUETIA

ACC

Tel./Fax: +58 (212) 355 2216
AFTN: SVZMZQZX
E-mail: acc@inac.gov.ve

MWO

Maiquetía

Tel.: +58 (212) 303 1522
AFTN: SVMIYMYX
E-mail: ovmmaiquetia@inac.gov.ve
Fax: +58 (212) 303 1522

NOF

Maiquetía

Tel./Fax: 58 (212) 355 1325
AFTN: SVMIYNYX
E-mail: nofmaiquetia@inac.gov.ve
notam.maiquetia@inac.gov.ve
