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"The development of the information management, in the new scenario, of airspace contamination by volcanic ash."

ATM Expert Flavio Sgrò - ENAV Operational Department

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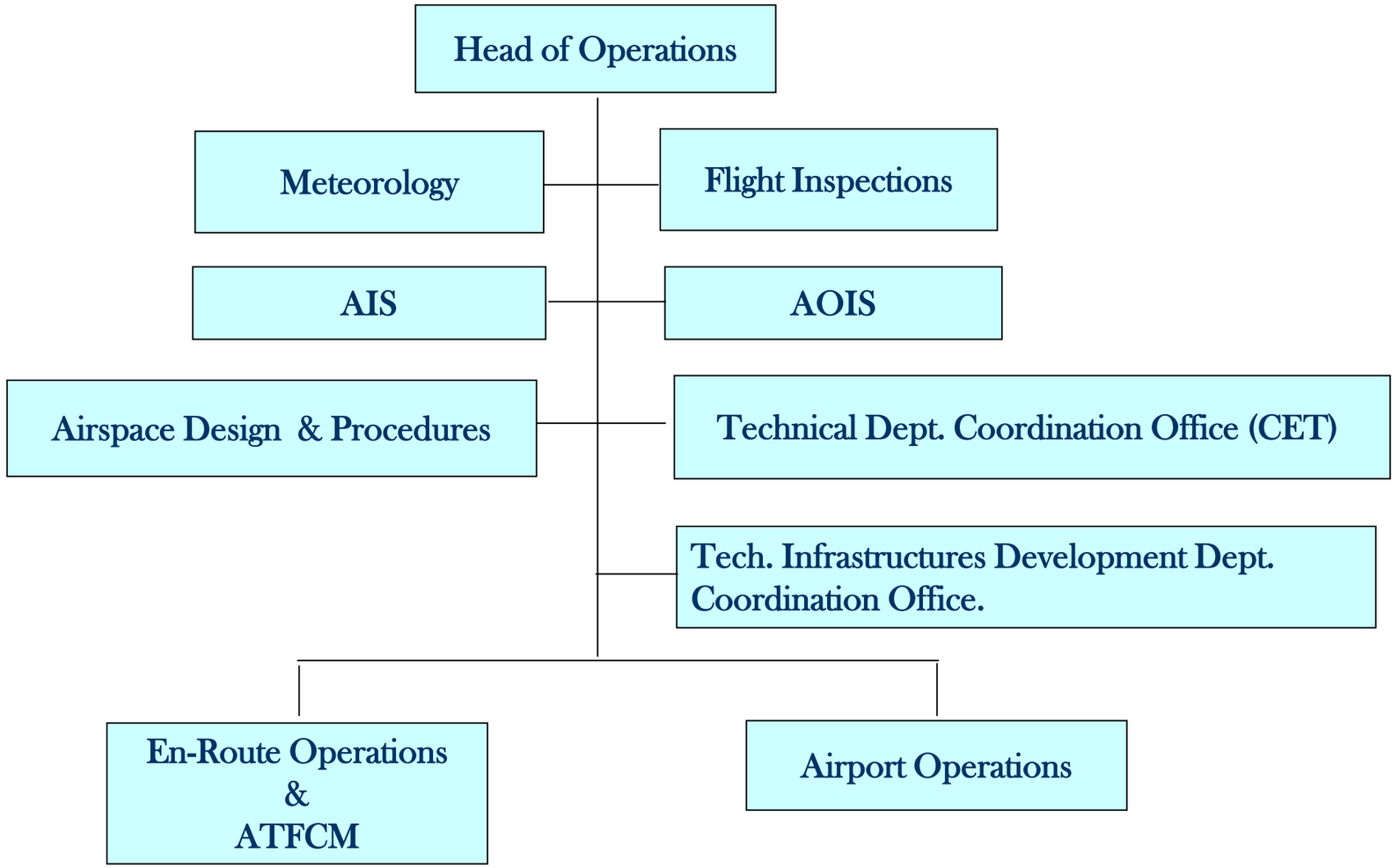
Air Navigation Service Provider /ENAV Operations Department



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ENAV – operational layout and facility location

- **3,300** employers
  (2/3 working operational –shift)
- **4** Area Control Centres
- **39** Airports
- **1.637.502** IFR Flight - 2008

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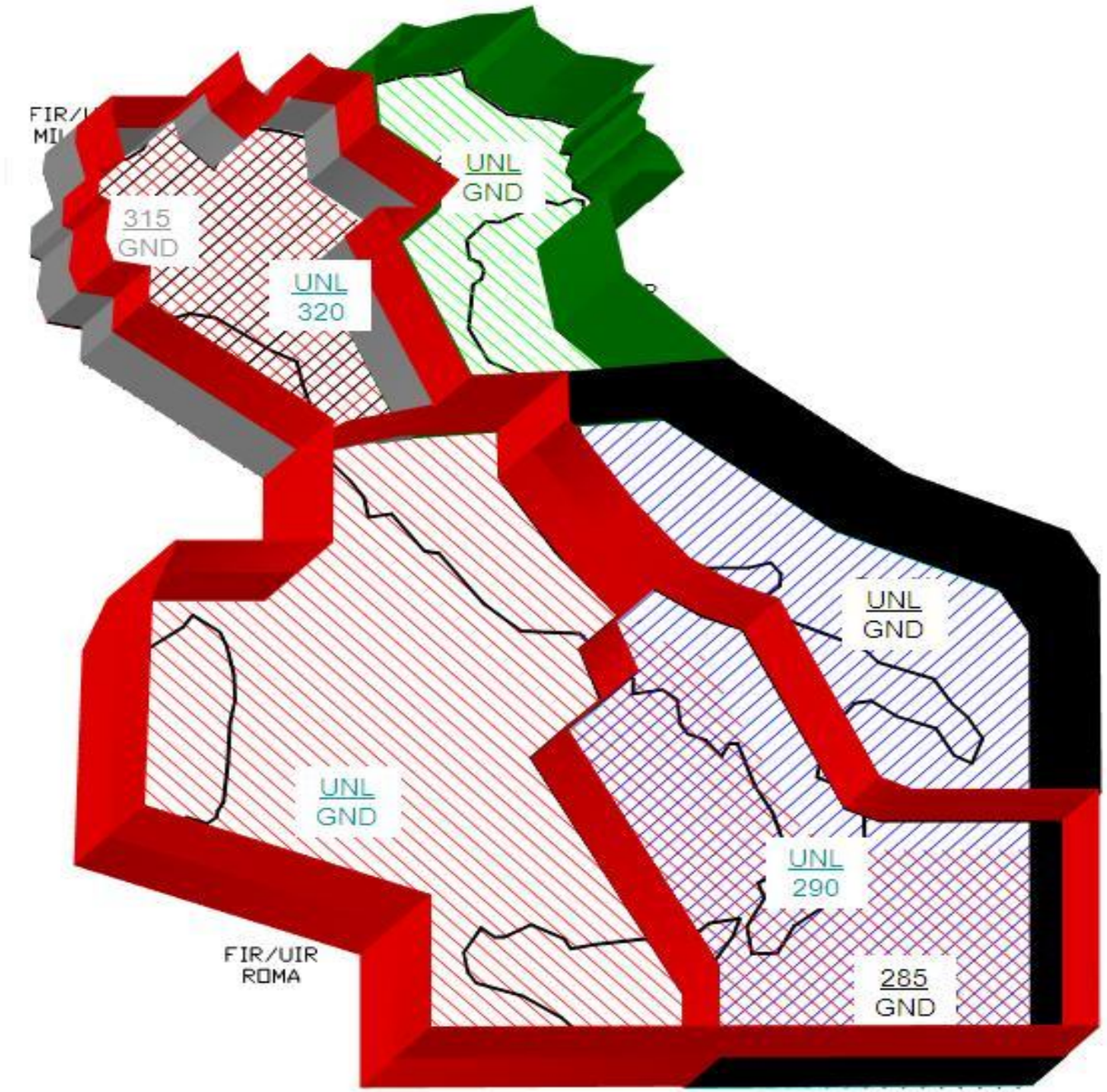
ENAV – ACCs Airspace Subdvision

- Brindisi (20% black)
- Padova (10% green)
- Milano (7% grey)
- Roma (63% red)



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ENAV – The Meaning of Aeronautical Information

The process or an action depending on a flight intent or an “ad hoc” need, where the user is supplied with all relevant aeronautical information (AI) in order to plan or to execute a flight, or to obtain generic information related to the flight .

The process shall provide knowledge to support the decision-making if a flight or flight related action can be safely and efficiently performed, enhancing by integrating access to and provision of additional data elements or other information, as required.

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ENAV – Activation volcanic ash contingency plan

Alert phase

- Pre eruption
  - Getting ready

Reactive phase

- Eruption about to start or has started
  - Inital reroutings (Tactical)
  - Notifications (Strategical)

Proactive phase

- Flow organized
- Every player settled in their role.

ENAV – Activation volcanic ash contingency plan

PROCEDURES FOR AN ATC UNIT WHEN A VOLCANIC ASH CLOUD IS REPORTED OR FORECAST

If a volcanic ash cloud is reported or forecast in the FIR for which the ACC is responsible, the controller should:

1. relay all information available immediately to pilots whose aircraft could be affected to ensure that they are aware of the ash cloud's position and the flight levels affected;
2. suggest appropriate re-routing to the flight crew to avoid an area of known or forecast ash clouds;
3. inform pilots that volcanic ash clouds are not detected by relevant ATS surveillance systems;

4. if the ACC has been advised by an aircraft that it has entered a volcanic ash cloud the controller should:

- consider the aircraft to be in an emergency situation;
- not initiate any climb clearances to turbine-powered aircraft until the aircraft has exited the ash cloud; and
- not initiate vectoring without pilot concurrence.

Note. Experience has shown that the recommended escape manoeuvre for an aircraft which has encountered an ash cloud is to reverse its course and begin a descent if terrain permits. The final responsibility for this decision, however, rests with the pilot.

ENAV – Activation volcanic ash contingency plan

Each State should develop appropriate procedures and contingency routings for avoidance of volcanic ash clouds that meet the circumstances of the State and fulfill its obligations to ensure safety of aircraft.
Controllers should be trained in procedures for avoidance of volcanic ash clouds and be made aware that turbine-engine aircraft encountering an ash cloud may suffer a complete loss of power. Controllers should take extreme caution to ensure that aircraft do not enter volcanic ash clouds.

Note 1.– There are no means to detect the density of a volcanic ash cloud or the size distribution of its particles and their subsequent impact on engine performance and the integrity of the aircraft.

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Volcanic Ash Related Products - OBSERVATION

Products that may contain volcanic ash or volcanic activity information in support of aviation operations.

- METAR: METeorological Aerodrome Report.

An international code (Aviation Routine Weather Report) used for reporting, recording and transmitting weather observations.

- SPECI: *In the METAR observation program, a surface observation issued on a non-routine basis as dictated by changing meteorological conditions.*

Volcanic ash observed at an aerodrome or in the vicinity of an aerodrome is normally reported with these messages

Volcanic Ash Related Products - OBSERVATION

- AIREP Special : Pilot Report.

A report of inflight weather by an aircraft pilot or crew member.
Pilots who observe volcanic ash can report the information in an AIREP or PIREP.
When volcanic ash information is issued in a AIREP Special the report is referred to as an Urgent

- AIREP: Aircraft Report.

A report from an aircraft in flight prepared in conformity with requirements for position, and operational and/or meteorological reporting.
An AIREP is an inflight evaluation usually made over areas where weather information is limited or non-existent (for example, over an ocean).

- VAR: Volcanic Activity Report.

A report of volcanic ash similar in formato a AIREP. However, the VAR may include additional information on the physical characteristics of the ash. Pilots normally provide VAR information immediately upon completion of flight operations or during flight debriefings.

Volcanic Ash Related Products - Advisories

- VAA: Volcanic Ash Advisory.

Information issued by a Volcanic Ash Advisory Center concerning the occurrence or expected occurrence of volcanic ash that may affect the safety of aircraft operations.

A VAA is a text message that identifies the volcano, time of eruption, observed position of the ash cloud, and the forecasted position of the ash.

The VAA is not to be used as a warning message.

- VAG: Volcanic Ash Graphic.

A graphical depiction of the Volcanic Ash Advisory (VAA).

Volcanic Ash Related Products – VAA

FVXX01 LFPW JJHHmm		
VA ADVISORY		
DTG:		**YYYYMMDD/HHmmZ**
VAAC:		**TOULOUSE**
VOLCANO:		Name and reference nr of volcano
PSN:		Geo Coordinates
AREA:		Geographical Area
SUMMIT ELEV:		Height of volcano top
ADVISORY NR:		**YYYY/NN**
INFO SOURCE:		free text
AVIATION COLOUR CODE:		**(when provided by volcano observatories)**
ERUPTION DETAILS:	free text	
OBS VA DTG:		**DD/HHmmZ**
OBS VA CLD:		boundaries (4 layers max) **or ASH NOT IDENTIFIABLE**
FR		
(or EST VA CLD:)		**SATELLITE DATA WINDS FLxxx/xxx ss/ss KT**
FCST VA CLD+6H :		**DD/HHmmZ** boundaries (4 layers max) **or NO VA EXP**
FCST VA CLD+12H :		**DD/HHmmZ** boundaries (4 layers max) **or NO VA EXP**
FCST VA CLD+18H :		**DD/HHmmZ** boundaries (4 layers max) **or NO VA EXP**
RMK :	free text	
NXT ADVISORY :		**YYYYMMDD/HHmmZ**

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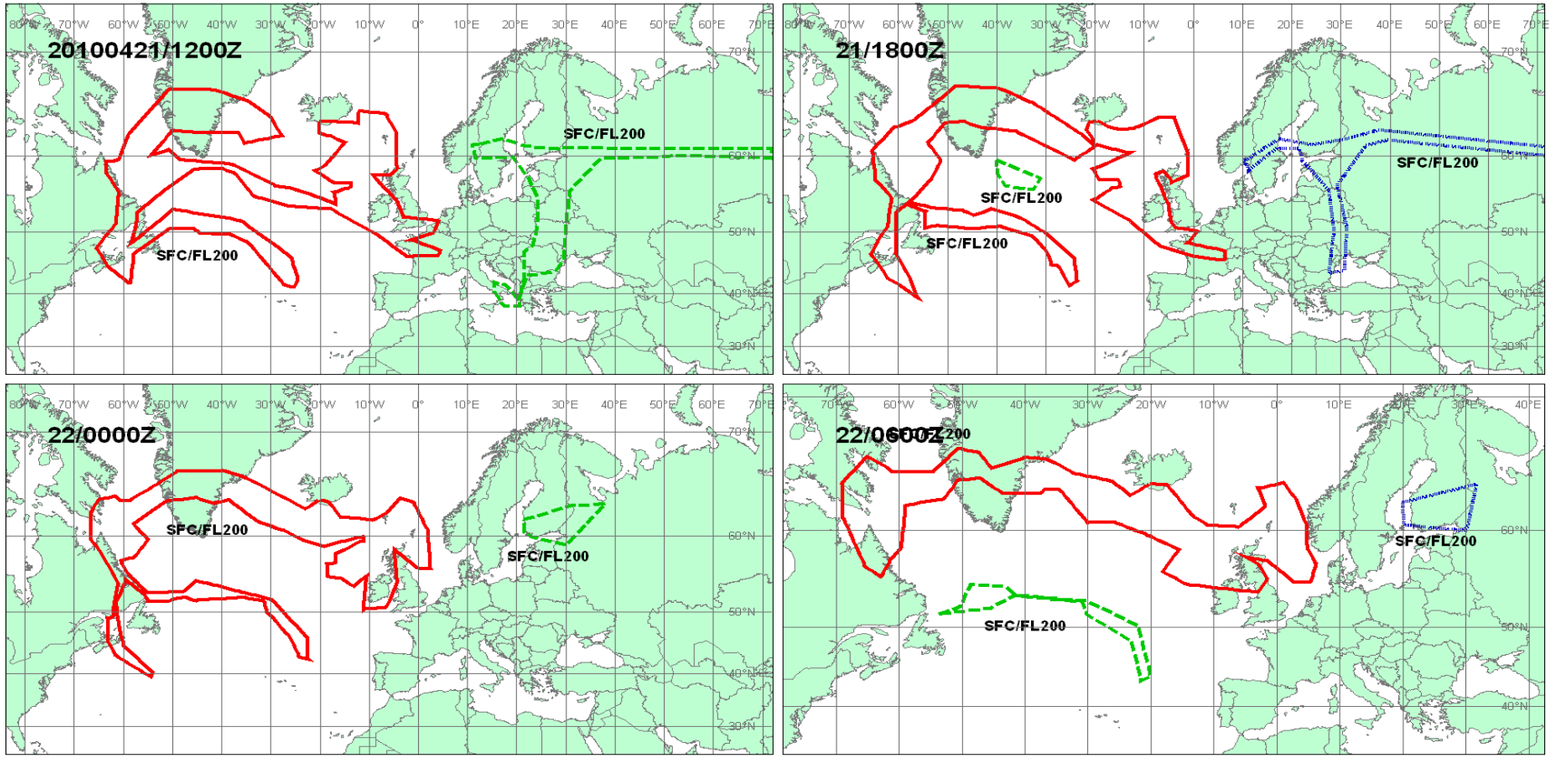
Volcanic Ash Related Products – VAA

FVXX03 LFPW 251210
VA ADVISORY
DTG: 20090325/1210Z
VAAC: TOULOUSE
VOLCANO: ASKJA 1703-06
PSN: N6502 W01645
AREA: ICELAND
SUMMIT ELEV: 1516M
ADVISORY NR: 2009/02
INFO SOURCE: EXERCISE VOLCEX09/01
AVIATION COLOUR CODE: UNKNOWN
ERUPTION DETAILS: EXERCISE VOLCEX09/01
OBS VA DTG: 25/1200Z
OBS VA CLD: SFC/FL360 N6600 E00000 - N6600 E00300 - N6400 E00300 - N6400 W00000 - N6600 E00000
FCST VA CLD + 6H: 25/1800Z SFC/FL360 N6545 E00000 - N6630 E01500 - N6630 E02500 - N6330 E02500 - N6330 E01500 - N6410 E00000 - N6545 E00000
FCST VA CLD + 12H: 26/0000Z SFC/FL360 N6615 W00000 - N6700 E01500 - N6700 E03700 - N6300 E03700 - N6300 E01500 - N6340 E00000 - N6615 W00000
FCST VA CLD + 18H: 26/0600Z SFC/FL360 N6645 E00000 - N6800 E01500 - N6800 E04700 - N6300 E04700 - N6300 E01500 - N6340 E00000 - N6645 E00000
RMK: FOR CONSISTANCY REASON, THIS VAA IS BASED ON LONDON VAAC ADVISORY. THIS VAA ONLY DESCRIBES THE VA CLOUD WITHIN TOULOUSE VAAC AREA AND NEIGHBORING FIRS. THIS IS EXERCISE VOLCEX09/01. THIS IS A TEST PLEASE IGNORE. EXERCISE EXERCISE EXERCISE. NXT ADVISORY: NO LATER THAN 20090325/1810

Volcanic Ash Related Products – VAG



VA ADVISORY
DTG: 20100421/1200Z
VAAC: LONDON
VOLCANO:
EYJAFJALLAJOKULL 1702-02
PSN: N6338 W01937
AREA: ICELAND

SUMMIT ELEV: 1666M
ADVISORY NR: 2010/030
INFO SOURCE: ICELAND MET OFFICE
AVIATION COLOUR CODE: RED
ERUPTION DETAILS: ERUPTION CONTINUING TO AROUND FL120 TO FL160.

RMK: NO SIG ASH ABOVE FL200. ASH CONCENTRATIONS UNKNOWN. ALL PLUMES ON ALL FOUR CHARTS APPLY TO SFC TO FL200.
NXT ADVISORY: 20100421/1800Z

Volcanic Ash Related Products – VAAC

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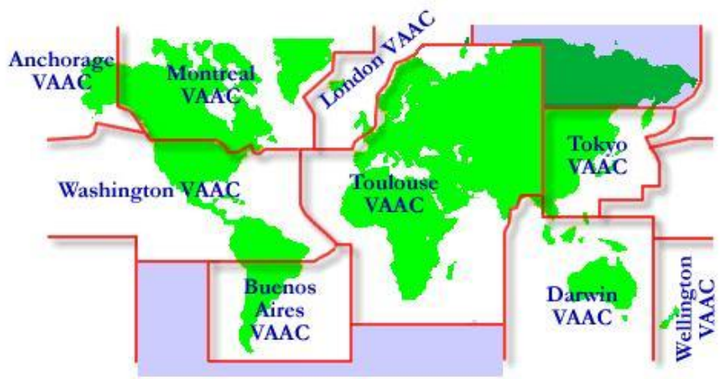
Volcanic Ash Advisory Centres

Current Volcanic Ash Advisories (VAA) from London and Toulouse

- **London VAA:** Issued advisories
- **Toulouse VAA:** Issued advisories

Nine Volcanic Ash Advisory Centres around the world are responsible for advising in



METEO FRANCE
Toujours un temps d'avance

Accuei

TOULOUSE VAAC

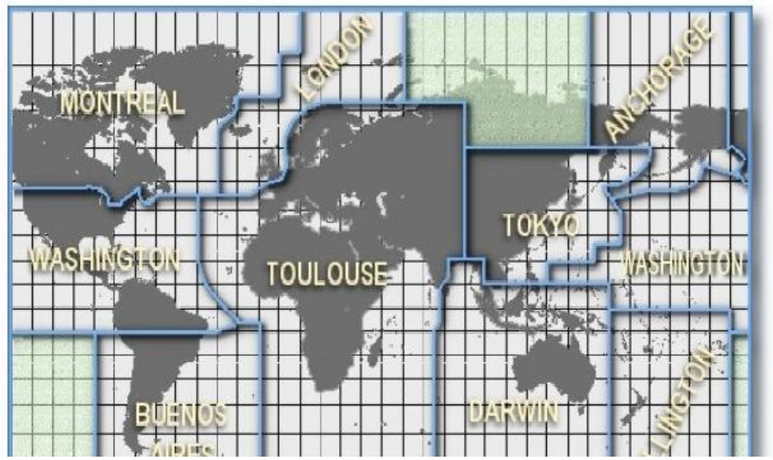
VAA and VAG

Volcanic Ash and aviation

Fictitious exemple : ETNA

Contacts

The nine VAACs (Volcanic Ash Advisory Centers), have been designated by the International Civil Aviation Organization to provide their expertise to civil aviation in case of significant volcanic eruptions. They are a basic part of the IAVW. (International Airways Volcano Watch).



Volcanic Ash Related Products - Advisories

- Supplementary modeled ash concentration charts

✈ *Area of Low Contamination: An airspace of defined dimensions where volcanic ash may be encountered at concentrations equal to or less than 2x10-3 g/m3.*

✈ *Area of Medium Contamination: An airspace of defined dimensions where volcanic ash may be encountered at concentrations greater than 2x10-3 g/m3, but less than 4x10-3 g/m3.*

✈ *Area of High Contamination: An airspace of defined dimensions where volcanic ash may be encountered at concentrations equal to or greater than 4x10-3 g/m3, or areas of contaminated airspace where no ash concentration guidance is available.*

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Volcanic Ash Related Products - Advisories - Supplementary modeled ash concentration charts

Met Office

Modelled Ash Concentration from FL200 to FL350 at
0000 UTC 11/05/2010

Issue time: 201005100600

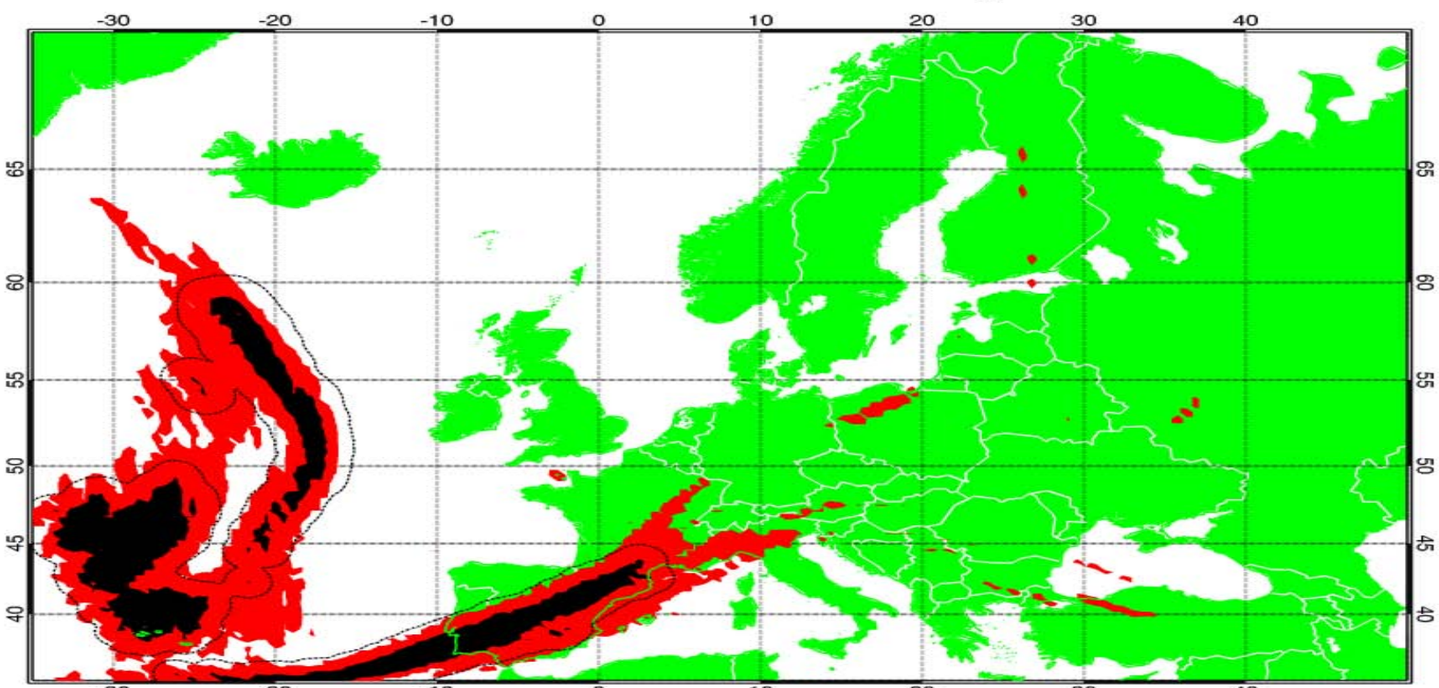
This is a guidance product generated from model data and is supplemental to the official VAAC London Volcanic Ash Advisory and Volcanic Ash Graphic products.

60 NM bufer zone is automatically generated. Please refer to national NOTAMs for definitive boundaries of No-Fly Zone areas.

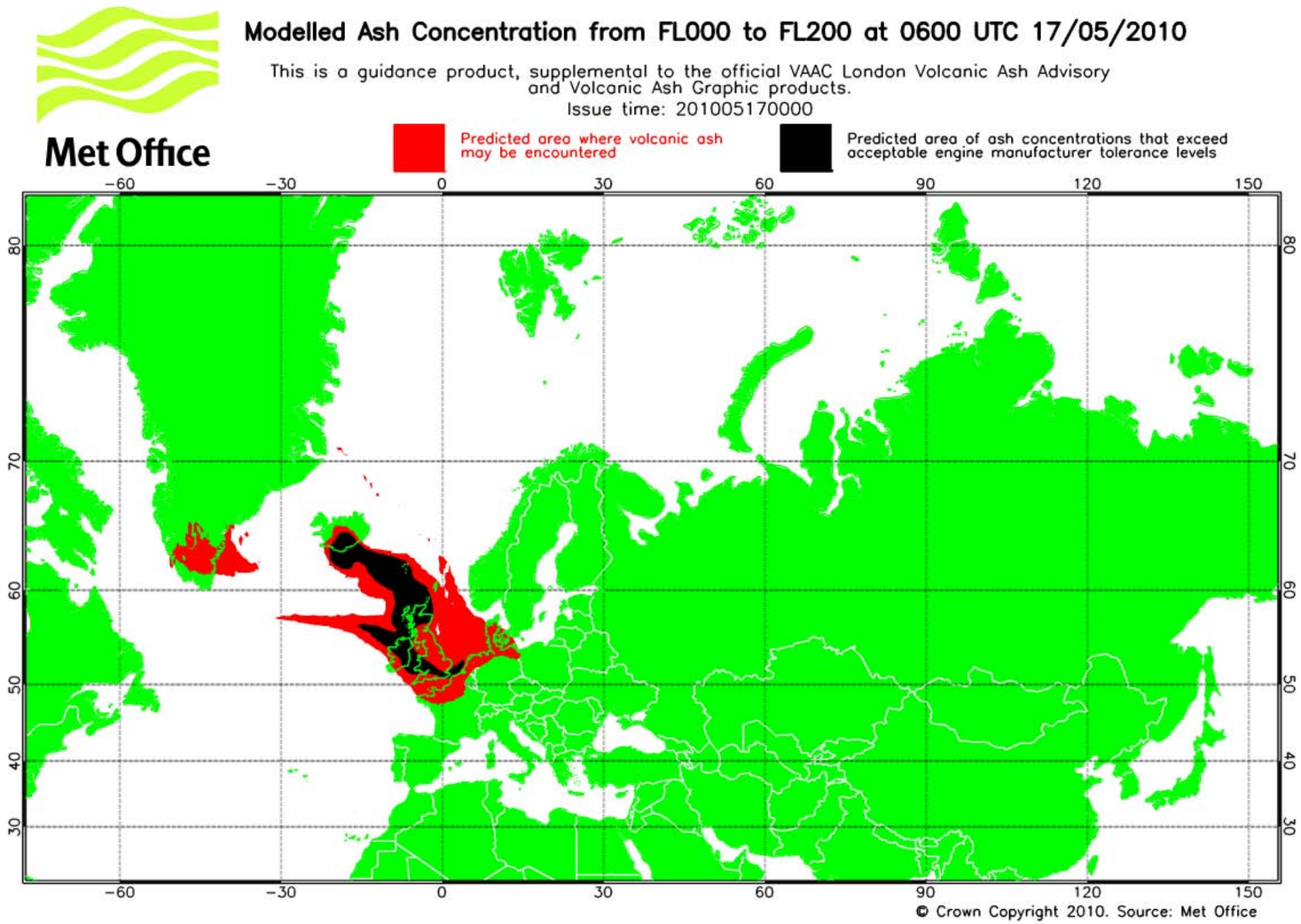
Predicted area where volcanic ash may be encountered

Predicted area of ash concentrations that exceed acceptable engine manufacturer tolerance levels

Predicted area of ash concentrations that exceed engine manufacturer tolerance levels, plus 60NM buffer



Volcanic Ash Related Products - Advisories - Supplementary modeled ash concentration charts



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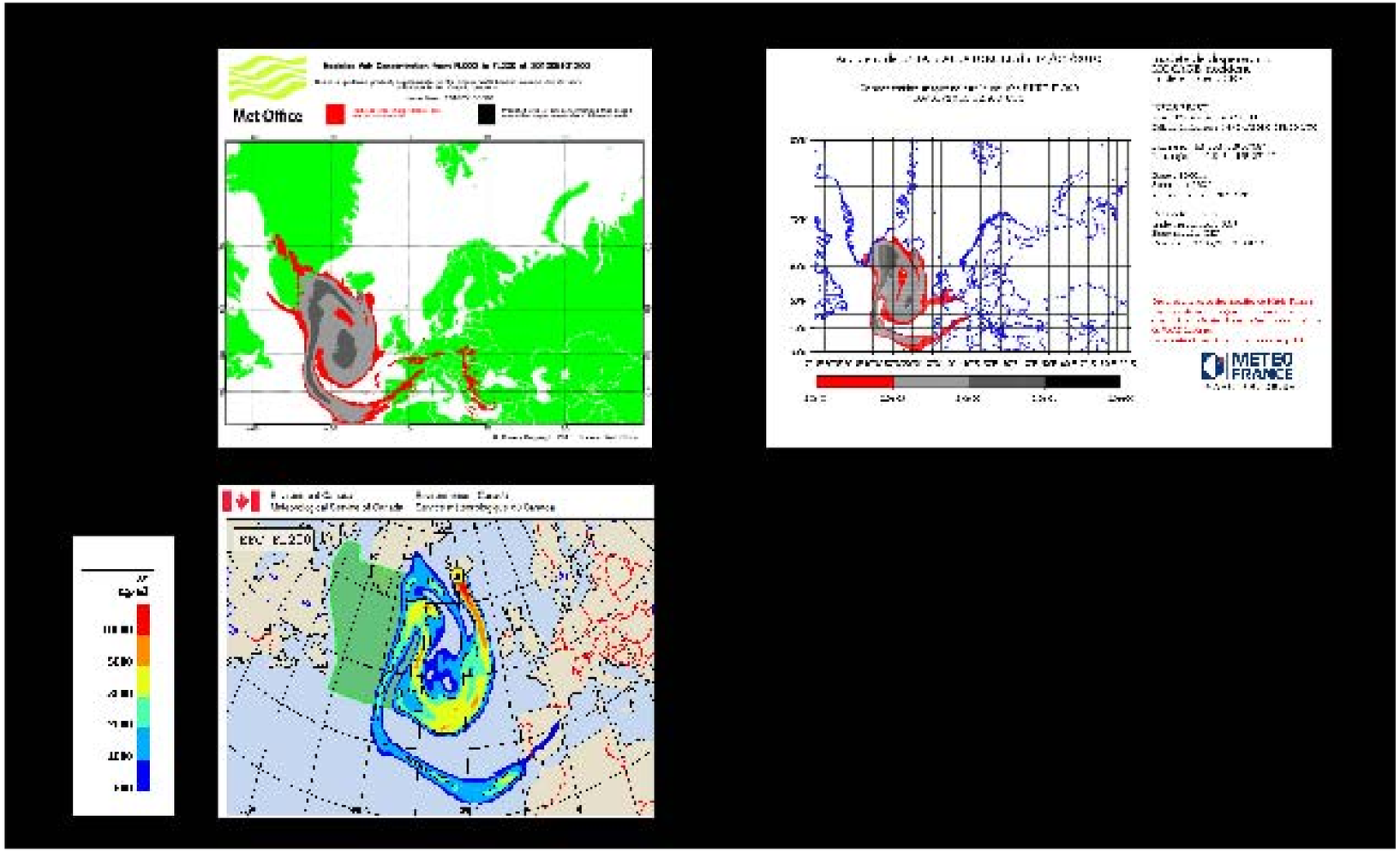
Volcanic Ash Related Products - Advisories - Supplementary modeled ash concentration charts



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Volcanic Ash Related Products - Inflight Weather Warnings

- SIGMET: SIGnificant METeorological Information.

SIGMET is a brief description of the occurrence and/or expected occurrence of specified en route Weather phenomena that may affect the safety of all aircraft operations (e.g. occurrence or expected occurrence of a volcanic ash cloud).

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SIGMET

GG EGRRYMYV 200402

RJTDYPYX

WVRA31 RUSH 200345 CCAUHSS

SIGMET 3 VALID 200345/200759

UHSS-UHSS COR YUZHNO-SAKHALINSK FIR

VA ERUPTION MT SARYCHEV-PEAK LOC N4806E15312

VA CLD OBS AT 20/0159ZUNKNOWN/FL320

N5309E14637N6455E14327-N6457E13532-

N6138E14053MOV N 40KMH UNKNOWN/FL070

N4800E15315-N4548E15320-N4629E15203 MOV S 40KMH

FCST 20/0759Z VA CLD APRX SFC/FL200/350 N4700E15100-

N5210E14500-N5210E15000 FL350/550 NO VA EXP=

Annex 3

Meteorological Service for International Air Navigation

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Volcanic Ash Related Products - Notice

- NOTAM: Notice to Airmen.

A notice containing information concerning the establishment, condition or change in any aeronautical facility, service, procedure or hazard, the timely knowledge of which is essential to personnel concerned with flight operations.

Information related to the pre-eruption or eruptive stage of a volcano can be reported in a NOTAM.
The NOTAM Office nof normally issues a NOTAM based on information as provided by the ACC.

- *ASHTAM:*

A special series NOTAM notifying by means of a specific format change in activity of a volcano, a volcanic eruption and/or volcanic ash cloud that is of significance to aircraft operations.

- VONA: Volcano Observatory Notice for Aviation.

A short message in structured format issued by a Volcanic Observatory to describe volcanic activity to the aviation sector, highlighting ash-plume information and including the aviation color Code.

The VONA is provided to the appropriate and VAAC in support of the issuance of VAA, VAG, and to provide (where applicable) initial information to ACC to start contingency procedures

ASHTAM

NWXX01 EGRR 210244
210244
GG EGRRYMYV
210244 YBBBZEZX
VAWR0253 WAAF 06210237 *(Indonesia)*
ASHTAM 0253/09
A) WAAF
B) 0906210237
C) RINJANI 0604-03
D) S0825 E11628
E) ORANGE
F) SFC/FL100 S0825 E11630 - S0730 E11625 - S0730 E11600 -
S0825 E11630
G) MOV NW 10KT
H) W34 W42 W43 W44 A450
J) MTSAT-1R
K) ERUPTION DETAILS: VA PLUME TO FL100 OBSERVED 30NM TO NW AT 21/0130

—

ICAO Annex 15,

ASHTAM Message Structur

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ASHTAM –COLOR CODES

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

ICAO Annex 15, Aeronautical Information Services

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Volcanic Ash Ground Notification

MWO

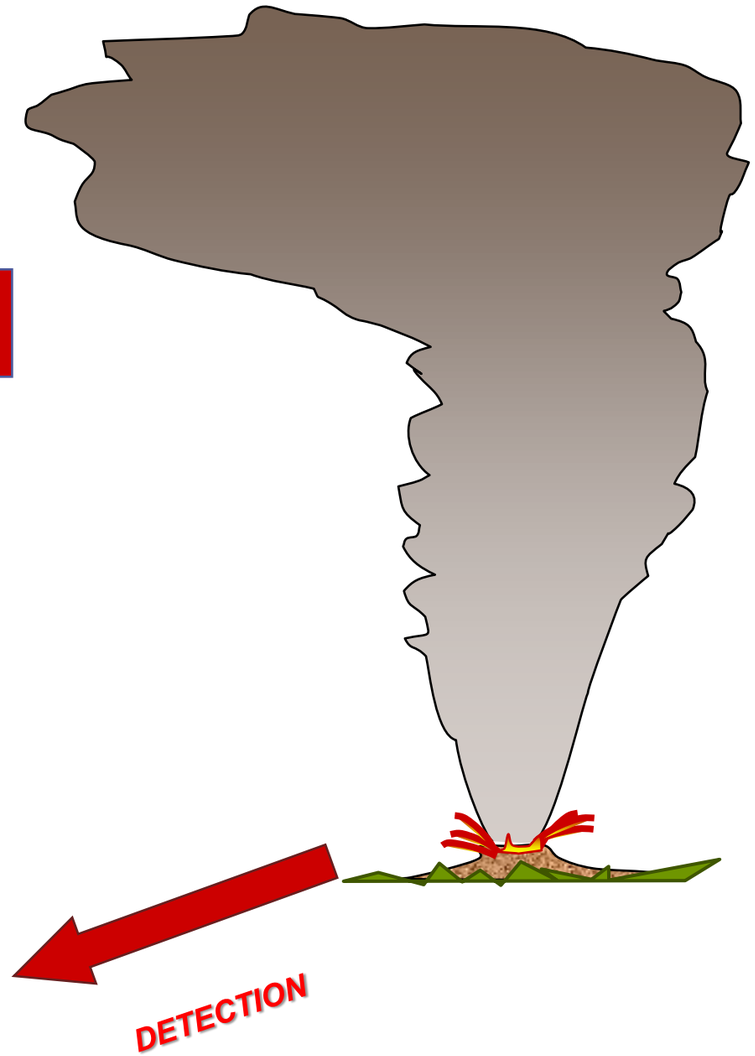
ACC/NOF

CFMU

VAAC

VONA

Volcano Observatory



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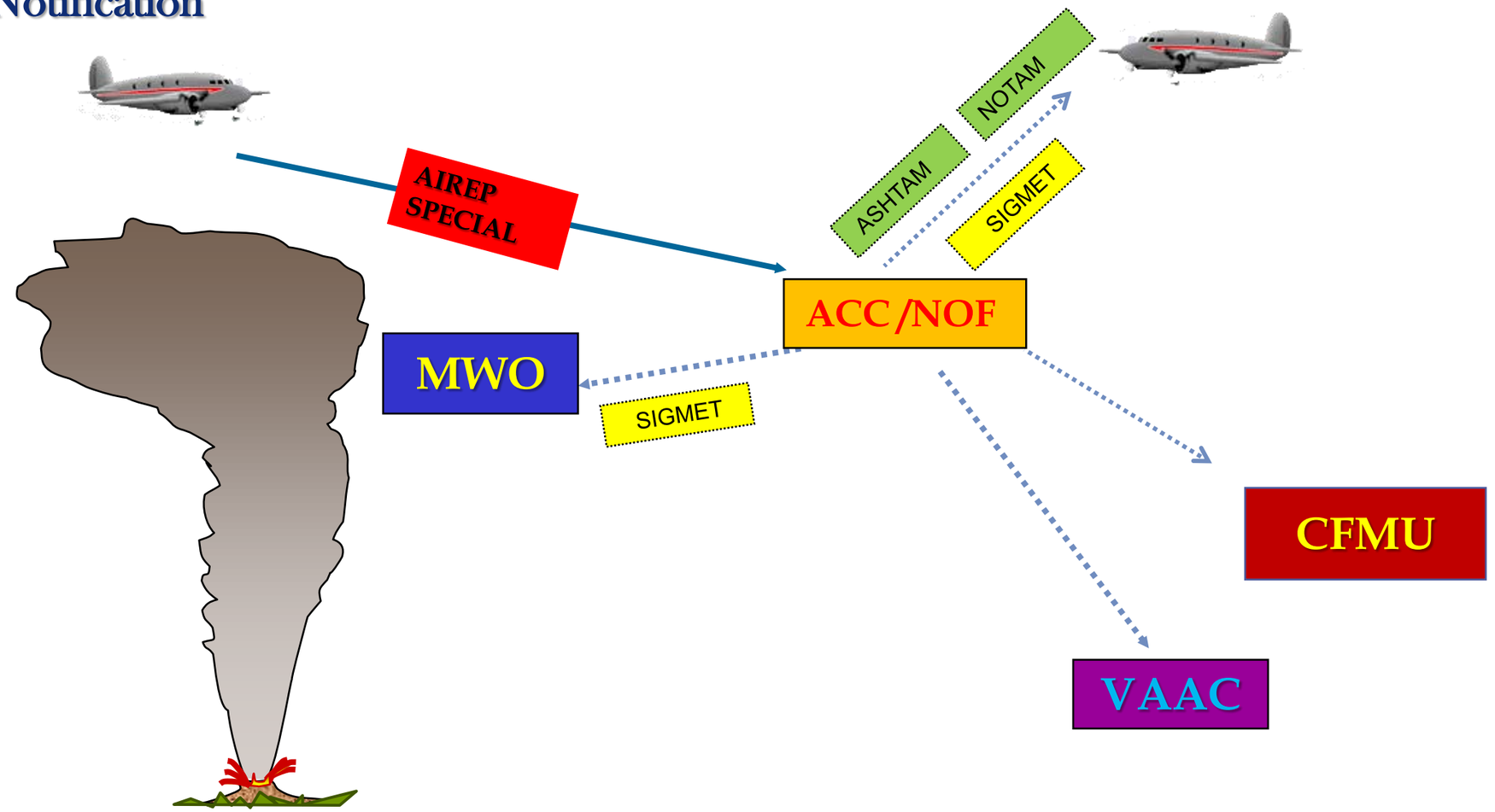
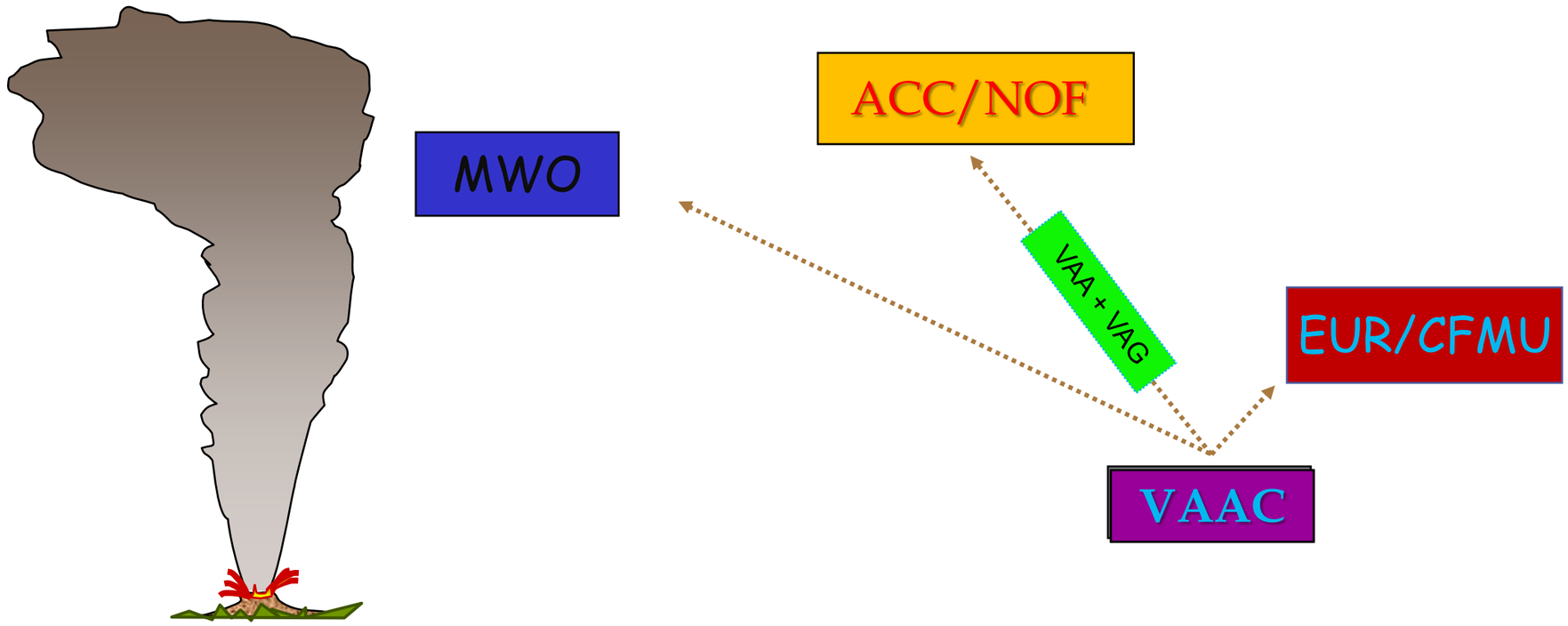
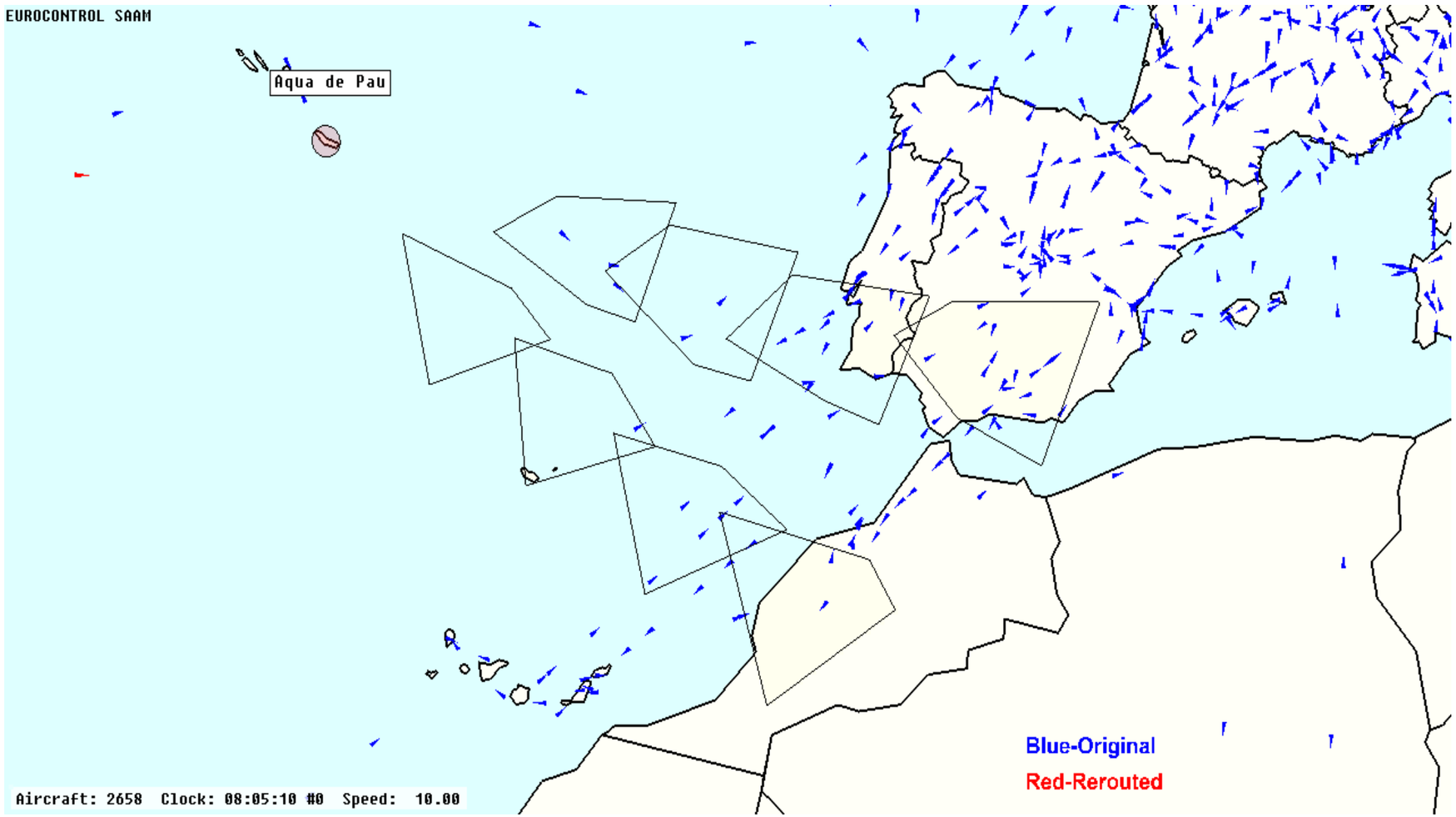
Volcanic Ash Airborne Notification



Volcanic Ash - ADVISORY INFORMATION



Volcanic Ash – Eurocontrol CFMU – Reroute



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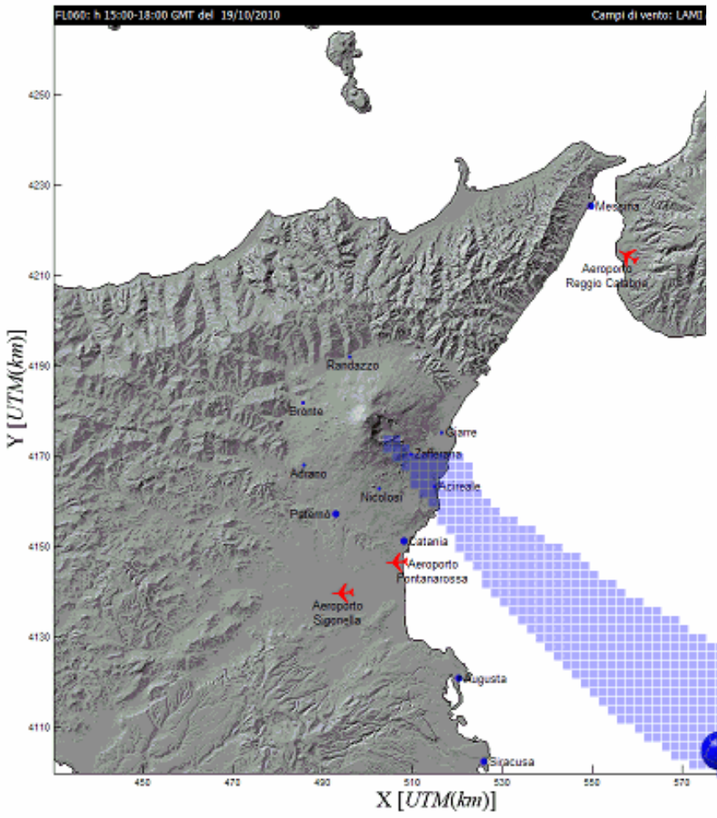
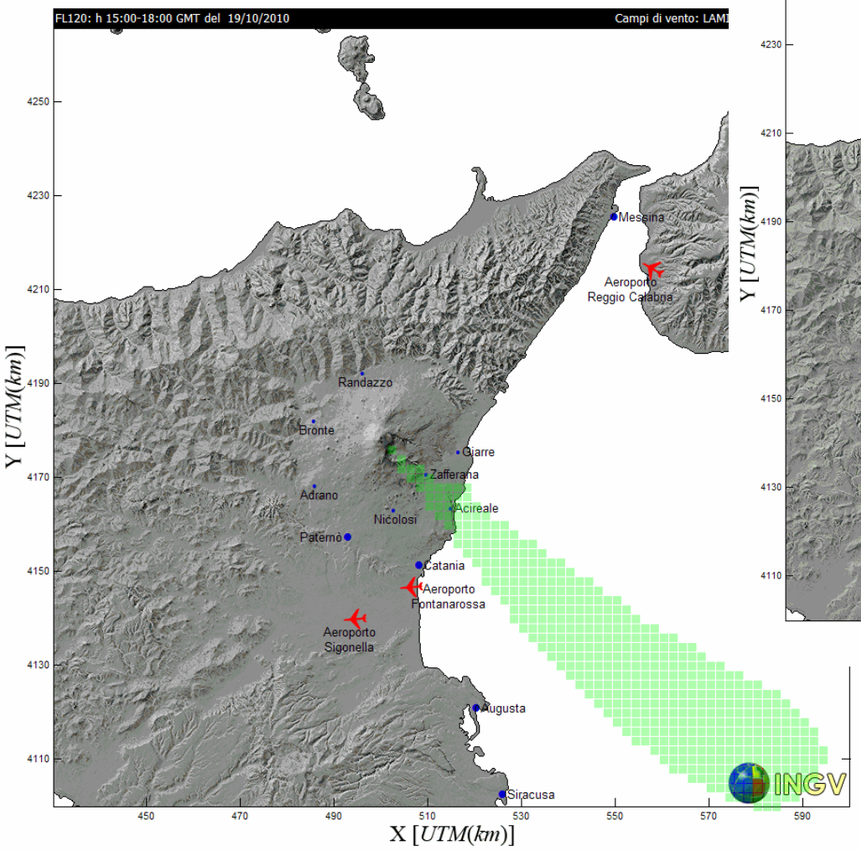
Volcanic Ash – Local Contingency - Flight Level

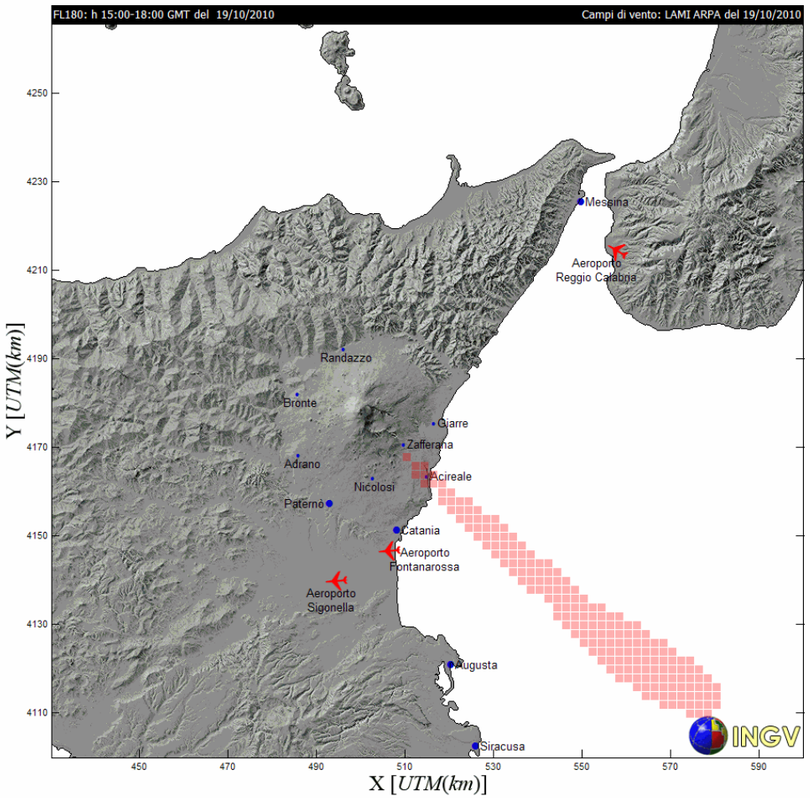
FL 060



FL 120



FL 180



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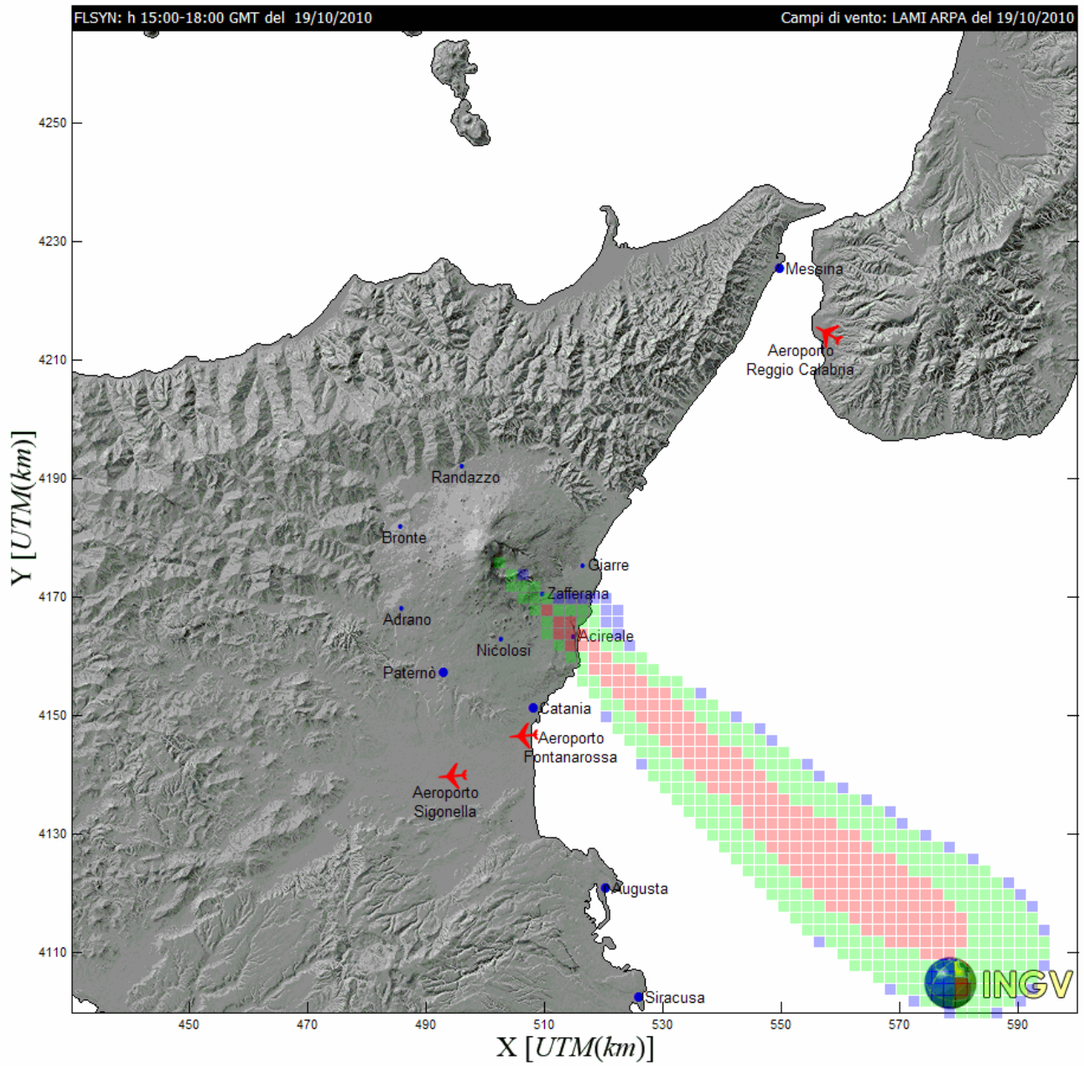
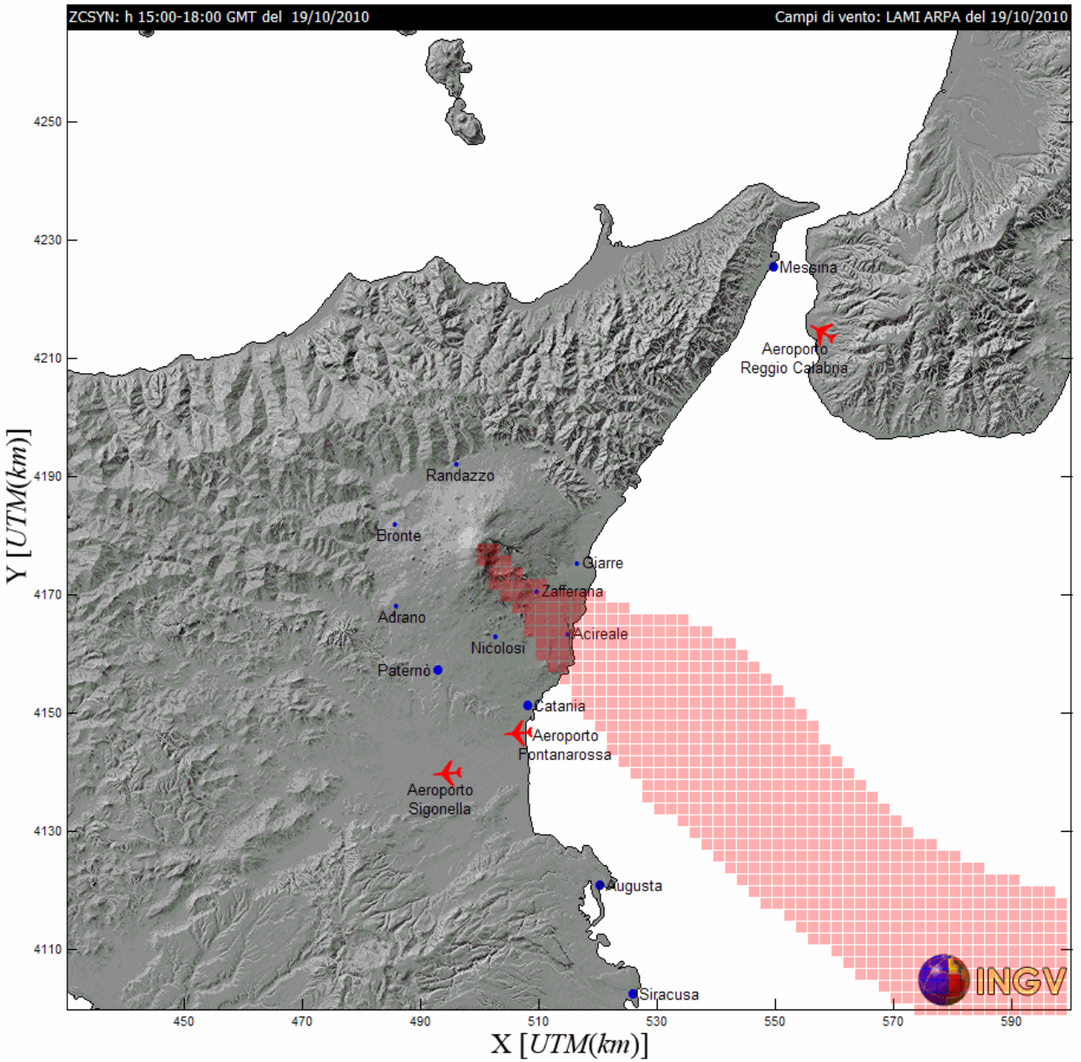
Volcanic Ash – Local Contingency - Union





Volcanic Ash – lesson learnt

Telephone conference on the effects of the volcanic ash cloud on the ATM network – towards a harmonized approach
19 April 2010 – 11.00 CET

Given the unprecedented nature of the impact in Europe of the continued volcanic activity, EUROCONTROL and the European Commission have looked at alternative ways of addressing the situation keeping safety at the forefront. Member States are ultimately responsible for restricting use of their airspace.
However, a harmonized approach would be called for.

Option 2:
Aircraft Operators (AOs) assume responsibility for decision to operate in potentially affected areas

Volcanic Ash – lesson learnt

Option 2: AOs assume responsibility for decision to operate in potentially affected areas

This approach focuses on providing as much information as possible to the aircraft operators who, in turn, assess the information and make the final operational decision regarding the operation of the aircraft and its tactical conduct.

A primary objective during volcanic ash episodes is to ensure the aviation community receives timely, consistent information about the ash cloud's position, altitude and projected trajectory and drift.

ICAO recommends that flight operators avoid the area of known or forecast ash clouds, while recognizing that final responsibility for flight decisions rests with the pilot in command.

Alternative routes to avoid would be suggested by ATC but the ultimate decision is left to the pilot in command to determine the best course of action for the flight. It reverses the current European assumption that flying through ash should be prohibited.

This option would entail a significant amount of re-routings which would substantially curtail capacity in dense areas.

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Volcanic Ash – lesson learnt

- *None of AOs have the knowledge to hinder a volcano to erupt, but AO do have the knowledge to avoid any dangerous volcanic ash encounter .*

- *Therefore improvements in all fields along the line are required.*

- Improve monitoring and detection techniques for volcanic activities
- Improve alerting system for volcanic activities
- Improve dispersion models for volcanic activities (details about ash cloud density would be helpful)
- Improve volcanic ash advisory message system for easy use in airline systems (standards, encoding, etc.)
- Discuss the issuance of pre-eruption alerts and advisories
- Review the principles of SIGMET issuance SIGMET,VA NOTAM, ASHTAM, not only valid for one FIR/UIR
- Research the impact of volcanic density on aircrafts

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Volcanic Ash – Summary

- COMMUNICATION OF VOLCANIC ASH EVENTS IS VERY CRITICAL TO AIR CARRIERS
- COHERENCE BETWEEN NOTAMS,ASHTAMS AND SIGMET, and VAA ,
- HIGH COST FACTORS IF ACFT IS DAMAGED OR IF IT DIVERTS
- EVEN DIFFUSE (or ash poor) CLOUDS CAN CAUSE COSTLY DAMAGE
- IMPROVE MODELING OF FUTURE ASH CLOUD PREDICTION
- INCIDENTS STILL HAPPEN

Volcanic Ash – CDM

Decision making is an everyday activity.

Decision-making involves gathering, interpreting and assessing information, formulating and judging alternatives and choosing a course of action that will fulfil a certain objective as closely as possible. Of course, decision-making is not solely an individual activity, but also occurs at group level.

Collaborative Decision Making (CDM) is about multiple parties working together as a team, about distributing tasks, reconciling conflicting goals, sharing resources and negotiating behaviours between parties.

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santo.sgro@enav.it - AKA FLAVIO

------THANK YOU FOR YOUR ATTENTION------

ZZZZZZ