# Examples of Scenarios of Volcanic Ash Exercises

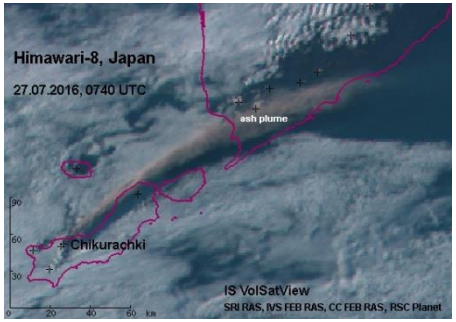
*Presented by : Christopher Keohan; ICAO EUR/NAT RO - MET*

# History


» 2006-2008
- Volcanic ash exercises conducted
- Expanded to airlines in 2008

» 2008 – COG and NAT SPG
- Formulated **VOLCEX/SG**
- Conduct exercises to routinely test VACP and suggest updates accordingly
- Future exercises to include Italy, Portugal in addition to Iceland
- 15 exercises conducted thus far

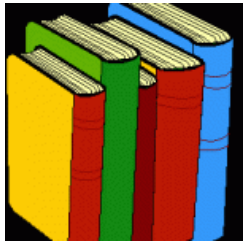
# History




» 2010 – COG

- Established **EUR (EAST) VOLCEX/SG**
- Exercises to include Kamchatka, Kurile Islands in Russian Federation
- 7 exercises conducted from 2013 to 2019

# Guidance for conducting volcanic ash exercises in ICAO Regions



– Appendix F of ICAO Doc 9766 – *Handbook on the International Airways Volcano Watch (IAVW)*

# Guidance - General

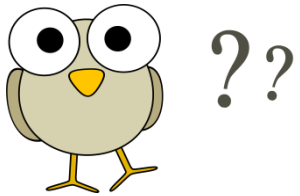
- Facilitated by ICAO RO concerned
- PIRG may propose revision of provisions (VACP regionally and/or global provisions to the appropriate ICAO group)
- PIRG may establish Steering Group to organize, conduct VA Exercises
  - Representation with concerned VAAC(s), ANSPs, airspace users, regulators

# Guidance – how often?

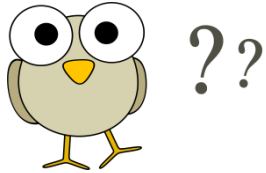

- Exercise at least every 3 years
- Test changed procedures (e.g. regional VACP)

# Guidance – what to test?

- Volcanic activity alerting
- Aeronautical information service (AIS)
- Meteorological message routing
- Volcanic ash information
- Air traffic control procedures
- Air traffic flow and capacity management
- Aircraft operator response
- Collaborative decision making between stakeholders



# Guidance – what to test?

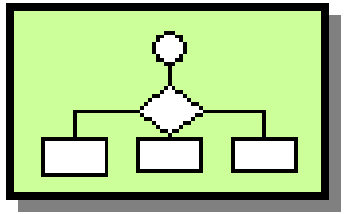


- When starting out
  - Can test components of the system – then build on previous exercise
    - » e.g. small test with VO, VAAC, ANSP(s) to test information flow and if successful, can test with the airlines at later date
    - » These smaller exercises typically test information flow in the first 90 minutes of a volcano eruption
  - Can test suggested new procedures before implementation

# Guidance – impact to operations

- Exercise simulates real event
- Operation of the aviation system must continue normally and be unaffected by the exercise
  - This may require additional staff on duty for the exercise
    - » e.g. dispatch calls in additional staff for the exercise for training purposes, particularly for new personnel

# Guidance - objectives



- Practice conduct of volcanic activity response in accordance with regional reference documents

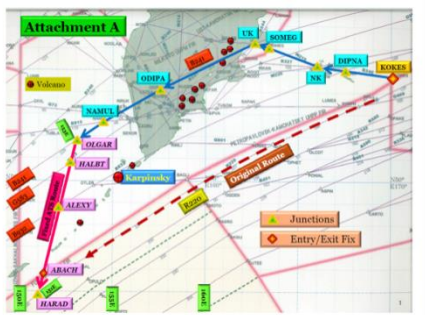
- Verify existing information, AIS and MET message routing via AFTN addresses, relevant e-mail addresses, telephone and fax numbers, and internet addresses (URLs)

# Guidance - objectives

- Maintain appropriate information and message routing between all involved agencies and organizations

- Provide volcanic activity response training for key personnel involved

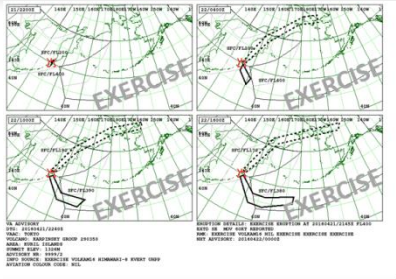
# Guidance - objectives




- Allow regulators to assess the preparedness and operational response in terms of planning, process and procedures of operators

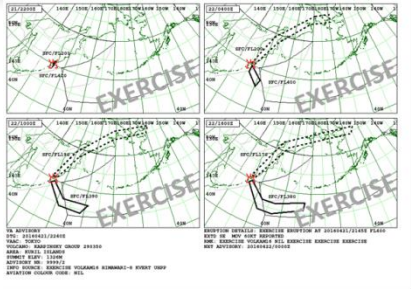
- Provide, when appropriate, recommendations for amendment of the reference documents, in accordance with lessons learned and conclusions contained in the final exercise report

# Guidance - concepts




- Simulate volcano eruption that produces ash cloud that impacts air navigation
  - e.g. Ash clouds that reach FL100 would not impact en-route commercial traffic in northern Pacific
  - Therefore, the ash cloud typically exceeds en-route traffic level (FL400) and the case in the northern Pacific uses wind from NW to assure Northern Pacific (NOPAC) Routes are impacted
  - Note that an ash cloud that reaches FL150 does impact some aircraft due to decompression regulations

# Guidance - concepts




- Any, or all of the activities below may be tested depending on scope of exercise
  - AFTN, email addresses, websites, message routing and voice communications
  - Alerting and observation of ash (e.g. use of VONA and VAR)
  - VAAC response (e.g. volcanic ash information)

# Guidance - concepts

- *continued*
  - ATS response (including air traffic control and AIS for NOTAM issuance)
  - Air traffic management (ATM) response
  - Aircraft operator response (including safety risk assessment)
  - Meteorological watch office response (i.e. SIGMET)
  - Suitability of information, its frequency, format and content

# Guidance - planning

- RO establish appropriate structure
  - e.g. Steering Group

- Exercise planning
  - Exercise Leader
  - Planning meeting at least 3 months before (suggest 6-12 months)
  - Develop **Exercise Directive**
    - » Exercise scenario, participating agencies, special instructions

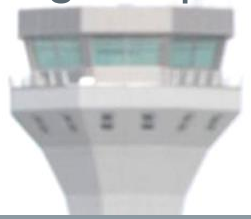
# Guidance - reporting

- Initial exercise reports should be prepared by all participating agencies
  - Submitted to Exercise Leader 1-2 weeks after the Exercise


- Debrief Meeting
  - Held about one month after the Exercise
    - » Discuss exercise reports
    - » Develop recommendations
    - » Produce consolidated final exercise report for consideration by appropriate ICAO group
      - any changes that arise to provisions can be tested in next exercise

# Full circle

- Establish Group to Govern
- Plan based on needs
- Conduct exercise
- Report on exercise
- Debrief – develop recommendations
- Report to ICAO group
- Implement change to provisions
- Retest



# VOLKAM19
# Issues

- ***<u>Reroutes – sharing information amongst ACCs</u>***

  – Test Dynamic Airborne Reroute Procedures (DARP)-like procedures

    » Using ATS Interfacility Data Communication (AIDC)
    » Using On-Line Interchange (OLDI)

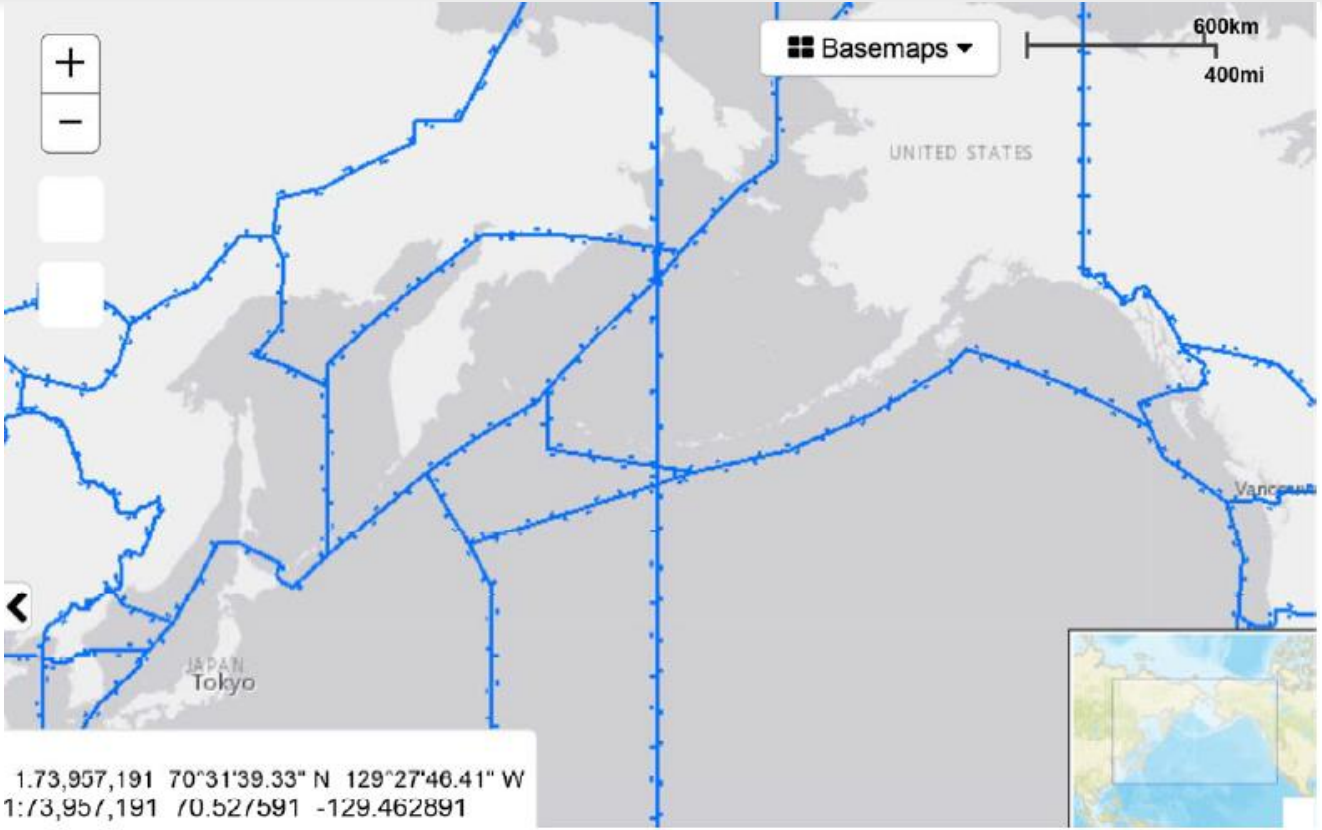
    *(reference task 13-3)*

# VOLKAM19
# Issues

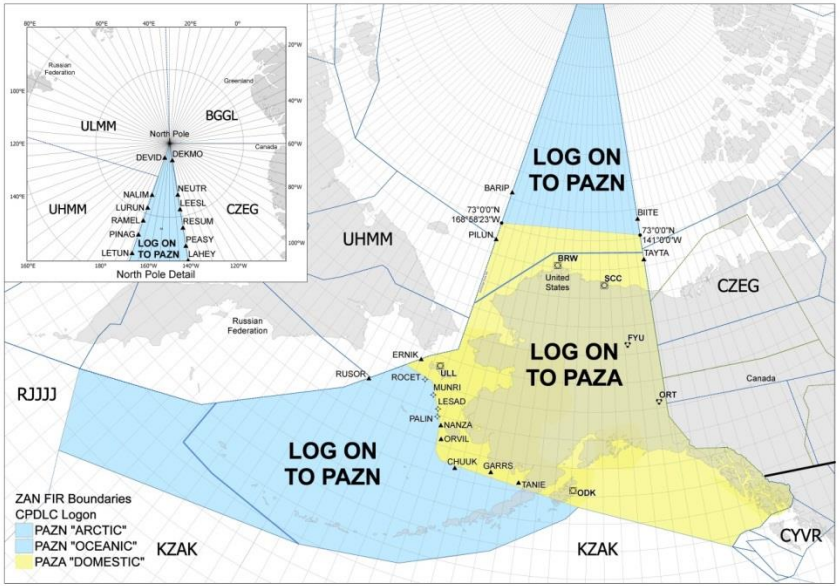
- ***Reroutes – sharing information amongst ACCs***

  - » Coordinate amongst ACCs
    - **Edmonton and Anchorage (AIDC) – 2020**
      - **American Airlines to conduct a CPDLC test (initiate in Edmonton)**
    - **Anchorage and Magadan (AIDC) – operational June 2020**
    - **Magadan and Khabarovsk (OLDI) – operational**
    - **Khabarovsk and Fukuoka (AIDC) – 2020/2021**
    - **Khabarovsk and Shenyang (OLDI) – bilateral discussion**

*(reference task 13-3)*

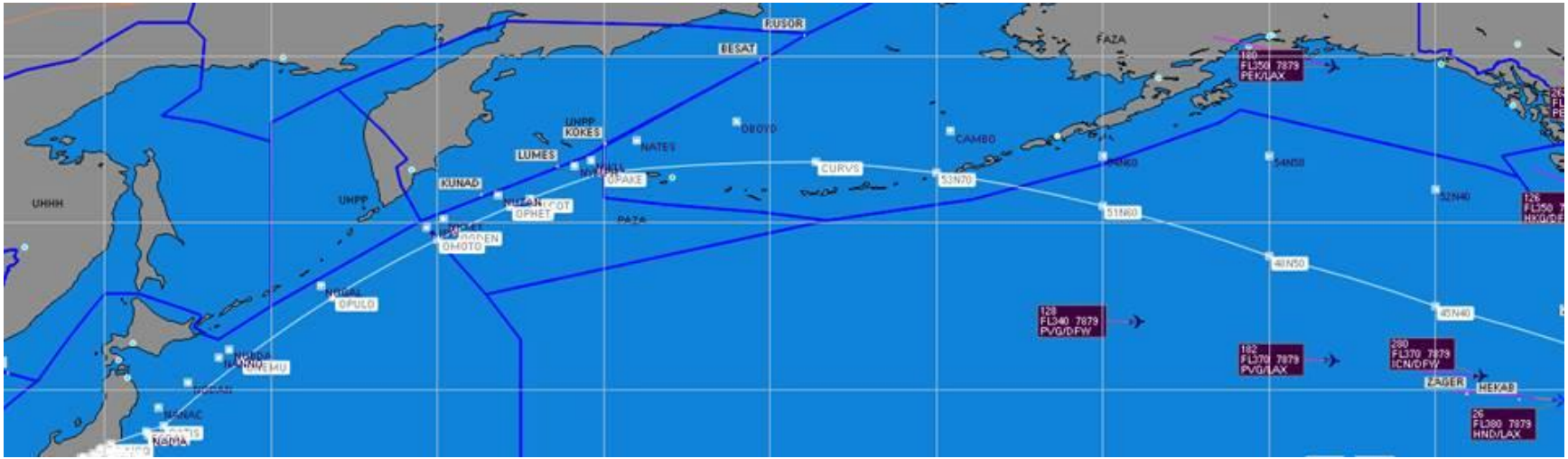

Basemaps
600km
400mi
UNITED STATES
JAPAN
Tokyo
1.73,957,191 70°31'39.33" N 129°27'46.41" W
1:73,957,191 70.527591 -129.462891

**Areas in Anchorage Air Space that can support a CPDLC test using DM24 and UM80: *this corresponds to Advanced Technologies and Oceanic Procedures (ATOP) airspace shaded in blue below***



**Example flight for sending reroute information via CPDLC to PAZN. Then ACC Anchorage can pass this information to ACC Magadan via AIDC.**

AAL183 KLAX-ZSPD (provided this route uses PAZN ATOP airspace and there are no significant operational delays):

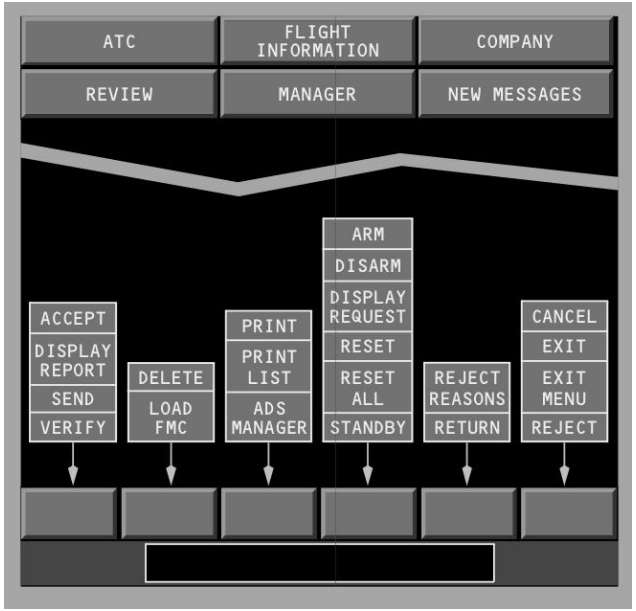


# Use of CPDLC for American Airlines Operations

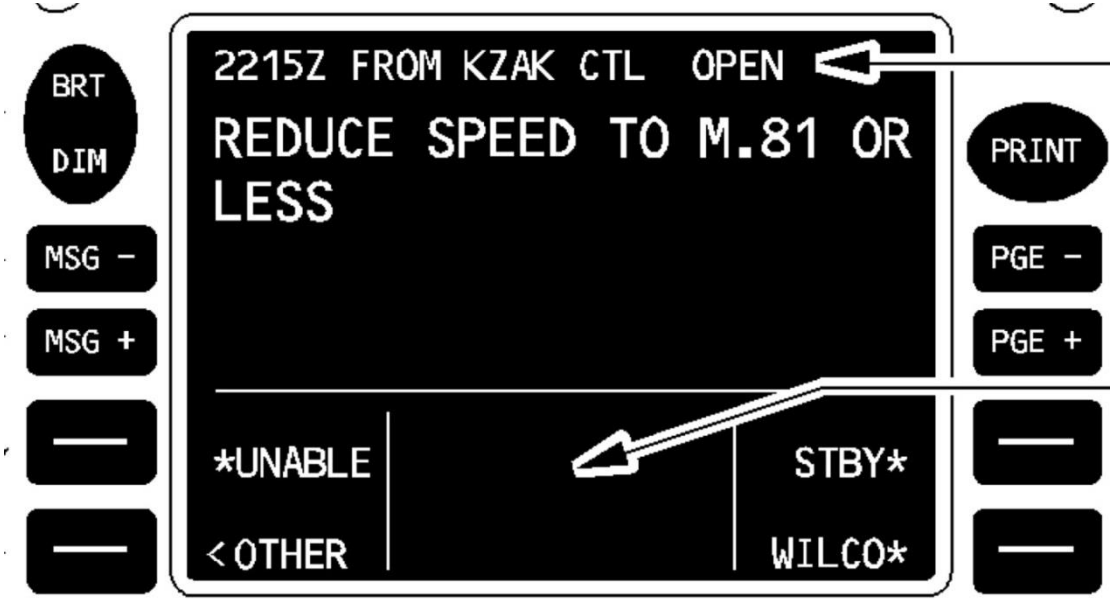
- Dispatch will provide the cockpit a proposed flight plan to deviate around volcanic ash. This will be uplinked from dispatch to the cockpit.
- The pilot will forward that flight plan (route request) via CPDLC to ATC.
- The pilot is expected to receive a reroute clearance via CPDLC from ATC (UM79, UM80 or UM83).
- The pilot is expected to provide a response to ATC (DM0, DM1 or DM2) accepting this reroute clearance. The response depends on the aircraft.

For AAL B777/787, the following procedure applies:

**ACCEPT** or **REJECT**



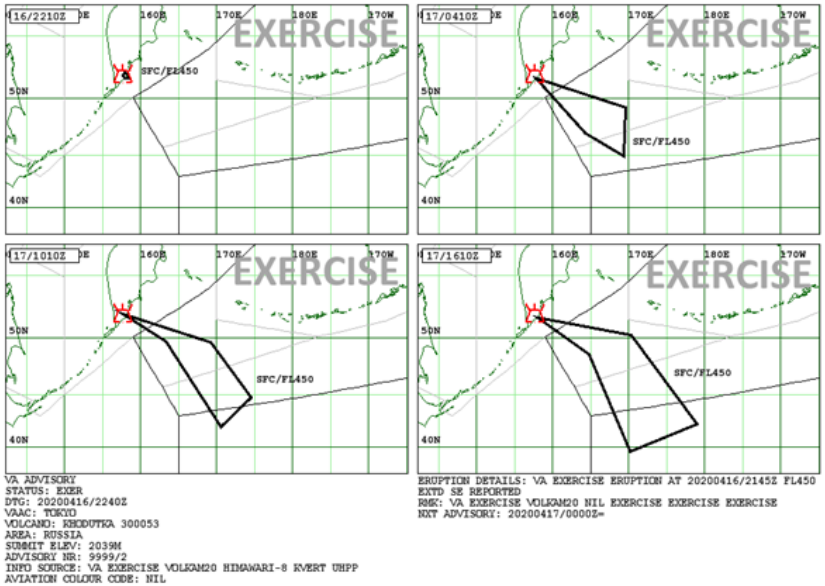
- For AAL A330, the following procedure applies:
  - **WILCO** or **UNABLE**



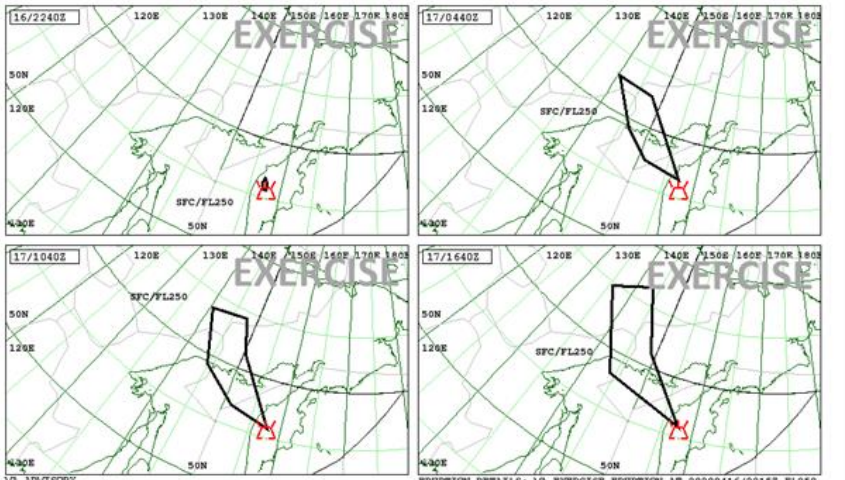
# Scenario attributes developed to achieve objectives

- Volcano or Volcanoes
- Flight levels
- Wind direction to impact certain zones, routes
- Wind speed such that the exercise can be done in a certain amount of time
- Times chosen for the maximum number of aircraft being impacted
  - That translates to midnight in Moscow; mid-AM in Kamchatka
- Practice Volcanic Ash Advisory Handover – VAAC Tokyo -> VAAC Anchorage -> VAAC Washington

# (VAG-1: Khodutka from VAAC Tokyo at 0716/2240)



# (VAG-2: Ichinsky from VAAC Tokyo at 0716/2310)



# VOLKAM19 Issues

- ***<u>Contingency MoU - finalize</u>***
  - Magadan & Fukuoka ACCs
    - » Consider changing airspace classification from Class G to A in Magadan ACC (for area north of NOPAC route)

*(reference task 14-1)*

# VOLKAM19
# Issues

- ***Increase Airline Participation***
  - Target:
    - » Air Canada
    - » Fed-Ex
    - » UPS
    - » Cathay Pacific and
    - » other Asian Airlines

*(reference task 16-8)*

# VOLKAM19
# Issues

- ***Special air-reports***
  - Test via controller-pilot data link communications (CPDLC)
    - » Currently have to use free text
      - **FAA to provide paper to OPDLWG**

*(reference task 17-3)*

# VOLKAM19 Issues

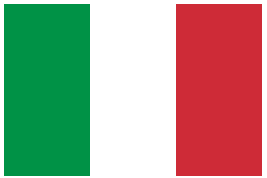
- ***Be prepared for real events***
  - Consider setting up a CADENA-like operational information system – include conducting teleconferences & CDM web platform
  - Consider generic VOLKAM email address for real volcanic ash events (add contacts where necessary)

*(reference task 19-1 & 19-2)*

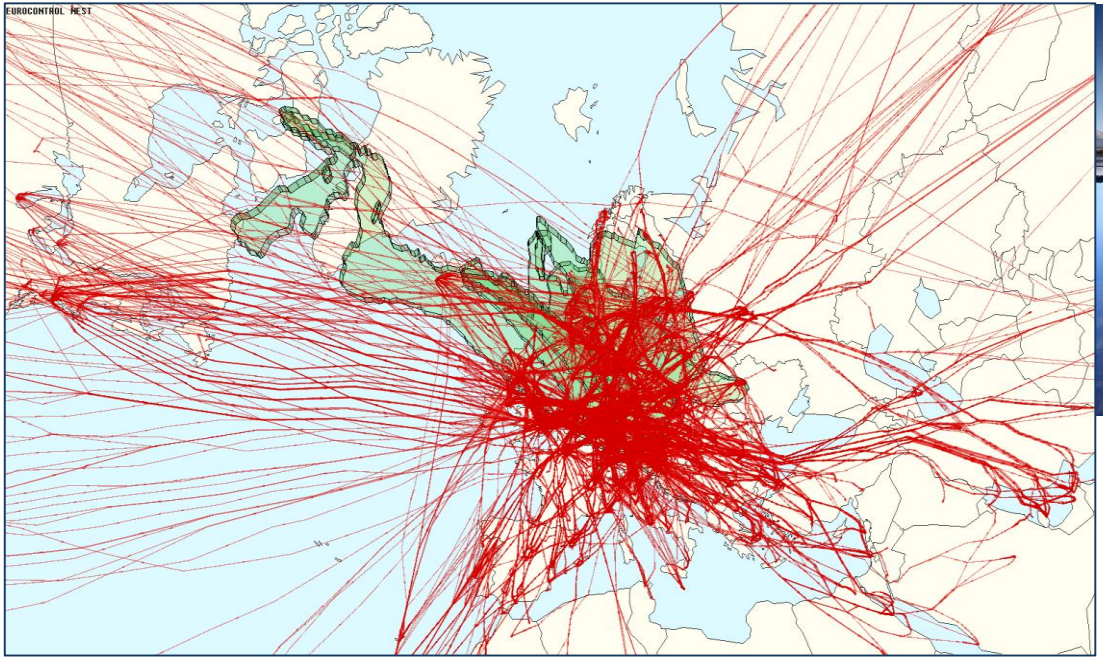
# VOLCEX

- Once per year
  - Rotation
    - Iceland
    - Portugal
    - Iceland
    - Italy



# VOLCEX – Example Scenario Iceland

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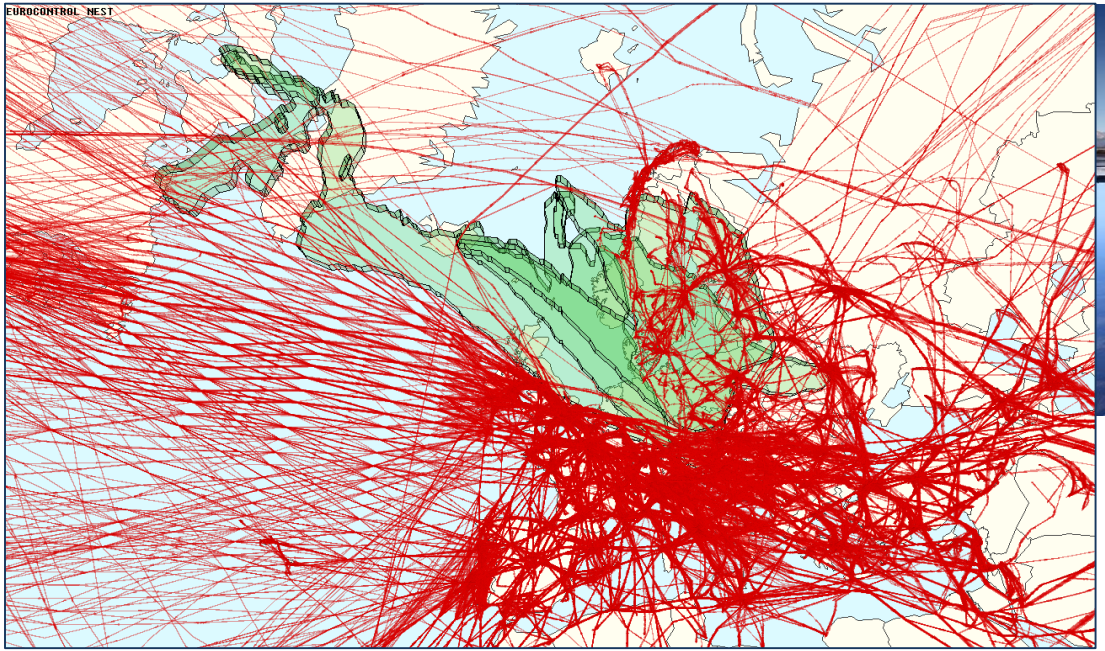


# VOLCEX – Example Scenario Portugal


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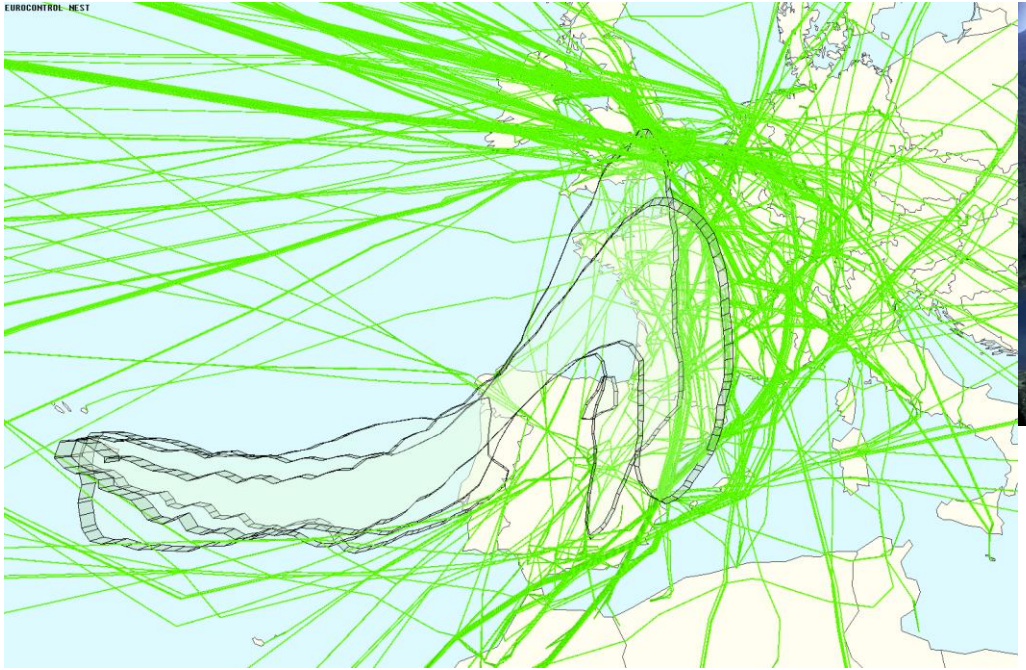
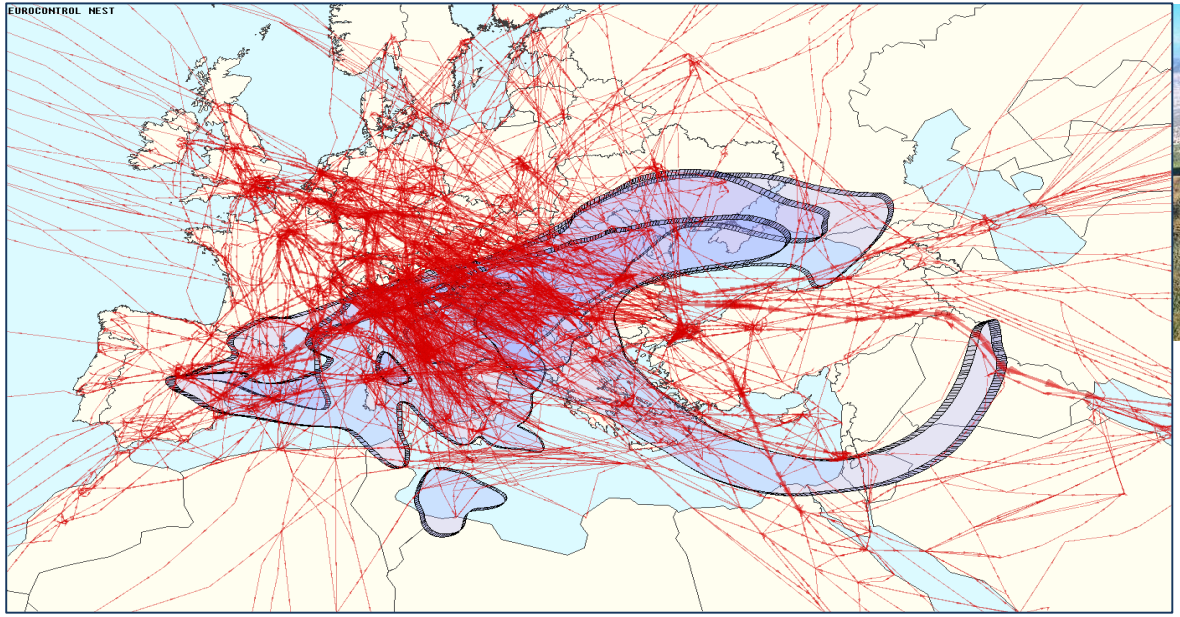



# VOLCEX – Example Scenario Italy

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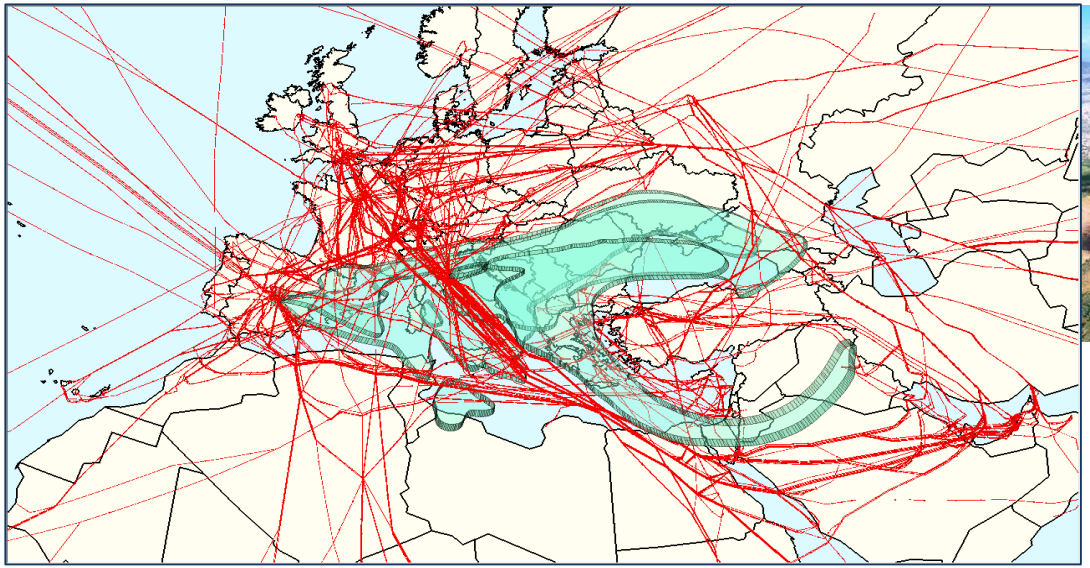

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THANK YOU