



# Delta Air Lines

## Aviation perspective: “Challenges in managing aviation risk from ash hazards”

Tom Fahey, Mgr. Meteorology, Delta Air Lines  
WORLD METEOROLOGICAL ORGANIZATION  
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# Positive Perspective

- We have made great progress since April 2010 eruption of Eyjafjallajokull volcano.



Eyjafjallajokull volcano, viewed from Fimmvorduhals, Iceland, Friday, 16 April 2010

# Airline Operational Decisions

## Successfully addressing both Safety & Efficiency:

- Air Navigation Service Providers (ANSP)
- Gov't Organizations &
- Airlines



Passengers await resumption of air travel: 16 April 2010 Frankfurt, Germany.



# Challenges & Solutions

- Detection of Eruptions & Ash
  - Duration
  - Resultant Ash Location & Density

Unknown: “Volcano obscured by Clouds”
- Generation & Access/Sharing Available Info
  - Observations (1<sup>st</sup> priority)
    - Seismic Activity
    - Satellite Imagery
    - Aircraft/Pilot Observed
  - Forecasting Ash
    - Level of certainty, Dispersion Models, T+06, +12 & +18Hrs, etc.

# Challenges & Solutions

- Volcanic Ash Concentration/Contamination Charts
  - $2\text{g/m}^2 = 2 \times 10^{-3}\text{-g/m}^3$  &  $4\text{g/m}^2 = 4 \times 10^{-3}\text{-g/m}^3$
- Color Coding Volcanoes for Eruption Risk

Table 2. SUMMARY OF AVIATION COLOR CODES

<b>GREEN</b>	Volcano is in typical background, non-eruptive state <i>or, after a change from a higher level,</i> volcanic activity has ceased and volcano has returned to noneruptive background state.
<b>YELLOW</b>	Volcano is exhibiting signs of elevated unrest above known background level <i>or, after a change from a higher level,</i> volcanic activity has decreased significantly but continues to be closely monitored for possible renewed increase.
<b>ORANGE</b>	Volcano is exhibiting heightened or escalating unrest with increased potential of eruption, timeframe uncertain, <b>OR</b> eruption is underway with no or minor volcanic-ash emissions [ash-plume height specified, if possible].
<b>RED</b>	Eruption is imminent with significant emission of volcanic ash into the atmosphere likely <b>OR</b> eruption is underway or suspected with significant emission of volcanic ash into the atmosphere [ash-plume height specified, if possible].