

The Global Voice of Pilots



**IFALPA**

**VOLCEX WORKSHOP and VOLCANO SURVEILLANCE WORKSHOP ON  
INTERNATIONAL AIRWAYS**

Lima, Peru, June 17 - 20, 2024

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Chair Weather Group VEREINIGUNG COCKPIT

The Global Voice of Pilots



**IFALPA**

An international not-for-profit organization, representing over 100,000 pilots in nearly 100 countries.

The mission of the Federation is to promote the highest level of aviation safety worldwide and to be the global advocate of the piloting profession; providing representation, services, and support to both our members and the aviation industry.

# IMPACT OF VOLCANIC ASH CLOUDS ON AIR OPERATIONS

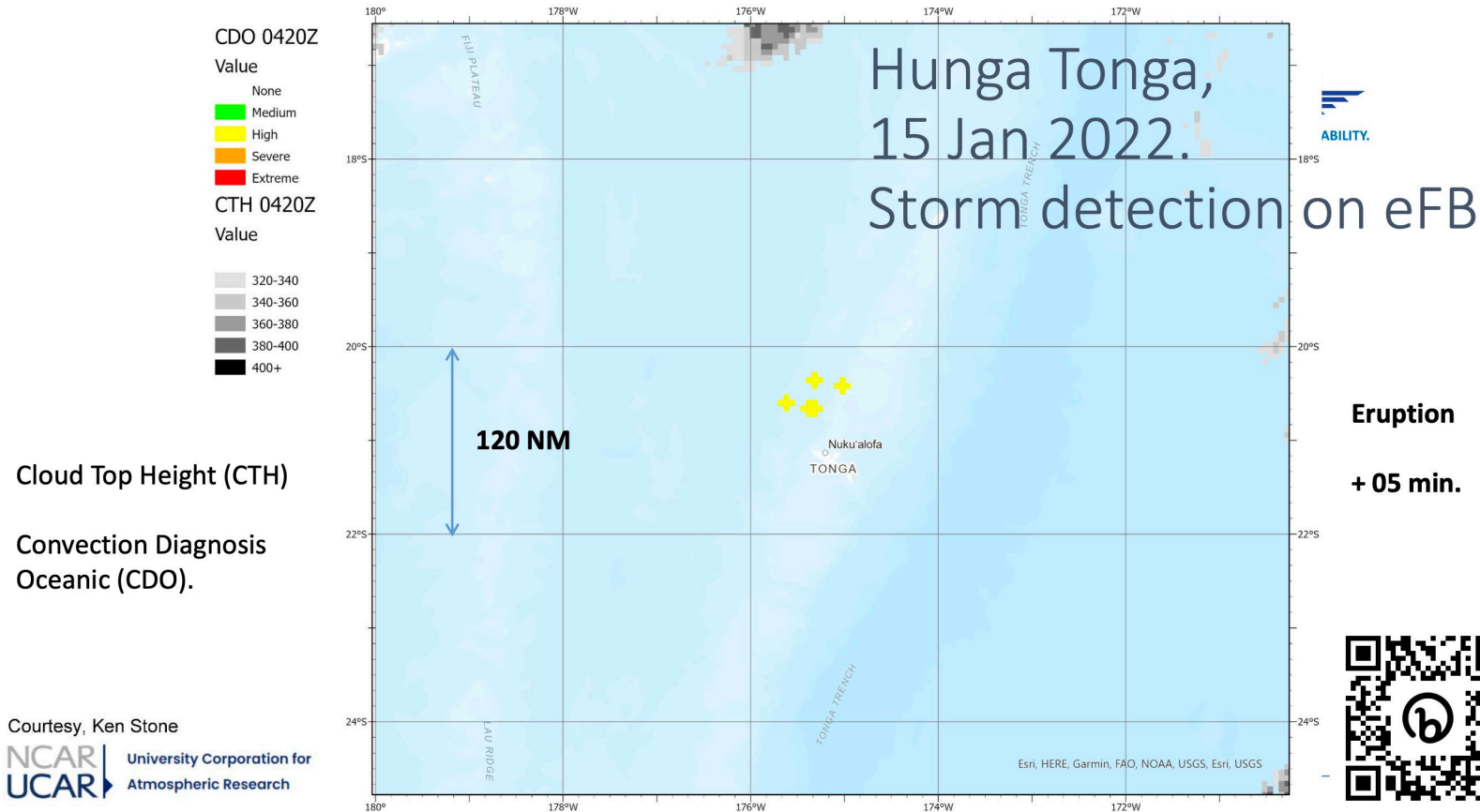




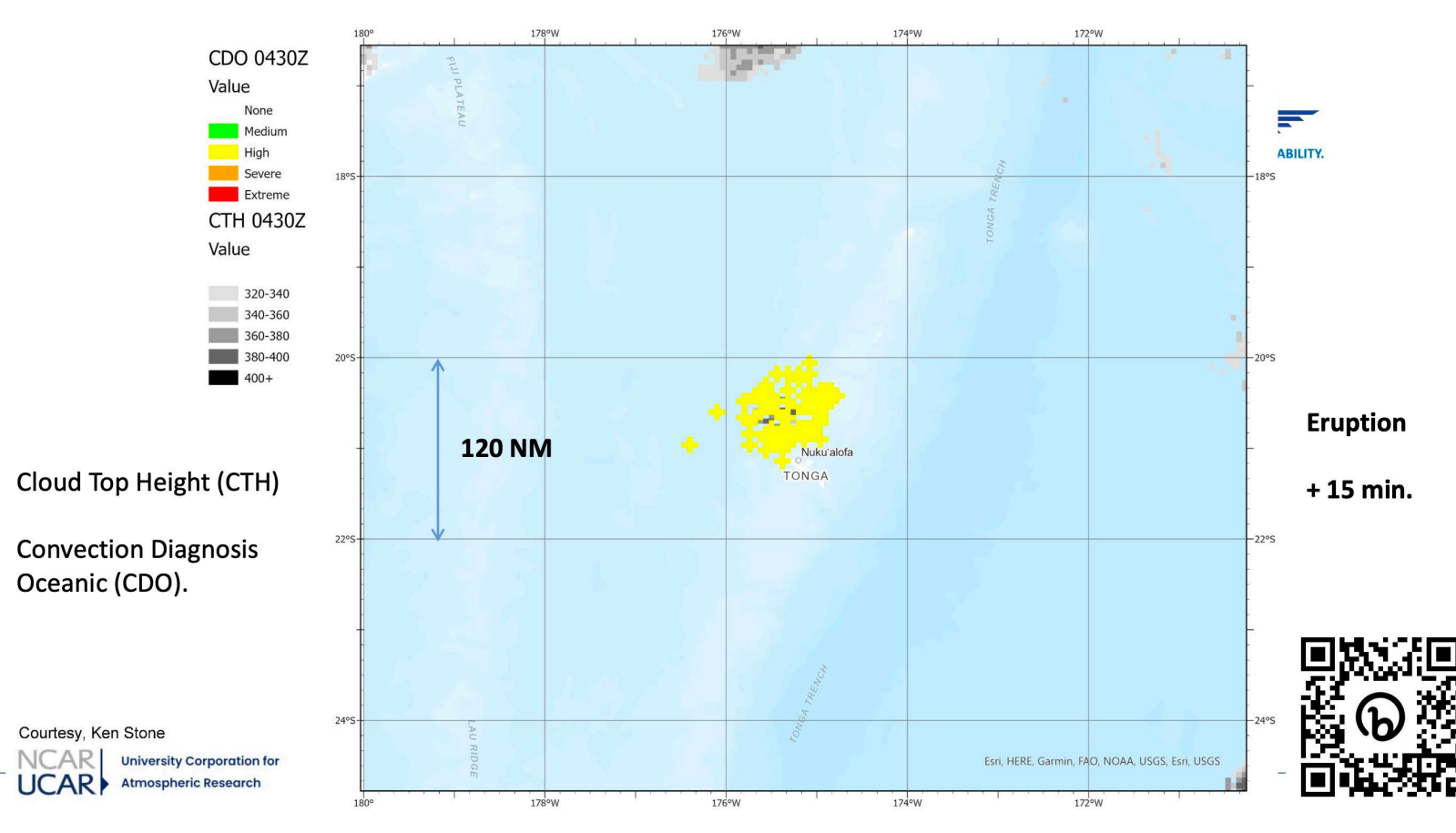
# Planning and Avoidance

- Routes should be planned laterally and vertically to take account of active eruption plumes and clouds of dispersing volcanic ash notified by appropriate meteorological information, for example SIGMET charts.
  - Additional route fuel and allowances in the crew rest schedule.
  - **Night flights or IMC Conditions** in regions known for regular explosive volcanic activity should be undertaken with especially careful pre flight planning because of the possibility that dangerous ash plumes, from new eruptions **which have not yet been detected and notified**, could be encountered.
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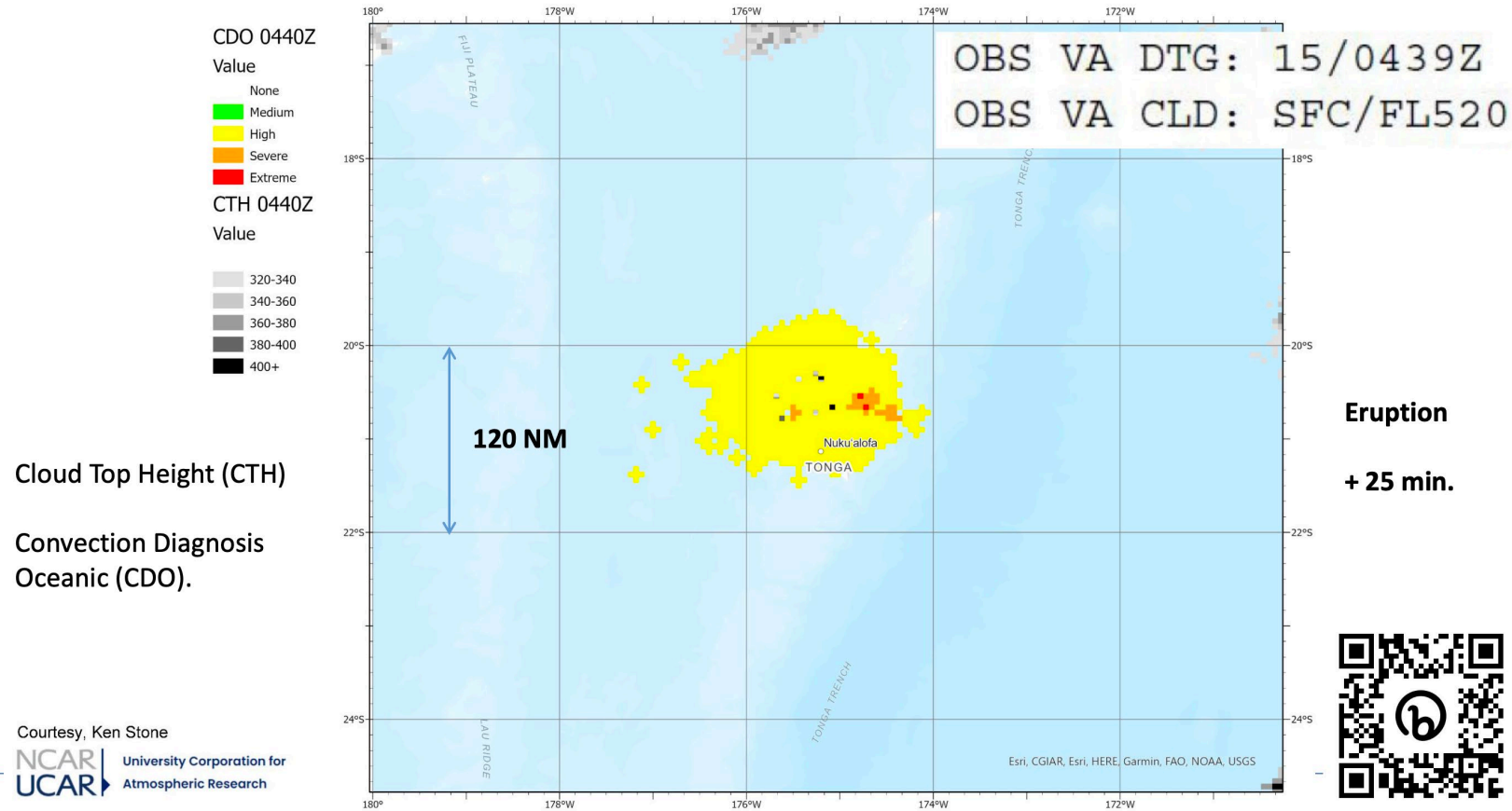
# Need to avoid, but based on what info...?



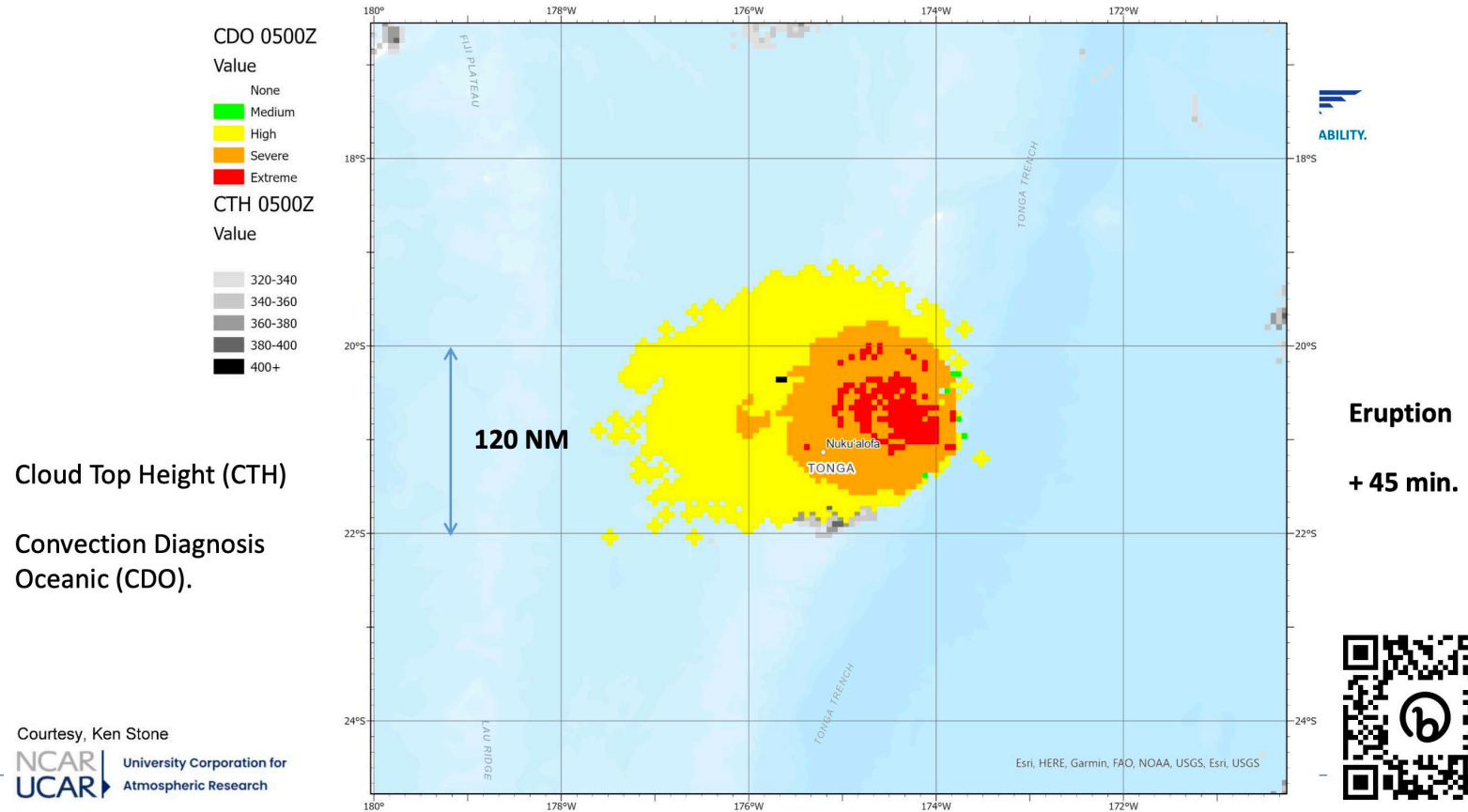
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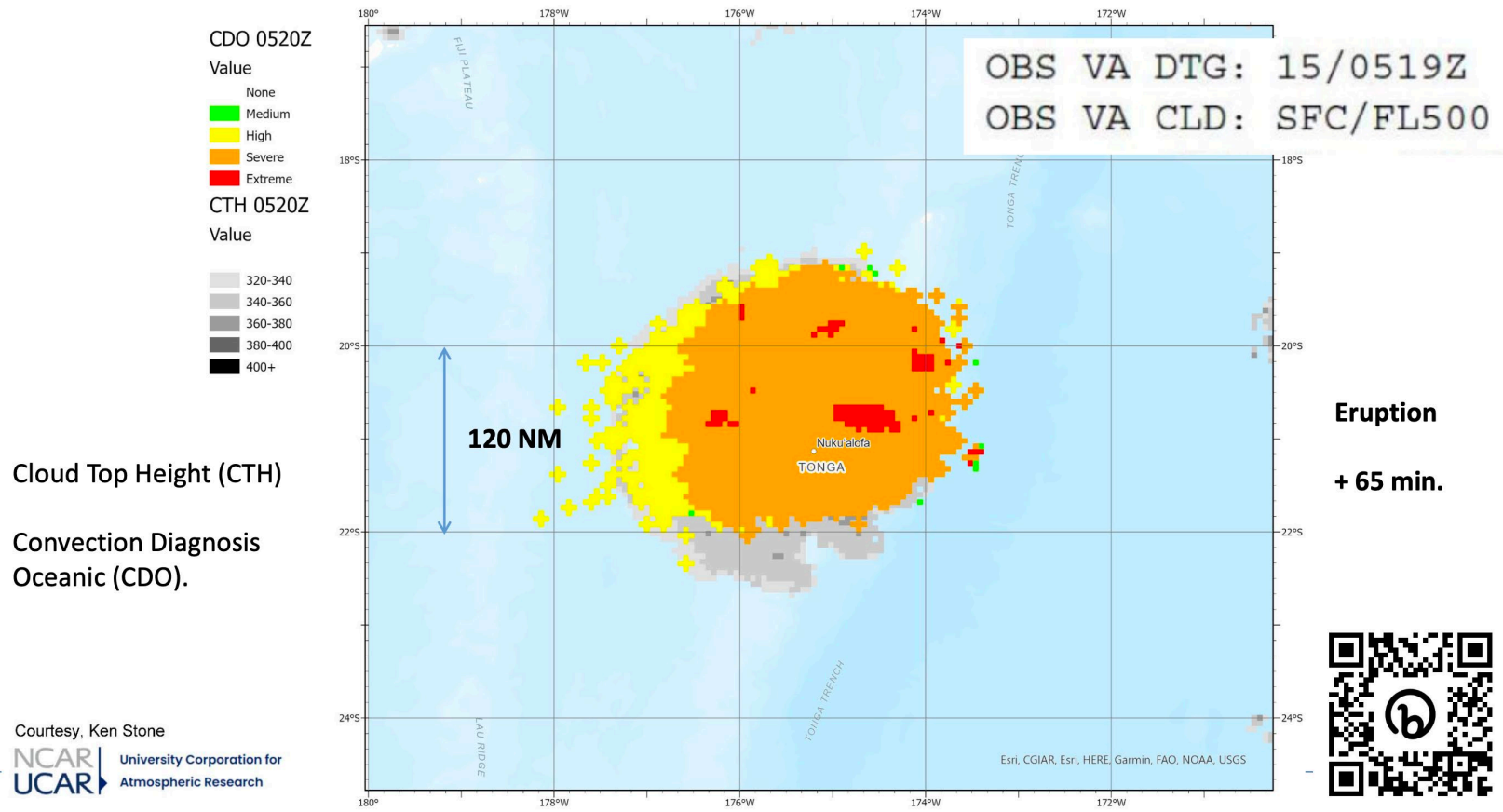
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# Changing SIGMETs can put pilots in the clouds, even if planned to stay outside

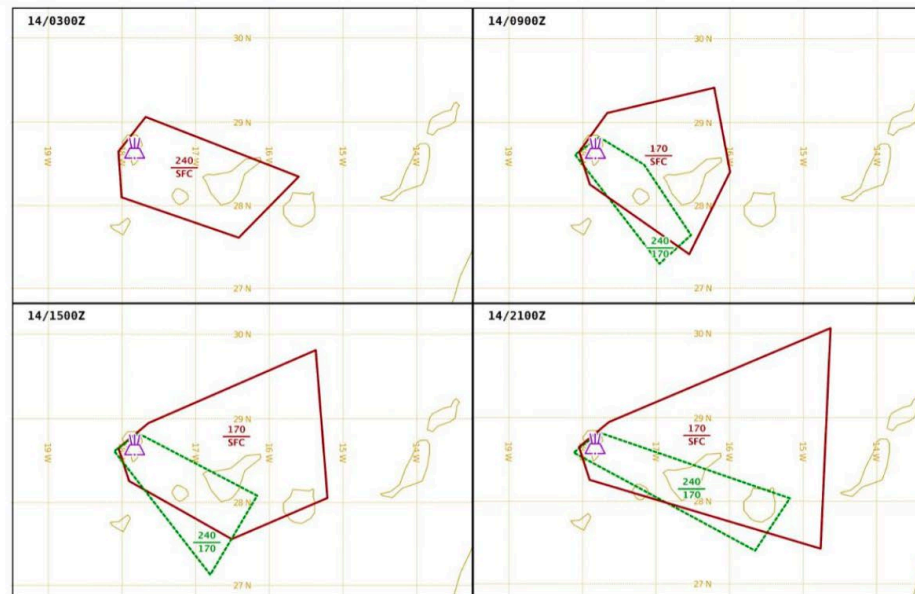


Courtesy, Ken Stone  
NCAR  
UCAR University Corporation for  
Atmospheric Research

# In order to avoid, pilots need the **MOST CURRENT INFO**



## The way to Quantitative Volcanic Ash VAA for Mt. La Palma, 14 Dec 2021



VOLCANIC ASH ADVISORY  
DTG:20211214/0255Z  
VAAC:Toulouse  
VOLCANO: LA PALMA 383810  
AREA: CANARY ISLANDS  
SUMMIT ELEV: 2426M



ADVISORY NR: 2021/366  
INFO SOURCE:WECAM, SAT IMAGERY  
AVIATION COLOUR CODE:RED  
ERUPTION DETAILS: ERUPTION AT 20210919/1410Z STRONG ONGOING ERUPTION  
RMK: STRONG ONGOING ERUPTION WITH PLUME HEIGHT REACHING APPROXIMATELY 7000M  
NXT ADVISORY:NO LATER THAN 20211214/0900Z.

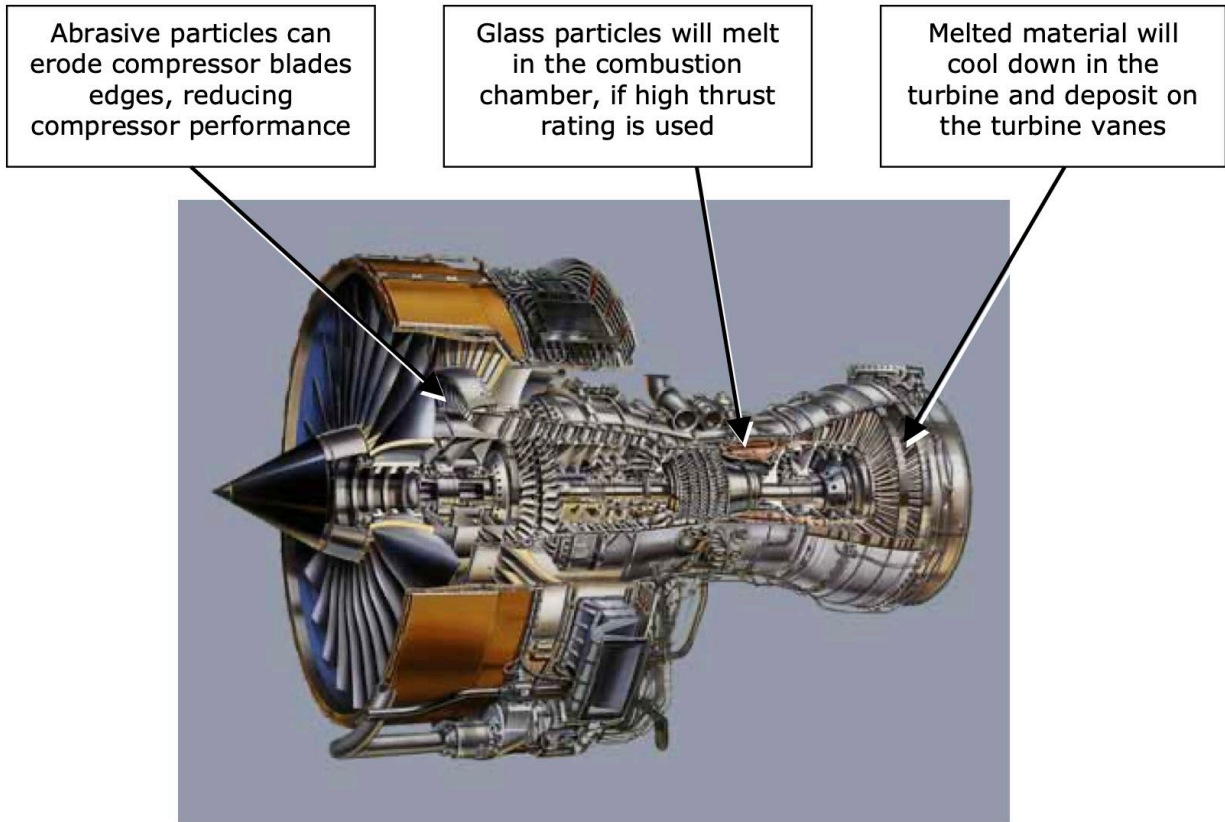
# Indications on the aircraft



- **Weather radar cannot detect** the small particle sizes of which ash clouds are composed.
  - **St. Elmo's Fire** caused by electrical discharges as small electrically charged rock particles impact the metal surface of the aircraft may be seen around the flight deck windscreens and on the leading edge of engine nacelles
  - A "**search light**" **effect** may be observable at the engine intakes - as if a light is shining from within the engines through the fan blades
  - The appearance of very fine **dust haze within the cabin** and the possible visible settlement of dust on surfaces.
  - An acrid **electrical smell** from the air conditioning system.
  - **Engine surges** and power fluctuations especially when occurring on more than one engine. There is a possibility of engine flame out.
  - Unexplained fluctuations or **erroneous readings in Indicated Airspeed (IAS)** on more than one displays, attributable to partial blockage of Pitot Tubes with ash.
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# Flight Operations Briefing Notes

Operating Environment  
Volcanic Ash Awareness



**Figure 3**  
*Effect of Volcanic Ash on Engine*

# Ash encounter : ground school



Cockpit-Window

Airspeed

Altitude / flight level

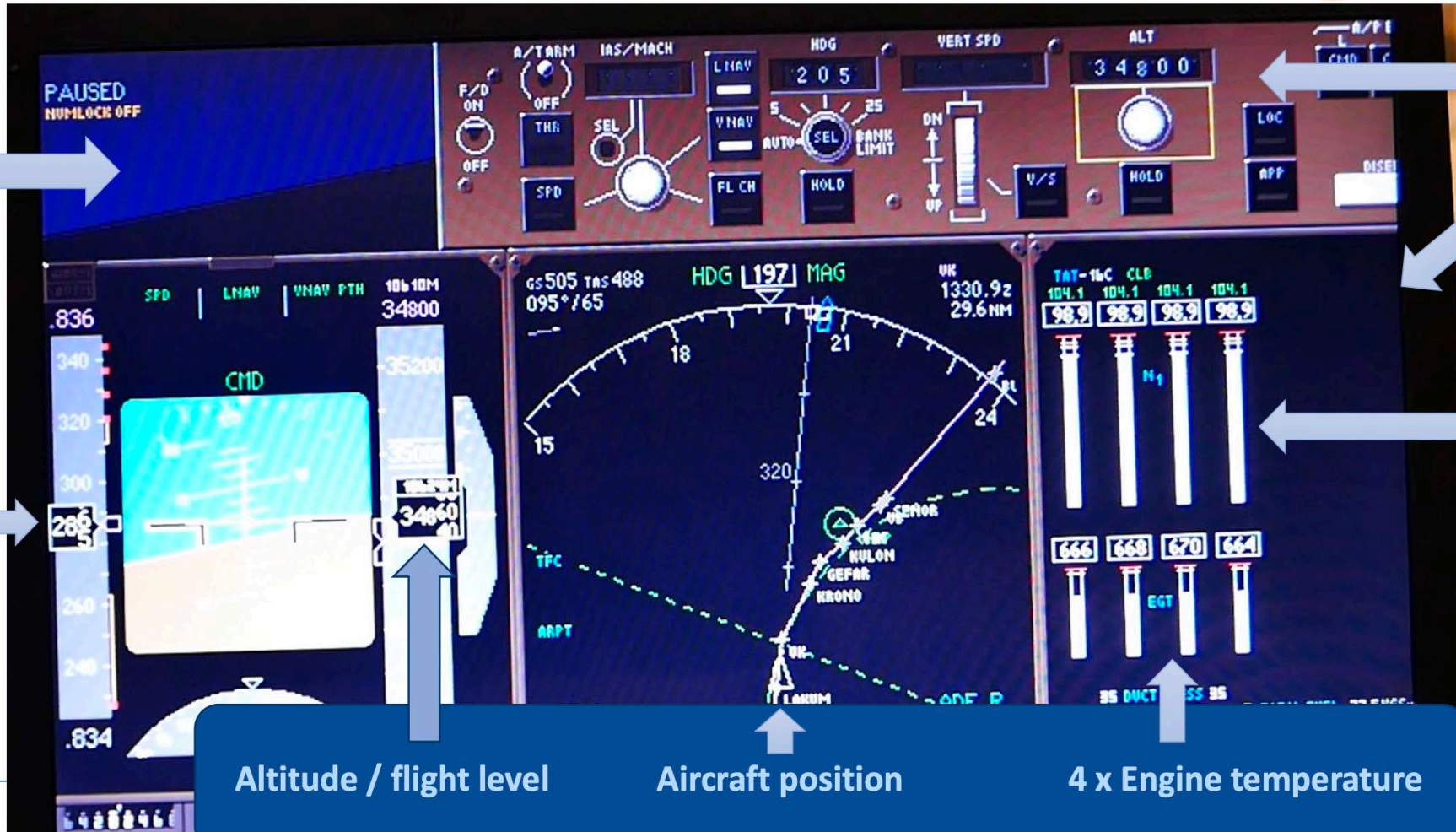
Aircraft position

4 x Engine temperature

Autopilot panel

Important system messages

Engine RPM (%)



## 4 engines have failed - gliding turn to escape the ash cloud.

- main electric supplies are powerless
- battery power essential instruments only
- no autopilot, multiple additional failures



# Lesson learned: 2 minutes to fail 4 engines

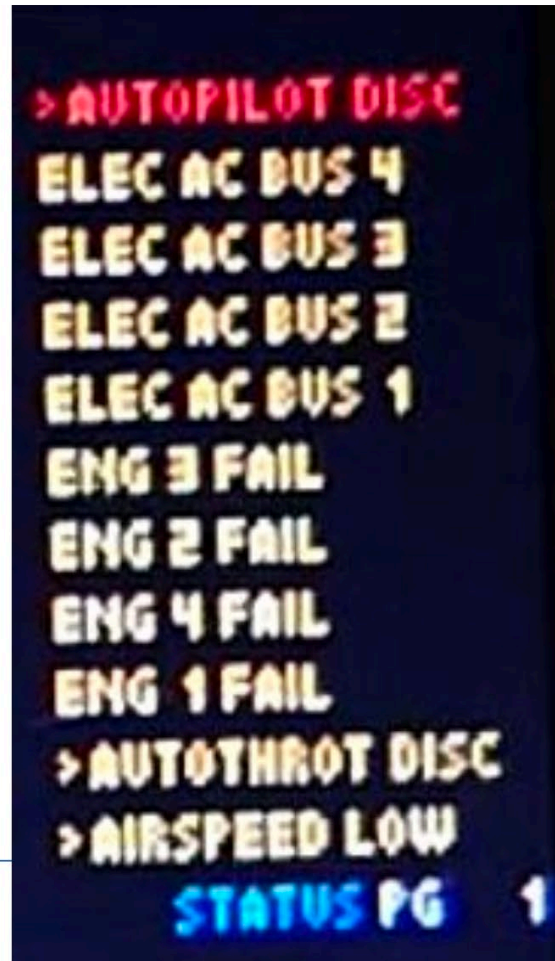


> BA 9, 1982  
Mt. Galunggung,  
Indonesia

**AND**

> KLM 867, 1989  
Mt. Redoubt,  
Alaska

**Info flow to be  
improved !**





# Actions to be taken by Flight Crews



- **Oxygen.** Use of flight crew oxygen masks may be advisable if the dust and sulphurous smell is strong.
- **Reduce thrust.** Engine core operating temperatures of jet engines must be reduced below the temperature at which silicate ash particles melt (around 1,100°C). Reduction of engine thrust to flight idle is the only reliable way of achieving this in the absence of more precise guidance. If this action is not taken at or before the first signs of engine malfunction then flame out is likely to follow if clear air cannot be regained.
- **Reverse track and /or descend.** Clear air must be regained as soon as possible. Terrain permitting, a descending 180 degree turn is likely to be the fastest way out of the contaminated air. Under no circumstances should a climb be attempted as an escape option.
- **Prepare aircraft systems for recovery from potential engine failure.** Follow company/manufacturer's guidance which may include advice on increasing the flow of bleed air to improve engine stall margins, and operation of the Auxiliary Power Unit (APU) .
- **Monitoring.** The engines will need careful monitoring, particularly the Engine Exhaust Gas Temperature (EGT) which may climb dangerously if there is significant ash contamination in the engine. Monitor aircraft attitude and airspeed remembering that *airspeed indications may become unreliable* if blockage of the pitot-static system occurs.

# Actions to be taken by Maintenance



- How to clean surfaces: With a lot of effort !  
No water!! Brooming, vacuum, cleaning ok
- VA is chemically reactive when wet and will anyway behave like cement, become rather solid
- Greased Hinges: De-grease, clean and service with fresh grease
- The pitot tubes, static ports, and other sensors must also be checked and cleaned. Ground APU usage must be avoided if possible.
- Engines: Follow Manufacturers Procedures, but as general guidelines, Blowtorch, Dry crank, boroscopy inspections



# Operational Recommendations



## TIME IS CRITICAL

- Re-routings by ATC, preferably by CPDLC to avoid VA Areas
  - Notify Operators Dispatch Centers immediately
  - Update the pilot's EFBs ASAP
  - Be prepared for unexpected enroute diversions or precautionary landings of aircraft affected by VA
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