

7TH INTERNATIONAL WORKSHOP ON VOLCANIC ASH

Anchorage October, 2015

An operator's view to developing a realistic global understanding and capability to efficiently manage the volcanic ash hazard and some of the challenges in using a evidence based risk approach



The August 2015 RAUNG eruption in Indonesia which intermittently impacted flying operations at Bali Denpasar Airport over a period of 3 weeks conservatively cost Australian operators an estimated US\$30m

- QANTAS adopted the risk assessment approach for Volcanic Ash –Why:
 - Strong Safety Management System culture and capability
 - Long time user of performance based provision for prescriptive regulation – quality of information drives the RA
 - Long lead distances, many flights over active volcanic areas, need to avoid visible ash, flight over/under ash – each requires considered process understood by Flight Dispatch and Flight Crew
 - Current state of forecasting volcanic ash – **Choice** - identify the threat, be decisive and manage it **or** be totally risk averse
 - Accepting the responsibility for our operations – investment in information, skills, system capability, developing the risk assessment process and live it

- Qantas Meteorologists
- Systematic approach for accessing information
- Extensive ground supporting systems and Flight Monitoring
- Satcom ACARS equipped aircraft – the ability to respond to change
- Evidence based assessment built around experience and knowledge – training in risk management and consistent, real time exposure
- Understand VAAC processes and forge good communication links
- Critical Event Operations Group (COEG) - Senior operations management planning group for escalated events – separate governance but structured within the company crisis management to ring fence operational events

- Tailored RA form which targets the hazard/threat and supports dynamic updating
- Invest in gaining knowledge by participation in industry working groups
- Extensive Volcanic Ash Operations Manual covering:
 - Pre-eruptive and post-eruptive procedures
 - Risk assessment – define what is being risk assessed
 - Event management with escalation triggers
 - Flight Crew information and training
 - Engineering – maintenance requirements
 - Communication – product information and tactical planning
 - Dynamic risk assessment
 - Risk assessment governance (process – who – start – middle – end)

- ICAO Doc 9974
- ICAO Doc 9691 Manual on Volcanic Ash, Radioactive Material and Toxic Chemical Clouds
- ICAO Doc 9766 Handbook
- ICAO Air Traffic Management (ATM) Contingency Plan
- ICAO Regional ATM Contingency Plans
- Qantas Volcanic Ash Manual and Risk Assessment
- VAAC website information
- Australia MET Bureau Volcanic Activity and eruption profile
- CASA Airworthiness Bulletin (AWB) 02-038, Flight in Airspace with Volcanic Ash Contamination
- Living with Volcanic Ash Episodes in Civil Aviation (New Zealand);
- ICAO Annex 3
- ICAO ROADMAP for Volcanic Ash
- Historical database (Smithsonian – VAAC)

- Volcanic ash is an ongoing daily threat for flying operations over Indonesia–PNG–Philippines-Chile
- Safety – aircraft traversing areas of increased volcanic activity (*measured as pre-eruption risk*)
- Efficiency – post eruption (*Fuel – Time – Engineering*) - Low level ash concentration events – make up most events – how do we start to move forward to turn these into ‘maintenance’ events which allows the operator to assess and decide to operate i.e. start to develop criteria which progressively improves the delineation between safety and efficiency ash
- Brand – major disruptive eruptions attract large media and political attention – emotive and often poorly reported
- Volcanic Ash = LOW Risk – HIGH Impact
- Relatively minor eruptions close to major airports are hurting - we need to planning how to progress to mitigate for low ash dosage airspace

- Demise of the IAVWOPSG and ICAO secretariat management
- Evolving ICAO MET Panel – need for consistency between State provided rapporteurs and competing State positions – opportunity for more dynamic and flexible approach
- Operators do not want to lose momentum or become immersed in unnecessary process or delay between the MET Information Support and Development (MISD) and the MET Operations Group (MOG)
- Equitable, regional cost recovery – we need to encourage and keep the good players in the game
- The MISD group have a unique opportunity to conduct a holistic review of the total volcanic system and within it, identify the players, the processes/procedures of each, the modes of communications, the level of capability and importantly the needs of an evidence based risk assessment

- Review the number of VAAC's to assess if fewer VAAC's would support focussed improvement, consistency, standards and harmonisation
- Improved pilot training to identify ash cloud
- The Colour Code – use as a global standard requires review – not consistently provided, distributed or applied by operators - constrain to pre-eruption and develop an operation code system for post-eruption
- VOLCEX planning must identify the parts of the system which require testing
- Operational and non-operational VOLCEX
- VOLCEX must provide value for operators

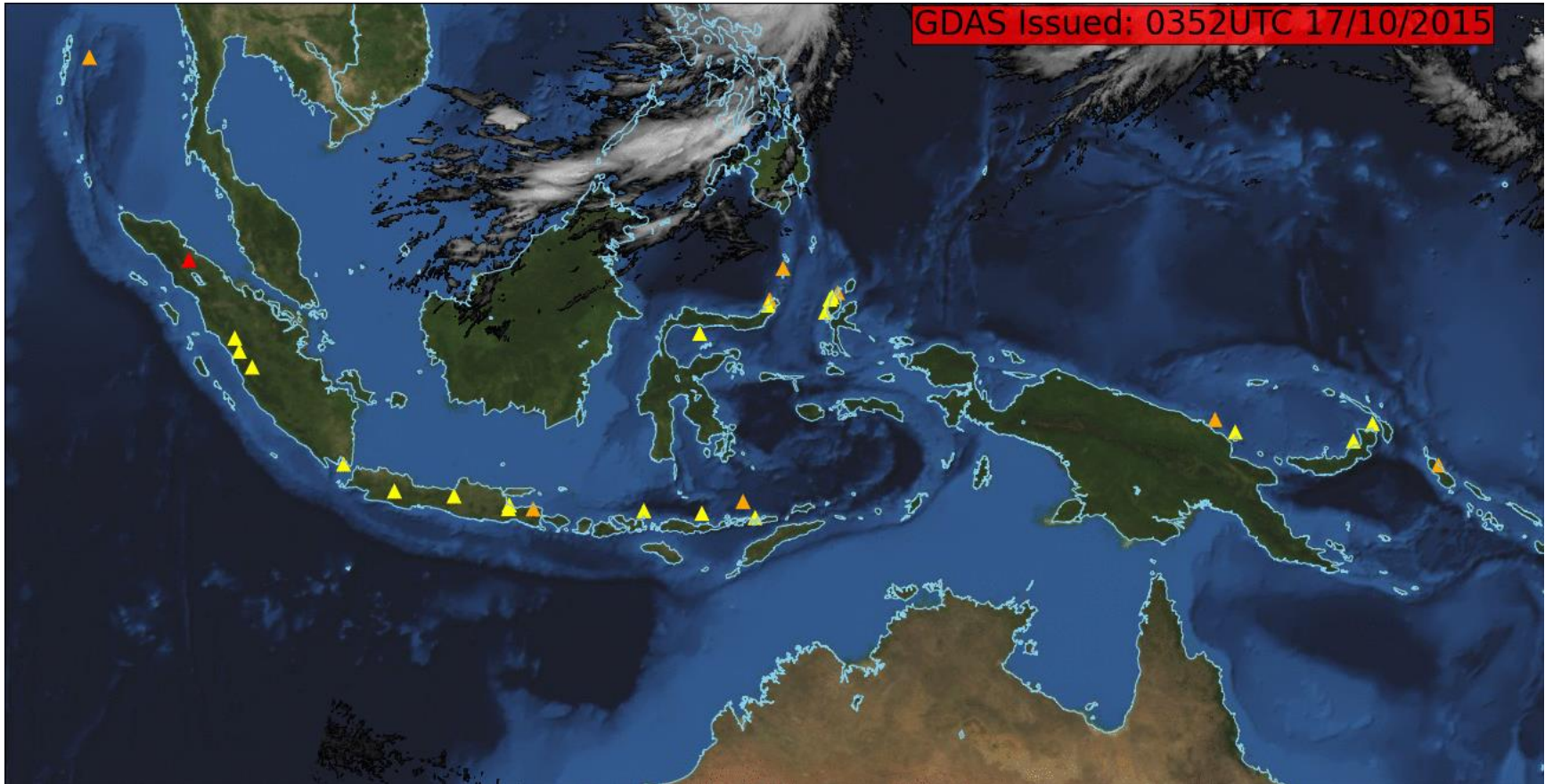
- Pre-eruption not included in VOLCEX for operations over active volcanic areas i.e. Asia – yet this is the most dangerous period for aircraft
- No consistency between VAAC's in the provision of increased volcanic activity



Photos of the eruption column by Peter Bosch, taken from the cockpit of his 737. Published by *The Jakarta Globe*¹.

- Operators understand it is rarely possible, if ever for the Volcanic Observatory to accurately predict an eruption. What operators require is the most skilled, known information, using consistent language which is conducive to an RA. As this is the most dangerous period for aircraft – we must progress the craft to better identify the likelihood of this hazard and threat – and for those who have consciously adopted a pre-eruption planning policy, it can be costly
- We use eruption profiling – do the VO's maintain a database which tracks the history of activity leading up to an eruption – *form of pre-eruption profiling* - this could assist operators ????
- VONA is good but has restrictions in both content and distribution
- Improve and provide 'best known' information along with limitations from VO – Daily Volcanic Activity Summary and Weekly Summary Update produced by Melbourne VAAC - effective information – Use of the Colour Code has limitations and can confuse
- New Darwin VAAC graphical Daily Update is an excellent start for a multi functional interactive product

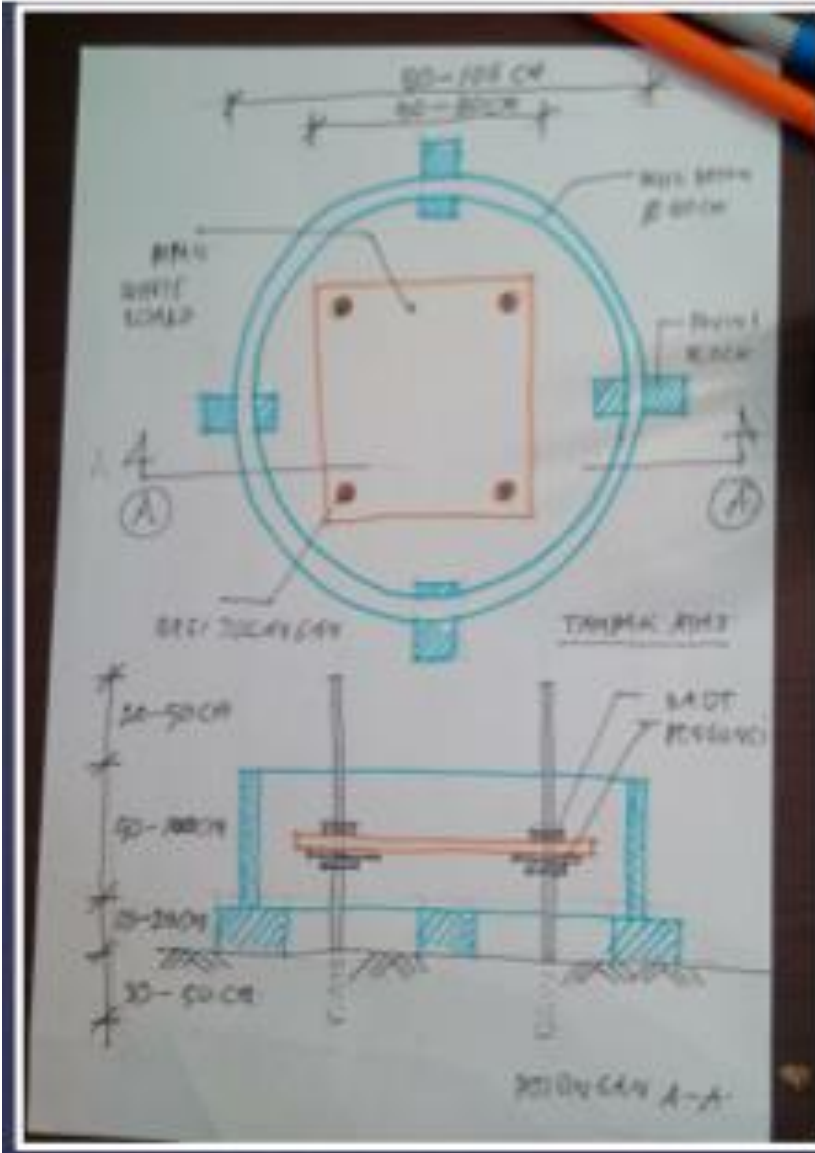
- Depending on the level of monitoring - VO should produce a table containing their best judgement assessment of the probable alerting timeframe for sudden eruptions
- Some States need to adopt an effective, transparent communication structure between VO – ANSP – VAAC – MWO



- Engine certification for VA – essential to minimise disruptive events
- Require VAAC ‘confidence’ in the forecast evidence and importantly, operators need to understand the message being conveyed
- Require consistent global standardised use of VAA/VAG
- The temporal issue associated with modelled dispersion forecasts remains a concern – improved tropical wind modelling needed – and realistic approach applied by VAAC based on experience – little confidence after T+6
- Include levels of VAA confidence and probabilities on VAA model forecasts
- Supplementary information - realistic shape of ash plume boundary – need for more ‘detailed’ or tailored information products for operators who have the capability to assess and use – not one size fits all !

- More frequent VAA updates when airports are impacted
- Need to take advantage of improvement as technology and practices permit – operators need to be able to use incremental improvement
- Trying to be less risk averse – but smarter
- VAAC State providers should consider providing additional volcanic information and products
- Increase and improve the number and quality of cameras sited around volcanoes and support operator access
- Future live streaming of satellite graphics into the aircraft
- Effective communication of PIREP including 'NO ASH'

- Low level eruptions around airports or on diversion/critical calculation tracks
- Inadequate, inconsistent and generally unknown State inter-agency planning and ANSP ATM Contingency Planning – ANSP's are in general part of the problem – not the solution
- Airport ash deposition
- Increasing number of airlines belong to a Group (multiple AOC holders) where a level of cohesive decision making is now necessary



Simple Paper Test Report

- Require an understood, collaborative approach to closing of Airports
- Ash encounter reporting by all operators
- Post event review – publish learnings – close the loop
- Database for Post Event Reviews
- Monitor the cost of disruptions and policies to leverage development and measure future improvement

----- TOGETHER WE HAVE MADE GOOD PROGRESS – **DON'T STOP** -----



QANTAS VOLCANIC ASH CHALLENGES

Given the current requirements for operations to avoid visible ash:

- Low level ash concentration events – make up most events – how do we progress and turn these occurrences into ‘maintenance’ events which permits the operator to assess and decide to operate or not i.e. start to develop criteria to progressively improve the delineation between ‘safety’ and ‘efficiency’ ash
- Evidence based risk assessment – continuously maturing – the type and timing of information is crucial to properly identify the hazard and the threat which either has to be mitigated or avoided
- Dynamic risk assessment required – long lead times prior to entering VA area
- Colour Code

- Defining efficient but best judgement pre-eruption policies for safely overflying active volcanic areas
- VAAC Inconsistencies with the VAA
- The need for a cohesive, consistently applied global ATM Contingency Plan which will complement the risk assessment process

Suggestion –

In 2010 we agreed that with no engine certification or the ability to properly detect concentration levels, CC's were not the way to proceed – in 2015

Future – ASBU 1 2018-2023 – to improve tracking and airspace efficiency, agree on the ash concentration level which is 'safe' but requires accumulation data for maintenance requirements

The Identified areas of ash below this 'safe' level should be an additional WAFS GRIDDED algorithm?

For areas of identified 'safe ash' the operator has a choice to traverse or not
More precise data is possible for engine monitoring.

ATM will have less constrained airspace to manage traffic flows ash in congested areas and this type of integrated approach will be required for trajectory based operations

Pre-eruption and post-eruption ash in larger concentrations than 'safe ash' should be the focus of the VAAC and the VAA. The operator evidence based risk assessment can be effectively used to determine the flight track

This combination will provide an improved common operating picture and treats ash in a similar way to other phenomena i.e. turbulence, Cb and icing