International Civil Aviation Organization

FIFTEENTH MEETING OF THE COMMUNICATIONS/NAVIGATION/SURVEILLANCE AND METEOROLOGY SUB-GROUP (CNS/MET SG/15) OF APANPIRG

Bangkok, Thailand, 25 – 29 July 2011

Agenda Item 9: Regional Implementaiton of International Airways Volcano Watch (IAVW)

VOLCANIC ASH IN AUSTRALIAN AIRSPACE

(Presented by Australia)

SUMMARY

This paper presents a summary of the incursion of volcanic ash from the Cordón Caulle volcano into Australian airspace and issues arising from that event.

This paper relates to –

Strategic Objectives:
A: **Safety** – Enhance global civil aviation safety
C: **Environmental Protection and Sustainable Development of Air Transport**

Global Plan Initiatives:
GPI-9 Situational awareness
GPI-16 Decision support systems and alerting systems
GPI-19 Meteorological Systems

1. Introduction

1.1 Cordón Caulle, part of the Puyehue-Cordón Caulle complex in southern Chile began erupting on Saturday afternoon 4 June 2011. The initial eruption was estimated to reach a height of at least 50,000ft (15 km), with lower level eruptions persisting for many days. At least 5 million tonnes of fine ash is estimated to have been erupted (in addition to coarse ash, rocks, SO2), and the resultant cloud moved from west to east, eventually circling the globe at least twice.

1.2 The ash cloud moved into the Melbourne FIR on the 9 June and then subsequently tracked over southeastern Australia, causing significant disruptions to flight operations. The National Operations Centre Meteorological Unit (NOC-MET) coordinated discussions involving the Darwin VAAC and the Qantas and Virgin Australia meteorological units as well as issuing regular briefings to Airservices Australia and the airline industry.

2. Chronology of Events.

2.1 The ash cloud was detected on satellite imagery (Figure 1) moving into the Darwin VAAC area of responsibility (Figure 2) on 9 June 2011. Prior to this the Darwin VAAC had been maintaining close contact with the Toulouse VAAC as it moved through their area of responsibility.

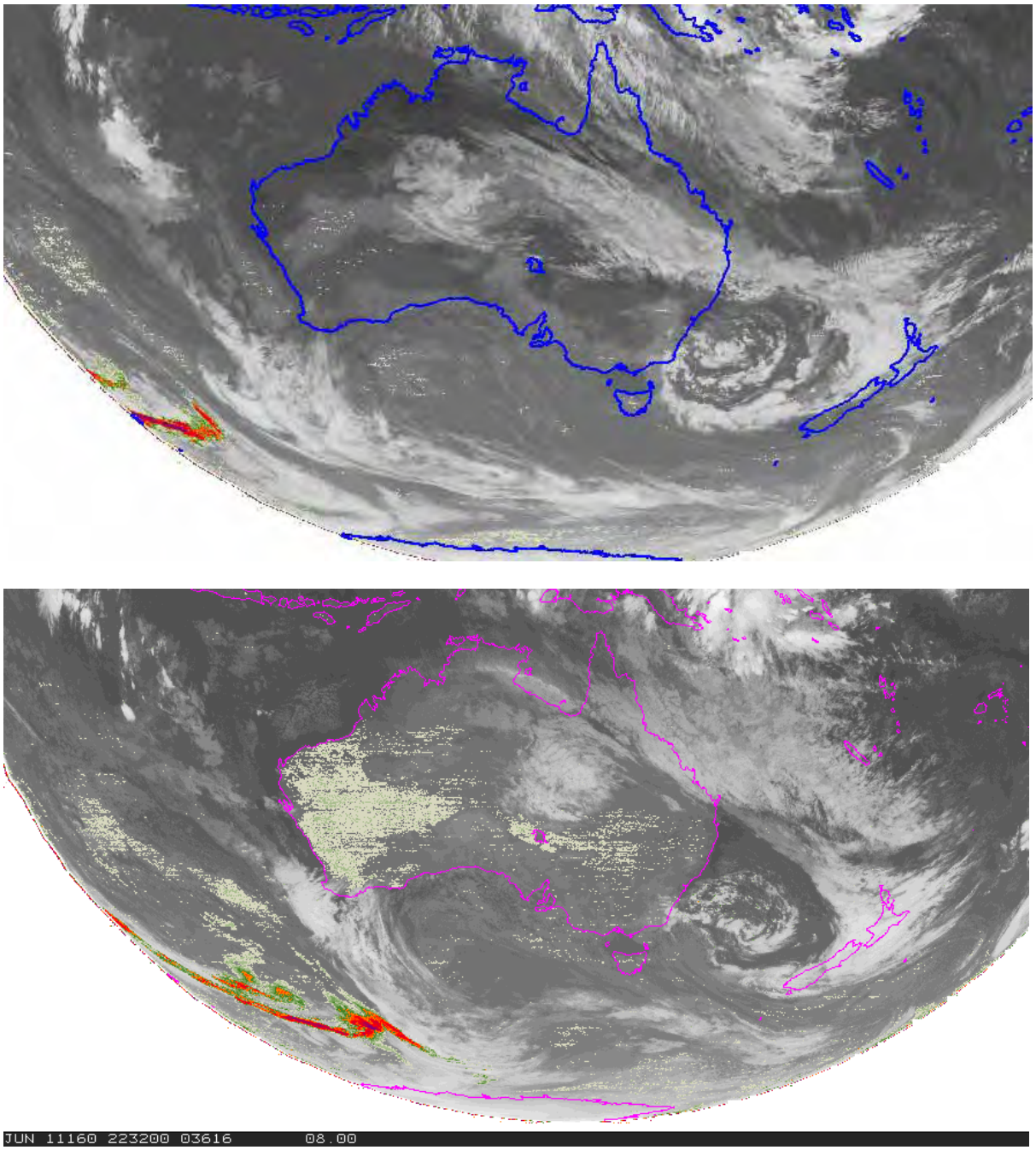

Figure1 – Split window enhanced MTSAT imagery showing volcanic ash signature (green through to red) on 9 June 2011 at 0230UTC (top) and 2230UTC (bottom).

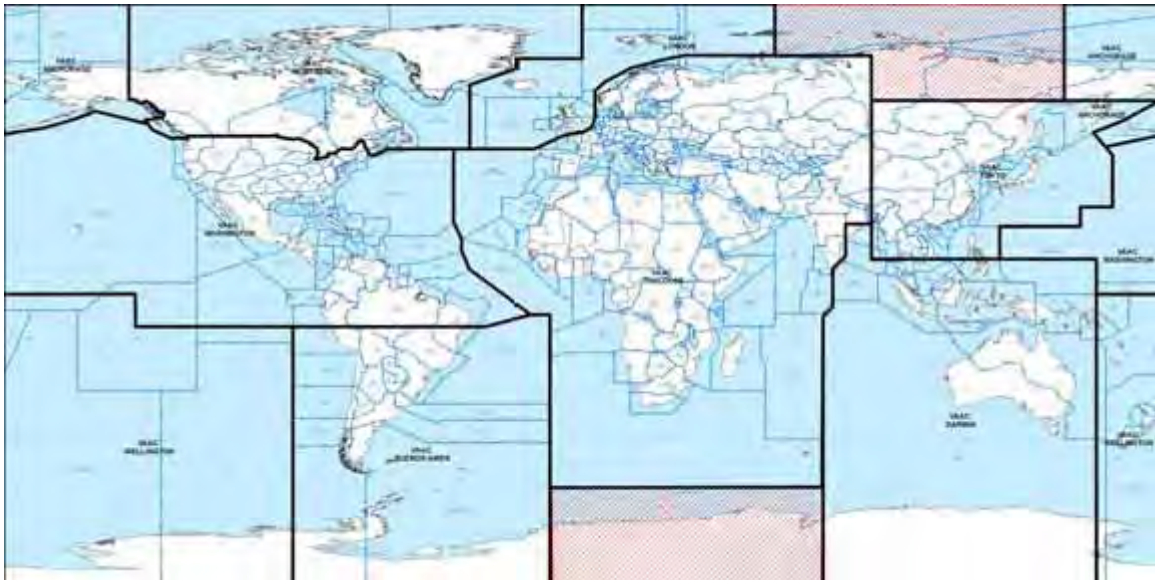

Figure 2 – Map showing VAAC areas of responsibility (red hatched areas are currently unmonitored).

2.2 Throughout the event the bulk of the ash cloud remained to the south of major air traffic routes however movement of frontal systems and their associated southerly jetstreams brought areas of ash across southern parts of Australia causing significant disruption.

2.3 The first of these events occurred on the 11 June when an area of ash estimated to extend from FL250 to FL350 moved across the south of Western Australia. Figure 3 shows the ash (pale yellow/green) being advected from the south by a deep trough on the 10 June.

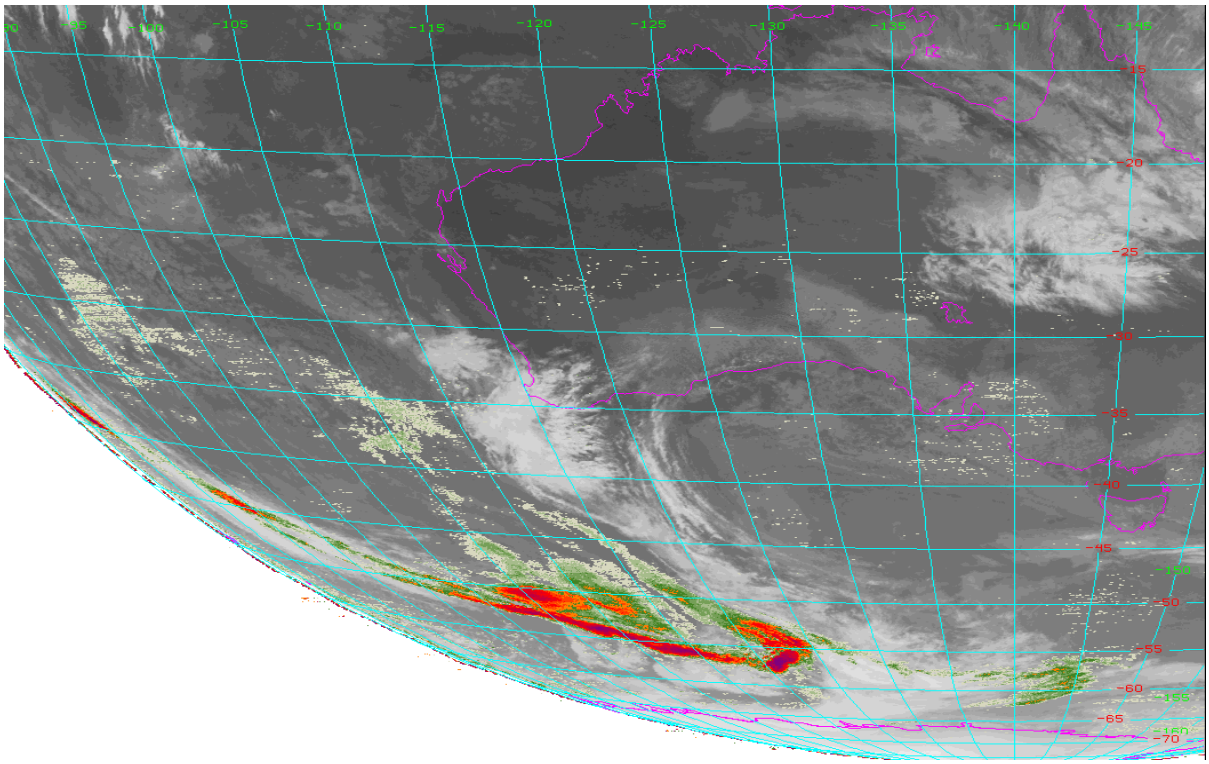

Figure 3 – Ash being advected towards the south of Western Australia (pale yellow/green) 10 June 2011 0530UTC.

2.4 This area of ash dissipated over the Great Australian Bight (between Perth and Adelaide) during the following day however the northern edge of the main cloud then moved over Tasmania and subsequently over Bass Strait (between Tasmania and the mainland) during the 12 June. The presence of ash was confirmed by multiple pilot reports (AIREP/PIREP).

2.5 Most of the southeast of Australia was affected by the ash cloud for the following three days after which it contracted to Tasmania, although a further pulse then moved across southwestern Western Australia on the 15 June causing many flights to Perth to be cancelled.

2.6 During the 16 June the ash cloud cleared from the Australian continent though air traffic routes to New Zealand, South America and South Africa were still being affected. This situation persisted for a few days however on 20 and 21 June another area of ash moved across the Melbourne FIR from the west, and was transported over southeast parts of Australia. This cloud consisted of ash that was circulating the southern hemisphere for the second time as well as fresh ash from continuing eruptions. The base of the cloud was analysed at FL200, lower than the first, which was significantly more disruptive as it was more difficult to fly safely underneath the ash. The ash did not clear the southeast of Australia until the 24 June.

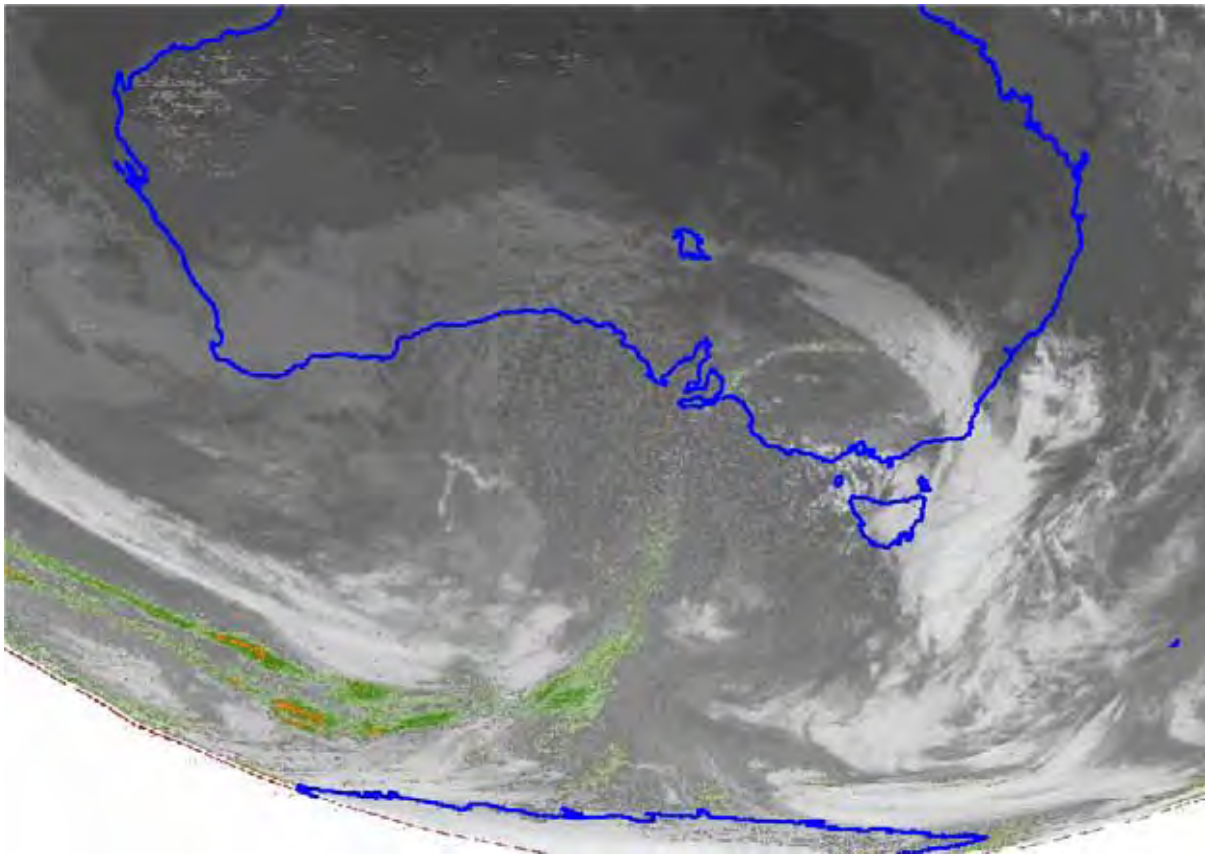

Figure 4 – Split-Window Enhanced MTSAT image of ash extending over Adelaide and southeastern Australia 21 June 2011 0130UTC.

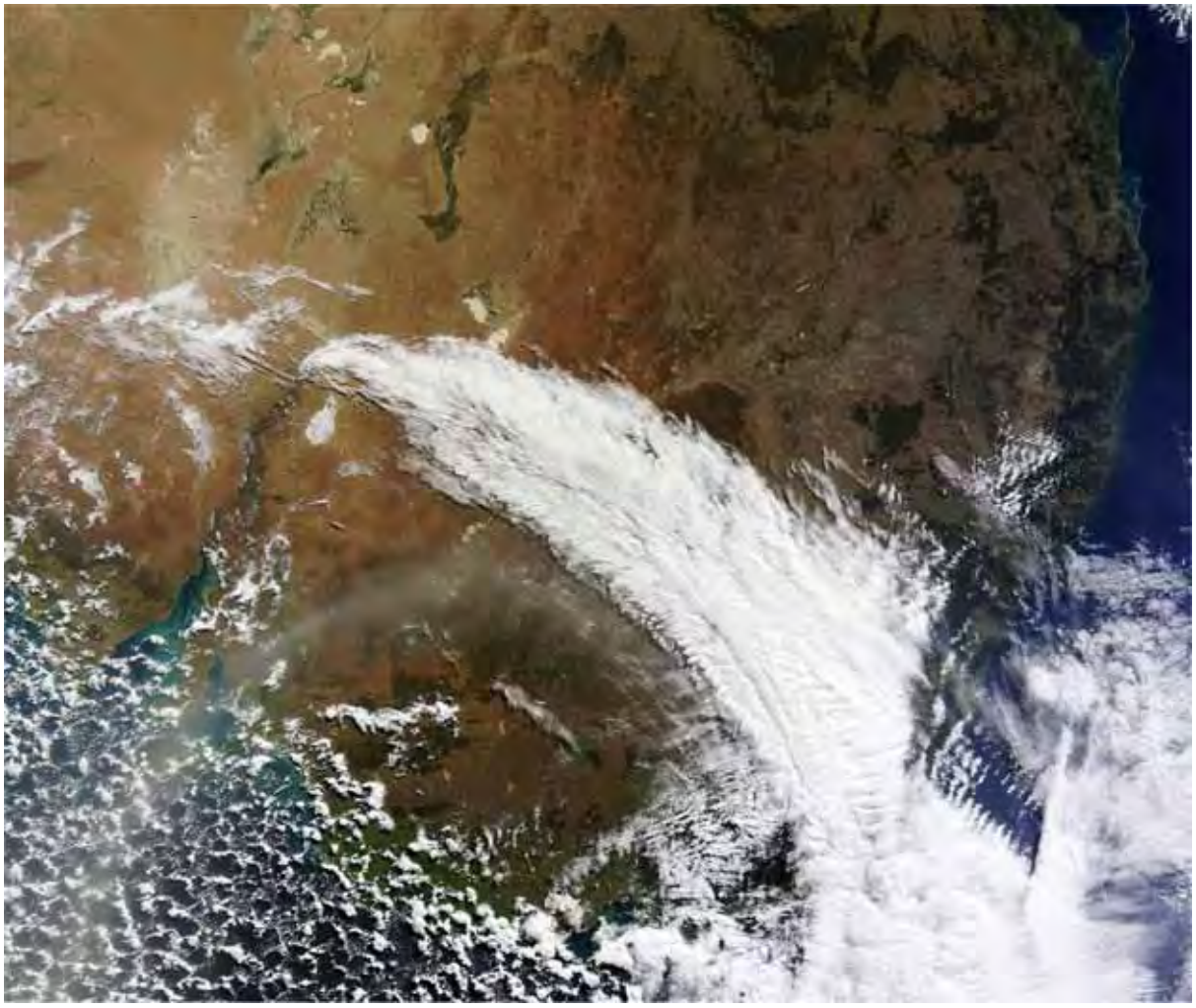

Figure 5 – NASA Terra/MODIS color image of ash extending over Adelaide and southeastern Australia.

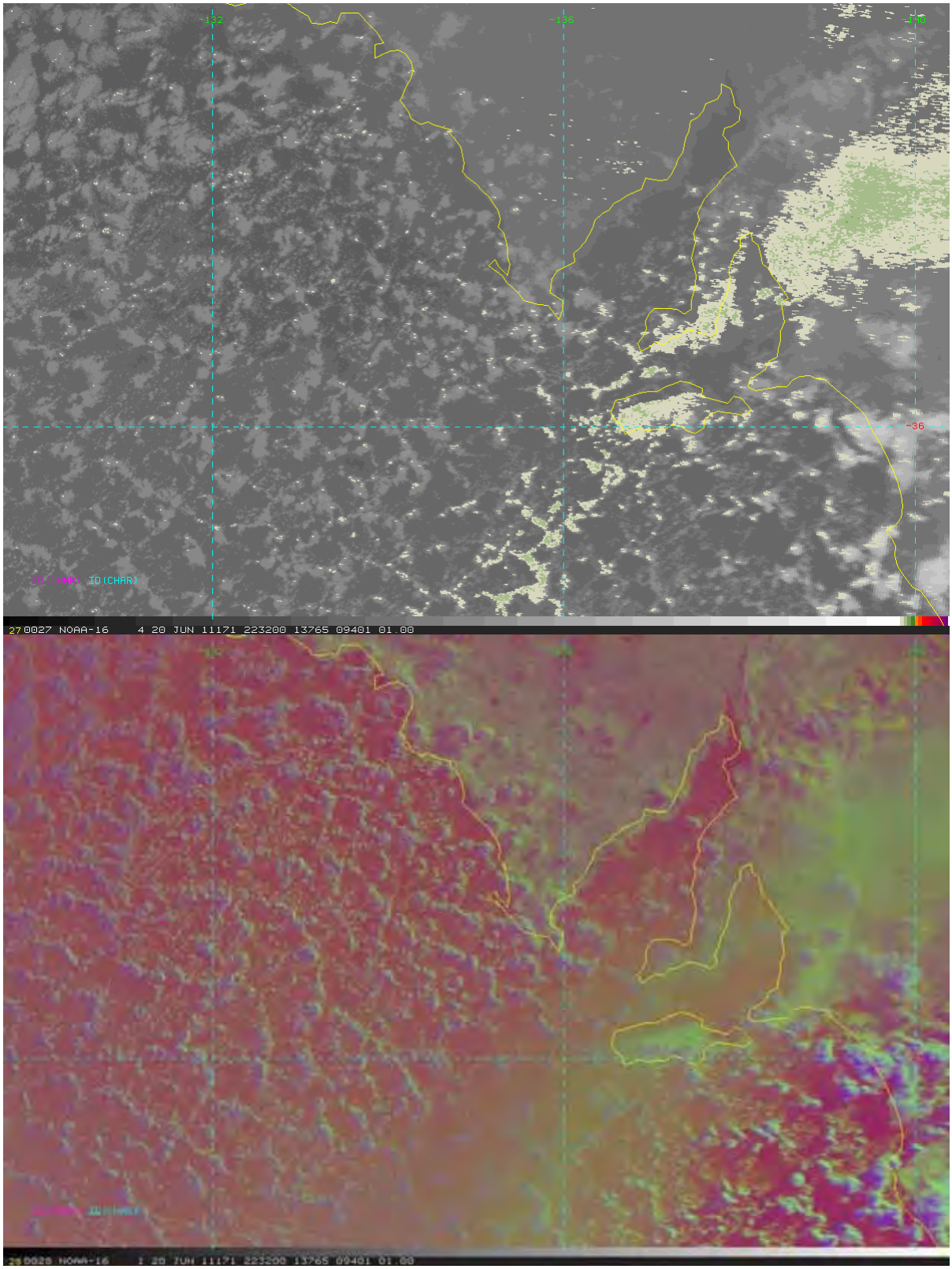

Figure 6 – Two different enhancements of NOAA/AVHRR imagery of ash moving over Adelaide 20 June 2011 2230UTC.

3. Communication, coordination and cooperation.

3.1 The Darwin VAAC began monitoring the situation as soon as the ash cloud from Cordón Caulle began moving east. Communications were established with the Toulouse VAAC as the ash moved through their area of responsibility and long range modeling scenarios were run to determine the potential impact on Australian airspace. Similarly, the Darwin and Wellington VAACs liaised closely when the ash moved further east across New Zealand's airspace. Due to the large extent of the ash cloud, VAACs Darwin, Toulouse and Wellington agreed they would issue Volcanic Ash Advisories only for those parts of the cloud within their respective areas of responsibility. A vital role in the communication process was carried out by the Airservices Australia National Operations Centre (NOC).

3.2 The National Operations Centre is located in Canberra and has an important role in information dissemination during events that result in disruption to the Australian air traffic network. The NOC has an embedded meteorological briefing unit (NOCMET) provided by the Bureau of Meteorology which acted as a central point of contact and coordinated regular meetings between the NOC, other airline meteorological units and the VAAC. This allowed information to be shared quickly and efficiently and for queries to be answered while minimizing disruption to the operational VAAC forecasters. NOCMET also provided a regular briefing product to the wider industry which contained the Volcanic Ash Advisories, SIGMET, AIREP/PIREP and a briefing summary in one document.

4. Issues arising from the event.

4.1 Australia's aviation regulator, the Civil Aviation Safety Authority (CASA), is currently developing a Volcanic Ash Contingency Plan. As a result of this event the contingency plan will be given a higher priority and inter-agency meetings on the issue will be progressed as a matter of urgency.

4.2 The discrepancy between the boundary of the Darwin VAAC area of responsibility, which extends to 160E, and the Melbourne FIR, which extends to 163E, resulted in considerable confusion, particularly when there were differences between the Darwin and Wellington advisories. Any differences in ash layer height or area boundaries led to unusual discontinuities in SIGMETs between 160E and 163E. In agreement with New Zealand a proposal to re-align the boundaries will be presented at IAVWOPSG/6 in September 2011.

5. Post event discussions

5.1 A post event review meeting was held in Melbourne on 7 July 2011, attended by representatives from the Bureau of Meteorology, CASA, Airservices Australia, ICAO and several domestic and international airlines. The following issues were amongst those discussed:

5.2 There is a strong perception amongst users that VAAC output is very conservative. The Darwin VAAC analyses and forecasts "visible ash" as per current ICAO requirements, using a combination of modeled data, satellite imagery and actual reports to refine the ash polygon boundaries as much as possible. It is acknowledged that ash may be visible on satellite imagery to very low concentrations.

5.3 Australia does not at this time produce ash concentration charts. Some international airlines that operate in European airspace had an expectation that these charts would be available. Prior to this event, Australia had given consideration to this issue and decided that due to the uncertainties associated with modeling accurate concentration levels, and difficulties with validating

the output, Australia would not produce such charts until these issues had been resolved. Australia is participating in the review of volcanic ash operations through the International Volcanic Ash Task Force (IVATF) and will await the outcomes of that forum before considering any changes to the current service. Preliminary analysis suggests that had concentration charts been issued during this event it would have led to increased disruption to air traffic.

5.4 There is a requirement from the aviation industry for more plain language information during a volcanic ash event. This could be provided as a separate product issued either by the VAAC or by a briefing unit such as NOCMET after consultation with the VAAC. Airlines would also like forecasts of greater duration and frequency however before these could be provided accuracy standards would have to be well defined. Required levels of accuracy may not be able to be met given current model skill levels however increased use of ensemble modeling may assist in this area.

5.5 AIREP/PIREPs are considered to be a vital source of information and all airlines are encouraged to pass them to the relevant VAAC during a volcanic ash event.

6. Action by the Meeting

6.1 The meeting is invited to note the information contained in this paper.

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