International Civil Aviation Organization

INFORMATION PAPER

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Agenda Item 6: Guidance and education related to the provision of meteorological services

NEW ZEALAND SYSTEM ASSESSMENT LESSONS ON SWX EDUCATION

(Presented by New Zealand)

SUMMARY

This paper presents the outcomes of the New Southern Sky System Assessment – highlighting the need for greater awareness of space weather (SWX) impact on aviation and better understanding of the ICAO SWX advisory system, both in New Zealand and likely in the wider APAC region.

1. INTRODUCTION

1.1 The New Southern Sky (NSS) Programme is a New Zealand government endorsed plan to modernise the national airspace system of New Zealand and to deliver measurable improvements to safety, efficiency, resilience and cost effectiveness.

1.2 Two of the major changes being implemented are Performance Based Navigation (PBN) and Automatic Dependent Surveillance – Broadcast (ADS-B). Both changes involve the aviation system placing an increasing level of dependence on the Global Navigation Satellite System (GNSS) and, specifically on the Global Positioning System (GPS).

1.3 The National Airspace and Air Navigation Plan (NAANP) recognised the criticality of this common point of dependence for both navigation and surveillance of aircraft within the aviation system and recommended mitigations that were endorsed in the 2016 Aviation System Safety Criteria (ASSC) (updated in 2018).

1.4 The NSS Ground Based Navigation Aid (GBNA) Infrastructure Strategy (November 2016) recommended a GBNA network and associated approach procedures be retained to allow reversion to conventional VOR/DME navigation when one or more aircraft encountered a disruption to GPS/GNSS service.

1.5 The ASSC recommended a contingency surveillance network be retained for the main trunk airspace around and between Auckland, Wellington and Christchurch airports. This mitigation would allow air traffic controllers to provide a surveillance-based separation service whenever one of more aircraft encountered a disruption to GPS/GNSS service while within the contingency surveillance

system coverage area.

1.6 The objective of these mitigations is to ensure that any aircraft operating under instrument flight rules (IFR) that encounters a disruption to GPS/GNSS service can be recovered safely to a suitable aerodrome and in the event of a widespread disruption, that the Air Traffic Management system was capable of safely managing a future large scale disruption event with the proposed mitigations.

1.7 A series of exercises were conducted to provide assurance to the NSS Governance Group that the proposed navigation and surveillance systems can provide the mitigation intended by the ASSC. The exercise descriptions and outcomes are presented in NSS System Assessment Report.

2. DISCUSSION

2.1 The exercises in the system assessment focused on three GPS failure scenarios:

- a single aircraft transponder failure;
- an unalerted large scale disruption to GNSS; and
- an alerted large-scale disruption.

The alerted large-scale disruption was simulated to be a solar storm, alerted by a space weather advisory.

2.2 The assessment determined that the GBNA and contingency surveillance network were effective and suitable enablers of extraction and recovery for IFR flights within the NZZC FIR. However, the assessment also detailed the following findings:

> ***5.*** *All observers agreed that the education of accountable managers, operational ATC and aircrew needed to achieve a greater awareness of the impact of space weather on Navigation and Surveillance systems, and agreed that a coordinated stakeholder response to sudden loss of GNSS/ GPS services would reduce ambiguity, and a need to proactively implement a transition from PBN (GNSS/GPS) based navigation to conventional navigation when disruption events occur or are forecast to occur, was a more effective and suitable response.*
> ***6.*** *All observers and participants agreed that the Space Weather Advisory notice was difficult to interpret and needs to incorporate plain language terminology to reduce the potential for confusion.*

2.3 New Zealand is sharing the outcomes of this assessment to highlight to other States the need to ensure that there is good understanding of the space weather advisory system, the potential impact of space weather on aviation including navigation and surveillance systems, and how to interpret the space weather advisories.

2.4 Useful information on space weather, space weather advisories and the impact on aviation is available in multiple locations, including:

- ICAO Doc 10100 Manual on Space Weather Information in Support of International Air Navigation (MET Panel public documents)
- BoM Australia Knowledge Centre (see ‘Product Info’ and ‘Hazardous Phenomena’ tabs)
- Impacts of space weather on aviation - CAA UK (includes information on historical events impacting aviation and guidelines on safety risk assessments for space weather)

3. ACTION BY THE MEETING

3.1 Note the information contained in this paper.

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