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TECHNICAL COMMISSION

Agenda Item 35: Aviation safety and air navigation standardization

PROVISION OF SPACE WEATHER INFORMATION IN SUPPORT OF INTERNATIONAL AIR NAVIGATION

(Presented by the United States)

EXECUTIVE SUMMARY

This paper discusses the need for the provision of space weather information to support international air navigation as part of ICAO's Global Air Navigation Plan (GANP) and the associated Aviation Safety Block Upgrades (ASBU). The paper is based on the premise that operators require information on space weather events as part of their safety risk management program for flight planning for hazardous weather situations that could compromise the safety of flight. In addition, Air Navigation Service Providers (ANSPs) require similar information to manage operations in their airspace for a space weather event that could compromise the performance of their communication and surveillance systems. This paper will propose a resolution to support the work effort by ICAO to introduce the provision of space weather information to operators, flight crew members and air traffic management in support of the decision making process.

Action: Recommend that ICAO directs development of Standards and Recommended Practices (SARPs) and guidance material to provide space weather information to support a safety risk management framework for international air navigation

Strategic Objectives:	This working paper relates to Strategic Objectives A, *Safety*
Financial implications:	Expected that this is covered in the draft budget.
References:	Annex 3 — *Meteorological Service for International Air Navigation* Doc 9750, *Global Air Navigation Plan*

1. INTRODUCTION

1.1 Annex 19 – *Safety Management* provides standards and recommended practices (SARPs) for the establishment of a safety management system, which includes the provision of meteorological services. It follows that measures of safety should include the ability of the operators and air navigation service providers (ANSPs) to effectively manage safety risks through the implementation of safety management processes that include the provision of meteorological information.

2. DISCUSSION

2.1 The Twelfth Air Navigation Conference (AN-Conf/12) recognized that the provision of space weather information is a high priority in support of international air navigation. Currently, there are over 10,000 flight operations annually at polar latitudes. Aircraft operating at these polar latitudes are more susceptible to space weather events that could affect navigation and communication systems and/or expose flight crew members and passengers to medically relevant levels of radiation.

2.2 The *Global Air Navigation Plan* (Doc 9750) (GANP) identifies the need for space weather information in Performance Improvement Area 2: Globally Interoperable Systems and Data, Module B1-AMET Enhanced Operational Decisions through Integrated Meteorological Information (Planning and Near-term).

2.3 As recently as November 2015, a solar storm disrupting the Earth's magnetic field caused radar malfunctions in Swedish airspace that resulted in operational delays until systems were restored.

2.4 Aviation decision-makers must know of meteorological events that could pose a hazard to the safety and efficiency of a flight operation. They must also know the potential impacts of a meteorological hazard and the options for mitigating the risk of that hazard in accordance with applicable aviation regulations, operational rules, and business practices.

2.5 The GANP states that space weather information is applicable to traffic flow planning and all aircraft operations in all domains and flight phases, regardless of the level of aircraft equipage. Thus, the following aviation decision-makers require observations and forecasts of space weather events and the hazards associated with those events:

a) operators;
b) aircrew members; and
c) ANSPs including air traffic management (ATM).

2.6 Operators including pilots are responsible for the safe and efficient conduct of flight operations and are the principal users of space weather information. Operators need to know the potential impact of space weather events on communications systems, navigation systems, and other onboard aircraft systems. In addition, they need to be made aware of radiation levels that may affect the health of flight crew and passengers.

2.7 ANSPs require information on space weather events that have the potential to affect communications and surveillance systems in order to effectively manage traffic flow in their airspace.

2.8 Through the work of the Meteorology Panel, space weather information standards are being developed for inclusion in ICAO Annex 3 — *Meteorological Service for International Air*

Navigation. New space weather observations and forecasts will provide users with aviation-specific, globally consistent, information on the potential impacts to aviation operations from space weather events. With this new space weather information users will be able to plan the most efficient flight routes and tracks while avoiding the potential impacts of space weather events.

2.9 Operators are required to develop hazardous weather plans to mitigate the potential impacts of any hazardous meteorological conditions. These plans are developed in accordance with applicable aviation regulations and business practices. With the expected addition of space weather information to the existing suite of meteorological information, as defined in Annex 3, there will be a need for operators and regulatory authorities to consider space weather in their operational policies.

2.10 Therefore, this paper proposes the establishment of standards and associated guidance to assess the safety risk to flight operations in the presence of current or expected space weather events that may impact air navigation.

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