



# ICAO

## INTERNATIONAL CIVIL AVIATION ORGANIZATION

Twenty Sixth Meeting of the Africa-Indian Ocean Planning and Implementation Regional Group

(APIRG/26)

7 - 8 November 2023

**Agenda Item 3: Implementation of air navigation goals, targets and indicators, including the priorities set in the Regional Air Navigation Plan.**

### 3.6. Other Air Navigation Initiatives

#### **THE IMPORTANCE OF MONITORING SPACE WEATHER AND THE ROLE AND RESPONSIBILITY OF THE REGIONAL WARNING CENTER.**

*(Presented by South Africa)*

#### **SUMMARY**

This working paper discusses the importance of monitoring space weather to support international air navigation as part of the International Civil Aviation Organization (ICAO) Global Air Navigation Plan (Doc 9750). In addition, the risks that space weather events pose to aviation operations are presented. ICAO through amendment 78 to Annex 3 and consequential amendment to Annex 15, PANS-ABC and PANS-ATM has included the provision of space weather information to be provided by the designated SWX center. As the ICAO-designated SWX center, South Africa has an obligation to monitor space weather events and provide space weather information to Air Navigation Service Providers (ANSPs) and *Operators*. This paper deals with the impacts of space weather events on aviation operations.

Action by the meeting is in paragraph 3.

#### **REFERENCE(S):**

- **Annex 3**
- **Annex 15, PANS-ABC and PANS-ATM**
- **Manual on Space Weather Information in Support of International Air Navigation (Doc 10100)**

#### **Related ICAO Strategic Objective(s):**

A - *Aviation Safety*

B - *Air Navigation Capacity and Efficiency*

**Related ASBU KPIs & B0 Modules: All applicable to AIM, and MET**

## 1. INTRODUCTION

- 1.1 An ICAO Annex 3 – Meteorological Service for International Air Navigation – provides Standards and Recommended Practices (SARPs) governing the provision of Meteorological Information for

International Air Navigation. As of 2018, the requirement for the provision of space weather services is included as part of global air navigation plans. These requirements have been incorporated into Annex 3, which now puts forward that measures of safety should include the ability of the operators and air navigation service providers (ANSPs) to effectively manage the risks of space weather impact on communications, navigation, and surveillance systems, as well as radiation exposure.

- 1.2 The Space Weather (SWX) provisions were incorporated into ICAO Annex 3 through Amendment 78 to ICAO Annex 3 – *Meteorological Service for International Air Navigation* published through State letter AN 10/1.1-18/32. The applicable date for SWX provisions was 8 November 2018. Furthermore, more information on SWX information and its applications within the air navigation community was incorporated in the Manual on Space Weather Information in Support of International Air Navigation (Doc 10100).
- 1.3 The ICAO State Letter AN10/1-17/11, dated 9 June 2017, called for States to express their candidature for designation as SWX centers. South Africa expressed interest in hosting a SWX center on behalf of ICAO and its course was successfully championed by the South African National Space Agency (SANSA) – An agency under the Department of Science and Innovation (DSI) with the relevant expertise, capacity and capabilities on matter relating to space weather and space science. The successful candidates for hosting SWX centers were announced by ICAO on the 13<sup>th</sup> of November 2018 through a State letter (AN 10/1 IND/18/9) dated the 21<sup>st</sup> of December 2018.
- 1.4 This working paper highlights the importance of monitoring space weather, the potential risk that space weather poses to the aviation system and associated health risk to flight crews.

## 2. DISCUSSION

- 2.1 ICAO has recognized the need for the adoption of procedures related to mitigating the impact of space weather on civil aviation. During the 2014 Montreal meeting of the ICAO Meteorology Division, a recommendation was passed for the development of provisions for information concerning space weather. Included in the recommendation was the requirement that space weather information be integrated into global air traffic navigation information systems. ICAO recommended that all aviation providers and users become familiar with the impacts of space weather on the aviation sector and requested that pertinent space weather information be filed with all flight plans by 2017, later amended to November 2018.
- 2.2 South Africa, through SANSa, is hosting the only Space Weather Regional Warning Center in Africa, which operates as part of the International Space Environment Service (ISES). ISES mission is to improve, coordinate and deliver operational space weather services. South Africa has been providing a space weather service and undertaking space weather research for more than a decade. Since 2014 South Africa has been working with ICAO and ISES to understand the impact that space weather events can have on the aviation sector and to advise on the provision of space weather information to the aviation sector. Space weather is a global phenomenon with regional impact.
- 2.3 In January 2021, South Africa was appointed as the Project Team coordinator to lead the MET 3 project under IIM SG. The objective of this work is to assist the AFI States by unpacking in detail the implications of Amendment 78 to ICAO Annex 3 – *Meteorological Service for International Air Navigation*. This objective would be achieved by creating awareness and education regarding the potential risks that space weather poses in the safety operations of the flight. Since 2021, South Africa hosted three workshops, two on a virtual platform and one physical meeting, in collaboration with the Eastern and Southern African (ESAF) Regional Office, and the aim was to create awareness and training within the region.
- 2.4 The role of space weather centers, their operational requirements, and mechanisms for cost recovery are being ventilated within various working groups under the Meteorological Panel (METP). The space weather centers would be required to monitor on a 24/7 basis the existence and extent of relevant space weather events, assess their potential impacts to the aviation industry and issue relevant warning information to Air Navigation Service Providers (ANSPs) and Operators.
- 2.5 Within the AFI Region, the ANSPs would be expected to establish facilities, procedures, and processes to process the information received from the designated space weather centers and make it available to users through flight briefing systems and other methods as agreed regionally. The MET Project 3 under APIRG IIM SG will implement projects aimed at assisting the AFI States to implement the necessary measures to comply with the requirements of space weather information provision which includes interpretation and presentation of space weather information in the format prescribed by ICAO.
- 2.6 With the expected addition of space weather information to the existing suite of meteorological information, as defined in ICAO Annex 3 – *Meteorological Service for International Civil Aviation*, there will be a need for operators and regulatory authorities to incorporate space weather in their national legislation, operational policies, and procedures.

- 2.7 In order to fulfill its obligation as the host of the designated space weather center, South Africa has invested in the development of the necessary facilities, capacity, and capabilities to enable it to execute its mandate. Such facilities include a 24/7 dedicated space weather operations center situated at the SANSA Space Science programme in Hermanus, South Africa and the center was officially launched in November 2022.

### **3. ACTION BY THE MEETING**

3.1 The meeting is invited to:

- a) take note of the information contained in this working paper;
- b) urge States to take measures to comply with ICAO requirements on space weather by establishing the necessary capabilities to receive, process, and disseminate space weather advisory information issued by the ICAO-designated space weather centers; and
- c) urge Member States to participate in workshops, training, and information sessions arranged by South Africa (SANSA), in collaboration with ESAF and under the auspices of the ICAO MET Project 3, to ensure adequate awareness and understanding of space weather impacts.

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