

## **SPACE WEATHER-RELATED ACTIVITIES**

*(Submitted by the WMO Secretariat)*

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### **Summary and Purpose of Document**

This document provides an overview of recent and ongoing activities relating to space weather, in particular summarising the developments taking place within the CBS/CAeM Inter-Programme Team on Space Weather Information, Systems and Services (IPT-SWeISS).

In addition, this document acknowledges the designation, by ICAO in late 2018, of the space weather information providers to serve international civil aviation.

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### **ACTION PROPOSED**

The Management Group (MG) is invited to:

- (1) note the information contained in this document in respect of the recent and ongoing activities of the IPT-SWeISS, including the development of a four-year plan for the period 2020 to 2023, as well as the recent developments within ICAO towards the establishment of an operational space weather information service for international civil aviation;
  - (2) note a request by CAeM-16 for the president of the CAeM to consult with the president of CBS on how to address space weather issues during the next intersessional period in support of international civil aviation;
  - (3) offer comment and/or strategic direction in respect of (1) and (2) above.
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## 1. DEVELOPMENTS WITHIN THE IPT-SWeISS

### **Background**

1.1 The CBS/CAeM Inter-Programme Team on Space Weather Information, Systems and Services (IPT-SWeISS) is responsible for coordinating space weather activities within WMO programmes, to maintain a linkage with constituent bodies and partner organizations (such as ICAO) and to provide guidance to WMO Members.

1.2 Guided by a four-year plan for space weather for WMO activities related to space weather 2016 to 2019, the main tasks of IPT-SWeISS can be summarized as follows:

- (1) Integration of space weather observations;
- (2) Standardization and enhancement of space weather data exchange and delivery;
- (3) Coordinating the development of space weather best practices for end-products and services;
- (4) Encouraging dialogue between research and operational space weather communities;
- (5) Organization of capacity building, training and outreach activities; and
- (6) Provision of guidance to WMO Members and programmes on space weather matters.

1.3 To address the foregoing, the team is supported by the following task teams:

- (1) *Task Team on Space Weather Basic Systems* (TT-SYS) addressing issues including those related to observation techniques and networks, data management and exchange, data centres, and space climatology;
- (2) *Task Team on Space Weather Science* (TT-SCI) addressing issues including those related to modelling, model evaluation and verification, interaction with climate, and transition from research to operations;
- (3) *Task Team on Space Weather Applications* (TT-APP) addressing issues including those related to requirements evaluation, the delivery of services, capacity building and user interaction; and
- (4) *Ad hoc Task Team on Space Weather Information Service for Aviation* (TT-AVI), addressing the support needs of ICAO in the establishment of an operational space weather information service for international civil aviation.

1.4 Information on the activities of IPT-SWeISS was given at the CAeM-16 session in July 2018 (CAeM-16/INF. 3.7 refers). The Commission consequently requested, through Decision 3 (CAeM-16)<sup>1</sup>, the president of CAeM, in coordination with president of CBS, to consider how space weather issues in support of international civil aviation should be addressed during the next intersessional period<sup>2</sup>.

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<sup>1</sup> The CAeM-16 report is [available here](#) as WMO-No. 1222.

<sup>2</sup> Decision 3 (CAeM-16) also addressed volcanic ash as part of the same decision and referred to the president of CAS mainly in this connection.

### ***Latest developments***

1.5 Since CAeM-16 and at the request of the 70<sup>th</sup> session of the Executive Council in June 2018, through Decision 41 (EC-70)<sup>3</sup>, the main activity of IPT-SWeISS has been on the development of a four-year plan for WMO activities related to space weather to cover WMO's next financial period (2020 to 2023). To undertake this work, a Task Team on the Four-Year Plan (TT-FYP) was established by IPT-SWeISS in mid-2018.

1.6 At time of writing, the four-year plan for 2020 to 2023 (FYP2020-23) is undergoing final drafting, in consultation with the management groups of both CBS and CAeM<sup>4</sup>. An illustration of the latest draft content of the FYP2020-23 is given at the Annex to this document, although it is to be noted that this is still subject to change during the final drafting stage.

1.7 As the table of contents illustrates, the FYP2020-23 is intending to provide strategic direction aligned with a set of high-level goals in terms of:

- (1) how space-based and ground-based space weather observing systems will be better coordinated through the principles of WIGOS;
- (2) how consistent, quality-assured space weather products will be available to Members through WIS; and
- (3) how the transition of space weather science to operations will be enhanced.

The plan is expected to further facilitate the effective coordination with initiatives external to WMO and to enable the long-term improvement of space weather service capabilities.

1.8 The FYP2020-23, as currently drafted, takes a high-level retrospective look at WMO's support to ICAO during the period 2016 to 2019 in the establishment of a space weather information service. It also considers how, in the period 2020 to 2023, WMO will continue to collaborate with ICAO in the context of the operation and development of the service.

1.9 Once a final draft of the FYP2020-23 has been prepared by IPT-SWeISS (February/March 2019), it will be submitted to the 18<sup>th</sup> World Meteorological Congress (Cg-18) in June 2019 for approval.

1.10 In the event of approval of the FYP2020-23 by Congress, it will form the basis of WMO's activities in the space weather area over the next four years.

1.11 Acknowledging WMO Constituent Bodies Reform (to be addressed at Cg-18), it is highly probable that IPT-SWeISS will continue in its current form or in a modified form after Congress. Given the proposed transition to a COIIS and CSA technical commission structure (see [CAeM-MG-2019/PPT. 3.4](#) for more information) and the associated dissolution of CBS and CAeM (and all other extant technical commissions), it is feasible that IPT-SWeISS (or its successor) could be a joint body of COIIS and CSA (or their subsidiary bodies including the standing committees). These are structural aspects which may only be decided upon during the proposed July 2019 to April 2020 transition period of WMO Reform.

1.12 In the immediate term, given Decision 3 (CAeM-16) referenced at 1.4 above and the WMO reform expectations, the president of the CAeM will initiate dialogue with the

<sup>3</sup> The EC-70 report is [available here](#) as WMO-No. 1218.

<sup>4</sup> Consultation with the CAeM MG commenced on 22 January 2019 for input by 31 January 2019.

president of CBS in respect of how space weather issues in support of international civil aviation should be addressed during the next intersessional period.

## **2. ICAO-DESIGNATED SPACE WEATHER INFORMATION PROVIDERS**

2.1 WMO, in particular experts of the ad hoc TT-AVI of IPT-SWeISS and the OPAG-ISS Expert Team on Centre Audit/Certification (ET-CAC), was instrumental in the conducting of site assessments and audits of prospective space weather information providers. This auditing activity was undertaken by WMO at the request of ICAO and completed in March 2018.

2.2 In April 2018, as alluded to in [CAeM-MG-2019/Doc. 3.2](#), a report on the outcomes of the WMO site assessment and audits was presented to the third meeting of the ICAO Meteorology Panel (METP/3) and the METP consequently made a recommendation to the ICAO Air Navigation Commission in this regard. In turn, the ANC made recommendations to the ICAO Council.

2.3 It is worthwhile to note here that the WMO final report on the site assessments and audits only presented objective opinion on the demonstrated capabilities of the prospective providers to fulfil a set of (ICAO-defined) criteria. The WMO final report did not, intentionally, determine the optimal arrangement of the prospective providers since the ICAO METP had already made recommendations in this regard – i.e. two global centres in 2018 augmented by up to four regional centres by 2022.

2.4 At the seventh meeting of its 215<sup>th</sup> session held on 13 November 2018, the ICAO Council decided to the designation of three (not two) global space weather information providers as follows:

- (1) ACFJ consortium comprising Australia, Canada, France and Japan;
- (2) PECASUS consortium comprising Austria, Belgium, Cyprus, Finland (as lead), Germany, Italy, Netherlands, Poland and the United Kingdom; and
- (3) United States of America.

2.5 In addition, the ICAO Council decided to designate two regional space weather information providers (to be established not later than November 2022) as follows:

- (1) China and Russian Federation consortium; and
- (2) South Africa.

2.6 In essence, the decisions of the ICAO Council have resulted in *all* the prospective space weather information providers audited by WMO being included in the provision of a global space weather information service for international civil aviation.

2.7 It is understood that a 'space weather centre coordination ad hoc group' has been established amongst the designated providers to commence discussion on their respective roles and responsibility in delivering the operational space weather information service.

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## **DRAFT CONTENT OF THE FOUR-YEAR PLAN FOR WMO ACTIVITIES RELATED TO SPACE WEATHER 2020-2023**

(Based on Version Draft 0.9a of 21 January 2019)

*Note. — The following table of contents is subject to change in light of consultation with the management groups of CBS and CAeM and finalisation by IPT-SWeISS.*

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