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INTER-PROGRAMME COORDINATION TEAM ON SPACE WEATHER

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**SPACE WEATHER SERVICES TO AVIATION
Review Process of ICAO Documents by ICTSW**

(Submitted by Terrance Onsager)

Summary and Purpose of Document

The purpose of this document is to summarize the review of ICAO documents conducted by the ICTSW. The ICTSW is now requested to review the "Concept of Operations for International Space Weather Information for Global Aviation" Version 2.3 and provide consolidated comments to IAWWOPSG.

ACTION PROPOSED

The Inter-Programme Coordination Team is invited to :

- Note the review process of ICAO documents
- Review the "Concept of Operations for International Space Weather Information for Global Aviation" Version 2.3 and provide consolidated comments to IAWWOPSG by December 6, 2013.
- Consider next steps in working with ICAO on space weather services for civil aviation.

DISCUSSION

1. ICTSW REVIEW OF ICAO DOCUMENTS

The ICTSW has the mandate to interact with the major space weather application sectors, including aviation, to support the coordination of products and services. The ICTSW is also responsible for defining observing requirements and identifying gaps that must be addressed in order to support the required products and services. Consequently, the ICTSW has been participating in reviewing and commenting on the ICAO documents related to space weather.

The ICTSW effort has focused on the “Concept of Operations for International Space Weather Information for Global Aviation” (referred to in this document as the CONOPS) developed by the ICAO International Airways Volcano Watch Operations Group (IAVWOPSG). The IAVWOPSG effort was first presented to the ICTSW at its first face-to-face meeting (ICTSW-1) in April, 2011. The ICTSW was informed of the CONOPS development effort as well as the broader plans to formalize space weather service requirements in a Standard and Recommended Practice (SARP) that was to be included in Annex III of the ICAO Convention.

The ICAO Convention is the fundamental treaty defining ICAO activities and the obligations of its Contracting States. Annex III of the convention contains the detailed regulatory description of “Meteorological Services for International Air Navigation”, which are the services coordinated by WMO in response to ICAO; it is defined in consultation between ICAO and WMO. In order to include the Space Weather SARP as either a “Change” or an “Addition” to Annex III, ICAO would require prior endorsement by its Decadal Decisional Meeting in 2014, which is a joint meeting with the WMO Commission for Aeronautical Meteorology (CAeM), and seek final approval by the ICAO General Assembly in November 2016.

During the ICTSW-1 meeting, the team agreed to review and comment on the CONOPS when it became available and to coordinate with ICAO on supporting the airline requirements. It was anticipated that the WMO Secretariat would circulate the CONOPS to the ICTSW by the end of October, 2011, and that the ICTSW would forward consolidated comments to ICAO by June, 2012.

The ICTSW reviewed the first draft of the CONOPS and provided its comments in July, 2012. A set of general comments were provided along with 41 specific comments. The ICTSW commended the ICAO team for their effort and reiterated the interest in continuing to work together. It was pointed out that many of the requirements and expectations in the CONOPS appeared overly ambitious, and it was recommended that a phased approach be adopted that identified the most basic and highest priority requirements that could be achievable in the near time, and include more ambitious goals for subsequent development. The review also stressed that space weather services today often are not well matched to what the aviation industry needs, and therefore a first step could be to define more effective products from currently available information and use this as a foundation for future requirements.

A subsequent version of the CONOPS (Version 2.0) was released in September, 2012. The ICTSW reviewed this new document and discussed it at its ICTSW-3 meeting in November, 2012. Although the ICTSW noted a substantial improvement over the previous version, there were still concerns regarding, for example, a nearly exclusive emphasis on the polar regions over equatorial, a lack of emphasis on ground-based observations relative to space-based, a lack of emphasis on health-radiation effects, and a lack of clarity on what could be accomplished in the near term versus the long term.

Given the concerns about the CONOPS expressed at ICTSW-3 and by other groups, it was recommended by the IAVWOPSG team that the ICTSW submit a working paper for the IAVWOPSG/7 meeting. In addition, a new version of the CONOPS (Version 2.2) was subsequently released. The working paper submitted by the WMO to IAVWOPSG/7 contained a preliminary, high-level review of CONOPS Version 2.2. The comments and recommendations were in the categories of: 1. expected accuracy of space weather information; 2. consistency and traceability of requirements; 3. proposed concept of space weather services to aviation; 4. global coordination and interaction with ICAO; 5. description of current capabilities; and 6. editorial aspects.

At IAVWOPSG/7, three conclusions were reached related to space weather. One involved the draft SARP regarding space weather centers, one conclusion tasked an ad-hoc working group, including WMO, to review and update the "Space Weather Effects in regard to International Air Navigation" document, and one conclusion tasked an ad-hoc working group, including WMO, to review and propose further changes to the CONOPS.

In July, 2013, ICTSW was invited by the Rapporteur of the ad-hoc working group to review and provide comments on the CONOPS Version 2.2 by September, 2013. It was requested that the comments be in the form of specific changes to the document or text that could be inserted. ICTSW submitted text to replace Section 2.1, an additional paragraph in Section 2, a replacement of Section 4, and a replacement of Figure 5.

Version 2.3 of the CONOPS was released on October 14, 2013. It was noted that over 100 comments were received, and a table detailing how each comment was address was also provided. On review by the ICTSW, it was agreed that additional comments should be submitted to guide the next revision, which will be presented at IAVWOPSG/8. Comments of the ICTSW will be discussed and compiled at ICTSW-4 and submitted to the ad-hoc Rapporteur by December 6, 2013.

No specific action was requested of ICTSW by the ad-hoc team formed to review the document "Space Weather Effects in regard to International Air Navigation".