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ICAO WRC-27 Preparatory Workshop
Agenda item 1.17: Space weather sensors

Chris Tourigny

U.S. Panel Member, FSMP

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Presentation Overview

01 **Background**

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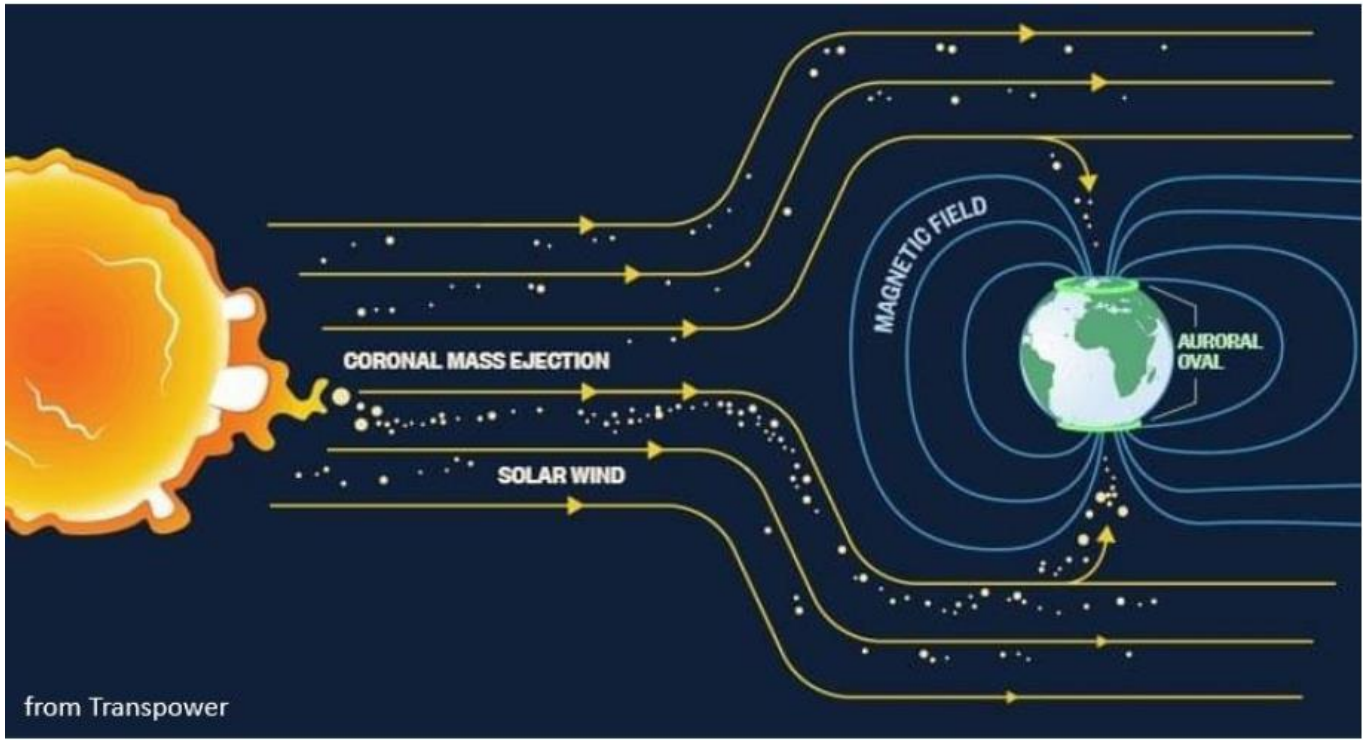
Background

WMO definition of space weather: "*The physical and phenomenological state of the natural space environment, including the Sun and the interplanetary and planetary environments*."

Definition from ITU-R Resolution 675: "*Natural phenomena, mainly originating from solar activity and occurring beyond the major portion of the Earth's atmosphere, that impact Earth's environment and human activities*".

Space weather phenomena include:

- Geomagnetic storms
- Solar radiation storms
- Solar flare radio blackouts
- Solar radio bursts
- Cosmic radiation



Background

- Space weather can influence the performance and reliability of space and terrestrial aviation safety systems and endanger human health. This can include unanticipated communications, navigation, and surveillance performance degradation, unanticipated on-board electronics performance leading to reboots and anomalies, and problems with radiation exposure for both aircrew and passengers.

Frequency bands in Res 682 (receive-only sensors):

- 27.5 – 28 MHz
- 29.7 – 30.2 MHz
- 32.2 – 32.6 Mhz
- 37.5 – 38.325 MHz
- 73 – 74.6 MHz
- 608 – 614 MHz

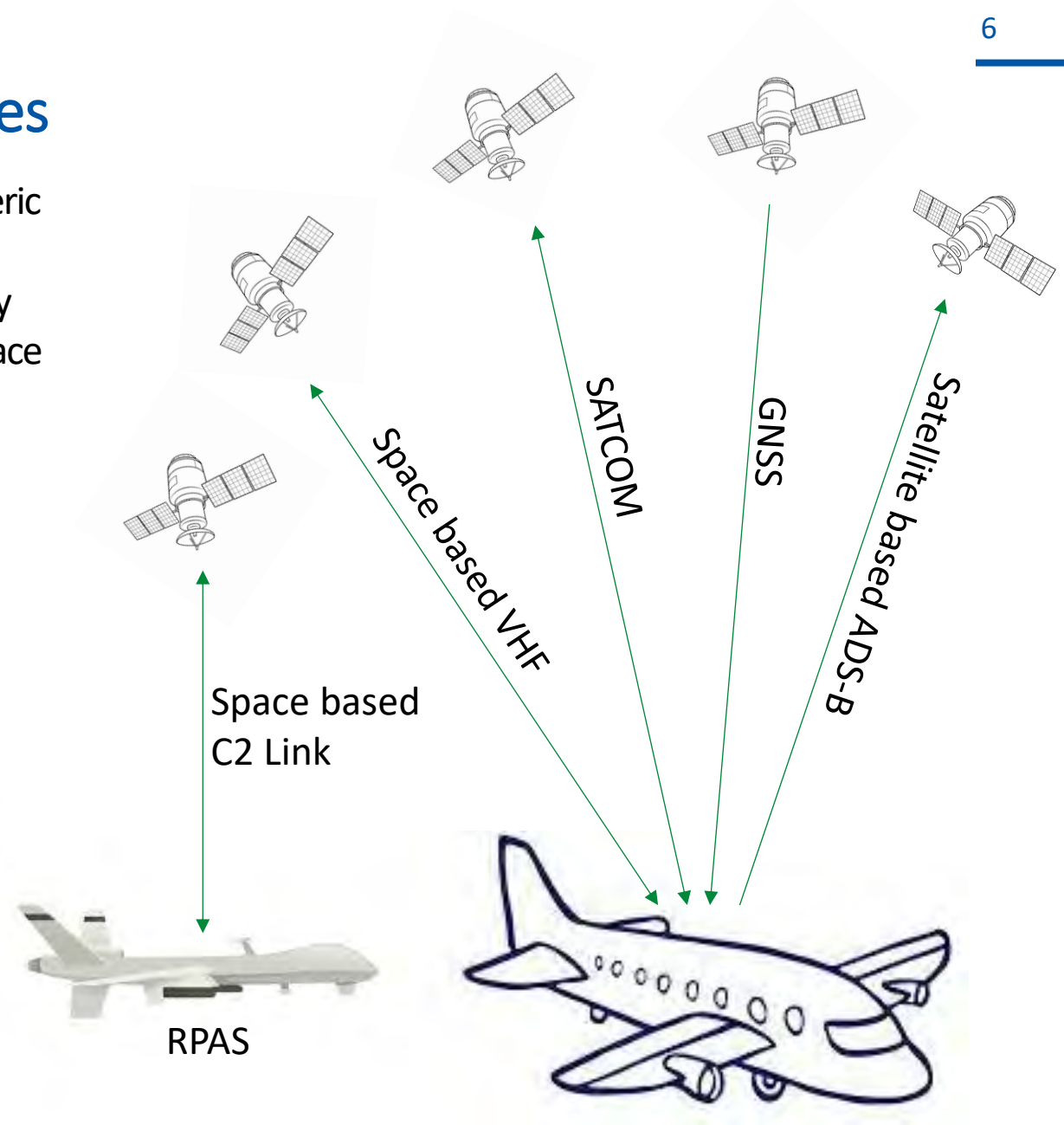
Potential issues… or opportunities

- Space weather is very different than Earth's atmospheric weather
- The ITU Radio Regulations currently do not adequately provide a framework for radiocommunications for space weather sensors

Civil aviation benefits from space weather forecasts

- Degradation of satellite communications
- On-board system failure due to radiation
- Higher ionizing radiation dose
- Degradation of magnetic equipment (e.g, compass)
- Degradation of electrical systems

➔ ICAO Doc 10100: *Manual on Space Weather Information in Support of International Air Navigation*



On-going work within ITU-R

Agenda item 1.17 is addressed by ITU-R WP-7C.
Several documents are under development:

Working document toward a preliminary draft new Report ITU-R RS.[SW_STUDIES] - Studies on possible primary allocations to the meteorological aids service (space weather) for receive-only space weather sensors

- Contains the sharing studies as well as intended applications.

Working document towards a preliminary draft new Recommendation ITU-R RS.[RXSW_PROTECT_CRITERIA] - Protection criteria of receive-only space weather sensors in the meteorological aids service (space weather)

- Proposes protection criteria for the systems under consideration by agenda item 1.17, in terms of max tolerable power or maximum power spectral density.

Draft CPM text for WRC-27 agenda item 1.17

- Based on the principle of receive-only can't interfere, but they also can't constrain incumbent services
  - ➔ New primary allocations to MetAids
  - ➔ footnote to limit to ground-based receive-only sensors
  - ➔ modifications to RR Appendix 4 to allow for registration of space weather stations in the MIFR
  - ➔ Footnotes (5.A117…. 5.F117) are written so these space-weather stations “shall not claim protection” and “shall not constrain future development” of incumbent services (and in some versions, incumbent + adjacent-band services)

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ICAO position

To support the appropriate radio regulatory changes for receive-only space weather sensors (excluding active sensors) while ensuring, based on the ITU-R studies as called for by Resolution 682 (WRC-23), any changes would not impose any technical or regulatory constraints on aviation safety systems.

Conclusion

This agenda item explores regulatory provisions and potential primary allocations to the meteorological aids service (space weather) to accommodate receive-only space weather sensor applications in the Radio Regulations

Civil aviation benefits from space weather monitoring and forecasts

As a consequence, ICAO supports this agenda item, provided that any changes would not impose any technical or regulatory constraints on aviation safety systems.

Thank You

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