

Aviation Space Weather: International Activities



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Outline

- Cross Polar Working Group
- Space Weather in the UN International Civil Aviation Organization (ICAO)
- Space Weather Plans in the UN World Meteorological Organization (WMO)



**28TH JULY 2009, UNITED COMPLETED IT'S 10,000TH POLAR
OPERATION - UA 898 ZBAA-KIAD
CURRENT TOTAL 10,816**





ECONOMIC COMPARISON OF NON-STOP OPTIONS

(MARCH 2006)

FLIGHT 829 ORD-HKG

POLAR 3

316 PSGRS AND 5000 lbs CARGO (14:32)

FLIGHT 829 ORD-HKG

RUSSIA

246 PSGRS AND NO CARGO (15:41)

FLIGHT 829 ORD-HKG

NOPAC

NO PSGRS OR CARGO (17:18)





United Airlines

DURING ADVERSE SOLAR ACTIVITY, UAL POLICY RESTRICTS FLIGHTS TO SPECIFIC ROUTES AND ALTITUDES.



UAL POLICY IN PART, IS DERIVED FROM AND BASED ON THE NOAA SPACE WEATHER SCALES



United Airlines

A DECADE AGO THERE WAS NO NEED OR REQUIREMENT TO TAKE SPACE WEATHER INTO OPERATIONAL CONSIDERATION.

TODAY, UNITED CLOSELY MONITORS SPACE WEATHER AND IS CONSTANTLY ENHANCING PROCEDURES TO MEET CRITERIA THAT RECENT RESEARCH AND DATA MANDATE.





Aviation Space Weather User Service Needs

Cross Polar Working Group – Representative Areas

- Air Traffic Management (Air Navigation Service Providers, Operations)
 - Canada, China, Iceland, Russia, USA
- International Air Transport Association (IATA) (Regulatory & Safety)
- International Business Aviation Council (IBAC) (Operations)
- FAA (Regulatory & Safety)
- Airlines (Operations)
 - Dispatchers, Managers



Integrating Space Weather Observations & Forecasts into Aviation Operations

“Aviation Space Weather User Service Needs” (Draft version 2)

Space Weather Sub-Group

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Additional Members

Genene Fisher (AMS)
Dave Rome* (NAV CANADA)
Dave Rose (NAV CANADA)

* Retired in December 2008

Integrating Space Weather Observations & Forecasts into Aviation Operations

“Aviation Space Weather User Requirements”

Space Weather Sub-Group
of the Cross Polar Working Group

April 2009



Aviation Space Weather User Service Needs

	7 days	3 days	30 hours	12 hours	6 hours	0 Dispatch	→
Forecast	X	X	X	X	X		
Warning				X	X		
Alert						X	X
Update							X Parameter Changes
Post-Event Analysis							X

- Additionally
 - Confidence Levels
 - Current Condition Reports



Aviation Space Weather User Service Needs



CPWG Timeline (Hopefully!!)

CPWG/9 meeting WP: 28-30 Apr 2010

Endorsed: CPWG/10 meeting Dec 2010

Published: Dec 2010 - tbc

FAA – ICAO Timeline (Hopefully!!)

Present at ICAO meeting: 15 Mar 2010

Next ICAO meeting: Sep 2011

Ready as ICAO Amendment: Mar 2011

Endorsed by ICAO: 2013/14

Officially implemented into ICAO: 2016



International Civil Aviation Organization (ICAO)

- The International Civil Aviation Organization, a UN Specialized Agency, is the global forum for civil aviation.
- ICAO works to achieve safe, secure and sustainable development of civil aviation through cooperation amongst its member States.
- The ICAO Council adopts standards and recommended practices concerning air navigation.



Space Weather in the International Civil Aviation Organization (ICAO)



- International Civil Aviation Organization Divisional Meeting (2002)
 - Space weather recognized as a hazard to aviation.
- Two significant operational issues in international air navigation require the ICAO to address space weather:
 - Significant increase in polar operations
 - Increased use of GNSS for navigation
- These issues were brought to the ICAO Air Navigation Commission (ANC). ANC suggested that space weather be addressed by the International Airways Volcano Watch Operations Group (IAVWOPSG).



Space Weather in the International Civil Aviation Organization

- At the 3rd meeting of the IAVWOPSG in Bangkok, *March 2007*, the U.S. was invited to prepare a proposal on how to address issues related to space weather storms.



4th meeting of IAVWOPSG Paris – Sep 2008

In response to this request the U.S. proposed to develop a manual and training material to educate dispatchers, pilots and controllers on space weather.

- NOAA SWPC agreed to lead effort to prepare the guidance document (team includes: Canada, Australia, and New Zealand)



Space Weather in the International Civil Aviation Organization

- At the 5th meeting of the IAVWOPSG in Peru, *March 2010*, the U.S. presented the “*Manual on Space Weather Effects in Regard to International Air Navigation*”
- Working Paper presented on the “*Development of Operational Requirements for Space Weather Information*”



Group formed to address space weather requirements that includes: Argentina, Australia, Canada, France, New Zealand, United Kingdom, United States (Rapporteur), IATA, IFALPA and IFATCA, in consultation with ICAO and WMO.

- Develop draft operational requirements for space weather, including draft guidance material (on use of products), as necessary.
- Prepare a report with milestones for the development and roll-out of space weather service for international aviation, for consideration by the IAVWOPSG/6.



FAA and ICAO

- FAA Aviation Weather Group tasked to develop requirements to be provided to NWS and coordinated with ICAO.
- FAA Aviation Weather Group created a team to develop Space Weather Aviation Requirements.
- Timeline through 2014 has been developed.

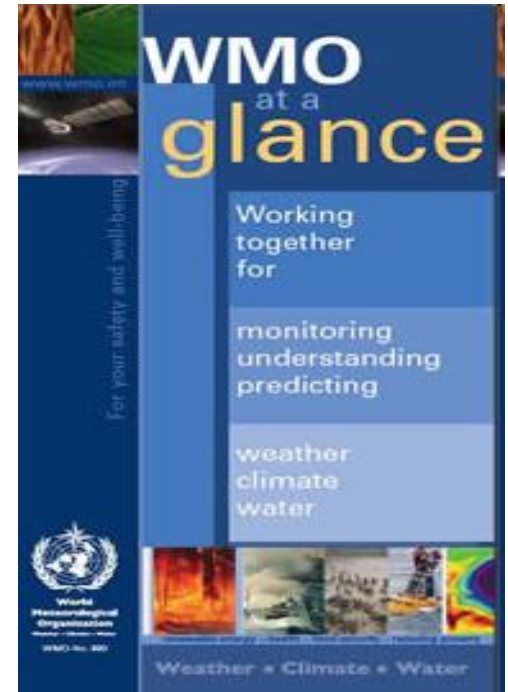


World Meteorological Organization (WMO)

WMO is the specialized agency of the United Nations for meteorology (**weather** and **climate**), operational **hydrology** and related geophysical sciences.

WMO has 188 Members (States and Territories).

- Fosters international cooperation
- Facilitates free and unrestricted exchange of information





Space Weather in the World Meteorological Organization

WMO – “UN system's authoritative voice on the state and behavior of the Earth's atmosphere”...*extends now to the space environment!*



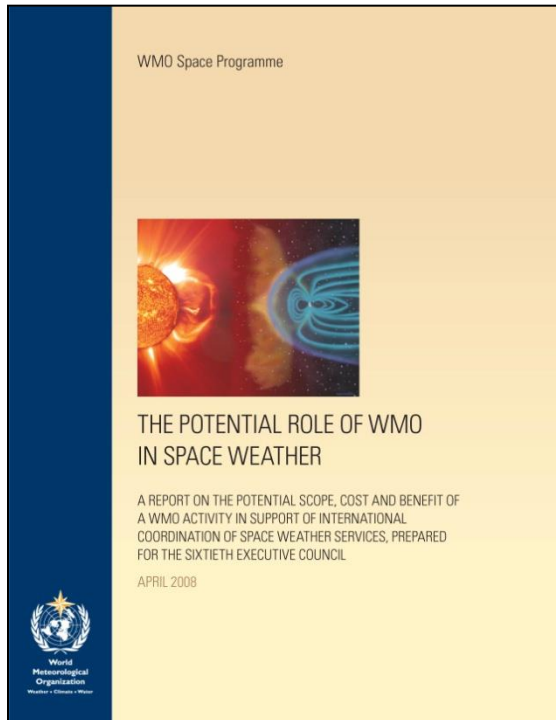
- Members lobbied WMO to engage space weather
- 11 June 2007: ISES letter to WMO
- NWS International Activities Office
 - U.S lead for introduction of space weather in WMO



Space Weather in the World Meteorological Organization



From the 60th Session of the WMO Executive Council in Geneva, June 2008



“In view of the considerable impact of Space Weather on meteorological infrastructure and on a growing number of human activities...the Council fully endorsed the principle of WMO activities in support of international coordination in Space Weather.”



Space Weather in the World Meteorological Organization

- June 08: **Executive Council (EC-LX)** endorsed principle of **WMO activities in support of SW** with focus on:
 - Harmonizing observations
 - Exchange of data and products
 - Definition of products, warning procedures
 - Linkage between research and operational communities
- Called for secondments, trust fund donations (no regular budget)
- Cooperation with ICAO, IMO, ITU, ISES, OOSA/COPUOS
- Tasks CBS (Commission on Basic Systems) and **CAeM** (Commission for Aeronautical Meteorology) to develop program



Space Weather in the World Meteorological Organization

- April 09: CBS agreed to Terms of Reference of Inter-program Coordination Team on Space Weather (ICTSW) with CBS-CAeM co-leadership
- Endorsed in June 09 by Executive Council (EC-LXI)
- Sept 09: Circular letter to ICAO, IMO, ITU, ISES, ESA, OOSA
 - Informed on ICTSW, proposed participation, invited POC
- Oct 09: Circular letter to all (188) WMO Members:
 - Informed on ICTSW and list of ISES Warning Centres
 - Interest ? Point of contact ? Contribution? Participation in ICTSW



WMO Space Weather Office

Dr. Barbara Ryan, Director, WMO Space Program

The WMO Space Program (Barbara Ryan and Jerome Lafeuille) is working to establish a Space Weather Office within the WMO

Effort is on going to identify staff, trust-fund contributions, points of contact, and experts from the member states

Expected Functions

- Support establishment and work of ICTSW
- Participate in relevant meetings (particularly on international coordination and transition to operations)
- Communication
 - Report to Members, CBS/CAeM, partners
 - Maintain website
- Identify partnership and development opportunities
 - Liaise with partner organizations
 - Consult major users, needs and expectations
 - Mobilize resources, prepare proposal for WMO Congress 2011



Summary

Four critical activities being conducted in parallel

- Space weather requirements being established by CPWG for polar operations
- FAA Aviation Weather Group tasked to develop requirements to be provided to NWS and coordinated with ICAO
- ICAO ANC tasked IAVWOPSG to develop requirements with United States leading international effort
- WMO Executive Council established an inter-program coordination team to address space weather services



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Questions?

