



World Meteorological Organization

Weather • Climate • Water

Inter-Programme Team on Space Weather Information, Systems and Services (IPT-SWISS)

**Future Seamless Global Data-processing and Forecasting
Systems (GDPFS) meeting, 1-4 November 2016, Geneva**

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WMO Space Programme Office

WMO Space Programme

The WMO Space Programme has 4 main components:

The space-based Observing System



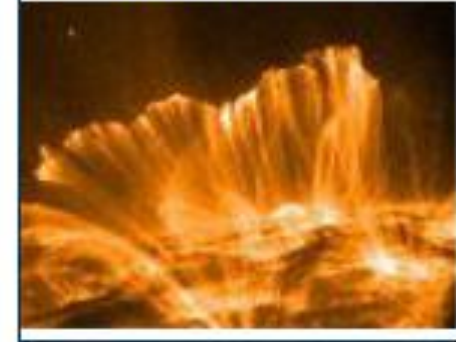
Access to Satellite Data and Products



Awareness and Training



Space Weather Coordination



- [OSCAR/Requirements \(Observing Requirements Database\)](#)
- [OSCAR/Space \(Satellite & Instrument Database\)](#)
- [Satellite Status list](#)
- [Satellite User Readiness Navigator \(SATURN\)](#)
- [Product Access Guide \(PAG\)](#)
- [Virtual Laboratory for Education and Training in Satellite Meteorology \(VLAB\)](#)
- [Working Documents for Meetings](#)



Coordination Group for Meteorological Satellites (CGMS)

- WMO Space Programme's objectives are to be achieved through strong partnership with CGMS and co-sponsoring international science groups: ITWG, IWWG, IPWG, **IROWG** and ICWG
- CGMS is a technical coordination body of satellite operators including space agencies focusing primarily on weather and climate satellite programmes in response to WMO requirements.



The baseline for holding a CGMS Membership covers: (http://www.cgms-info.org/index_.php/cgms/members_observers)

- Current and prospective developers and operators of meteorological satellites;
- WMO, because of its unique role as representative of the world meteorological data user community, and other programmes jointly supported by WMO and other international agencies;
- Space agencies operating R&D satellites contributing to WMO programmes.

Organisation	Website	Accession
Centre National d'Etudes Spatiales	CNES	2004
China Meteorological Administration	CMA	1989
China National Space Administration	CNSA	2006
EUMETSAT	EUMETSAT	1987
India Meteorological Department	IMD	1979
Indian Space Research Organisation	ISRO	2015
Intergovernmental Oceanographic Commission / UNESCO	IOC/Unesco	2001
Japan Aerospace Exploration Agency	JAXA	2003
Japan Meteorological Agency	JMA	1972
Korea Meteorological Administration	KMA	2005
National Aeronautics and Space Administration	NASA	2003
National Oceanic and Atmospheric Administration	NOAA	1972
Russian Federal Service for Hydrometeorology and Environmental Monitoring	ROSHYDROMET	1973
Russian Federal Space Agency	ROSCOSMOS	2003
The European Space Agency	ESA	2003
World Meteorological Organization	WMO	1973



- In 2014, CGMS decided to include objectives related to space weather monitoring into its multi-year High-Level Priority Plan (HLPP) and agreed on Terms of Reference for CGMS Space Weather Activities.
- It is anticipated that CGMS will soon extend the scope of its activity towards space-based observation of space weather variables.
- Space Weather Task Team (SWTT) was organized to define the methodology for the implementation of space weather into CGMS



WMO Space Weather

There is an increasing societal demand for space weather services as a result of growing dependence on technologies impacted by space weather:

- air navigation on polar routes exposed to space weather events
- fleet of satellites used operationally for telecommunication, broadcasting, observation or positioning
- use of satellite-based navigation and timing signals that are affected by ionospheric disturbances
- electric power grids that are exposed to geomagnetically induced currents



Establishment of ICTSW

- The Interprogramme Coordination Team on Space Weather (ICTSW) was established in May 2010 following a proposal from the Commission for Basic Systems (CBS-14) supported by the Commission for Aeronautical Meteorology (CAeM) and approved by the Executive Council (EC-61).
- The ICTSW has two co-chairs nominated by CBS and CAeM respectively. The team works primarily by teleconferences and holds one or more face-to-face meetings per year.



- As of April 2016, it involves experts from 26 WMO Members, and several international organizations: European Union (EU), the International Civil Aviation Organization (ICAO), the International Space Environment Service (ISES), the International Telecommunications Union (ITU) and the Office of Outer Space Affairs (OOSA).
- Co-chairs Dr. T. Onsager (NOAA) and Dr. X. Zhang (CMA)



ToR for ICTSW

- Standardization and enhancement of Space Weather data exchange and delivery through the WMO Information System (WIS)
- Harmonized definition of end-products and services, including e.g. quality assurance guidelines and emergency warning procedures, in interaction with aviation and other major application sectors
- Integration of Space Weather observations, through review of space- and surface-based observation requirements, harmonization of sensor specifications, monitoring plans for Space Weather observation
- Encouraging the dialogue between the research and operational Space Weather communities.



Initial Achievements of ICTSW

- formulation of the “Observation Requirements”,
- drafting the “Statement of Guidance” on space weather observation,
- establishment of a Space Weather Product Portal,
- supporting CAeM to review the ICAO concept of future space weather services to aviation.



Transition from ICTSW to IPT-SWISS

Cg-17

-The 17th World Meteorological Congress (Cg-17) agreed that WMO should undertake international coordination of operational space weather monitoring and forecasting. In providing a global intergovernmental framework, WMO would facilitate international commitments and enable the establishment of operational space weather services, in particular in the context of the support to the International Civil Aviation Organization (ICAO).

-Cg-17 requested that space weather observations be integrated into the *WMO Integrated Global Observing System (WIGOS)*.

-Cg-17 requested CAeM and CBS to consider existing responsibilities, working mechanisms, expert teams and integration within relevant WMO programmes in finalizing a draft “Four-year Plan for WMO Coordination of Space Weather Activities (the Plan)”



CBS Management Group meeting

-CBS Management Group meeting at its February, 2016 decided to expand the responsibilities of the Open Programme Area Group on Data-Processing and Forecasting Systems (IPT-DPFS) to include the IPT-SWISS.

ICT-DPFS meeting

-The ICT-DPFS meeting at its May, 2016 noted the expansion of its scope to include IPT-SWISS, and it was reported that the Technical Commissions were supportive of moving toward seamless Global Data Processing and Forecasting Systems including space weather.

-Discussions by ICT-DPFS on space weather resulted in the following decisions and recommendations: 1. CBS, in collaboration with CAeM, to consider a recommendation to EC-69 for funding IPT SWISS activities; 2. IPT-SWISS to be formally established and to include core and Associate memberships; 3. Letters be sent to Members to nominate experts for the IPT-SWISS; and 4. CIMO and CAS to be invited to identify focal points (CBS and CAeM Presidents to send a joint note to the Presidents of CIMO and CAS).



The 68th Executive Council

- The 68th Executive Council (EC-68) approved the Plan in Annex (EC-68/Doc. 5.1(2)/2) , and requested CAeM and CBS to establish an Inter-Programme Team on Space Weather Information, Systems and Services (IPT-SWISS) with the Terms of Reference defined in Annex 2 of the Plan.
- EC-68 called for Members to support the implementation of the Plan with participation of experts, in-kind contributions and contributions to the Space Weather Trust Fund.
- EC-68 requested the Secretary-General to take appropriate actions to support the activities identified in the Plan in partnership with relevant organizations such as the International Space Environment Service (ISES), as well as national and international agencies, and to submit to the Cg-18 a report on the achieved results and a proposal for future actions in this domain.



ToR for IPT-SWISS

- Integration of Space Weather observations, through review of space- and surface-based observation requirements, harmonization of space-based sensor specifications, monitoring plans for Space Weather observations;
- Standardization and enhancement of Space Weather data exchange and delivery through the WMO Information System (WIS);
- Coordinating the development of WMO Space Weather best practices for end-products and services, including e.g. quality assurance guidelines and emergency warning procedures, in collaboration with aviation and other major application sectors;
- Encouraging the dialogue between the research and operational space weather communities;
- **Organization of capacity building, training and outreach activities towards WMO Members and space weather potential users;**
- **Provision of guidance to WMO Members and programmes on space weather matters, and conduct appropriate actions as requested by CBS and CAeM.**



WMO Space Weather

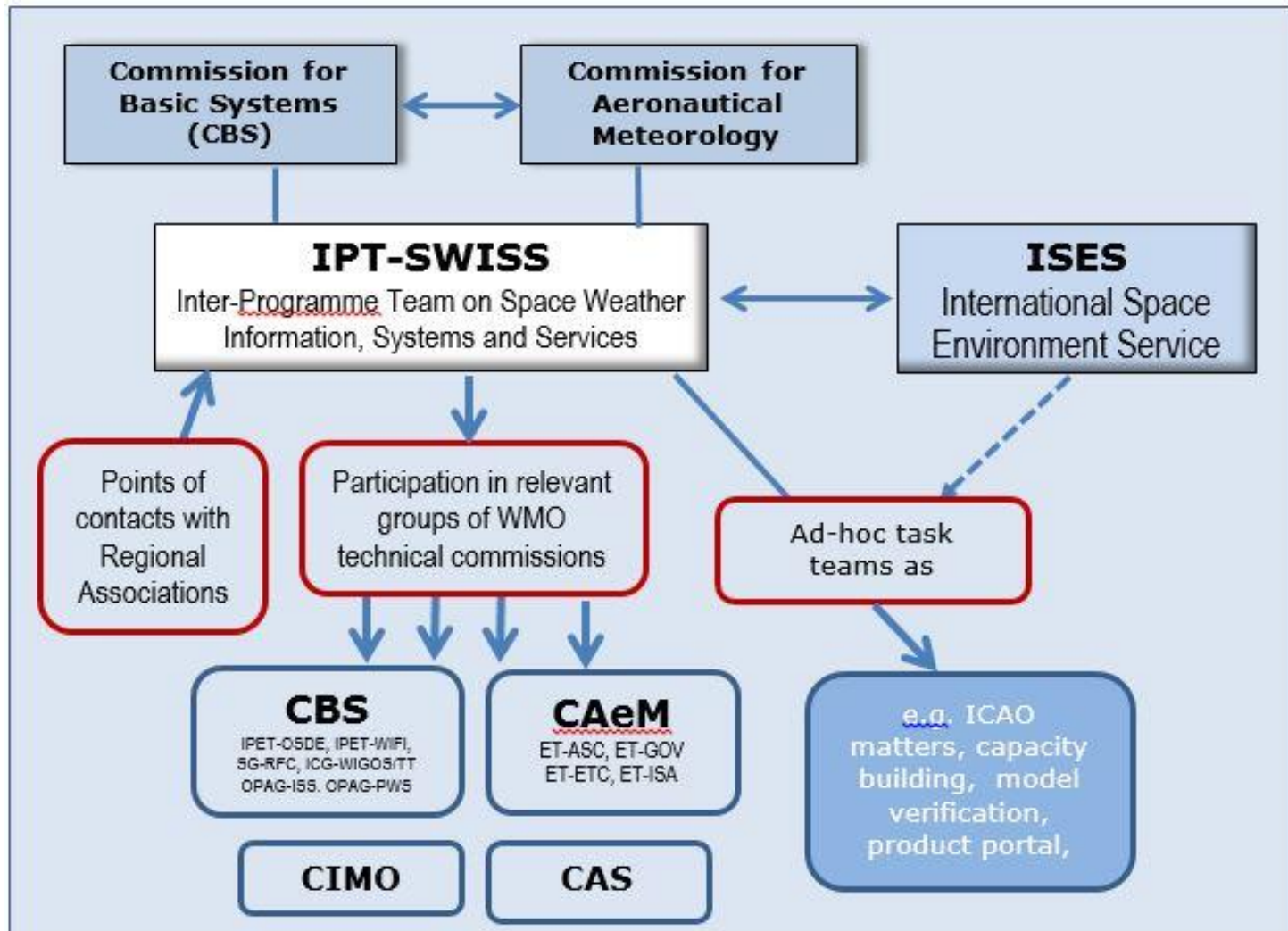


Figure 1: Relationship of IPT-SWISS to WMO Programmes and to external groups (from the Four-Year Plan)

WMO Space Weather

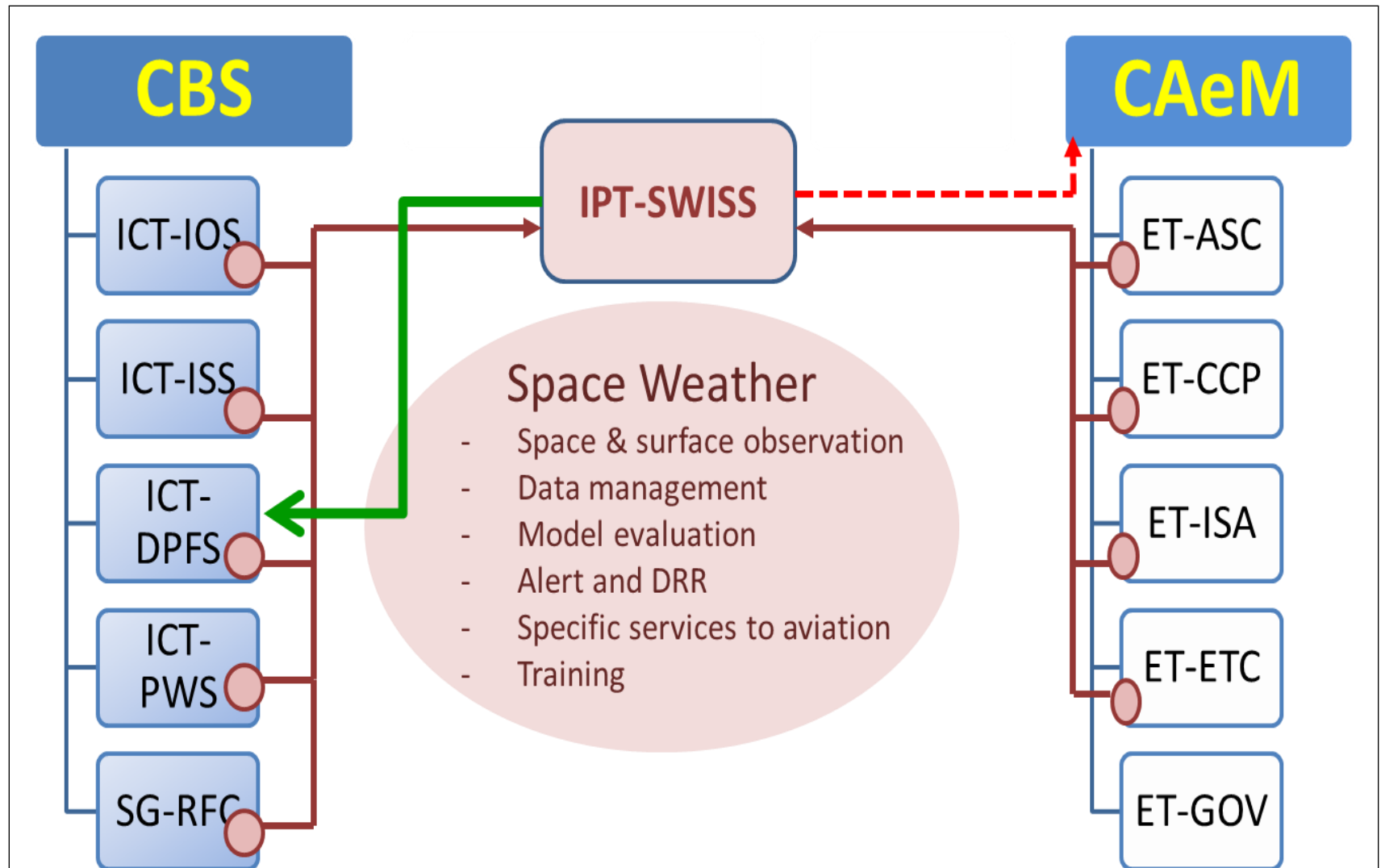


Figure 2: Reporting lines to IPT-SWISS and from IPT-SWISS to CBS and CAeM



WMO Space Weather

Table 1: Tentative estimation of the annual level of resources needed to support the plan

Type of expenditures	Annual cost(CHF)
Participation of qualified experts in one annual meeting of IPT-SWISS and related task teams	60 000
Participation of IPT-SWISS members in relevant bodies of WMO technical commissions	30 000
Liaison with external partners	20 000
Communication actions, development or translation of training material	20 000
One seminar	50 000
Consultancy and financial support to secondment of staff to supplement the Secretariat	60 000
Total	240 000



WMO Space Weather

Table 2: Tentative breakdown of resources

Tentative indication of annual resources	(CHF)
Regular Budget (WMO Space Programme)	20 000
In-kind contributions	30 000
Co-sponsored events	30 000
Voluntary contributions to the Space Weather Trust Fund	160 000
Total	240 000

- In-kind contributions from Members: e.g. translation of training material, secondment of staff, or participation in meetings at no cost to WMO
- Co-sponsored events: e.g. training seminar supported by COSPAR



A strategy for promoting WMO Space Weather

- Build on:
 - Partnership with service providers (ISES)
 - Observations providers (e.g., INTERMAGNET, CGMS)
 - Scientific organizations (e.g., COSPAR)
 - User organizations (e.g., ICAO and ITU)
 - Capacity building initiatives (e.g., ISWI)
 - Overall UN space policy framework (COPUOS)
- Emphasize synergy with core WMO activities
- Support involvement of additional WMO Members
- Focus on achievable priority objectives for 2016-2019
- Pave the way for long-term sustained activity



CGMS



Thank you



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