

International Organization Activities on Space Weather



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Overarching Goal: Strengthen Resilience Through Improved Services

Four elements needed to improve space weather capabilities:

1. User Needs: Understand the risks and the actions that need to be taken
2. Targeted Services: Develop useable capabilities from basic science knowledge
3. Observing Infrastructure: Shared approach for long-term continuity
4. Global Coordination: Consistent, accurate message



International Organizations Involved in Space Weather Services



International Space Environment Service – Global network of space weather service providers since 1962



World Meteorological Organization – Global observing and service infrastructure – combining meteorology and space weather



Coordination Group for Meteorological Satellites – Satellite observations and anomaly reporting – drafting Terms of Reference



International Civil Aviation Organization – Defining civil aviation needs and information flow



UN Committee on Peaceful Uses of Outer Space – New space weather agenda item – Research, observations, applications



U.S. Bilateral Space Weather Activities

China:

- China Meteorological Administration

Korea:

- Korean Space Weather Center
- Korea Meteorological Administration

Japan:

- National Institute of Information and Communications Technology

Germany:

- German Aerospace Center

UK:

- Met Office



中国气象局

China Meteorological Administration



Ministry of Science, ICT and Future Planning
National Radio Research Agency

Korean Space Weather Center



Korea Meteorological
Administration



国立研究開発法人

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National Institute of Information and
Communications Technology



DLR





International Space Environment Service

Coordinating space weather services since 1962

- Improved service coordination is a priority
- Endorsed by national governments as space weather service providers
- Provide local users with targeted services
- Promote exchange of data and information
- Close collaboration with WMO



ISES
International Space
Environment Service



World Meteorological
Organisation

- 18 Regional Warning Centers
- 4 Associate Warning Centers
- 1 Collaborative Expert Center





International Space Environment Service

Newest Member: Indonesia

Space Weather Information and Forecast Services (SWIFtS),
Space Science Center LAPAN

Clara Yatini, Director
Tiar Dani

Korean Space Weather Center:

Provides web infrastructure and a collaboration framework for future developments of ISES

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ISES
International Space Environment Service

Members Space Weather Now Space Weather Effects ISESgram Codes Info Discussions

ISES

Welcome to the International Space Environment Service

ISES

The International Space Environment Service (ISES) is a collaborative network of space weather service-providing organizations around the globe. Our mission is to improve, to coordinate, and to deliver operational space weather services. ISES is organized and operated for the benefit of the international space weather user community.

ISES currently includes 16 Regional Warning Centers, four Associate Warning Centers, and one Collaborative Expert Center. ISES is a Network Member of the International Council for Science World Data System (ICSU-WDS) and collaborates with the World Meteorological Organization (WMO) and other international organizations.

ISES has been the primary organization engaged in the international coordination of space weather services since 1962. ISES members share data and forecasts and provide space weather services to users in their regions. ISES provides a broad range of services, including: forecasts, warnings, and alerts of solar, magnetospheric, and ionospheric conditions; space environment data; customer-focused event analyses; and long-range predictions of the solar cycle.

NEWS [see more](#)

- Indonesia Becomes Newest ISES Regional Warning Center
- Mexico Elected New ISES Regional Warning Center

Members

Space Weather NOW

	-48H	-24H	Current
Radio Blackouts	R0	R0	R0
Solar Radiation Storms	S0	S0	S0
Geomagnetic Storms	G2	G0	G0

SWIFtS (Indonesia)

SWIFtS is a novel service of space weather information and...



WMO Inter-Programme Coordination Team on Space Weather

Established in May, 2010

Joint leadership: Commission for Basic Systems & Commission for Aeronautical Meteorology



25 out of 191 WMO Member States

7 International Organizations



World Meteorological Organization Four-Year Plan for Space Weather

- Approved by WMO Executive Council June, 2016
- Promote sustainability of observations
- Foster production of high-quality services targeting key users, such as aviation
- Promote international coordination of services
- Facilitate transfer of scientific advances to operations
- A new team is now forming to coordinate space weather capabilities

WORLD METEOROLOGICAL ORGANIZATION

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FOUR-YEAR PLAN FOR WMO ACTIVITIES RELATED TO SPACE WEATHER 2016-2019

9 June 2016





World Meteorological Organization Four-Year Plan for Space Weather

Strategic level

(3.7) COORDINATION, COMMUNICATION AND ADVOCACY

(3.1) SERVICE REQUIREMENTS

- Review user needs
- Feasibility analysis
- Demonstration
- Prioritization

Products & services level

(3.2) BEST PRACTICES
for products & services to:

Aviation

GNSS and radiocommunication

Ground infrastructure design & operations (incl. power grids)

Spacecraft design & operations

Disaster risk management

(3.3) TRAINING & CAPACITY BUILDING

- New providers
- New users
- New products

(3.4) OBSERVATION

- Gap analysis
- Prioritization
- Coordination
- Standardization

(3.5) DATA MANAGEMENT

- Data formats
- Metadata standards
- Data exchange

(3.6) SCIENCE

- Analysis/forecasting
- Model evaluation
- Research-to-Operations
- Interaction with weather/climate

System level



Coordination Group for Meteorological Satellites

CGMS is a technical coordination body of satellite operators in coordination with WMO requirements

High-level space weather goals have been established:

- Identify the baseline space-based space weather observational system and review with respect to the WMO 2040 vision for space-based global observing system
- Establish a coordinated approach to the reporting of space weather-related spacecraft anomalies
- Improve the near-real-time access to and global exchange of space weather data from instruments hosted on meteorological satellites
- Evaluate existing operational space weather products and services in support of CGMS members' spacecraft operations, and recommend additional services as appropriate



International Radio Occultation Working Group

CGMS IROWG Space Weather Sub-Group – September 10, 2016 Meeting Recommendations:

- Recommends development of data-assimilation models utilizing GNSS radio-occultation data
- Encourages future GNSS radio-occultation missions
- Recommends near-real-time and standard access to radio occultation data
- Recommends expanded space weather participation in Sub-Group activities



International Civil Aviation Organization

Enabling space weather services for aviation



Space weather events pose a risk to flight safety, impacting communication, navigation, avionics, and passengers

Meteorology Panel Working Group formed to:

- Address requirements for space weather information services
- Address capabilities needed for global and regional space weather centers
- Address selection criteria for global and regional centers
- Work in coordination with the World Meteorological Organization



United Nations Committee on the Peaceful Uses of Outer Space

Expert group on space weather established in 2015



- Promote the prioritization and implementation of space weather recommendations and best practices
- Identify roles of UNCOPUOS complementary to other UN organizations
- Promote increased involvement in space weather ground-based and space-based monitoring and service delivery

UNISPACE+50 – Commemorative event (2018) and to define global “Space 2030” agenda

- One of seven thematic priorities: “International framework for space weather services”
 - Develop a roadmap for international coordination and information exchange on space weather events



How do the Different Organizations Contribute Today?

- **User Needs:** ISES, WMO, CGMS, ICAO
- **Targeted Services:** ISES, WMO, CGMS, COPUOS
- **Observing Infrastructure:** ISES, WMO, CGMS, COPUOS
- **Consistent Message:** ISES, WMO



Opportunities and Challenges

- Numerous organization are actively engaged in different aspects of space weather
- ISES is growing and welcomes new members
- New WMO structure is an opportunity to integrate space weather activities with meteorology/climate infrastructure and efforts
- New COPUOS thematic priority on space weather services will highlight and promote needed global cooperation and coordination
- Challenge: Identify and focus on the key areas where combining our efforts will improve our service capabilities.