



WMO Unified Data Policy

The 2021 Extraordinary World Meteorological Congress approved the **WMO Unified Policy for the International Exchange of Earth System Data** (Res. 1, Cg-Ext 2021), confirming the commitment of WMO Members to **broadening and enhancing free and unrestricted exchange** of Earth system data as a fundamental principle.

It has two-tiered approach via the following practice:

- (1) Members *shall* provide on a free and unrestricted basis the ***core*** data that are necessary for the provision of services in support of the protection of life and property and for the well-being of all nations, at a minimum those data described in Annex 1 to the present resolution, which are required to monitor and predict seamlessly and accurately weather, climate, water and related environmental conditions;
- (2) Members *should* also provide the ***recommended*** data that are required to support Earth system monitoring and prediction activities at the global, regional and national levels and to further assist other Members with the provision of weather, climate, water and related environmental services in their States and Territories. Conditions may be placed on the use of recommended data.

- Vital importance of satellite data now clearly recognized.
- The concept of core satellite data is framed primarily in terms of importance to global Numerical Weather Prediction (NWP).
- No specific satellite datasets are listed as neither core nor recommended in current draft of policy. This is referred to the Manual on the WMO Integrated Global Observing System (WMO-No. 1160).
- It is irrespective to data origin: no particular position regarding provision of observational data by private sector i.e., exchange of **core data** is considered mandatory.
- The policy is addressed to national governments of WMO Members and cannot dictate what private sector entities should or should not do.

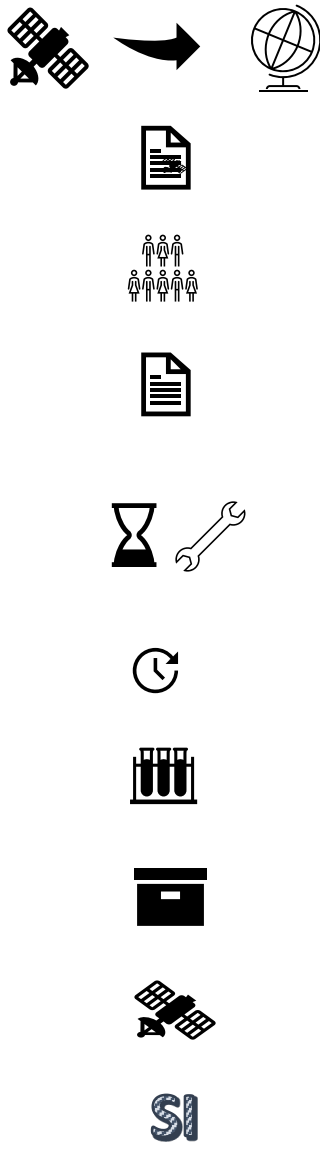


Defining WMO Core Satellite Data

- WMO expert teams IPET-SUP and later ET-SSU made an extensive work preparing the Position Paper on Satellite Data Requirements for Global NWP.
- WMO Secretariat organized bilateral discussions with satellite operators to understand their perspectives and prepare way forward.
- WMO Core Satellite Data Workshop was convened in 2023 for the final user consultation bringing together satellite operators and global NWP centers to address the WMO Unified Data Policy.
- The primary objective of the Workshop was for global NWP centers to identify an initial list of core and recommended satellite data to meet their needs, balancing feasibility and impact.
- The workshop was a first step to addressing also the satellite data needs of other WMO application areas in WMO Earth System approach in global NWP relying heavily on satellite data as defined in the Vision for the WMO Integrated Global Observing System in 2040 (WMO-No. 1243)

Workshop statement also defined recommended practices for core and recommended satellite data:

1. Share globally with all global NWP centers as required for global NWP in real time or near real-time consistent with the WMO Unified Data Policy.
 2. Provide documentation to users on instrument characteristics and processing steps.
 3. Engage with users and document potential impact on applications when developing new satellite systems, products, or ground systems.
 4. Provide documentation to users on algorithms and information to support calibration and validation of the data by users.
 5. Provide information on planned and achieved data timeliness, data format and processing tools availability.
 6. Provide advanced notification of operational changes that may impact data quality and usability.
 7. Provide timely pre-operational data to global NWP centers before formal release.
 8. Maintain and provide access to satellite data archives including all relevant metadata pertaining to the location, orbit parameters and calibration procedures used.
 9. Plan for sustained data provision.
 10. Provide calibrated data with complete and traceable estimates of stability and uncertainty that are linked to the International System of Units (SI) standards.



Core and Recommended Satellite Data in WIGOS Manual

Satellite data designating as ***core*** and ***recommended*** in the Manual on the WMO Integrated Global Observing System (WMO-No. 1160):

Table 1. Core satellite data

Geostationary core constellation with a minimum of five satellites providing complete Earth coverage		
Type of satellite sensors	Products	Attributes
Multi-spectral VIS/IR imager	Level 1: Radiances Level 2: Clear Sky Radiances (CSR), All Sky Radiances (ASR), Atmospheric Motion Vectors (AMVs), Aerosol Optical Depth (AOD), Sea Surface Temperature (SST), Land Surface Temperature (LST)	
Hyperspectral Infrared Sounder	Level 1: Radiances Level 2: AMVs	Level 1: Compressed (PC, BUFR compression or similar) with subset of channels.
Lightning Mapper	Level 2: Lightning flash products	
Sun-synchronous core constellation satellites in three orbital planes (morning, afternoon, early morning)		
Type of satellite sensors	Products	Attributes
VIS/IR imager	Level 1: Radiances Level 2: Aerosol Optical Depth (AOD), Atmospheric Motion Vectors (AMVs), Sea Surface Temperature (SST), Land Surface Temperature (LST)	Including water vapour channels
Hyperspectral Infrared Sounder	Level 1: Radiances	
Microwave Sounder	Level 1: Radiances	
Microwave Imager	Level 1: Radiances Level 2: SST, total column water vapour, clouds, precipitation, soil moisture, sea ice, snow water equivalent	Including low-frequency imager (e.g. L-Band)
Scatterometer	Level 2: Ocean surface wind vectors, soil moisture	
Other Low-Earth orbiting satellites		
Type of satellite sensors	Products	Attributes
Microwave Sounder	Level 1: Radiances	
Microwave Imager	Level 1: Radiances Level 2: SST, total column water vapour, clouds, precipitation, soil moisture, sea ice, snow water equivalent	Including low-frequency imager (e.g. L-Band)
Wide-swath radar altimeter and high altitude, inclined, high-precision orbit altimeter	Level 2: Sea surface height, ocean surface wind speed and significant wave height, ice freeboard	
UV/VIS/NIR sounder, nadir and limb	Level 2: Aerosol properties, O3, CO, CO2 and other atmospheric constituents	
IR dual-angle view imagers	Level 2: SST	
Global Navigation Satellite System (GNSS) radio- occultation	Level 1: Bending angle Level 2: Refractivity	Minimum 6000 occultations from low inclination orbits (<30°) distributed geographically and temporally in local time, 1000 occultation from other drifting orbits, and 7600 occultations from sun-synchronous orbits
Absolutely calibrated broadband radiometers and total solar irradiance and solar spectral irradiance radiometers	Level 1: Radiances	

Table 2. Recommended satellite data

Geostationary core constellation with a minimum of five satellites providing complete Earth coverage		
Type of satellite sensors	Products	Attributes
Hyperspectral Infrared Sounder	Level 1: Radiances	Full spectrum
Data from Low-Earth orbiting satellites		
Type of satellite sensors	Products	Attributes
Multiangle, multipolarization radiometers	Level 1: Radiances Level 2: Aerosol Optical Depth (AOD)	
Precipitation Radar	Level 1: Backscatter Level 2: Precipitation rate	
SAR imagers	Level 1: Backscatter Level 2: Sea ice, Surface Winds, Wave Spectra, Surface Soil Moisture	
Global Navigation Satellite System (GNSS) radio- occultation	Level 1: Bending angle Level 2: Refractivity	The goal of providing 20,000 occultations per day on a sustained basis.
Scatterometer	Level 1: Backscattering cross-sections	
High-resolution optical imagers	Level 1: Radiances	Resolution of 10-100 meters

Core data and other applications

- The 2023 WMO Core Satellite Data Workshop stressed the urgency of developing the additional proposals for core and recommended satellite data for Nowcasting and Early Warning systems, building on this work, and to continue with hydrology, climate and space weather applications.
- WMO Secretariat together with ET-SSU works for definitions for Core satellite data for nowcasting and hydrology with similar process like applied for global NWP core data.
- Core and recommended data updates for hydrology and nowcasting in Manual on WIGOS are following the occurrence of INFCOM meetings, next one taking place in Autumn 2026.