

Global ITU/WMO Seminar

Preparing for WRC-27:

Meteorological Priorities

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The Foundation of Environmental Safety

WIGOS Backbone: Our global networks are completely dependent on radio frequencies for data sensing and real-time dissemination.

ITU Resolution 673: Formally recognizes that Earth observation applications carry immense, non-negotiable societal and economic value.

Global Development Agendas: This data directly underpins the Paris Climate Agreement, the Sendai Framework, and the UN's Early Warnings for All initiative.

A Free Global Resource: Observations are performed for the collective international community and shared globally at no cost.

Meteorology & Spectrum: The Operational Challenge

Unalterable Physical Laws vs. Commercial Scaling

- **Fixed Physical Attributes:** Passive sensors must detect exact molecular resonance frequencies (water vapor, oxygen, trace gases) which cannot be shifted or re-allocated.
- **Commercial Expansion:** Rapid scaling of IMT-2020, 6G, satellite mega-constellations, and private wireless networks drives intense spectrum scarcity.

CRITICAL NOTE: Passive sensing bands rely entirely on fixed physical molecular resonance lines and cannot be physically relocated if compromised by interference.

Pristine Signal Requirements & Impact

- **Weak Natural Emissions:** Sensors cannot easily differentiate between exceptionally weak natural thermal microwave emissions and artificial, man-made noise.
- **Global Model Dependency:** Pristine radio conditions directly underpin the validity of Numerical Weather Prediction (NWP) models globally.
- **Data Degradation:** Compromises in backbone WMO Integrated Global Observing System (WIGOS) bands directly impact multi-hazard early alerts.

WMO Position and Preparation for WRC-27

Protecting Radio-Frequency Spectrum for Global Environmental Observations

Summary of the 14 WMO Agenda Items

Passive Remote Sensing Protection: Items 1.1, 1.3, 1.12, 1.13, 1.18, 1.19

Satellite Downlink & Uplink Infrastructure: Items 1.4, 1.7, 1.11, 1.14

Space Weather & Radar Services: Items 1.8, 1.17

Regulatory Oversight & Future Planning: Item 7, Item 10

Item 1.1 & 1.3 — Upper Microwave Sounder Protection

Agenda Item 1.1: ESIMs (Earth stations in motion) in the 47.2-50.2 GHz and 50.4-51.4 GHz bands.

Agenda Item 1.3: NGSO FSS Gateways in the 51.4-52.4 GHz band.

The Core Asset: The adjacent 50.2-50.4 GHz and 52.6-54.25 GHz bands are globally utilized for lower tropospheric air temperature sounding and precipitation tracking.

WMO Position: Do not oppose ESIMs/Gateways, provided adjacent-band passive sensors are fully protected. Demands revision of Resolution 750 (Rev. WRC-19) to enforce mandatory unwanted emission limits accounting for aggregate interference.

Item 1.4 & 1.11 — Space Infrastructure Protection

Agenda Item 1.4 (Region 3 FSS/BSS Downlinks in 17.3-17.8 GHz): No opposition, provided it protects the adjacent 17.2-17.3 GHz band used by planned space-borne synthetic aperture radars (EESS active).

Agenda Item 1.11 (Space-to-space links in 1518-1675 MHz & 2483.5-2500 MHz): Must ensure zero negative impact on the 1675-1710 MHz MetSat downlink band and the 1668.4-1700 MHz MetAids radiosonde operations.

Item 1.7 — Major Concerns for IMT Encroachment

The Threat: Broad IMT identification proposals in the 7125-8400 MHz range conflict directly with critical meteorological satellite infrastructure.

7450-7550 MHz & 7750-7900 MHz: Essential for GSO MetSat instrument data downlinks and NGSO MetSat low-latency global direct data broadcasts.

8025-8400 MHz: Core EESS communications infrastructure for real-time weather forecasting, flood alerts, and wildfire monitoring.

WMO Position: Opposes any IMT identification in these specific bands. Demands 'reverse studies' to determine separation distances for tracking/telecommand uplinks (7190-7250 MHz).

Item 1.8 — Radiolocation in Millimetric Waves (231.5-700 GHz)

The Trend: Proposed allocations for millimetric wave imaging systems (e.g., automotive radar, handheld mobile devices) in 231.5-700 GHz.

The Meteorological Risk: Frequencies above 230 GHz offer unique physical properties used to measure atmospheric cloud ice, snowfall, and water vapor profiles to improve forecasts.

WMO Position: Strictly opposes allocations in the 250-252 GHz band (RR No. 5.340 'all emissions prohibited') and overlaps with nadir/conical scanning EESS passive sensors in 296-356 GHz. Focus should be kept within 252-296 GHz and 356-439 GHz with strict unwanted emission limits.

Item 1.12 & 1.14 — Mobile-Satellite Service Sharing

Scope: Low data rate NGSO mobile systems (1.12) and additional MSS allocations (1.14) targeting bands around 1.4-2.1 GHz.

Critical Adjacencies: The 1400-1427 MHz band maps to passive soil moisture, vegetation, and sea-surface salinity tracking. The 2025-2110 MHz band manages critical satellite Telemetry, Tracking, and Command (TT&C) uplinks.

WMO Position: Requires mandatory unwanted emission limits under Resolution 750 to insulate the 1400-1427 MHz passive band. No allocations allowed to disrupt EESS/SOS satellite control links in the 2025-2110 MHz range.

Item 1.13 — Direct Satellite-to-Phone Connectivity

The Scope: Evaluating new MSS allocations across 694-2700 MHz for direct connectivity between space stations and standard consumer IMT smartphones.

Vulnerable Systems: EESS passive soil sensing (1400-1427 MHz), global MetSat downlinks (1675-1710 MHz), satellite command/control (2025-2110 MHz), and surface-based weather radar networks (2700-2900 MHz).

WMO Position: Not opposed to direct connectivity within existing mobile allocations, provided that strict adjacent-band guardrails protect all four vulnerable environmental observing systems from aggregate out-of-band interference.

Item 1.17 — Receive-Only Space Weather Sensors

Context: WRC-23 formally designated space weather sensors to the MetAids service as 'MetAids (space weather)'.

The Goal: Establish regulatory status and baseline protection criteria for receive-only space weather systems across 6 select bands (from 27.5 MHz up to 614 MHz).

The Value: Vital for monitoring solar activity (flares, high energetic particles) that disrupts infrastructure like aviation, telecom, power grids, and satellite operations.

WMO Position: Fully supports new primary allocations for receive-only sensors without constraining existing services. Endorses updates to RR Articles 1, 11, and Appendix 4 to record stations in the Master International Frequency Register.

Item 1.18 & 1.19 — Sea Surface & Atmospheric Sounding

Agenda Item 1.18 (Protection above 76 GHz): Guarding foundational window channels (86-92 GHz, 164-167 GHz, 200-209 GHz) vital for precipitation over land and Climate Data Records. Supports mandatory unwanted emission limits in Resolution 750 before widespread deployment of active services.

Agenda Item 1.19 (Allocations in 4.2-4.4 GHz & 8.4-8.5 GHz): Supports new primary allocations to EESS (passive) for Sea Surface Temperature (SST) tracking to provide long-term continuity due to the 6-7 GHz IMT interference threat. Demands limits to prohibit high-density mobile systems in the 8.4-8.5 GHz band.

Item 7 & Item 10 — Rules & WRC-31 Planning

Agenda Item 7 (Satellite Procedures): Monitors filings to protect MetSat and EESS. Opposes any proposals undermining the rule that active services cannot be authorized in RR No. 5.340 passive bands via RR No. 4.4.

WRC-31 Preliminary Agenda (Item 10):

- **AI 2.1 (275-325 GHz):** Not opposed if existing passive IDs (RR No. 5.565) are upgraded to primary allocations.
- **AI 2.6 (IMT above 100 GHz):** Concerned with passive system protection near strict No. 5.340 bands.
- **AI 2.10 (22.55-23.15 GHz):** Strongly supports new primary EESS uplink allocation to pair with existing downlinks for future TT&C capacity.

Technical Cross-Reference Matrix

Agenda Item	Target Spectrum	Affected WMO Infrastructure Element	Required WMO Safeguard
1.1 / 1.3	47.2 – 52.4 GHz	Temperature Sounding & Weather Forecast Models	Revised Resolution 750 Limits
1.4 / 1.7	4.4 / 7-8 / 17 GHz	Fleet Command, Telemetry Downlinks, Active SAR Radars	Strict Opposition to target IMT bands
1.8 / 1.18	76 to 700 GHz	Sub-millimetric Cloud Analysis & Moisture Tracks	Protection of exclusive 250 GHz passive band
1.11 / 1.12	1.4 / 1.5-1.6 GHz	Radiosonde Flights, Soil Moisture Tracker Networks	Zero signal bleed into weather balloon channels
1.13 / 1.14	694 MHz to 2.1 GHz	Severe Weather Doppler Radars & Satellite TT&C	Isolation from space-to-mobile transmission
1.17 / 1.19	HF Bands / 4 & 8 GHz	Space Weather Solar Scans & Sea Surface Temperature	New Primary Passive Allocations

Action Plan: Next Steps for National Administrations

ENGAGE

Coordinate directly with national telecom ministries to ensure weather radar and satellite needs are prioritized.

ALIGN

Actively participate in regional groups (CEPT, CITELE, ATU, ASMG, APT) to build unified consensus proposals.

UTILIZE

Leverage the technical guidance in the official joint WMO-ITU Handbook on Spectrum Use for Meteorology.

Thank you