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RADIO-FREQUENCY SPECTRUM MANAGEMENT ISSUES

WMO Preliminary Position on WRC-15 Agenda

(Submitted by the Secretariat on behalf of the Steering Group on Radio-Frequency Coordination)

Summary and Purpose of Document

The agenda of the next World Radiocommunication Conference to be held in 2015 (WRC-15) includes a number of agenda items of direct interest or concern for WMO Programmes, and in particular for space-based observation and communications.

The document provided in Appendix is the Preliminary Position of WMO on these agenda items, as adopted by the WMO Steering Group on Radio-frequency Coordination (SG-RFC).

ACTION PROPOSED

The Expert Team is invited to:

- take note of the WMO preliminary position on WRC-15 agenda items,
- comment as appropriate,
- seek the support of all agencies represented in ET-SAT on this position.

APPENDIX:

- WMO Preliminary Position on WRC-15 Agenda (SG-RFC/2013-1-30 -r1, 8/02/2013)

**WORLD WEATHER WATCH
COMMISSION FOR BASIC
SYSTEMS**



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(Approved for release)

WMO Preliminary Position on WRC-15 Agenda

1. INTRODUCTION

Timely warning of impending natural and environmental disasters, accurate climate prediction and detailed understanding of the status of global water resources: these are all critically important everyday issues for the global community. National Meteorological and Hydrological Services (NMHS) around the world are responsible for providing this information, which is required for the protection of the environment, economic development (transport, energy, agriculture,..) and the safety of life and property.

Radio-frequencies represent scarce and key resources used by National Meteorological and Hydrological Services to measure and collect the observation data upon which analyses and predictions, including warnings, are based or processed, and to disseminate this information to governments, policy makers, disaster management organisations, commercial interests and the general public.

Nowadays radio-based remote sensors (active and passive) are the main tools for environment and climate monitoring, disaster prediction, detection and mitigating negative effects of disasters. These sensors obtain environmental data by measuring level and parameters of natural and artificial radio waves that inherently contain information about the environment with which they have been in contact. Terrestrial and space-born remote sensing applications form the backbone of the WMO Integrated Global Observing System.

WMO information systems also make extensive use of radiocommunication systems and radio-frequency spectrum, and although they are more and more relying on commercially provided services such as communication satellites, meteorological related radiocommunication systems still form a core part of WMO's critical data collection and distribution systems (e.g. Earth-to-space and space-to-Earth transmissions). WMO Members in remote or isolated areas are most dependent on these special services and will benefit most from many of the new initiatives such as wireless broadband that are putting new stress on the demand for spectrum bandwidth.

The development of new, mass-market and added-value radio applications is putting increasing pressure on the frequency bands used for meteorological purposes. This presents the potential risk of limiting meteorological and other related applications in future.

On a more general basis, the utmost importance of radio-frequencies for all Earth Observation activities is also to be stressed, in particular with regard to the global warming and climate change activities.

This document reflects the preliminary position of the World Meteorological Organisation (WMO) on the agenda of the World Radiocommunication Conference 2015 (WRC-15) as given

in Resolution **807 (WRC-12)** “Agenda for the 2015 World Radiocommunication Conference”. This Agenda was approved by the ITU Council 2012 in the Council Resolution 1343.

2. GENERAL COMMENTS

The WMO Integrated Global Observing System (WIGOS) comprises components which make use of a wide number of different radio applications and services, some of which may be affected by WRC-15 decisions.

Space-borne sensing of the Earth’s surface and atmosphere has an essential and increasing importance in operational and research meteorology, in particular for mitigating the impact of weather and climate-related disasters, and in the scientific understanding, monitoring and prediction of climate change and its impacts.

The impressive progress made in the recent years in weather and climate analysis and forecasts, including warnings for dangerous weather phenomena (heavy rain, storms, cyclones) that affect all populations and economies, is to a great extent attributable to spaceborne observations and their assimilation in numerical models.

Space-borne passive sensing for meteorological applications is performed in bands allocated to the Earth exploration-satellite (passive) and meteorological satellite services. Passive sensing requires the measurement of naturally-occurring radiations, usually of very low power levels, which contain essential information on the physical process under investigation.

The relevant frequency bands are determined by fixed physical properties (molecular resonance) that cannot hence be changed or ignored, nor are these physical properties able to be duplicated in other bands. Therefore, these frequency bands are an important natural resource. Even low levels of interference received by a passive sensor may degrade its data. In addition, in most cases these sensors are not able to discriminate between natural and man-made radiations.

For passive sensing bands shared with active services, the situation is tending to be more and more critical with the increased density of terrestrial active devices and serious cases of interference already being reported.

In the more critical passive sensing frequency bands, RR No. **5.340** stating that “all emissions are prohibited” enables in principle passive services to deploy and operate their systems with the highest reliability. However this protection appears in practice insufficient with examples of unregulated and potentially mass-market short range devices allowed nationally to operate in these bands or unwanted emissions from not properly regulated adjacent bands.

It should be stressed that bands below 100 GHz are of particular importance, as they provide an “all-weather” capability since clouds are almost transparent at these frequencies.

Several geophysical parameters contribute, at varying levels, to natural emissions, which can be observed at a given frequency which presents unique properties. Therefore, measurements at several frequencies in the microwave spectrum must be made simultaneously in order to isolate and to retrieve each individual contribution, and to extract the parameters of interest from the given set of measurements.

As a consequence, interference that could impact a given “passive” frequency band could thus have an impact on the overall measurement of a given atmospheric component.

Each passive frequency band cannot hence be considered on its own but should be seen as a complementary component of a complete spaceborne passive sensing system. Current scientific

and meteorological satellite payloads are not dedicated to one given band but include many different instruments performing measurements in the entire set of passive bands.

It should also be noted that full global data coverage is of particular importance for most weather, water and climate applications and services.

Space-borne active sensing, performed in particular by altimeters, scatterometers, rain and cloud radars, provides meteorological and climatology activities with important information on the state of the ocean, ice and land surfaces and atmospheric phenomena.

In addition, **meteorological radars** and **wind-profiler radars** are important surface-based instruments in the meteorological observation processes. Radar data are input to nowcasting, and to the Numerical Weather Prediction models for short-term and medium-term forecasting. There are currently about one hundred wind-profiler radars and several hundreds of meteorological radars worldwide that perform precipitation and wind measurements and play a crucial role in the immediate meteorological and hydrological alert processes. Meteorological radar networks represent the last line of defence in a disaster warning strategy against loss of life and property in flash flood or severe storm events, such as in several recent dramatic cases.

Meteorological aids systems, mainly radiosondes, are the main source of atmospheric *in situ* measurements with high vertical resolution (temperature, relative humidity and wind speed) to provide real time vertical atmospheric profiles that are and will remain essential for operational meteorology, including weather analysis prediction and warnings, as well as for climate monitoring. In addition, these *in situ* measurements are essential for calibrating space-borne remote sensing, in particular passive.

Also of great importance is the availability of sufficient and well-protected **Earth exploration** and **meteorological-satellite** services radio-frequency spectrum for **telemetry/telecommand** as well as for **satellite downlink** of the collected data.

Finally, it should be noted that the **fixed-satellite service** systems, through commercial payloads in the **C-band** (3 400-4 200 MHz) and the **Ku Band** (10 700-11 700 MHz), are used globally to disseminate weather, water and climate related information, including disaster warnings to meteorological agencies and user communities. It has to be stressed that a large part of the population, in particular in developing countries, is heavily dependent on the use of **C-Band satellites** in areas where propagation conditions (e.g. heavy rain in tropical and equatorial zones) make the use of any other telecommunication support impractical.

The Fifteenth World Meteorological Congress (Geneva, May 2007), attended by 163 Member countries, confirmed serious concern at the continuous threat to radio frequency bands allocated for meteorological and related environmental systems and adopted the Resolution 4 (Cg-XV) – *Radio frequencies for meteorological and related environmental activities* – in which all WMO Member countries are urged to make all efforts to do their utmost to ensure the availability and protection of suitable radio frequency bands required for meteorological and related environmental operations and research.

The Sixteen World Meteorological Congress (Geneva, May 2011) “...agreed that the protection of frequencies used for meteorological purposes is of direct and vital interest to the international meteorological community and reiterated its full support for radio-frequency activities. It urged the pursuance of, in an organized manner, the continuous review of regulatory and technical matters related to radio-frequencies for operational and research meteorological and related environmental activities.”

The WMO Integrated Global Observing System (WIGOS) comprises components which make use of a wide number of different radio applications and services, some of which may be affected by WRC-15 decisions. The dependency of observing systems on radio-frequency management has long term ramifications on the sustainability and usability of essential climate variables and other weather, water and climate related observations that contribute to the Observations and Monitoring pillar of the Global Framework for Climate Services (GFCS) as identified at World Meteorological Congress XVI in 2011, and the Extraordinary World Meteorological Congress in 2012.

3. WMO PRELIMINARY POSITION ON WRC-15 AGENDA

Among WRC-15 Agenda items, ten items are related to frequency bands or issues of prime interest or concern for meteorology and the related fields.

There are also eight WRC-15 Agenda items that are currently not involving specific frequency bands used for meteorological purposes and the related fields but may potentially have an impact on WMO interests, either due to their wide open scope in terms of frequency ranges under study or in relation with a potential general interest.

The WRC-15 decisions on the following WRC-15 Agenda items may have positive or negative effect on development and operation of meteorological systems and applications:

- Agenda item 1.1:** additional spectrum allocations to the mobile service on a primary basis and identification of additional frequency bands for International Mobile Telecommunications (IMT) (see section 3.1)
- Agenda item 1.6:** consider possible additional primary allocations to the fixed-satellite service (FSS) of 250 MHz (in Regions 1 and 2) and 300 MHz (in Region 3) (see section 3.2)
- Agenda item 1.9.2:** consider the possibility of allocating the bands 7 375-7 750 MHz and 8 025-8 400 MHz to the maritime-mobile satellite service (see section 3.3)
- Agenda item 1.10:** consider spectrum requirements and possible additional spectrum allocations for the mobile-satellite service in the Earth-to-space and space-to-Earth directions, including the satellite component for broadband applications (see section 3.4)
- Agenda item 1.11:** consider a primary allocation for the Earth exploration-satellite service (Earth-to-space) in the 7-8 GHz range (see section 3.5)
- Agenda item 1.12:** consider an extension of the current worldwide allocation to the Earth exploration-satellite (active) service in the frequency band 9 300-9 900 MHz by up to 600 MHz within the frequency bands 8 700-9 300 MHz and/or 9 900-10 500 MHz (see section 3.6)
- Agenda item 1.17:** consider possible spectrum requirements and regulatory actions, including appropriate aeronautical allocations, to support wireless avionics intra-communications (WAIC) (see section 3.7)
- Agenda item 9.1.1:** consider and approve the Report of the Director on the ITU-R activities on protection of the systems operating in the mobile-satellite service in the band 406-406.1 MHz (see section 3.8)
- Agenda item 9.1.5:** consider and approve the Report of the Director on the ITU-R activities on technical and regulatory actions in order to support existing and

future operation of fixed-satellite service earth stations within the band 3 400-4 200 MHz, as an aid to the safe operation of aircraft and reliable distribution of meteorological information in some countries in Region 1 (see section 3.9)

Agenda item 10: recommend to the Council items for inclusion in the agenda for the next WRC, and to give its views on the preliminary agenda for the subsequent conference and on possible agenda items for future conferences (see section 3.10)

Other WRC-15 Agenda items that may potentially have an impact on WMO interests are the following (see section 3.11):

Agenda item 1.3: review and revise Resolution 646 (Rev.WRC-12) for broadband public protection and disaster relief (PPDR)

Agenda item 1.5: consider the use of frequency bands allocated to the fixed-satellite service for the control and non-payload communications of unmanned aircraft systems (UAS)

Agenda item 1.18: consider a primary allocation to the radiolocation service for automotive applications in the 77.5-78.0 GHz frequency band

Agenda item 7: consider possible changes, and other options, an advance publication, coordination, notification and recording procedures for frequency assignments pertaining to satellite networks

Agenda item 1.9.1: consider possible new allocations to the fixed-satellite service in the frequency bands 7 150-7 250 MHz (space-to-Earth) and 8 400-8 500 MHz (Earth-to-space)

Agenda item 9.1.2: consider and approve the Report of the Director on the ITU-R activities on studies on possible reduction of the coordination arc and technical criteria used in application of No. 9.41 in respect of coordination under No. 9.7

Agenda item 9.1.6: studies towards review of the definitions of *fixed service*, *fixed station* and *mobile station*

Agenda item 9.1.8: consider and approve the Report of the Director on the ITU-R activities on regulatory aspects for nano- and picosatellites.

3.1 Agenda item 1.1: to consider additional spectrum allocations to the mobile service on a primary basis and identification of additional frequency bands for International Mobile Telecommunications (IMT) and related regulatory provisions, to facilitate the development of terrestrial mobile broadband applications, in accordance with Resolution 233 (WRC-12).

The Agenda item 1.1 does not specify frequency bands for studies. However, at this stage, studies are concentrating on bands between 470 MHz and 6 GHz, in which the following frequency bands are of particular interest to WMO:

- 1 400-1 427 MHz¹ used for EESS (passive) sensing. This band is used by SMOS and AQUARIUS and it would have to be protected from unwanted emissions from possible use

¹ According to RR No. 5.340 all emissions are prohibited in the frequency band 1 400-1 427 MHz.

by mobile service systems operating in both adjacent bands (1 375-1 400 and 1 427-1 452 MHz);

- 1 675-1 710 MHz used by all meteorological-satellite systems with Earth stations operated by almost all NMHS² and many other users. This band is essential for providing operational and time-critical meteorological information to the users around the world;
- 2 025–2 110 MHz and 2 200–2 290 MHz used by systems operating in the space research, the Earth exploration-satellite and the space operation services. These bands are essential to all satellite operators and in particular Earth exploration and meteorological satellites operators. Previous studies showed that the satellite operations are not compatible with high density mobile applications (as confirmed in RR No. **5.391** and Recommendation ITU-R SA.1154);
- 2 700-2 900 MHz used for meteorological radars. This band was already considered for IMT identification (i.e. use by mobile service systems) at WRC-2000 and WRC-07 and was duly rejected. In particular Report ITU-R M.2112 concludes on the non-compatibility between IMT and radars in the 2 700-2 900 MHz frequency band;
- 3 400-4 200 MHz frequency band is used by the meteorological community to distribute meteorological data through commercial satellite systems;
- 5 350-5 470 MHz band used by EESS (active) applications, such as ASCAT on Metop, Poseidon on Jason and Radarsat. It is also used by ground-based meteorological radars in some countries.

WMO Position:

WMO opposes allocation/identification for terrestrial mobile broadband applications including IMT of the frequency bands 1 675-1 710 MHz, 2 025-2 110 MHz, 2 200-2 290 MHz, 2 700-2 900 MHz and 5 350-5 470 MHz.

WMO opposes any allocation in the 1 400-1 427 MHz frequency band, covered by RR No 5.340, and also requires that protection of sensors in this band be ensured from unwanted emissions of terrestrial mobile broadband applications including IMT if proposed in the adjacent bands.

In addition, WMO states its requirement to maintain relevant fixed satellite service capacity and availability in the 3 400-4 200 MHz frequency band.

3.2 Agenda Item 1.6: To consider possible additional primary allocations:

3.2.1 Agenda item 1.6.1: to the fixed-satellite service (Earth-to-space and space-to-Earth) of 250 MHz in the range between 10 GHz and 17 GHz in Region 1 and review the regulatory provisions on the current allocations to the fixed-satellite service within each range, taking into account the results of ITU-R studies, in accordance with Resolution 151 (WRC-12).

3.2.2 Agenda item 1.6.2: to the fixed-satellite service (Earth-to-space) of 250 MHz in Region 2 and 300 MHz in Region 3 within the range 13-17 GHz and review the regulatory provisions on the current allocations to the fixed-satellite service within each range, taking into account the results of ITU-R studies, in accordance with Resolution 152 (WRC-12).

For WRC-15 Agenda items 1.6.1 and 1.6.2 at this stage of studies potentially affected frequency bands particular of WMO interest are:

² NMHS – National Meteorological and Hydrological Services.

- 10.6-10.7 GHz EESS (passive);
- 13.25-13.75 GHz EESS (active).

The frequency band 10.6-10.7 GHz is the primary passive satellite sensing band for measurement of rain, snow, ice, sea state, ocean wind, ocean surface temperature and soil moisture. The frequency band 13.25-13.75 GHz is intensively used for active remote sensing using altimeters, scatterometers and precipitation radars.

As far as the frequency band 13.25-13.75 GHz is concerned, a similar situation occurred during WARC-92 where the band 13.75-14 GHz, allocated to the EESS (active), was re-allocated to FSS (Earth-to-space) even though it was recognized that these services are not compatible. Indeed, sharing between EESS (active) and FSS (Earth-to-space) around 13.5 GHz is known as not being practicable. Any new allocation to FSS within the 13.25-13.75 GHz band would hence lead to a situation that further parts of the current EESS (active) primary allocation will become unusable in some or all Regions.

WMO Position on WRC-15 Agenda item 1.6 (including both 1.6.1 and 1.6.2):

WMO opposes a new allocation to FSS in the 13.25-13.75 GHz frequency band.

WMO also opposes any allocation in the 10.6-10.7 GHz frequency band. WMO requires that protection of sensors in the band 10.6-10.7 GHz be ensured from unwanted emissions of FSS systems.

3.3 Agenda item 1.9: to consider, in accordance with Resolution 758 (WRC-12):

3.3.1 Agenda item 1.9.2: the possibility of allocating the bands 7 375-7 750 MHz and 8 025-8 400 MHz to the maritime-mobile satellite service and additional regulatory measures, depending on the results of appropriate studies.

Resolution **758 (WRC-12)** calls for technical and regulatory studies on the possible new allocations to the maritime mobile-satellite service (MMSS) in the frequency bands 7 375-7 750 MHz (space-to-Earth) and 8 025-8400 MHz (Earth-to-space) while ensuring compatibility with existing services.

The potentially affected frequency bands of WMO interest are:

- 7 450-7 550 MHz allocated to the meteorological-satellite service (space-to-Earth) and limited to geostationary-satellite systems;
- 8 025-8 400 MHz allocated to the Earth exploration-satellite service (space-to-Earth).

WMO Position:

WMO considers that no new allocations to the MMSS should be made in these frequency bands unless acceptable sharing criteria with EESS and MetSat are developed. Particular concern is noted with regard to potential interference to EESS (space-to-Earth) operations in 8 025-8 400 MHz at high latitudes from ships operating in proximity.

3.4 Agenda item 1.10: to consider spectrum requirements and possible additional spectrum allocations for the mobile-satellite service in the Earth-to-space and space-to-Earth directions, including the satellite component for broadband applications, including International Mobile Telecommunications (IMT), within

the frequency range from 22 GHz to 26 GHz, in accordance with Resolution 234 (WRC-12).

Resolution **234 (WRC-12)** calls for sharing and compatibility studies towards additional allocations to the mobile-satellite service in the Earth-to-space and space-to-Earth directions, within portions of the bands between 22 GHz and 26 GHz, while ensuring protection of existing services within these bands as well as taking into account No. **5.340** and No. **5.149**.

Resolution **234 (WRC-12)** also recognizes that unwanted emissions in the band 23.6-24 GHz will need to be limited to ensure protection of systems of the EESS (passive), SRS (passive) and radio astronomy services.

The main frequency bands at risk for WMO are:

- 1) The frequency band 23.6-24 GHz allocated to EESS (passive) (to be protected against unwanted emissions taking into account interference apportionment and the levels contained in Resolution **750 (Rev. WRC-12)**);
- 2) The first 500 MHz of the EESS/SRS space-to-Earth allocations in the frequency band 25.5 – 27.0 GHz.

WMO Position:

WMO opposes new MSS allocations in the 23.6-24 GHz and 25.5–26.0 GHz frequency ranges. Allocations to MSS in other portions of the 22-26 GHz frequency range will have to be associated with the adequate protection of EESS applications from emissions of MSS systems.

3.5 Agenda item 1.11: to consider a primary allocation for the Earth exploration-satellite service (Earth-to-space) in the 7-8 GHz range, in accordance with Resolution 650 (WRC-12).

Resolution **650 (WRC-12)** calls for study of the spectrum requirements and compatibility studies in the 7-8 GHz frequency range for EESS (Earth-to-space) telecommand operations in order to complement telemetry operations of EESS (space-to-Earth) in the 8 025-8 400 MHz frequency band. Resolution **650 (WRC-12)** indicates that priority is given to the frequency band 7 145-7 235 MHz and then within other portions of the 7-8 GHz range only if the band 7 145-7 235 MHz is found not to be suitable.

This new allocation would allow for uplinks and downlinks on the same transponder, increasing efficiency and reducing complexity of Earth-observation satellites.

It should be noted that under Agenda Item 1.9.1 a possible new allocation to the FSS in the frequency band 7 150-7 250 MHz (space-to-Earth) is also being considered and it could have an impact on this Agenda item.

WMO Position:

WMO supports a new EESS (Earth-to-space) allocation in the 7-8 GHz frequency band, provided that compatibility with meteorological-satellite systems operating in the bands 7 450-7 550 MHz and 7 750-7 900 MHz is ensured.

3.6 Agenda item 1.12: to consider an extension of the current worldwide allocation to the Earth exploration-satellite (active) service in the frequency band 9 300-

9 900 MHz by up to 600 MHz within the frequency bands 8 700-9 300 MHz and/or 9 900-10 500 MHz, in accordance with Resolution 651 (WRC-12).

Resolution **651 (WRC-12)** invites *ITU-R* to conduct and complete, in time for WRC-15, compatibility studies addressing:

- EESS (active) and existing services in the frequency bands 8 700-9 300 MHz and 9 900-10 500 MHz in order to ensure the protection of the existing services, taking into account the constraints as per No. **5.476A**;
- unwanted emissions from stations operating in the EESS (active) within the frequency band 8 700-9 300 MHz into stations of the space research service operating in the frequency band 8 400-8 500 MHz;
- unwanted emissions from stations operating in the EESS (active) within the frequency band 9 900-10 500 MHz into stations of the radio astronomy service, space research service (passive) and EESS (passive) operating in the frequency band 10.6-10.7 GHz.

WMO Position:

WMO urges that a new EESS (Earth-to-space) allocation in the 9 GHz frequency range shall ensure adequate protection of meteorological applications, in particular, meteorological radars in the frequency band 9 300-9 500 MHz and passive sensors in the frequency band 10.6-10.7 GHz.

3.7 Agenda item 1.17: to consider possible spectrum requirements and regulatory actions, including appropriate aeronautical allocations, to support wireless avionics intra-communications (WAIC), in accordance with Resolution 423 (WRC-12).

Resolution **423 (WRC-12)** invites *ITU-R* to conduct the necessary studies to determine the spectrum requirements needed to support WAIC systems and also conduct sharing and compatibility studies to determine appropriate frequency bands and regulatory actions. WRC-12 requested to consider frequency bands within existing worldwide aeronautical mobile service, aeronautical mobile (R) service and aeronautical radionavigation service allocations and additional frequency bands above 15.7 GHz for aeronautical services if spectrum requirements cannot be met in already allocated frequency bands.

Potentially affected frequency bands of WMO interest below 15.7 GHz are:

- the frequency band 2 700-2 900 MHz allocated to the radiolocation service on a secondary basis and employed by ground-based S-band weather radars;
- the frequency band 5 350-5 460 MHz allocated to the Earth exploration-satellite (active) service and to the radiolocation service (employed by ground-based meteorological radars in some countries);
- the frequency band 13.25-13.4 GHz EESS (active) - subject to RR No. **5.498A**.

The aeronautical industry initially considered the 5 GHz RLAN bands for such applications. Although it seems that such band is not anymore considered, a particular survey will be required, noting that recent activities in Europe shown that RLAN on-board aircraft are not compatible with meteorological radars (ECC Report 140). Finally, some information has been recently received about a possible consideration of the 2 700-2 900 MHz and 5 350-5 470 MHz frequency bands for WAIC systems/applications.

WMO Position:

WMO opposes to the use of the 2 700-2 900 MHz and 5 350-5 460 MHz frequency bands for WAIC based on the previous studies in the frequency band 5 600-5 650 MHz, which concluded that mobile applications on board aircraft are not compatible with meteorological radars.

For other frequency bands considered for WAIC (e.g. the frequency band 13.25-13.4 GHz or frequency bands above 15.7 GHz), compatibility with meteorological and Earth observation applications should be assessed and the adequate protection should be ensured.

3.8 Agenda item 9.1.1: to consider and approve the Report of the Director of the Radiocommunication Bureau, in accordance with Article 7 of the Convention: on the activities of the Radiocommunication Sector since WRC-12:

Protection of the systems operating in the mobile-satellite service in the band 406-406.1 MHz (Resolution 205 (Rev.WRC-12)).

The revised Resolution **205 (Rev. WRC-12)** resolves to conduct, and complete in time for WRC-15, the appropriate regulatory, technical and operational studies with a view to ensuring the adequate protection of MSS systems in the frequency band 406-406.1 MHz from any emissions that could cause harmful interference (see RR No. **5.267**).

It is known that current noise increase events of a number of Cospas-Sarsat search and rescue instruments (mainly over Europe and Asia) are due to emissions of services operated in adjacent bands and in particular the mobile service operated in the 380-400 MHz and 406.1-420 MHz frequency bands.

It is likely that meteorological satellite systems uplinks and meteorological aids systems (radiosondes) operating in the vicinity of the 406 MHz frequency band have no negative effect on Cospas-Sarsat receivers.

WMO Position:

WMO supports studies and regulatory measures towards ensuring the adequate protection to Cospas-Sarsat receivers against emissions from adjacent bands, noting that, to a large extent, those receivers are implemented on meteorological satellites.

3.9 Agenda item 9.1.5:

Consideration of technical and regulatory actions in order to support existing and future operation of fixed-satellite service earth stations within the band 3 400-4 200 MHz, as an aid to the safe operation of aircraft and reliable distribution of meteorological information in some countries in Region 1 (Resolution 154 (WRC-12)).

Resolution **154 (WRC-12)** calls to study possible technical and regulatory measures in some countries in Region 1 to support the existing and future FSS earth stations in the 3 400-4 200 MHz band used for satellite communications related to safe operation of aircraft and reliable distribution of meteorological information.

Ensuring the availability of the 3 400-4 200 MHz frequency band for the distribution of meteorological data via satellites is an important issue for the whole meteorological community and should be followed and supported in the framework of WMO.

WMO Position:

WMO supports technical and regulatory actions to protect the FSS operations in the band 3 400-4 200 MHz for the dissemination of meteorological data in Region 1.

In addition, WMO states its requirement to maintain relevant fixed satellite service capacity and availability in the 3 400-4 200 MHz frequency band.

3.10 Agenda item 10: to recommend to the Council items for inclusion in the agenda for the next WRC, and to give its views on the preliminary agenda for the subsequent conference and on possible agenda items for future conferences, in accordance with Article 7 of the Convention, (Resolution 808 (WRC-12)).

WMO will provide possible Agenda items, as appropriate, and its position on other proposals in time for WRC-15.

3.11 Other WRC-15 Agenda items that may have an impact on WMO interests.

Other WRC-15 Agenda items that may potentially have an impact on WMO interests are listed below. WMO will monitor the development under these Agenda items and react accordingly in order to protect meteorological interests.

Agenda item 1.3: review and revise Resolution 646 (Rev.WRC-12) for broadband public protection and disaster relief (PPDR)

Agenda item 1.5: consider the use of frequency bands allocated to the fixed-satellite service for the control and non-payload communications of unmanned aircraft systems (UAS)

WMO is concerned with the frequency band 8 025-8 400 MHz allocated on a primary basis to EESS (space-to-Earth) and to FSS (Earth-to-space) and will object to the use of the 8 GHz FSS allocation for the CNPC links for the operation of UAS. WMO also considers that the protection of existing allocations to the Earth exploration-satellite service and other services employed by meteorological applications shall be ensured if WRC-15 decides on the usage of FSS for the CNPC links for the operation of UAS.

Agenda item 1.9.1: consider possible new allocations to the fixed-satellite service in the frequency bands 7 150-7 250 MHz (space-to-Earth) and 8 400-8 500 MHz (Earth-to-space)

WMO considers that studies under WRC-15 Agenda item 1.9.1 should not have negative effect on a new EESS (Earth-to-space) allocation in 7-8 GHz frequency band under Agenda item 1.11.

Agenda item 1.18: consider a primary allocation to the radiolocation service for automotive applications in the 77.5-78.0 GHz frequency band

WMO supports a primary allocation to the radiolocation service in the 77.5-78 GHz frequency band under the assumption that this new allocation to the radiolocation service will facilitate

moving automotive applications out of the 24 GHz “passive” frequency band currently used by automotive radars.

Agenda item 7: consider possible changes, and other options, an advance publication, coordination, notification and recording procedures for frequency assignments pertaining to satellite networks

This standing agenda item to the WRCs deals with any possible changes to the Radio Regulations affecting the advance publication, coordination, notification and recording of satellite networks. WMO will support changes to the Radio Regulations that would improve the advance publication, coordination, notification and recording procedures for satellite networks.

Agenda item 9.1.2: consider and approve the Report of the Director on the ITU-R activities on studies on possible reduction of the coordination arc and technical criteria used in application of No. 9.41 in respect of coordination under No. 9.7

WMO supports studies on possible reduction of the coordination arc and technical criteria used in application of RR No. 9.41 in respect of coordination under RR No. 9.7 until they provide adequate protection and reduce unjustified restrictions for coordination of meteorological and Earth observation-satellite systems.

Agenda item 9.1.6: studies towards review of the definitions of *fixed service*, *fixed station* and *mobile station*

WMO considers that there should be a clear distinction in definitions of the fixed service and the mobile service, the fixed station and the mobile station in order to maintain availability and the relevant protection of meteorological and other relevant applications.

Agenda item 9.1.8: consider and approve the Report of the Director on the ITU-R activities on regulatory aspects for nano- and picosatellites
