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| World Meteorological OrganizationCOMMISSION FOR BASIC SYSTEMSSTEERING GROUP ON RADIO FREQUENCY COORDINATIONSG-RFC-2019Toulouse , 05-07 March 2019 | **Final Report**  |
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# FINAL REPORT OF THE Steering Group on Radio Frequency Coordination, 05-07 March 2019



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**Regulation 43**

Recommendations of working groups shall have no status within the Organization until they have been approved by the responsible constituent body. In the case of joint working groups the recommendations must be concurred with by the presidents of the constituent bodies concerned before being submitted to the designated constituent body.

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# FINAL REPORT OF THE STEERING GROUP ON RADIO FREQUENCY COORDINATION, 05-07 Marcgh 2019

## Annexes

[Annex 1: Agenda](#_Annex_1:_Agenda)

[Annex 2: Workplan](#_ANNEX2:_WORKPLAN)

[Annex 3: Participants](#_Annex_3:_Participants)

# ORGANIZATION OF THE MEETING

1. SG-RFC-2019 was held at the Meteo France Centre International de Conférences in Toulouse by the kind invitation of France. It ran from 05 to 07 March 2019 and included a visit to Meteo France Operational and Observational Facilities.

## Opening of the meeting

1. The meeting was opened at 0930 by Mr Allaix (Chair of SG-RFC). He thanked participants for attending and emphasized that the team needed to remain focussed on preparing the final WMO position paper for WRC-19 following on from the CPM which had just concluded in Geneva.
2. Mr Bryan Hodge (WMO) welcomed participants on behalf of the Secretary-General and noted the importance of the meeting post the CPM and upcoming World Radiocommunication Conference 2019 (WRC-19) so that WMO Programmes could continue to deliver their services in the future.
3. The chair, led a tour de table to allow participants to introduce themselves. He further noted that due to the full participant list and remote participation was not offered required for this meeting or requested.

## Approval of the agenda

1. Participants agreed the agenda in [Annexe](#_Annex_1:_Agenda) 1.
2. The Chair highlighted that the primary focus of this meeting would be Agenda Item 3, WMO/SG-RFC preparation for the WRC-19 and the updating of the supporting position paper post CPM-2 in February. The majority of time in this meeting would be assigned to this task.
3. The list of participants in the meeting is in [Annex 3](#_Annex_3:_Participants) .

## Working arrangements

1. Participants agreed the working arrangements for the meeting in [Annex 2](#_ANNEX2:_WORKPLAN)

# Review of previous activities

## Report on progress of WMO activities (Including WMO/ITU workshop, Guide, EC-70; update on RA II and RA VI sessions.)

1. Covered under [Agenda item 5](#_Review_of_EC-70)

## Organization of the Steering Group on Radio Frequency Coordination

1. The nominated focal points for specific activities can be found at [Annex 5](#_Annex_5:_Responsible) and focal points for other organisations can be found at [Annexe 6](#_Annex_6:_SG-RFC)  and remain unchanged from the 2018 allocations.

## Coordination with other organizations

### SG-RFC cooperation with the Group on Earth Observations

1. Based on all the potential impacts on Earth observation systems, in particular in the framework of WRC-19, the Participants discussed the linkages to GEO need to be strengthened.

### SG-RFC activities in the International Telecommunication Union (ITU)

1. Participants discussed the CITEL report as introduced by Mr David Franc SG-RFC co-ordinator with CGMS.
2. Participants discussed the preliminary views of APT as introduced by Phillipe Tristant who attended the recent APT WRC preparations meeting in January Korea on WRC-19 agenda items.

### SG-RFC coordination with the Space Frequency Coordination Group

1. See item 4.5 and 4,6.

### SG-RFC relations with the Commission for Instruments and Methods for Observations (CIMO)

1. Since last SG-RFC meeting, no specific relation with CIMO was undertaken.

# WMO/SG-RFC preparation for the World Radiocommunication Conference 2019 (WRC-2019)

## Preparation of the WMO preliminary position on WRC-19

1. This agenda item formed the primary focus of the meeting with all the associated presentations used as inputs to a final position version. The pre CBS draft was used to revise all agenda items in significant detail and based on the outcomes of the CBS process, further group discussion and edits, the final position statement was reached [Docs 06](https://elioscloud.wmo.int/share/page/site/sg-rfc/document-details?nodeRef=workspace://SpacesStore/6824de36-47b6-46ef-92c5-5c3bba72d1bf). (Restricted ).
2. The high level summary, changes and amendments between the SG-RFC 2018 position (the position and reference entering CPM 19-2) and reviewed after SG-RFC 2019 and are in full detail in [Docs 06](https://elioscloud.wmo.int/share/page/site/sg-rfc/document-details?nodeRef=workspace://SpacesStore/6824de36-47b6-46ef-92c5-5c3bba72d1bf) and summarised as follows:
3. **Introduction** updated to include the 17 Sustainable Development Goals for readers who may not have detailed knowledge on the global relevance of the WMO spectrum allocations.
4. **WMO preliminary position on WRC-19 Agenda** amended to include additional item on satellite regulatory procedures and delete references to additional items no longer require.
5. **Agenda item 1.1 : Amateur service in the 50-54 MHz band**, language tightened and clarified WMO position in relation to WMO opposition in the primary allocation if no specific provisions are made for protection of wind profiler radars.
6. **Agenda item 1.2 : Satellite hard limits at 400 MHz**, notes added that WMO recognize that the WMO primary focus is on 401 to 403Mhz. Additional text added to supporting text addressed proposed waiver periods for EIRP that could render the spectrum unusable and final position statement updated.
7. **Agenda item 1.3 : Meteorological Satellite (MetSat) and Earth Exploration Satellite Service (EESS) at 460-470 MHz** , text added to highlight the essential nature of the downlink components that need protection, and addition clarifications in relation to the formulas (but not the actual formulas ). The final paragraph of the position text was modified to clarify support for method C of the CPM report and highlight concerns about *Resolves 5* of the draft resolution and recommends the deletion of *Resolves 5*.
8. **Agenda item 1.6 : Non Geostationary Satellite Orbit (GSO) of the Fixed Satellite Service (FSS) at 37.5-51.4 GHz**, Considerable text added to highlighting that the existing protection limits under Resolution 750 are not sufficient to protect WMO interests and this position is supported by ITU studies. The position statement was modified to reflect support for a revision of Resolution 750 and a suggested inclusions and deletions for clarity and development of solutions.
9. **Agenda item 1.7 : Non GSO satellites with short duration missions**, numerous editorial changes made to support and tighten the position and definition of radiosondes or metaids. Specifically reference was made to new studies that support the current allocation in this band for SOS services would not be appropriate for non GSO short term mission requirements. The position text was modified to summarize the included support text.
10. **Agenda item 1.11 : Frequency bands harmonization to support railway radiocommunication systems (RRST)**, this agenda item was not considered as prime interest for WMO in a first step but due to the output of CPM19-2 which proposed to re-inserte the radiosondes frequency band, SG-RFC agreed to add this agenda item in the prime interest list for WMO. Narrative was added highlighting and strengthening the use of RadioSonde in this band and clear opposition in the position to the use of 400.15-406 Mhz for RRST. As this is a new item the full position formulated is as follows :

*WMO emphasises that the frequency band 400.15 – 406 MHz is the key band for global radiosonde and DCS operations. WMO is strongly opposed to the consideration of this frequency band under this agenda item (i.e. Method B).*

*WMO will not oppose the consideration of the 460-470 MHz frequency band as long as no additional constraints are added to the use of MetSat service and EESS in this frequency band.*

1. **Agenda item 1.13 : International Mobile Telecommunication 2020 (IMT2020),** this position was extensively reviewed as it has significant implications across numerous use spectrum cases for the WMO partners and members. The language was changed to present tense where applicable, and highlights that, based on all compatibility studies in numerous bands, current unwanted emission specifications for IMT-2020 are largely insufficient to ensure the protection of EESS(passive) operated in adjacent band(s). It strengthens the WMO position that reduction of unwanted IMT2020 adjacent band emissions is needed to ensure protection for EESS and highlights the need to protect current and future receiving earth stations. The position statement was extensively re worked to address and strengthen the position in *each of the bands* in question referencing the post CPM options and protection methods.
2. **Agenda item 1.14 : High Altitude Platforms (HAPS)**, the text was modified to suggest more studies in several of the bands would be appropriate and notes the more severe impact that HAPS may have on EESS (passive) . The position statement was updated to reflect the WMO position for the post CPM methods and requests more solution development under this agenda item.
3. **Agenda item 1.15 : Fixed Service (FS) and Land Mobile Service (LMS) above 275 GHz**, the text was tightened to assert sharing FS services in the EESS (passive) bands and that the amount of spectrum identified in this item, exceeds the allocation and may overlap and cause issues. The position text was reworked to support these points with reference to post CPM methods.
4. **Agenda item 1.16 : Radio Local Area Network (RLAN) 5 GHz**, references completed ITU-R studies in the supporting text that demonstrate that compatibility is not possible. Also deletes references to speculation about further studies. Position text remains the same and does not support relaxation of position.
5. **Agenda item 7 : Satellite regulatory procedures**, the item was added as a new WMO agenda item. This position came out of concerns that changes may be made to advance publications and notifications in radio regulations that may adversely affect MetSat and ESS systems . As this is a new item the full position formulated is as follows :

*WMO has concerns regarding issues A and I of this agenda item. Regarding issue A, the frequency bands used by EESS, Metsat and SOS should not be subject to any milestone-based approach, as this would not be a justified regulatory mechanism for MetSat and EESS satellite systems, which usually consist of a very limited number of satellites. Such a milestone-based approach, however, is intended to monitor the deployment of non-GSO systems composed of multiple, multi-satellite constellations, in particular frequency bands.*

*The regulations regarding the bringing into use shall not put undue constraints on satellite networks filed for using frequency bands allocated to EESS, Metsat and SOS.*

*Regarding issue I, regulation for short duration satellite should not adversely affect filings for other satellite networks.*

1. **Agenda item 9.1.5 : RLAN 5 GHz and reference to radar ITU-R recommendations**, no changes made to the supporting text but the position added an additional paragraph supporting the use of approaches A or B following the CPM2-19 deliberations.
2. **Agenda item 9.1.9 : FSS at 51.4-52.4 GH**z, no additional changes made to supporting text but strengthened the position statement with references to GSO passive sensors and requests the development of a solution for the continued operations of ground based radiometers in the 50.4-51.4 GHz frequency band.
3. **Agenda item 10 : Agenda for next WRCs**, final determination to retain the two items on the WRC-23 Preliminary Agenda that are of prime interest to WMO (space weather sensors and spaceborne radar sounders around 45 MHz) was approved.

Due to documents presented at last CPM2-19 meeting presenting some proposals for possible WRC-23 agenda items which would be of concern for the meteorological community in particular in EESS(passive), MetSat and Metaids frequency bands, WMO position for this agenda item was reviewed as follows :

*WMO supports retention of both of the preliminary agenda items on the WRC-23 Agenda, related to EESS (active) around 45 MHz (AI 2.2) and to space weather sensors (AI 2.3).*

*In addition, WMO has concerns about two proposals made in document CPM19-2/7 related to the FSS in the 17.7-51.4 GHz frequency range. WMO does not support these two proposed agenda items, unless corrections presented in document CPM19-2/178 are captured to ensure that the necessary protection of EESS (passive) is duly considered.*

*Finally, WMO has also concerns about the proposal for possible MSS (s-to-s) allocations in the 1518-1675 MHz range made in document CPM19-2/154 and that could only be supported if the due protection of the MetAids and Metsat services in the 1668-1710 MHz range is specifically addressed.*

1. **Other WRC-19 agenda items that may have an impact on WMO interest section:** The added value of this section was raised. After some discussions it was decided to delete this section. These agenda items will in any case be monitored during WRC-19.

**D19/1**  Delete the section on Other WRC-19 agenda items in the position paper.

## Working arrangements for WRC-19

1. The Chair noted that the resources required to cover all the WMO related sessions in WRC-19 would be challenging and invited SG-RFC members to pursue participation and attended through either their WMO member agency or National regulator as part of a delegation. Further discussion will be had with the WMO Secretariat on WRC-19 resourcing.

**A19/1.**  Chair to discuss resourcing to attend WRC 19 and WMO representation

# Spectrum issues related to meteorological and Earth exploration applications/systems

## Applications in the meteorological aids service

1. The Radiosonde band allocation range 400.15-406 MHz, is the focus of Agenda item 1.7 in relation to non GSO satellite with short term missions. The meeting noted that some members had already, on a national basis, revised spectrum usage in this band but it still remains a global issue. It was pointed out that many WMO members have not registered their usage requirements in this band via their national regulator as an international requirement.
2. Where members are adjacent, lack of registration is masking the visibility and need for the continued use of this full allocation. Several members of the group asked that given the introduction of digital sonde transmission technology if the entire allocation (derived from analogue techniques) still required? Whilst members were still using analogue sondes relatively large allowance were still required for drifts of upto 100 KHz.

**A19/2.**  Members need to register radiosonde usage as international through their regulators if required, for ITU visibility and protection, Secretariat to communicate to members

## Applications in the meteorologicals satellite service

1. Mr Marcus Dreis gave a verbal presentation that no particular *additional* issues existed that were not covered in extensive detail within the WMO WRC-19 position and response paper.

## Space-borne remote sensing applications

1. Mr David Franc presented the report of EESS active ([Docs 05](http://wiswiki.wmo.int/tiki-download_file.php?fileId=5277)). WMO interest include AI 1.11, AI 1.16, and AI 10 and include the work of Working Group 7C. This report specifically references progress and positions on the following items.
2. **WRC-19 agenda item 1.11** : Sharing compatibility studies for railway radio communication systems between train and trackside (RSTT) within existing mobile service allocations in the 92-94 GHz, 94.1 100 GHz and 102-109.5 GHz band that could potentially affect cloud profile radar (CPR).
3. **WRC-19 agenda item 1.16**: The 5 250-5 570 MHz portion of the band is allocated worldwide on a primary basis to the EESS (active) and SRS (active) services. Currently, the 5 350-5 470 MHz portion of that frequency range does not have an allocation to the mobile service and is being considered but there is unanimous view that no mitigation techniques have been found for the protection of EESS.
4. **WRC-19 Agenda Item 10**: addresses WRC-23 preliminary agenda item.
	1. 2.2 to consider the results of studies on spectrum needs for a possible new allocation to the Earth exploration-satellite (active) service for spaceborne radar sounders within the range of frequencies around 45 MHz and possible implications to a range of services.
	2. 2.3 : is to consider regulatory provisions necessary to provide protection to space weather sensors operating in the appropriately designated radio service that is to be determined during ITU-R studies.
5. These items form the basis for the suggested new work for ITU-R WP 7C which will be meeting in May 2019 and are discussed in detail in [Docs 05](http://wiswiki.wmo.int/tiki-download_file.php?fileId=5277). Item 6. In addition, other sensing issues raised the at the Space Frequency Coordination Group (SFCG) meeting held in Moscow, Russia, 22-30 August 2018 can be viewed at [Docs 05](http://wiswiki.wmo.int/tiki-download_file.php?fileId=5277). Item 7.

## Issues related to weather radars and wind-profiler

1. Mr Mike Banks presented [Docs 10](https://wiswiki.wmo.int/tiki-index.php?page=ET-CTS2019http://wiswiki.wmo.int/tiki-download_file.php?fileId=5269) an update to issues facing the Weather Radar and profilers with a particular focus on C band Radar interferences. The issue been highly problematic with many members due to unlicensed and non-compliant RLAN/WIFI devices causing significant degradation and interference to weather watch radars. This is further complicated by licencing agencies taking different approaches to national regulations. UK Met Office have fitted receiver filters to many of its Radars to ensure that the actual interference being experienced can be assured to be in band and argued effectively for protection. All of their 15 C band Radars are experiencing interference and degradation with many cases being resolved but it remains a constant issue due to sporadic interference.
2. UK Met Office also decided in 2018 that due to the aging asset profile, they would not renew their Boundary layer wind profilers and are looking to gift the spares to the European Community. Wind data will now be sourced via ADSB mode S systems in the UK.
3. Mr Bryan Hodge also presented a live composite of the Australian C band issues that are getting progressively worse due to non-compliant WIFI devices. This situation is also likely to degrade as the Australian licencing authority (ACMA) have regulated to share the C band Radar allocation with licenced point to point WIFI operators , recognising that this may interfere in some case with Weather Radars and needs to be worked through on a case by case basis. Because in cases of new licencing, priority has been given to the WIFI operators in some segments of the band, the only safe unfunded option is to consider the expanded use of S Band Radars.
4. The group discussed that the introduction of solid state Radars may require a further revision of the WMO Radar position in the near future.

## Issues related to “Space Weather”

1. Mr Rezende Costa gave a verbal update about the importance of further engagement in the space weather area and the work and linkages for organised response via the WMO processed and positions were not fully formed and needed more focus. Standardisation of the WMO position and products are seen as opportunity. A 4 years plan was proposed to consolidate the WMO position, the group concurred that it may be better to keep this option open until after the WRC-19 as not to remove focus from the current agenda items.
2. Mr David Franc also reported that they has been developing a report on spectrum reliant HF weather systems, and will send the report to ITU-R WP 7C. The report is still under development and will focus on 4 categories , Ionosondes, VLF signals, GPS, Others.
3. They are attempting to consolidate views into a single item and not expecting to have a finalised draft for CITEL in April but later.
4. Mr Marcus Dreis reported that the work on space weather is supported by Eumetsat but the feeling is that the priority is the finalisation of ITU-R report in ITU-R WP 7Cwith a focus on the necessity a clear view of what do we want to achieve?
5. Mr Phillipe Tristant cautioned that that too much detail in any of these new space weather areas at this stage as it may complicate the current discussions and positions coming into WRC19. Mr David Franc is rallying support and trying to get regions behind these potential new agenda items, but cautioned that, if we don’t have a position then we might get taken in a direction we are not comfortable with.

**A19/3.** David Franc will provide report on spectrum reliant HF weather systems (for submission ITU-R WP 7C ) for posting on the SG-RFC Wiki when it is complete.

## Other radio spectrum issues

1. Mr Stephen English presented [Docs 09](https://wiswiki.wmo.int/tiki-index.php?page=ET-CTS2019https://elioscloud.wmo.int/share/page/site/sg-rfc/document-details?nodeRef=workspace://SpacesStore/92a77671-a157-45d9-9639-0dd6c4851275) (Restricted)[[1]](#footnote-1) from the Radio Interference Workshop in 13th to the 14th September 2018 with the goal of better quantifying the value MW spectrum to NWP. It was attended by representatives from all WMO NWP members and examined all the relevant sensing bands that were of interest to the WMO community.
2. The bands were specifically mapped to applications and areas of benefit and reinforces that Microwave observations are critical to NWP and articulated that they can contribute to 40% or more of the forecast skill.
3. The derived value alone in the UK is estimated $2Bn per annum and $11.4Bn in the US.
4. Whilst individual bands might contribute highly to specific products or applications the portfolio of spectrum allocation is essential as they are used to *cross reference* each other and provide the *very* high level of precision required.
5. The loss or interference of any of the sensing spectrum would have a significant effect on the calibration of all bands that while some may not compromised relied on the other bands for the quality assurance
6. In the consideration of excess or surplus spectrum and suggestions of bands that might not be required, taking a simplistic band specific view was highly problematic as the value of the soundings are in their entirety.
7. The group discussed possible statements of protection criteria that could be applied but it became apparent that the mapping between the scientific expressions of these known figures are in degrees K, was not easily understood or converted to the lexicon of RF protection parameters (dB variants) or noise expressions per Hz. The regulators will only understand the RF terminology and this is a risk if we use alternate specifications.
8. Stephen explained that the margins of usability in some bands were within a few degrees K, and most likely map to very high protection criteria expressed in RF terms. Given these margins were so tight it was unlikely that we would be able to comprise and derived S/N figures in any band.

**A19/4.** Mr Stephen English to provide the actual sensitivity figures required per band to the group

**A19/5.** The Group needs to investigate mapping criteria from degrees Kelvin to dB to form a more cohesive argument for protection. (For after WRC-19 ), Chair to coordinate as the technical expertise to define this may need to be sourced outside group.

# Review of EC-70 Decisions and Preparation for Cg-18

1. The Secretariat presented a summary of EC-70 actions that were of interest to and directly related to the SG-RFC activities [Docs 03](http://wiswiki.wmo.int/tiki-download_file.php?fileId=5245),. In particular issues and resolutions relating to the WMO community support for WRC-19 and beyond.
2. A presentation was also given on the constituent body reform [Docs](http://wiswiki.wmo.int/tiki-download_file.php?fileId=5259) 1 and 2 , and the realignment of the commission structure with a focus on the infrastructure commission where the groups function is most likely to reside.

# Further activities (list of actions, next meetings, etc.)

1. Details and plans around next SG-RFC meeting to be discussed after WRC-19 and outcomes of constituent body reform process.
2. Deadlines for position paper reviews and WMO submission discussed.

**A19/6.** Chair proposed that after the conclusion of the 2019 meeting a further 2 weeks would be allocated to a final review of the position document before submission (15th March 2019).

**A19/7** WMO circulation of revised position document at the end of March for final submission onto the Congress 18 by end of March 2019.

# Any other Business

1. No other business.

# Closure of the meeting

1. Mr Eric Alliax thanked the group for the participation especially in relation to the extensive review process under agenda item 3, the updated the WMO WRC 19 position paper.
2. The meeting closed at 1630 on the 7th March 2019.

# Annex 1: Agenda

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| 1 | **ORGANIZATION OF THE MEETING** |  |
| 1.1 | Opening of the meeting |  |
| 1.2 | Approval of the agenda | Secretariat/Chair  |
| 1.3 | Working arrangements | Secretariat/Chair |
| 1.4 | Work plan | Secretariat/Chair |
| 2 | **Review of previous activities** |  |
| 2.1 | Report on progress of WMO activities* Including WMO/ITU workshop, Guide, EC-69; update on RA II and RA VI sessions.
 | Chair |
| 2.2 | Organization of the Steering Group on Radio Frequency Coordination | Report of 2018 meeting (open actions)/Secretariat |
| 2.4 | Coordination with other organizations |  |
| 2.4.1 | SG-RFC cooperation with the Group on Earth Observations | GEO secretariat |
| 2.4.2 | SG-RFC activities in the International Telecommunication Union (ITU) | Regional coordinators |
| 2.4.3 | SG-RFC coordination with CGMS | CGMS coordinator |
| 2.4.4 | SG-RFC coordination with the Space Frequency Coordination Group | SFCG coordinator |
| 2.4.5 | SG-RFC relations with the Commission for Instruments and Methods for Observations (CIMO) | CIMO coordinator |
| 3 | **WMO/SG-RFC preparation for the World Radiocommunication Conference 2019 (WRC-2019)** |  |
| 3.1 | Preparation of the WMO preliminary position on WRC-19 | Chairs / Members  |
| 3.2 | Working arrangements for WRC-19 | Chair |
| 4 | **Spectrum issues related to meteorological and Earth exploration applications/systems** | Members |
| 4.1 | Applications in the meteorological aids service | Members |
| 4.2 | Applications in the meteorological-satellite service | Members |
| 4.3 | Space-borne remote sensing applications | Members |
| 4.4 | Issues related to weather radars and wind-profiler | Members |
| 4.5 | Issues related to “Space Weather” | Members |
| 4.6 | Other radio spectrum issues | Members |
| 5 | **Review of EC-70 Decisions and Preparation for Cg-18** | Secretariat |
| 6 | **Further activities (list of actions, next meetings, etc.)** | Members |
| 7 | **Any other Business** |  |
| 8 | **Closure of the meeting** |  |

# ANNEX2: Workplan

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
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| **Tuesday 5th March 2019** |
| **Time** | **Documents** | **Session/title** |
| 9:00 | 9:30 |  | Registration |
| 9:30 | 10:30 | [Doc 0](http://wiswiki.wmo.int/tiki-download_file.php?fileId=5213) [Doc  01.2](http://wiswiki.wmo.int/tiki-download_file.php?fileId=4887) | Welcome, Opening, approval of the agenda and Working Arrangements (AI 1) |
| **10:30** | **11:00** | **Coffee Break** |
| 11:00 | 12:30 | [Docs 13](http://wiswiki.wmo.int/tiki-download_file.php?fileId=5253)[Docs 03](http://wiswiki.wmo.int/tiki-download_file.php?fileId=5245)[Docs](http://wiswiki.wmo.int/tiki-download_file.php?fileId=5259) 12 | WMO progress and previous actions (AI 2.1, 2.2)Review of EC-70 Decisions and Preparation for Cg-18 (AI 5) |
| **12:30** | **14:00** | **LUNCH** |
| 14:00 | 15:15 | [Docs 04](http://wiswiki.wmo.int/tiki-download_file.php?fileId=5261)[Docs 05](http://wiswiki.wmo.int/tiki-download_file.php?fileId=5277)[Docs 06](https://elioscloud.wmo.int/share/page/site/sg-rfc/document-details?nodeRef=workspace://SpacesStore/6824de36-47b6-46ef-92c5-5c3bba72d1bf). [Docs 07](https://elioscloud.wmo.int/share/page/site/sg-rfc/document-details?nodeRef=workspace://SpacesStore/6824de36-47b6-46ef-92c5-5c3bba72d1bf) | Preliminary draft WMO positions. (AI 3) |
| **15:15** | **15:45** | **Coffee Break** |
| 15:45 | 17:15 | [Docs 04](http://wiswiki.wmo.int/tiki-download_file.php?fileId=5261)[Docs 05](http://wiswiki.wmo.int/tiki-download_file.php?fileId=5277)[Docs 06](https://elioscloud.wmo.int/share/page/site/sg-rfc/document-details?nodeRef=workspace://SpacesStore/6824de36-47b6-46ef-92c5-5c3bba72d1bf). [Docs 07](https://elioscloud.wmo.int/share/page/site/sg-rfc/document-details?nodeRef=workspace://SpacesStore/6824de36-47b6-46ef-92c5-5c3bba72d1bf) | Preliminary draft WMO positions. (AI 3) - continued |
| 17:15 |  |  | End of day 1 |

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| **Wednesday 6th March 2019** |
| **Time** | **Documents** | **Session/title** |
| 09:00 | 10:30 | [Docs 08](https://wiswiki.wmo.int/tiki-index.php?page=ET-CTS2019)[Docs 09](https://wiswiki.wmo.int/tiki-index.php?page=ET-CTS2019https://elioscloud.wmo.int/share/page/site/sg-rfc/document-details?nodeRef=workspace://SpacesStore/92a77671-a157-45d9-9639-0dd6c4851275) (Restricted )[Docs 10](https://wiswiki.wmo.int/tiki-index.php?page=ET-CTS2019http://wiswiki.wmo.int/tiki-download_file.php?fileId=5269) | Coordination with other organizations (AI 2.4) Applications in the meteorological aids service (AI 4.1) |
| **10:30** | **11:00** | **Coffee Break** |
| 11:00 | 12:30 | [Docs 08](https://wiswiki.wmo.int/tiki-index.php?page=ET-CTS2019)[Docs 09](https://wiswiki.wmo.int/tiki-index.php?page=ET-CTS2019https://elioscloud.wmo.int/share/page/site/sg-rfc/document-details?nodeRef=workspace://SpacesStore/92a77671-a157-45d9-9639-0dd6c4851275)[Docs 10](https://wiswiki.wmo.int/tiki-index.php?page=ET-CTS2019http://wiswiki.wmo.int/tiki-download_file.php?fileId=5269) | Issues related to weather radars and wind-profiler radars (AI 4.4)Applications in the METSAT service and EESS (AI 4.2 and 4.3) |
| **12:30** | **14:00** | **LUNCH** |
| 14:00 | 17:00 |  | Visit Meteo-France facility |
| **17:00** |  | **End of day 2** |
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| **Thursday 7th March 2019** |
| **Time** | **Document** | **Session/title** |
| 09:00 | 10:30 |  | Issues related to “Space Weather” (AI 4.5)Other radio-frequency spectrum issues (AI 4.6) |
| **10:30** | **11:00** | **Coffee Break** |
| 11:00 | 12:30 | [Docs 04](http://wiswiki.wmo.int/tiki-download_file.php?fileId=5261)[Docs 05](http://wiswiki.wmo.int/tiki-download_file.php?fileId=5277)[Docs 06](https://elioscloud.wmo.int/share/page/site/sg-rfc/document-details?nodeRef=workspace://SpacesStore/6824de36-47b6-46ef-92c5-5c3bba72d1bf). [Docs 07](https://elioscloud.wmo.int/share/page/site/sg-rfc/document-details?nodeRef=workspace://SpacesStore/6824de36-47b6-46ef-92c5-5c3bba72d1bf) | Preliminary draft WMO positions. (AI 3.1) - continued |
| **12:30** | **14:00** | LUNCH |
| 13:30 | 17:00 | [Docs 04](http://wiswiki.wmo.int/tiki-download_file.php?fileId=5261)[Docs 05](http://wiswiki.wmo.int/tiki-download_file.php?fileId=5277)[Docs 06](https://elioscloud.wmo.int/share/page/site/sg-rfc/document-details?nodeRef=workspace://SpacesStore/6824de36-47b6-46ef-92c5-5c3bba72d1bf). [Docs 07](https://elioscloud.wmo.int/share/page/site/sg-rfc/document-details?nodeRef=workspace://SpacesStore/6824de36-47b6-46ef-92c5-5c3bba72d1bf) | Preliminary draft WMO positions. (AI 3.1) – continuedFurther activities (list of actions, next meetings, etc.) (AI 6)Any other Business (7)Closure of the meeting |
|  | **17:00** |  | **End of day 3** |

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# Annex 3: Participants

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| --- | --- | --- |
| **Name**  | **Role**  | **Representing**  |
| ALLAIX, Eric    | Chair  | Météo-France   |
| FRANC, David    | Co-Chair  | National Oceanic and Atmospheric Administration (NOAA)   |
| CASEY, Alec  | Core Member  | Environment & Climate Change Canada |
| ZHANG, Ming    | Core Member  | China Meteorological Administration (CMA)   |
| TRISTANT, Philippe    | Core Member  | EUMETNET Co-ordinating Office   |
| DREIS, Markus    | Core Member  | European Organisation for the Exploitation of Meteorological Satellites (EUMETSAT)   |
| NOZDRIN, Vadim    | Core Member  | International Telecommunications Union (ITU)   |
| ODHIAMBO, Elias Otieno    | Core Member  | Kenya Meteorological Department   |
| CHOI, JUNG-HUN    | Core Member  | Korea Meteorological Administration (KMA)   |
| HERVO, Maxime    | Core Member  | MétéoSwiss   |
| BANKS, Michael    | Core Member  | United Kingdom Met Office  |
| ENGLISH, Stephen    | Associate member  | European Centre for Medium-Range Weather Forecasts (ECMWF)   |
| MOHR, Rudolf    | Associate member  | Deutscher Wetterdienst (DWD)   |
| POOL, Marcus    | Associate member  | Leonardo, Germany GmbH   |
| RYZHKOVA, Olga  | Associate member  | Russian Federal Service for Hydrometeorology and Environmental Monitoring (ROSHYDROMET)   |
| SPENCER, Benjie | Associate member | USA NOAA NWS  |
| MENTZER, JAMES    | Associate member  | USA NOAA NWS  |
| COSTA , Rezende  | Associate member  | INSTITUTO NACIONAL DE PESQUISAS ESPACIAIS (INPE)   |
| HODGE, Bryan   | Associate member  | WMO Secretariat    |

# Annex 4: Status of actions following SG-RFC-2019

| **Action Number**  | **Action designation**  | **Responsible** | **Objective/deadline** | **Status** |
| --- | --- | --- | --- | --- |
| 11/1-2 | Ensure support for WMO representation at ITU-R Regional Seminars (associated with SG7 WPs) | Secretariat | N/A | Ongoing |
| 17/1-1 | Follow up with ITU on access statistics for Handbook on Radio Frequency, including language distribution. | V Nadim | Move to after new publication SG-RFC meeting following SG-RFC-2018 | Ongoing |
| 17/1-3 | Maintain RFC presence in GEO activity  | Chair | On-going | Ongoing |
| 17/1-4 | Develop strategy for protection of ground based passive sensors. The aim is to produce a report for WRC-19 on frequencies being used. | All, including HMEI | Review by 2019 SG-RFC meeting | Ongoing |
| 17/1-11 | Confirm location and date~~s~~ of next meeting~~s~~, tentatively Jan 2019 based on ITU and CPM input requirements and in Nov 2018 (tentative) | Chair & Secretariat | June 2018 | Closed  |
| 17/1-12 | Update Resolution 29 (Cg-17) for Cg-18 to be provided by CBS through Executive Council as appropriate | Chair & Secretariat | March 2018 | Ongoing |
| 17/1-19 | Review the reports (and recommendations) to WRC-19 and prepare, if necessary, a new report for ITU-R describing all the different lightning detection sensor characteristics to WP 7C in 2018, review draft at next SG-RFC.  | M Banks & J Salmivaara  | September 2018 | Ongoing  |
| 18/1 | SG-RFC would ask the Secretary-General to inform Members of items for which the CPM report did not include methods acceptable to WMO, if needed, and asking Members to submit proposals to address the omissions. | Chair  |  | Ongoing  |
| 18/2 | WMO Secretariat would inform Mr Franc of any WMO working groups responsible for ground based passive sensing. | WMO  | Email sent  | Closed |
| 18/3 | WMO interests needed to be represented at all discussions of all relevant agenda items at the ITU Inter-Regional Workshops on WRC-19 preparations. WMO should plan to be present at the 2nd workshop 21-23 November 2018 | WMO  | Represented  | Closed  |
| 18/4 | SG-RFC would monitor WRC-19 agenda item 9.1.4 more closely, in particular in WP 5B. | Chair  |  | Ongoing  |
| 18/5 | SG-RFC would obtain more information about development of WRC-19 agenda item 1.9.2 regarding the future usage possible interest of WMO in regard to VDES (VHF Data Exchange System) technology. | Chair  |  | Ongoing  |
| 18/6 | The radiosonde focal point would examine contents of OSCAR/surface and the legacy catalogue of radiosondes to find out what information on frequency use is available. Complete before the next SG-RFC meeting | Radiosonde focal point  |  | Ongoing |
| 18/7 | The radiosonde focal point would create a questionnaire for WMO Members to collect information on the frequencies being used to support radiosondes and similar equipment. The Secretariat should distribute the questionnaire following the result of the action on OSCAR/surface contents, if necessary | Radiosonde focal point  |  | Ongoing  |
| 18/8 | SG-RFC would create a strategy to develop a study for the spectrum requirements for radiosondes. Review at the next meeting. | Radiosonde focal point  |  | Ongoing  |
| 18/9 | Chair SG-RFC would reply to Vaisala Oyj’s proposals in Doc 10.3 on radiosonde frequency use. By end of March 2018. (Post meeting note: done) | Chair  |  | Closed |
| 18/10 | Check whether WRC-19 Agenda Item 1.11 on railway radiocommunication systems may have an impact on cloud radars in 94-94.1 GHz range, whether this should be of concern to WMO. | Chair  | Monitored as part of WRC 19 agenda  | Closed |
| 18/11 | The chair and secretariat would ensure that all abbreviations and acronyms in the position paper were defined at the first time of their use. (Post meeting note: done) | Chair and WMO  |  | Closed  |
| 18/12 | Members would provide corrections to the position paper to the chair of SG-RFC and secretariat by 2 March 2018. | Chair and WMO |  | Closed  |
| 18/13 | WMO secretariat would find out how to submit the draft WMO position paper to CITEL. | WMO  | Draft submitted  | Closed |
| 18/14 | In respect of WRC-19 agenda item 1.3, WMO SG-RFC members planning to use the band 460-470 MHz for GSO Metsat or EESS systems were encouraged to provide proposals to the next meeting of WP 7B in May 2018, noting that this would be the deadline for completion of the draft CPM text. | Chair and WMO |  | Closed  |
| 18/15 | Members of WMO SG-RFC were invited to contribute to the review of Recommendation ITU-R RS.1861 (characteristics of passive sensors between 1.4 and 275 GHz) that was expected to be completed after WRC-19. | Chair |  | Closed  |
| 18/16 | Mr Hervo would confirm whether there was an opportunity to prepare a new ITU-R recommendation to replace the existing ITU-R recommendations (M.1085, M.1226 and M.1227) related to wind profiler radars. Report to the next meeting | Chair |  | Ongoing  |
| 18/17 | SG-RFC asked its chair to submit the recommendation in Annex 3 on radio frequencies to the CBS TECO for subsequent recommendation to eighteenth Congress. | Chair |  | Closed  |
| 18/17 | The secretariat would organize a conference call following the WG 5B meeting (at the end of May) to agree a way forward regarding space weather. | WMO  |  | Open  |
| 19/1.  | Chair to discuss resourcing to attend WRC 19 and WNMO representation  |  |  |  |
| 19/2 | Secretariat to prompt members to register radiosonde usage as international if relevant through their regulators, for ITU visibility and protection . | WMO |  | Open |
| 19/3 | David Franc will provide report on spectrum reliant HF weather systems (For submission ITU-R 7C ) for posting on the SG RFC Wiki when it is complete  | David Franc  |  | Open |
| 19/4 | Stephen English to provide the actual sensitivity figures required for EESS per band to the SG RFC group  | Stephen English  |  | Open |
| 19/5 | SG RFC needs to investigate mapping criteria for EESS from degrees Kelvin to dB to form a more cohesive argument for protection. (after WRC-19 ), Chair to coordinate as the technical expertise to define this may need to be sourced outside group .  | Chair  |  | Open |
| 19/6 | Chair proposed that after the conclusion of the 2019 meeting a further 2 weeks would be allocated to a final review of the position document before submission (15th March 2019). | Chair and Group  |  | Done |
| 19/7 | WMO circulation of revised position document at the end of March for final submission onto the Congress 18 . End of March 2019 | Chair and WMO  |  | Done |

# Annex 4: Draft resolution by eighteenth Congress

RADIO FREQUENCIES FOR METEOROLOGICAL AND RELATED ENVIRONMENTAL ACTIVITIES .

**THE WORLD METEOROLOGICAL CONGRESS,**

**Recalling:**

(1) Resolution 29 (Cg-17) - Radio frequencies for meteorological and related environmental activities,

(2) Decision 33 (EC-69) - Preserving the radio-frequency spectrum for meteorological and related environmental activities at the World Radiocommunication Conference 2019,

(3) Decision 22 (CBS-16) - Preserving the radio-frequency spectrum for meteorological and related environmental activities at the World Radiocommunication Conference 2019,

**Considering:**

(1) The prime importance of the specific radiocommunication services for meteorological and related environmental activities required for the detection and early warning of hazards and the prevention and mitigation of natural and technological (human-induced) disasters, the safety of life and property, the protection of the environment, climate change studies and scientific research,

(2) The importance of information provided by the Earth-exploration systems including meteorological systems for a wide range of economic activities such as agriculture, transportation, construction and tourism,

(3) The crucial importance of the allocation of suitable radio-frequency bands for the operation of surface-based meteorological observing systems, including in particular radiosondes, weather radars and wind profiler radars,

(4) The crucial importance of the allocation of suitable radio-frequency bands for the operation of meteorological and research and development satellites, including remote-sensing, data collection and data distribution links,

**Stressing** that some radio-frequency bands are a unique natural resource due to their special characteristics and natural radiation enabling space-borne passive sensing of the atmosphere and the Earth surface, which deserve adequate allocation to the Earth-exploration satellite service (passive) and absolute protection from interference,

**Expresses** its serious concern at the continuing threat to several radio-frequency bands allocated to the meteorological aids, meteorological-satellite, Earth-exploration satellite and radiolocation (weather and wind profiler radars) services posed by the development of other radiocommunication services;

**Requests** the Commission for Basic Systems to pursue the continuous review of regulatory and technical matters related to radio frequencies for operational and research meteorological and related environmental activities, and preparation of guidance and information for National Meteorological and Hydrological Services, in coordination with other technical commissions especially the Commission for Instruments and Methods of Observation, and in liaison with other relevant international bodies, in particular the Coordination Group for Meteorological Satellites;

**Requests Regional Associations** to coordinate on a regional basis contributions of meteorological experts to the work of relevant regional telecommunication organizations and of ITU-R, especially ITU-R Study Groups 5 and 7 on Terrestrial (including radiolocation) and Science Services, respectively;

**Urges** all Members to do their utmost to ensure the availability and protection of suitable radiofrequency bands required for meteorological and related environmental operations and research, and in particular:

(1) To ensure that their national radiocommunication administrations are fully aware of the importance of and requirements for radio frequencies for meteorological and related activities, and to seek their support in the ITU World Radiocommunication Conferences and Radiocommunication Sector (ITU-R) activities;

(2) To participate actively in the national, regional and international activities on relevant radiocommunication regulatory issues and, in particular, to involve experts from their Services in the work of relevant regional telecommunication organizations and of ITU-R, especially ITU-R Study Groups 5 and 7 on Terrestrial (including radiolocation) and Science Services, respectively;

(3) To register adequately with their national radiocommunication administrations all radiocommunication stations and radio frequencies used for meteorological and related environmental operations and research;

**Appeals** to the International Telecommunication Union and its Member Administrations:

(1) To ensure the availability and absolute protection of the radio-frequency bands which, due to their special physical characteristics, are a unique natural resource for spaceborne passive sensing of the atmosphere and the Earth surface and are of crucial importance for weather, water and climate research and operations;

(2) To give due consideration to the WMO requirements for radio-frequency allocations and regulatory provisions for meteorological and related environmental operations and research;

(3) To pay special attention to the WMO positions related to the WRC agenda, in the light of Appeals (1) and (2) above;

Requests the Secretary-General:

(1) To bring the present resolution to the attention of all concerned, including the International Telecommunication Union;

(2) To pursue as a matter of high priority the coordination role of the Secretariat in radiofrequency matters, especially with ITU-R, including participation of WMO in ITU-R Radiocommunication Study Groups, conference preparatory meetings and World Radiocommunication Conferences;

(3) To facilitate the coordination between National Meteorological and Hydrological Services and their national radiocommunication administrations, particularly in preparing for the ITU World Radiocommunication Conferences, by providing appropriate information and documentation;

(4) To assist the Commission for Basic Systems in the implementation of the present resolution.

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Note: This resolution replaces Resolution 29 (Cg-17).

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# Annex 5: Responsible persons (focal points) for specific activities

The following SG-RFC members or experts have been confirmed as focal points for specific issues noting one focal point for international, however, all members of SG-RFC are encouraged to provide national focus and report individually (national issues identified and reported to the meeting in addition to international as sometimes a national activity can be a precursor to international issues):

* Meteorological-satellite service (MetSat): Markus DREIS
* Earth exploration-satellite service (EESS) (passive): Philippe TRISTANT
* EESS (active): Bryan HUNEYCUTT,
* Radars (weather radars and wind profilers): Michael BANKS,
* Meteorological aids service (MetAids) - Radiosondes: Paul HETTRICK,
* Lightning detection: Michael BANKS,
* Space Weather: David FRANC,
* Establish a national focal point group, and ensure each Regional WG Infrastructure (or equivalent) has a task team or rapporteur on RFC under WIGOS activity (Action item 15/1-1).

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# Annex 6: SG-RFC focal points for cooperation with other organizations

* Commission for Instruments and Methods for Observations (CIMO)
	+ Mr David FRANC is CIMO’s Theme Leader on radio-frequency matters.
* Group on Earth Observations (GEO)
	+ Mr Eric ALLAIX.
* Coordination Group of Meteorological Satellites (CGMS) & SFCG
	+ Mr Markus DREIS
* Inter-Programme Team on Space Weather Information, Systems and Services (IPT-SWeISS)
	+ Mr David FRANC

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1. Document restricted because conclusions are still under consideration [↑](#footnote-ref-1)