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| Radiocommunication Study Group 7 |
| SCIENCE SERVICES |
| LIST OF RECOMMENDATIONS |
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# ITU-R RA-series of Recommendations

# ITU-R SA-series of Recommendations

# ITU-R TF-series of Recommendations

# ITU-R RS-series of Recommendations

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| **NOC** = Maintained | **MOD** = Revised | **SUP** =Deleted | **ADD** =New text | **UNA** = Undergoing approval |

Radio astronomy

| Rec. ITU-R | Recommendation title | Actionby RA-15 | Comments |
| --- | --- | --- | --- |
| **RA.314-10** | Preferred frequency bands for radio astronomical measurements | NOC |  |
| **RA.479-5** | Protection of frequencies for radioastronomical measurements in the shielded zone of the Moon | NOC |  |
| **RA.517-4** | Protection of the radio astronomy service from transmitters operating in adjacent bands | NOC |  |
| **RA.611-4** | Protection of the radio astronomy service from spurious emissions | NOC |  |
| **RA.769-2** | Protection criteria used for radioastronomical measurements | NOC |  |
| **RA.1031-2** | Protection of the radio astronomy service in frequency bands shared with other services | NOC |  |
| **RA.1237-2** | Protection of the radio astronomy service from unwanted emissions resulting from applications of wideband digital modulation | NOC |  |
| **RA.1272-1** | Protection of radio astronomy measurements above 60 GHz from ground based interference | NOC |  |
| **RA.1417-1** | A radio-quiet zone in the vicinity of the L2 Sun-Earth Lagrange point | NOC |  |
| **RA.1513-2** | Levels of data loss to radio astronomy observations and percentage-of-time criteria resulting from degradation by interference for frequency bands allocated to the radio astronomy service on a primary basis | NOC |  |
| **RA.1630-0** | Technical and operational characteristics of ground-based astronomy systems for use in sharing studies with active services between 10 THz and 1 000 THz | NOC |  |
| **RA.1631-0** | Reference radio astronomy antenna pattern to be used for compatibility analyses between non-GSO systems and RAS stations based on the epfd concept | NOC |  |
| **RA.1750-0** | Mutual planning between the Earth exploration-satellite service (active) and the radio astronomy service in the 94 GHz and 130 GHz bands | NOC |  |
| **RA.1860-0** | Preferred frequency bands for radio astronomical measurements in the range 1-3 THz | NOC |  |

Space applications and meteorology

| Rec. ITU-R | Recommendation title | Actionby RA-15 | Comments |
| --- | --- | --- | --- |
| **SA.363-5** | Space operation systems. Frequencies, bandwidths and protection criteria | NOC |  |
| **SA.364-5** | Preferred frequencies and bandwidths for manned and unmanned near-Earth research satellites | NOC |  |
| **SA.509-3** | Space research earth station and radio astronomy reference antenna radiation pattern for use in interference calculations, including coordination procedures, for frequencies less than 30 MHz | NOC |  |
| **SA.510-2** | Feasibility of frequency sharing between the space research service and other services in bands near 14 and 15 GHz – Potential interference from data relay satellite systems | NOC |  |
| **SA.514-3** | Interference criteria for command and data transmission systems operating in the Earth exploration-satellite and meteorological-satellite services | NOC |  |
| **SA.609-2** | Protection criteria for radiocommunication links for manned and unmanned near-Earth research satellites | NOC |  |
| **SA.1014-2** | Telecommunication requirements for manned and unmanned deep-space research | NOC |  |
| **SA.1015-1** | Bandwidth requirements for deep-space research | NOC |  |
| **SA.1016-0** | Sharing considerations relating to deep-space research | NOC |  |
| **SA.1018-0** | Hypothetical reference system for systems comprising data relay satellites in the geostationary orbit and user spacecraft in low Earth-orbits | NOC |  |
| **SA.1019-0** | Preferred frequency bands and transmission directions for data relay satellite systems | NOC |  |
| **SA.1020-0** | Hypothetical reference system for the Earth exploration-satellite and meteorological-satellite services | NOC |  |
| **SA.1021-0** | Methodology for determining performance objectives for systems in the Earth exploration-satellite and meteorological-satellite services | NOC |  |
| **SA.1022-1** | Methodology for determining interference criteria for systems in the Earth exploration-satellite and meteorological-satellite services | NOC |  |
| **SA.1023-0** | Methodology for determining sharing and coordination criteria for systems in the Earth exploration-satellite and meteorological-satellite services | NOC |  |
| **SA.1024-1** | Necessary bandwidths and preferred frequency bands for data transmission from Earth exploration satellites (not including meteorological satellites) | NOC |  |
| **SA.1025-3** | Performance criteria for space-to-Earth data transmission systems operating in the Earth exploration-satellite and meteorological-satellite services using satellites in low‑Earth orbit | NOC |  |
| **SA.1026-4** | Aggregate interference criteria for space-to-Earth data transmission systems operating in the Earth exploration-satellite and meteorological-satellite services using satellites in low‑Earth orbit | NOC |  |
| **SA.1027-4** | Sharing criteria for space-to-Earth data transmission systems in the Earth exploration-satellite and meteorological-satellite services using satellites in low‑Earth orbit | NOC |  |
| **SA.1030-0** | Telecommunication requirements of satellite systems for geodesy and geodynamics | NOC |  |
| **SA.1154-0** | Provisions to protect the space research (SR), space operations (SO) and Earth exploration-satellite services (EESS) and to facilitate sharing with the mobile service in the 2 025-2 110 and 2 200-2 290 MHz bands | NOC |  |
| **SA.1155-1** | Protection criteria related to the operation of data relay satellite systems | NOC |  |
| **SA.1157-1** | Protection criteria for deep-space research | NOC |  |
| **SA.1158-3** | Feasibility in frequency sharing in the 1 670-1 710 MHz band between the meteorological-satellite service (space-to-Earth) and the mobile-satellite service (Earth-to-space) | NOC |  |
| **SA.1159-3** | Performance criteria for data dissemination, data collection and direct data readout systems in the Earth exploration-satellite service and meteorological-satellite services | NOC |  |
| **SA.1160-2** | Interference criteria for data dissemination and direct data readout systems in the Earth exploration-satellite and meteorological-satellite services using satellites in the geostationary orbit | NOC |  |
| **SA.1161-1** | Sharing and coordination criteria for data dissemination and direct data readout systems in the Earth exploration-satellite and meteorological-satellite services using satellites in geostationary orbit | NOC |  |
| **SA.1162-2** | Performance criteria for service links in data collection and platform location systems in the Earth exploration- and meteorological-satellite services | NOC |  |
| **SA.1163-2** | Interference criteria for service links in data collection systems in the Earth exploration-satellite and meteorological-satellite services | NOC |  |
| **SA.1164-2** | Sharing and coordination criteria for service links in data collection systems in the Earth exploration-satellite and meteorological-satellite services | NOC |  |
| **SA.1258-1** | Sharing of the frequency band 401-403 MHz between the meteorological-satellite service, Earth exploration-satellite service and meteorological aids service | NOC |  |
| **SA.1273-0** | Power flux-density levels from the space research, space operation and Earth exploration-satellite services at the surface of the Earth required to protect the fixed service in the bands 2 025-2 110 MHz and 2 200-2 290 MHz | NOC |  |
| **SA.1274-0** | Criteria for data relay satellite networks to facilitate sharing with systems in the fixed service in the bands 2 025-2 110 MHz and 2 200-2 290 MHz | NOC |  |
| **SA.1275-4** | Orbital locations of data relay satellites to be protected from the emissions of fixed service systems operating in the band 2 200-2 290 MHz | NOC |  |
| **SA.1276-4** | Orbital locations of data relay satellites to be protected from the emissions of fixed service systems operating in the band 25.25-27.5 GHz | NOC |  |
| **SA.1277-0** | Sharing in the 8 025-8 400 MHz frequency band between the Earth exploration-satellite service and the fixed, fixed‑satellite, meteorological-satellite and mobile services in Regions 1, 2 and 3 | NOC |  |
| **SA.1344-1** | Preferred frequency bands and bandwidths for the transmission of space VLBI data within existing space research service (SRS) allocations | NOC |  |
| **SA.1345-1** | Methods for predicting radiation patterns of large antennas used for space research and radio astronomy | NOC |  |
| **SA.1396-0** | Protection criteria for the space research service in the 37‑38 and 40-40.5 GHz bands | NOC |  |
| **SA.1414-1** | Characteristics of data relay satellite systems | NOC |  |
| **SA.1415-0** | Sharing between inter-satellite service systems in the frequency band 25.25-27.5 GHz | NOC |  |
| **SA.1626-1** | Feasibility of sharing between the space research service (space-to-Earth) and the fixed and mobile services in the band 14.8-15.35 GHz | NOC |  |
| **SA.1627-0** | Telecommunication requirements and characteristics of EESS and Metsat service systems for data collection and platform location | NOC |  |
| **SA.1629-0** | Sharing between command links in the space research and space operation services with the fixed, mobile and mobile‑satellite services in the frequency band 257‑262 MHz | NOC |  |
| **SA.1742-0** | Technical and operational characteristics of interplanetary and deep-space systems operating in the space-to-Earth direction around 283 THz | NOC |  |
| **SA.1743-0** | Maximum allowable degradation to radiocommunication links of the space research and space operation services arising from interference from emissions and radiations from other radio sources | NOC |  |
| **SA.1745-0** | Use of the band 1 668.4-1 710 MHz by the meteorological aids service and meteorological-satellite service (space-to-Earth) | NOC |  |
| **SA.1805-0** | Technical and operational characteristics of space-to-space telecommunication systems operating around 354 and 366 THz | NOC |  |
| **SA.1807-0** | System characteristics and interference criteria for meteorological satellite systems operating around 18 GHz | NOC |  |
| **SA.1810-0** | System design guidelines for Earth exploration-satellites operating in the band 8 025-8 400 MHz | NOC |  |
| **SA.1811-0** | Reference antenna patterns of large-aperture space research service earth stations to be used for compatibility analyses involving a large number of distributed interference entries in the bands 31.8-32.3 GHz and 37.0-38.0 GHz | NOC |  |
| **SA.1862-0** | Guidelines for efficient use of the band 25.5-27.0 GHz by the Earth exploration‑satellite service (space-to-Earth) and space research service (space-to-Earth) | NOC |  |
| **SA.1863-0** | Radiocommunications used for emergency in manned space flight | NOC |  |
| **SA.1882-0** | Technical and operational characteristics of space research service (Earth-to-space) systems for use in the 22.55-23.15 GHz band | NOC |  |
| **SA.2044-0** | Protection criteria for non-GSO data collection platforms in the band 401-403 MHz | NOC |  |
| **SA.2045-0** | Basic general partitioning and sharing conditions for the band 401-403 MHz for future long-term coordinated use of data collection systems on geostationary and non-geostationary METSAT and EESS systems | NOC |  |
| **SA.2078-0** | Protection of SRS earth stations from mobile (aircraft) stations in the 2 200-2 290 MHz band | NOC |  |
| **SA.2079-0** | Frequency sharing between SRS and FSS (space-to-Earth) systems in the 37.5-38 GHz band | NOC |  |

Time signals and frequency standards emissions

| Rec. ITU-R | Recommendation title | Actionby RA-15 | Comments |
| --- | --- | --- | --- |
| **TF.374-6** | Precise frequency and time-signal transmissions | NOC |  |
| **TF.457-2** | Use of the modified Julian date by the standard-frequency and time-signal services | NOC |  |
| **TF.460-6** | Standard-frequency and time-signal emissions | NOC |  |
| **TF.486-2** | Use of UTC frequency as reference in standard frequency and time signal emissions | NOC |  |
| **TF.535-2** | Use of the term UTC | NOC |  |
| **TF.538-3** | Measures for random instabilities in frequency and time (phase) | NOC |  |
| **TF.583-6** | Time codes | NOC |  |
| **TF.686-3** | Glossary and definitions of time and frequency terms | NOC |  |
| **TF.767-2** | Use of global navigation satellite systems for high-accuracy time transfer | NOC |  |
| **TF.768-7** | Standard frequencies and time signals | NOC |  |
| **TF.1010-1** | Relativistic effects in a coordinate time system in the vicinity of the Earth | NOC |  |
| **TF.1011-1** | Systems, techniques and services for time and frequency transfer | NOC |  |
| **TF.1153-4** | The operational use of two-way satellite time and frequency transfer employing pseudorandom noise codes | NOC |  |
| **TF.1876-0** | Trusted time source for Time Stamp Authority | NOC |  |
| **TF.2018-0** | Relativistic time transfer in the vicinity of the Earth and in the solar system | NOC |  |

Remote sensing systems

| Rec. ITU-R | Recommendation title | Actionby RA-15 | Comments |
| --- | --- | --- | --- |
| **RS.515-5** | Frequency bands and bandwidths used for satellite passive remote sensing | NOC |  |
| **RS.577-7** | Frequency bands and required bandwidths used for spaceborne active sensors operating in the Earth exploration-satellite (active) and space research (active) services | NOC |  |
| **RS.1165-2** | Technical characteristics and performance criteria for systems in the meteorological aids service in the 403 MHz and 1 680 MHz bands | NOC |  |
| **RS.1166-4** | Performance and interference criteria for active spaceborne sensors | NOC |  |
| **RS.1259-0** | Feasibility of sharing between spaceborne passive sensors and the fixed service from 50 to 60 GHz | NOC |  |
| **RS.1260-1** | Feasibility of sharing between active spaceborne sensors and other services in the range 420-470 MHz | NOC |  |
| **RS.1261-0** | Feasibility of sharing between spaceborne cloud radars and other services in the range of 92-95 GHz | NOC |  |
| **RS.1263-1** | Interference criteria for meteorological aids operated in the 400.15-406 MHz and 1 668.4-1 700 MHz bands | NOC |  |
| **RS.1264-1** | Feasibility of frequency sharing between the meteorological aids service and the mobile-satellite service (Earth-to-space) in the 1 668.4-1 700 MHz band | NOC |  |
| **RS.1279-0** | Spectrum sharing between spaceborne passive sensors and inter-satellite links in the range 50.2-59.3 GHz | NOC |  |
| **RS.1280-0** | Selection of active spaceborne sensor emission characteristics to mitigate the potential for interference to terrestrial radars operating in frequency bands 1-10 GHz | NOC |  |
| **RS.1281-0** | Protection of stations in the radiolocation service from emissions from active spaceborne sensors in the band 13.4‑13.75 GHz | NOC |  |
| **RS.1282-0** | Feasibility of sharing between wind profiler radars and active spaceborne sensors in the vicinity of 1 260 MHz | NOC |  |
| **RS.1346-0** | Sharing between the meteorological aids service and medical implant communication systems (MICS) operating in the mobile service in the frequency band 401-406 MHz | NOC |  |
| **RS.1347-0** | Feasibility of sharing between radionavigation-satellite service receivers and the Earth exploration-satellite (active) and space research (active) services in the 1 215‑1 260 MHz band | NOC |  |
| **RS.1416-0** | Sharing between spaceborne passive sensors and the inter‑satellite service operating near 118 and 183 GHz | NOC |  |
| **RS.1449-0** | Feasibility of sharing between the fixed-satellite service (FSS) (space-to-Earth) and the Earth exploration-satellite (passive) and space research (passive) services in the band 18.6-18.8 GHz | NOC |  |
| **RS.1624-0** | Sharing between the Earth exploration-satellite (passive) and airborne altimeters in the aeronautical radionavigation service in the band 4 200-4 400 MHz | NOC |  |
| **RS.1628-0** | Sharing in the band 35.5-36 GHz between the Earth exploration-satellite service (active) and space research service (active), and other services allocated in this band | NOC |  |
| **RS.1632-0** | Sharing in the band 5 250-5 350 MHz between the Earth exploration-satellite service (active) and wireless access systems (including RLANs) in the mobile service | NOC |  |
| **RS.1744-0** | Technical and operational characteristics of ground-based meteorological aids systems operating in the frequency range 272-750 THz | NOC |  |
| **RS.1745-0** | Use of the band 1 668.4-1 710 MHz by the meteorological aids service and meteorological-satellite service (space-to-Earth) | NOC |  |
| **RS.1749-0** | Mitigation technique to facilitate the use of the 1 215-1 300 MHz band by the Earth exploration-satellite service (active) and the space research service (active) | NOC |  |
| **RS.1803-0** | Technical and operational characteristics for passive sensors in the Earth exploration-satellite (passive) service to facilitate sharing of the 10.6-10.68 GHz and 36-37 GHz bands with the fixed and mobile services | NOC |  |
| **RS.1804-0** | Technical and operational characteristics of Earth exploration-satellite service systems operating above 3 000 GHz | NOC |  |
| **RS.1813-1** | Reference antenna pattern for passive sensors operating in the Earth exploration-satellite service (passive) to be used in compatibility analyses in the frequency range 1.4-100 GHz | NOC |  |
| **RS.1858-0** | Characterization and assessment of aggregate interference to EESS (passive) sensor operations from multiple sources of man‑made emissions | NOC |  |
| **RS.1859-0** | Use of remote sensing systems for data collection to be used in the event of natural disasters and similar emergencies | NOC |  |
| **RS.1861-0** | Typical technical and operational characteristics of Earth exploration-satellite service (passive) systems using allocations between 1.4 and 275 GHz | NOC |  |
| **RS.1881-0** | Protection criteria for arrival time difference (ATD) receivers operating in the met aids service in the frequency band 9-11.3 kHz | NOC |  |
| **RS.1883-0** | Use of remote sensing systems in the study of climate change and the effects thereof | NOC |  |
| **RS.1884-0** | Methodology for determining terrestrial and space-to-Earth sharing and coordination criteria for meteorological aids in the 400.15-406 MHz and 1 668‑1 700 MHz bands | NOC |  |
| **RS.2017-0** | Performance and interference criteria for satellite passive remote sensing | NOC |  |
| **RS.2042-0** | Typical technical and operating characteristics for spaceborne radar sounder systems using the 40-50 MHz band | NOC |  |
| **RS.2043-0** | Characteristics of synthetic aperture radars operating in the Earth exploration-satellite service (active) around 9 600 MHz | NOC |  |
| **RS.2064-0** | Typical technical and operating characteristics and frequency bands used by space research service (passive) observation systems | NOC |  |
| **RS.2065-0** | Protection of space research service (SRS) space-to-Earth links in the 8 400-8 450 MHz and 8 450-8 500 MHz bands from unwanted emissions of synthetic aperture radars operating in the Earth exploration-satellite service (active) around 9 600 MHz | NOC |  |
| **RS.2066-0** | Protection of the radio astronomy service in the frequency band 10.6-10.7 GHz from unwanted emissions of synthetic aperture radars operating in the Earth exploration-satellite service (active) around 9 600 MHz | NOC |  |

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