

Resolution 21-2R1

**REQUIREMENTS, PERFORMANCE, AND PROTECTION CRITERIA
FOR EESS (PASSIVE) SENSORS**

The SFCG,

CONSIDERING

- a) that due to the continuous technological and scientific development, the requirements, performance and protection criteria for EESS (passive) sensors must be periodically reviewed;
- b) that the basic parameters related to requirements, performance and protection criteria for EESS (passive) sensors are contained in the ITU-R Recommendations SA.515, 1028, 1029 respectively;
- c) that any revision to these Recommendations requires a large consensus and a coherent approach in the parameters definition across all the passive bands;
- d) that three main categories of passive sensors can be identified for the use of these bands:
 - 1. 3-dimensional vertical atmosphere sounders requiring very high data reliability and medium resolution over multiple channels,
 - 2. Imaging radiometers requiring high data reliability, medium resolution, integration over relatively large bandwidth single channels,
 - 3. Atmospheric limb sounders requiring medium data reliability at very high resolution over many small bandwidth channels.
- e) that any performance requirement has to be based on known scientific requirements for the measurement; the data resolution and availability levels must therefore be scientifically meaningful with respect to the applications for which they are used (e.g. forecasting, surface observations and climate monitoring);
- f) that the implementation and orbiting of instruments capable of achieving the performance requirements should be met within a 10-year timeframe;
- g) that the data availability parameter currently applied for imaging radiometers (99%) is considered inadequate for several applications associated to those measurements;

h) that the resulting values in these Recommendations will not be applied retroactively;

RESOLVES

that Member Agencies submit to the SFCG contributions to update the values contained in Table 1, with a view to future updating of the ITU-R Recommendations listed in considering b).

TABLE 1

Performance criteria for satellite passive remote sensing

Frequency Band ⁽⁶⁾ (GHz)	Total BW required (MHz)	Reference BW (MHz)		Required ΔT_e (K)	Data availability (%) ³	Scan Mode N, L ⁽⁴⁾
1.370-1.400s, 1.400-1.427P	100	27		0.05	99.9	N
2.640-2.655s, 2.655-2.690s, 2.690-2.700P	45	10		0.1	99.9	N
4.200-4.400s, 4.950-4.990s	200	200		0.3/0.05*	99.9	N
6.425-7.250	200	200		0.3/0.05*	99.9	N
10.60-10.68p, 10.68-10.70P	100	100		1.0/0.1*	99.9	N
15.200-15.350s, 15.350-15.400P	200	50		0.1	99.9	N
18.600-18.800p	200	200		1.0/0.1*	95/99.9*	N
21.200-21.400p	200	100		0.2/0.05*	99/99.9*	N
22.210-22.500p	300	100		0.4/0.05*	99/99.9*	N
23.600-24.000P	400	200		0.05	99.99	N
31.30-31.50P, 31.50-31.80p	500	200		0.2/0.05*	99.99	N
36.000-37.000p	1 000	100		1.0/0.1*	99.9	N
50.200-50.400P	200	200		0.05	99.99	N
52.60-54.25P, 54.25-59.30p	6 700 ⁽¹⁾	100		0.3/0.05*	99.99	N
86.00-92.00P	6 000	100		0.05	99.99	N
100.0-102.0P	2 000	10		0.005	99	L
109.5-111.8P	2 000	10		0.005	99	L
114.25-116.00P	1 750	10		0.005	99	L
115.25-116.00P 116.00-122.25p	7000 ⁽¹⁾	200/10 ⁽⁵⁾		0.05/0.005 ⁽⁵⁾	99.99/99 ⁽⁵⁾	N, L
148.5-151.5P	3 000	500/10 ⁽⁵⁾ 200		0.1/0.005 ⁽⁵⁾	99.99/99 ⁽⁵⁾	N, L

155.5-158.5p ⁽²⁾	3 000	200		0.1	99.99	N
164.0-167.0P	3 000 ⁽¹⁾	200/10 ⁽⁵⁾		0.1/0.005 ⁽⁵⁾	99.99/99 ⁽⁵⁾	N, L
174.8-182.0p, 182.0-185.0P, 185.0-190.0p, 190.0-191.8P	17 000 ⁽¹⁾	200/10 ⁽⁵⁾		0.1/0.005 ⁽⁵⁾	99.99/99 ⁽⁵⁾	N, L
200.0-209.0P	9 000 ⁽¹⁾	3		0.005	99	L
226.0-231.5P	5 500	200/3 ⁽⁵⁾		0.2/0.005 ⁽⁵⁾	99.99/99 ⁽⁵⁾	N, L
235.0-238.0p	3 000	3		0.005	99	L
250.0-252.0P	2 000	3		0.005	99	L
275.0-277.0	2 000 ⁽¹⁾	3		0.005	99	L
294.0-306.0	12 000 ⁽¹⁾	200/3 ⁽⁵⁾		0.2/0.005 ⁽⁵⁾	99.99/99 ⁽⁵⁾	N, L
316.0-334.0	18 000 ⁽¹⁾	200/3 ⁽⁵⁾		0.3/0.005 ⁽⁵⁾	99.99/99 ⁽⁵⁾	N, L
342.0-349.0	7 000 ⁽¹⁾	200/3 ⁽⁵⁾		0.3/0.005 ⁽⁵⁾	99.99/99 ⁽⁵⁾	N, L
363.0-365.0	2 000	3		0.005	99	L
371.0-389.0	18 000 ⁽¹⁾	200		0.3	99.99	N
416.0-434.0	18 000 ⁽¹⁾	200		0.4	99.99	N
442.0-444.0	2 000 ⁽¹⁾	200/3 ⁽⁵⁾		0.4/0.005 ⁽⁵⁾	99.99/99 ⁽⁵⁾	N, L
496.0-506.0	10 000 ⁽¹⁾	200/3 ⁽⁵⁾		0.5/0.005 ⁽⁵⁾	99.99/99 ⁽⁵⁾	N, L
546.0-568.0	22 000 ⁽¹⁾	200/3 ⁽⁵⁾		0.5/0.005 ⁽⁵⁾	99.99/99 ⁽⁵⁾	N, L
624.0-629.0	5 000 ⁽¹⁾	3		0.005	99	L
634.0-654.0	20 000 ⁽¹⁾	200/3 ⁽⁵⁾		0.5/0.005 ⁽⁵⁾	99.99/99 ⁽⁵⁾	N, L
659.0-661.0	2 000	3		0.005	99	L
684.0-692.0	8 000 ⁽¹⁾	3		0.005	99	L
730.0-732.0	2 000 ⁽¹⁾	3		0.005	99	L
851.0-853.0	2 000	3		0.005	99	L
951.0-956.0	5 000 ⁽¹⁾	3		0.005	99	L

- (1) This bandwidth is occupied by multiple channels.
 - (2) This band is needed until 2018 to accommodate existing and planned sensors.
 - (3) Data availability is the percentage of area or time for which accurate data is available for a specific sensor measurement area or sensor measurement time. For a 99.99% data availability, the measurement area is a square on the Earth of 2,000,000 km², unless otherwise justified; for a 99.9% data availability, the measurement area is a square on the Earth of 10,000,000 km², unless otherwise justified; for a 99% data availability, the measurement time is 24 hours, unless otherwise justified .
 - (4) N = Nadir; Nadir scan modes concentrate on sounding or viewing the Earth's surface at angles near Nadir. The scan terminates at the Earth's surface and weighting functions peak from the surface to the top of the atmosphere. L = Limb; Limb scan modes view the atmosphere "on edge" and terminate in space rather than at the surface, and accordingly are weighted zero at the surface and maximum at the tangent point height. Nadir-scanning sounders have superior horizontal resolution; limb sounders have superior vertical resolution.
 - (5) Second number for microwave limb sounding applications
 - (6) P = Primary allocation, shared only with passive services (5.340); p = primary allocation, shared with active services, and s = secondary allocation
- * First number for sharing conditions circa 2003; second number for scientific requirements that are technically achievable by sensors within the next 10 years