

RECOMMENDATION ITU-R RA.1417

**A RADIO-QUIET ZONE IN THE VICINITY OF THE
L₂ SUN-EARTH LAGRANGE POINT**

(Question ITU-R 147/7)

(1999)

The ITU Radiocommunication Assembly,

considering

- a) that radio astronomy observations made by radio telescopes in space offer important advantages related to the avoidance of observing through the Earth's ionosphere and troposphere, and the use of very long interferometer baselines between telescopes in space and on the Earth;
- b) that the vicinity of the L₂ Sun-Earth Lagrange point (see Annex 1) is a relatively radio-quiet zone because of its great distance from the Earth (about 1.5 million kilometres);
- c) that quasi-stable orbits having radii up to about 250 000 km are possible in the vicinity of the L₂ point, and can be used by space astronomy stations;
- d) that space radio astronomy stations in the vicinity of the L₂ point are being designed (see Annex 2);
- e) that it is desirable for space radio astronomy stations in the vicinity of the L₂ point to be able to observe in most frequency bands, in order to exploit the full scientific potential of the L₂ point;
- f) that the low levels of spectral power flux-density in the vicinity of the L₂ point from the quiet Sun and from transmitters operating on the Earth and in space between the Earth and the geostationary orbit, would permit highly sensitive radio astronomy observations to be made at that location;
- g) that viewed from the L₂ point almost all sources of interference will lie within a cone no more than 3.2° across (as determined by the diameter of the geostationary orbit);
- h) that additional rejection of interference can be obtained by using antennas having low side lobes and back lobes,

recommends

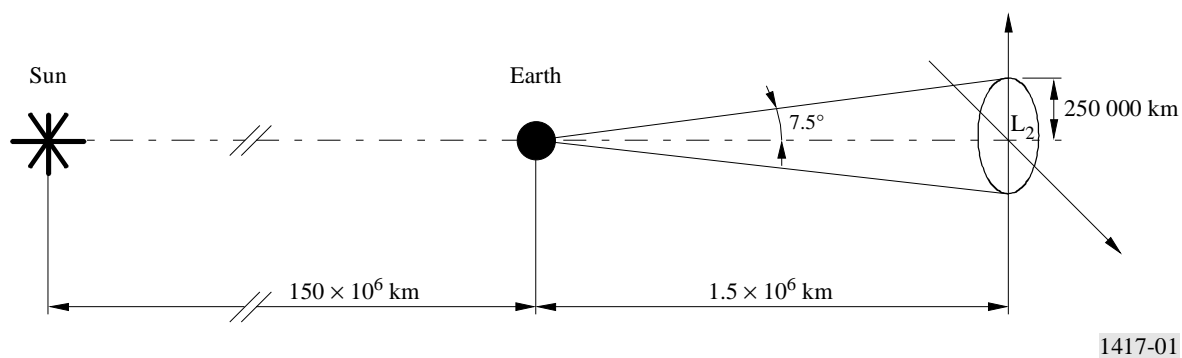
- 1** that administrations note the scientific importance of the L₂ point and take all practicable steps to maintain the radio-quiet environment in the vicinity of the L₂ point;
- 2** that administrations, in making frequency assignments that may affect missions near the L₂ point, should protect a volume of space of radius 250 000 km, centred on the L₂ Lagrange point of the Sun-Earth system as a coordination zone of low electromagnetic emission, where all radio transmissions originating in the coordination zone are confined to specified bands of frequencies and limited transmitter powers;
- 3** that to minimize mutual interference problems among space missions using the zone, administrations are urged to encourage the operators of those services to coordinate their activities.

ANNEX 1

Vicinity of the L₂ Sun-Earth Lagrange point

The L₂ Lagrange point of the Sun-Earth system lies 1.5 million kilometres from the Earth, in the anti-solar direction, on a line joining the barycentres of the Earth and Sun. There is an area around the L₂ point where objects will execute orbits that are stable for long periods of time, and are suitable for long-term space missions (see Fig. 1).

FIGURE 1
Typical geometry of an L_2 orbit



ANNEX 2

TABLE 1
Space radio astronomy missions to be launched into orbit around the
 L_2 Sun-Earth system point

Mission/ experiment	Type of mission	Dates	Observing frequency bands (GHz)
MAP	Cosmic microwave background	2000-2003	18-96
PLANCK	Cosmic microwave background	2005-2010	30 ± 3 44 ± 4.4 70 ± 7 100 ± 10 150 ± 28 217 ± 40 353 ± 65.5 545 ± 101 857 ± 158.5
FIRST	Submillimetre telescope	2005-2010	490-642 640-802 800-962 960-1 122 1 120-1 250 1 600-1 800 2 400-2 600
Millimetron	Space very long baseline inter- ferometry (VLBI)	2010-2015	22 ± 4 49 ± 4 89 ± 4 108 ± 4 221 ± 4