

EU Space Act: Response from the Royal Astronomical Society

This is the official response from the Royal Astronomical Society (RAS) to the proposed EU Space Act establishing common rules for space activities. The RAS represents around 4,000 astronomers, space scientists and geophysicists in 70 countries worldwide.

Although the RAS is a UK-based organisation, our research community maintains strong ties with EU countries, for example as a partner on Horizon Europe projects. The reflected light and radio signals (and interference across the electromagnetic spectrum) from satellites that cause potential harm to astronomy also do not respect international borders, so the proposed Space Act is a matter for astronomers everywhere. The UK is also a member of the European Space Agency, and has an interest through both launches of satellites and deployment of observatories in Low Earth Orbit (LEO, defined as an altitude of 2,000 km or lower).

We are also affiliated to the European Astronomical Society (EAS) and endorse its submission in full.

In summary we welcome the explicit inclusion of the mitigation of light and radio pollution in Articles 72 and 73 of the proposed Act. This is a major step forward for the harmonisation of the European framework for space activities, and reflects the concern of the astronomical community to protect dark and quiet skies.

European astronomers, including those in the UK, are major users of astronomical observatories on the ground and in space, and are heavily involved in the development of major new facilities such as the Extremely Large Telescope and the Vera Rubin Observatory, which will both operate at optical wavelengths, and the Square Kilometer Array Observatory radio telescope under construction in southern Africa and Australia. These publicly funded facilities should operate to their full capacity, something potentially compromised by the ongoing deployment of satellites in LEO, where reflected sunlight from and radio signals from spacecraft have their greatest impact.

Although the overall thrust of the Act is welcome, we suggest the following further changes (in line with those set out in the EAS submission):

1. Although Articles 72 and 73 explicitly indicate ‘mitigating’ and ‘limiting’, further specification in quantitative terms could strengthen the Act, specifically regarding radio interference. Article 72 explicitly mentions ensuring the visual magnitude for spacecraft is fainter than 7, and does not address limits for radio-frequency emissions.

As Article 104 foresees the definition of technical standardisation in accordance with Article 72, this framework could leave radio frequency pollution insufficiently regulated, since Article 72 only explicitly mentions optical brightness. To ensure comprehensive coverage, the provision could explicitly include quantitative limits for acceptable interference thresholds for radio astronomy services.

Since these limits are already defined in the ITU-R Radio Regulations, Article 72 should refer to them (specifically ITU-R Recommendations RA.769 and RA.1513). Our suggested text for inclusion after the first paragraph of Article 72(2) is: “The level of radio pollution from spacecraft and associated systems, including both radiation and emissions (as defined by the ITU-R Radio Regulations Volume 1 Article 1.137 and 1.138 respectively), into radio astronomy stations in frequency bands allocated to the radio astronomy service shall remain below the detrimental-interference thresholds defined in ITU-R Recommendations RA.769 and RA.1513”.

2. Apart from the already mentioned articles, other provisions in the Act could add an explicit mention of radio pollution, such as Articles 96-98. These provisions refer to the obligation of all operators seeking authorisation to submit an environmental footprint declaration. As Article 72 explicitly recognises light and radio as pollutants, a suggestion would be that Articles 96-98 refer to the specific technical standards to be soon defined in accordance with Article 104. This would be in addition to our suggestion about explicit reference to the ITU Radio Regulations, as mandatory items for authorisation of satellite licences.
3. A key concern for the radio astronomy community related to radio pollution is Unintended Electromagnetic Radiation (or UEMR).¹ Given the increasing number of satellites in orbit, the cumulative level of UEMR from onboard electronics has the potential to produce harmful interference in radio astronomy bands. While the ITU Radio Regulations clearly define the thresholds of interference for radio astronomy, it does not fully address this type of radio pollution, so regulation in this respect is required. The use of the term “radio pollution” in the Act appears suitable to encompass this type of electromagnetic radiation, and our proposal of text to be included in Article 72 of the Act would indeed incorporate the effects of UEMR as a necessary consideration for satellite constellations, mega-constellations and giga-constellations.