

Written evidence submitted by the Campaign for Nuclear Disarmament (CND)

Defence Committee Inquiry:

Space in Modern Warfare

The Campaign for Nuclear Disarmament (CND) campaigns to rid the world of nuclear weapons and other weapons of mass destruction and to create genuine security for future generations.

We believe the UK should reaffirm the importance of space as a global commons, which should be used for peaceful purposes. We would like to express the following concerns about space in modern warfare, which will be addressed in separate sections:

1. It is important to remember the UK is committed to the spirit and the letter of the 1967 Outer Space Treaty;
2. The UK is in a good position to seriously explore ways in which an arms race in outer space can be prevented and space can continue to be explored and used peacefully by all nations;
3. The rapidly increasing militarisation of space means that accidents or failures in vital space components could lead to catastrophe;
4. Increasing space activity is leading to increasing space debris which is becoming a serious problem;
5. Space launches have environmental effects that need to be better understood and recognised;
6. The huge increase in the number of satellites being placed in Low Earth Orbit means that the night sky is becoming crowded with moving objects which is causing problems for astronomers and for those who love to see the glory of the heavens.

1. The UK should reaffirm the commitments made by signing the 1967 Outer Space Treaty.

- a) The UK has signed and ratified the Outer Space Treaty¹ and should remember the belief, stated therein, “that the exploration and use of outer space should be carried on for the benefit of all peoples irrespective of the degree of their economic or scientific development”, also the desire “to contribute to broad international co-operation in the ... use of outer space for peaceful purposes” and further that “such co-operation will contribute to the development of mutual understanding and to the strengthening of friendly relations between States and peoples”.
- b) The UK is also committed, under Article II of the Treaty, to the understanding that outer space, including the Moon and other celestial bodies, is not subject to national appropriation by claim of sovereignty, by means of use or occupation, or by any other means. In addition, Article III limits state parties in the use of outer space to activities that “are in accordance with international law, including the Charter of the United Nations, in the interest of maintaining international peace and security and promoting international co-operation and understanding”.
- c) Article V forbids the placing “in orbit around the Earth any objects carrying nuclear weapons or any other kinds of weapons of mass destruction, install such weapons on celestial bodies, or station such weapons in outer space in any other manner”.
- d) Article IX declares that the “use of outer space, including the Moon and other celestial bodies, States Parties to the Treaty shall be guided by the principle of co-operation and mutual assistance and shall conduct all their activities in outer space, including the Moon and other celestial bodies, with due regard to the corresponding interests of all other States Parties to the Treaty”. It also seeks to avoid “harmful contamination and also adverse

¹ <https://unoosa.org/oosa/en/ourwork/spacelaw/treaties/introouterspacetreaty.html>

changes in the environment of the Earth” and if a State Party has reason to believe that an activity planned by it or its nationals in outer space would cause potentially harmful interference with activities of other States Parties, it shall undertake appropriate international consultations before proceeding with any such activity. Also, Article XIII states that the provisions of the Treaty shall apply whether the activities are carried on by a single State Party to the Treaty or jointly with other States.

- e) The Partial Test Ban Treaty of 1963, to which the UK is a signatory, states: “Each of the Parties to this Treaty undertakes to prohibit, to prevent, and not to carry out any nuclear weapon test explosion, or any other nuclear explosion, at any place under its jurisdiction or control: a) In the atmosphere; beyond its limits, including outer space; or under water, including territorial waters or high seas.” Any testing or use of nuclear weapons in outer space is against international law and would be contrary to the UK’s treaty obligations.
- f) While an arms race in space is sometimes presented as inevitable and unavoidable, it describes one possible outcome amongst a number of possibilities. Whether or not space becomes militarized depends on what states, including the UK, do over the next couple of decades.
- g) It is important to point out that the UK government does not stand to benefit from the unregulated military exploitation of space, not least because the UK is not among the leading developers of space systems. It is therefore in the UK’s security interests to push for a multilateral approach to control of the uses of space.
- h) **Recommendation** The UK should attempt at all times to use space for the benefit of all, with no aggressive intent or attempt to prevent others from its use. The 2018 United Nations Guidelines for the Long-term Sustainability of Outer Space Activities² should also be followed to protect the environment of space and of the Earth and the government should ensure that any space partners are aware of and follow these commitments.

2. Progressing initiatives through the UN

- a) The UK has made positive moves in the United Nations to reduce space threats through Resolution 75/36 “Reducing space threats through norms, rules and principles of responsible behaviours” which was adopted in December 2020³.
- b) **Recommendation** It is especially important to follow this initiative through when the report from the Secretary General on the views of member states on this issue is considered by the First Committee in October. Working for a united response to allow the peaceful use of space must include participation in confidence building measures between states and a mutual understanding that an arms race in space is undesirable and extremely dangerous. It would help with progressing issues of transparency if the role that each satellite launched from the UK, and UK-based agencies, were to be outlined in as much details as possible – even if they have a dual use for commercial and military applications.

3. The militarisation of space

- a) Space is becoming crucial for the military in several nations. The UK government stated in the Integrated Review “Global Britain in a competitive age” that it is planning for war in space and intends to have “the ability to monitor, protect and defend” its interests “in and through space” in contradiction of much of the positive work outlined in 2 above.⁴

² <http://www.spaceref.com/news/viewpr.html?pid=54243>

³ <https://www.un.org/disarmament/topics/outerspace-sg-report-outer-space-2021>

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https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/975077/

- b) The Integrated review also noted that some military space projects will raise “important questions about the interaction between economic opportunity, security and ethics, and the balance between the role of the state, businesses and individuals”. They also come with “considerable risks to strategic stability if ... not managed and regulated effectively”.
- c) The continued use of space systems for surveillance and the establishment of a citizen database, also bring “challenges to privacy and liberty” and that there is a “need to be active in ensuring effective accountability and oversight that protects democratic values, while opposing the overreach of state control”.
- d) These are extremely important issues that affect everyone and therefore require extensive and wide-spread discussion and consultation with politicians, academics, concerned citizen groups.
- e) Becoming dependent upon space presents serious problems. Space assets are extremely vulnerable and exceedingly difficult to defend. They can be temporarily or permanently disabled relatively easily by space or ground-based attacks. If, at a time of international tension, a vital space component was to suddenly cease to function due to technical failure, damage by collision or impact with a meteor say, it may be misinterpreted as an attack and lead to disastrous consequences. NATO has already declared that an attack in space could trigger their mutual defence clause to include a collective response.
- f) Of course, the UK is not the only country to think that a dominant position in space is a possible way forward. Space forces and space ports are being established in several countries.
- g) **Recommendation** The UK can lead the world in pulling back from hostile and confrontational behaviour. More openness concerning activities in space can help with building confidence and understanding between spacefaring nations. Sharing of facilities and resources, leading to fewer launches, is not only good for environmental reasons, it also helps build cooperation rather than aggressive competition and confrontation. The government should address the concerns raised in the Integrated Review about the development of space. It should publish a position statement to show how it will balance the economic opportunities, and security issues, with ethical principles arising from the use of space; how it will safeguard challenges to the privacy and liberty of UK citizens and others from the development of space; and how it will ensure its space programmes are accountable and have adequate oversight. This should be done in parallel with the development and publications of the Ministry of Defence’s forthcoming Space Strategy.

4. Space debris

- a) There is increasing international concern over the amount of space debris⁵. Some are even concerned that the density of objects in low Earth orbit (LEO) is approaching the so-called ‘Kessler syndrome’ when collisions between objects generates enough debris to cause a cascade of secondary collisions that generates more and so on in a chain reaction. One implication of this is that the distribution of debris in orbit could become so dense that space activities and the use of satellites in specific orbital ranges may become difficult or even impossible for future generations.
- b) The European Space Agency (ESA) has published the following statistics⁶:

[Global Britain in a Competitive Age- the Integrated Review of Security Defence Development and Foreign Policy.pdf](#)

⁵ https://www.esa.int/Safety_Security/Space_Debris/ESA_and_UNOOSA_illustrate_space_debris_problem

⁶ https://www.esa.int/Safety_Security/Space_Debris/Space_debris_by_the_numbers

- There have been about 6,060 rocket launches since the start of the space age in 1957;
 - These launches have placed 11670 satellites into Earth orbit;
 - Of these, about 7,200 are still in space and 4,300 are still functioning;
 - 28,600 debris objects are regularly tracked by Space Surveillance Networks;
 - Over 560 break-ups, explosions, collisions, or anomalous events have resulted in fragmentation of objects;
- c) Models also estimate that there are 34,000 pieces of debris greater than 10 cm and 900,000 objects in the range 1 cm to 10 cm, with 128 million between 1 mm to 1 cm in size. Each piece of debris travelling at thousands of miles an hour could penetrate and damage a satellite in its path.
- d) The ESA is developing a ‘Space Sustainability Rating’ (SSR)⁷ to shed light on this problem and space operators will be scored on “the sustainability of their missions, increasing the transparency of their contributions to protecting the space environment and encouraging and recognising responsible behaviour”.
- e) **Recommendation** Spacecraft operators, launch service providers and satellite manufacturers should be encouraged to join the SSR system and achieve a high level of certification. The ratings can be used to increase transparency and demonstrate a commitment to sustainability. More information via the World Economic Forum website⁸ and ESA’s Space Environment Report 2021⁹.

5. Environmental Impact

- a) In addition to space debris there are additional environmental concerns. Space launches can have a large carbon footprint due to the burning of solid rocket fuels. Rocket engines release trace gases into the upper atmosphere that contribute to ozone depletion, as well as particles of soot.¹⁰
- b) In addition, significant ground pollution effects have been reported at launch sites in the US and launch failures can cause considerable environmental damage and financial costs to local communities.
- c) Outer space should be treated as a pristine environment which humanity has a responsibility to safeguard. We are concerned that some of the programmes funded by the government have the potential to introduce harmful materials into space, such as the UK Space Agency’s support for Rolls-Royce to develop nuclear power for space exploration, which has the potential to transport fissile nuclear materials to Mars, and presumably abandon them there.¹¹
- d) **Recommendation** The government could encourage and finance more research into the effects of rocket launches on the environment and the upper atmosphere. Collaborative work with other countries who can or wish to host rocket launches could be encouraged. Priority should be given to research which respects the environmental issues associated with space exploration and programmes which are environmentally questionable and/or highly speculative in nature should be defunded.

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https://www.esa.int/Safety_Security/Space_Debris/Space_sustainability_rating_to_shine_light_on_debris_problem

⁸ <https://www.weforum.org/press/2021/06/new-space-sustainability-rating-addresses-space-debris-with-mission-certification-system>

⁹ https://www.esa.int/Safety_Security/Space_Debris/ESA_s_Space_Environment_Report_2021

¹⁰ <https://www.sciencedirect.com/science/article/abs/pii/S0959652620302560>

¹¹ <https://www.rolls-royce.com/media/press-releases/2021/12-01-2021-rr-uk-space-agency-launches-first-study-into-nuclear-power.aspx>

6. Losing the Night Sky

- a) Currently, many space developments (and thereby policies) are being created by individual billionaires, such as Elon Musk (through SpaceX, Starlink, etc.), Jeff Bezos (Blue Origin) and Richard Branson (Virgin Galactic) and the aerospace corporations, rather than by governments and international cooperative ventures.
- b) A commercial space race is underway to exploit the space environment to provide global fast 5G internet and communications coverage via tens of thousands of satellites launched into Low Earth Orbit. Space tourism is becoming a reality – but only for the super-rich.
- c) Elon Musk’s Starlink satellites are already causing problems professional and amateur astronomers have said that the light pollution produced by mega-constellations of satellites “pose[s] an existential threat to astronomy,” potentially ending “ground-based astronomy as we know it”.¹² Although the response has been that Starlink satellites have “no material effect on discoveries in astronomy”¹³ the light trails of the satellites that are already in orbit are seen to be causing harm.
- d) The reflected light of the satellites may also be interfering with the ability of migratory birds, seals, moths, frogs and other creatures to orient themselves and navigate at night. If the plans of SpaceX to launch tens of thousands of satellites actually go ahead, satellites will outnumber the 9,000 or so stars that are visible to the naked eye. As of late 2019, the first 122 Starlink satellites were already brighter than all but 172 of visible stars.¹⁴
- e) Astronomers launched an international appeal in January 2020¹⁵ to “safeguard the astronomical sky,” they are requesting that Starlink launches are put on hold and they ask governments to abide by existing treaties addressing environmental risks as outlined in point 1 above. Over 2,000 professional astronomers from 48 countries have signed the appeal. SpaceX and others should not continue to launch thousands of satellites before these serious issues and problems have been properly debated and resolved.
- f) **Recommendations** As with point 1 above, working with other nations to develop more sustainable rules and regulations on what is launched, where it is launched from and what the objectives of the launch are. The government could call for a moratorium on launches involving the establishment of a network of thousands of satellites in Low Earth Orbit.

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¹² <https://www.forbes.com/sites/startswithabang/2019/11/20/this-is-how-elon-musk-can-fix-the-damage-his-starlink-satellites-are-causing-to-astronomy/>

¹³ <https://www.geekwire.com/2019/sightings-spacexs-starlink-satellites-spark-awe-astronomical-angst/>

¹⁴ <https://www.universetoday.com/144949/astronomers-have-some-serious-concerns-about-starlink-and-other-satellite-constellations/>

¹⁵ <https://astronomersappeal.wordpress.com/>