Part II
Major Country Policies in the Changing Environment

Chapter 4
The UK in the Global Space Age

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This paper sets out a brief history of the UK in military space and contemporary UK policy while placing the UK in its immediate transatlantic geopolitical context, where it is entrenched in a "Global Space Age". The "bottom line up front" of this presentation is that the UK finds itself in a binary system, caught between the bigger blocs of the United States on the one hand and the European Union (EU) on the other. London has long had to manage its military and intelligence dependencies on the United States alongside its economic and scientific integration with Europe in space.[1]

Brexit did not cause such tensions or problems, but it has arguably made such tensions in Britain's position relative to the USA and Europe more acute. Brexit has deprived the UK of an important position within the European Union, which is crucial in shaping the wider European system, including the European Space Agency (ESA). A new, unpredictable Trump administration adds a new force of uncertainty to an already volatile geopolitical situation in Europe, which has to contend with a revanchist Russia, expeditionary North Korean forces, and authoritarian and populist political movements within the EU. As the EU may turn inwards and may have to contend with a trade war with both China and the USA, the US-UK "Special Relationship", particularly in nuclear, space, missile, and intelligence matters, will be strained further.

Therefore, the two biggest challenges facing the UK in space security are: how to make its relatively meagre resources matter and, more importantly, in which direction? There are no clear or easy answers to such difficult questions, but this paper may further a wider understanding of the challenges and trade-offs facing the UK Government in military space matters at the moment. Whilst the UK Government has published the Strategic Defence Review (SDR) and recognised the fundamental importance of space systems to modern defence planning and military capabilities, it did not provide a clear

[1] See: Bleddyn E. Bowen, "British strategy and outer space: A missing link?", *British Journal of Politics and International Relations*, 2018, 20:2.

list of priorities for capability investment at scale in space.[2]

Losing an Empire, Finding a Role?

How has the UK become more integrated with and dependent on others in space than many of its peers, such as France and Japan? Much of the answer lies in the UK's "Special Relationship" with the US, particularly in the nuclear, missile, and space dimensions, which still bears a dominating influence on UK space security and military power today. Therefore, exploring how this came about is important to understand the structural conditions British spacepower faces as we enter the middle years of the 21st century.

The UK has an interesting history in outer space and, like Japan, is still shaped by the legacies of big decisions made on space and rocket technologies back in the 1960s. Today, Britain has no sovereign launch capability and very few assets in orbit. 2025 or 2026 may see the first suborbital small satellite test launches from UK soil by companies such as Germany-based Rocket Factory Augsburg and UK-based Skyrora. Despite the absence of launch capability, Britain fields one of the most modernised military forces on Earth, which draws upon cutting-edge space support and intelligence from the United States and numerous allied states and companies. Compared to France, which is the fulcrum of the 'European' launcher industry and has a military with access to a range of sovereign or bilaterally operated satellites with Germany and Italy, Britain is far less of a direct or sovereign spacepower.

Yet Britain began the Space Age as a contender for the rank of third-place space power, after the Soviet Union and the USA. It would soon be overtaken, however, due to the collapse of the British Empire and a string of economic crises, ultimately settling into a new reality where the two superpowers dominated.[3] In the early years of nuclear and space technologies, the UK was investing in these new technological areas as they were seen as crucial to keeping up with the two new superpowers. Similarly to France, Britain was pushing ahead with its nuclear bomb and ballistic missile programmes. Britain was adamant to not repeat the experience of the US McMahon Act of 1946, which cut

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2 UK Government, "The Strategic Defence Review 2025 - Making Britain Safer: secure at home, strong abroad", 2 June 2025, https://www.gov.uk/government/publications/the-strategic-defence-review-2025-making-britain-safer-secure-at-home-strong-abroad

3 On British decline, nuclear weapons, and the early Cold War, see: Richard Moore, *Nuclear Illusion, Nuclear Reality: Britain, the United States and Nuclear Weapons, 1958–64* (Palgrave, 2010); Kristan Stoddart, *Losing an Empire and Finding a Role: Britain, the USA, NATO, and Nuclear Weapons* (Palgrave, 2012)

all allies, including the UK, out of all nuclear cooperation. This upended years of UK support and cooperation in the Manhattan Project. Britain doubled down on its nuclear weapons programme, Tube Alloys, and reckoned with the reality that the US was not as reliable a post-war partner as some had hoped.[4]

Ernest Bevin, the UK Foreign Secretary in the Attlee government, commented that:

> "We've got to have this… I don't mind for myself, but I don't want any other Foreign Secretary of this country to be talked at, or to, by the Secretary of State in the United States as I just have with Mr Byrnes. We've got to have [the nuclear fission bomb] over here, whatever it costs. We've got to have the bloody Union Jack [sic] on top of it."[5]

Of course, nuclear weapons are pointless without a delivery mechanism, unless one is building nuclear-tipped mines. Britain's delivery system was a Medium-Range Ballistic Missile (MRBM) called Blue Streak. It would be housed in silos on UK soil designed to reach the western/northern Soviet Union and other Warsaw Pact countries. Developed and tested through the 1950s, including at the Woomera test range in Australia, the rocket functioned well and, by some accounts, came in under budget. According to one historian, it was one of the last achievements of Britain's wartime state engineering prowess.[6] A Blue Streak missile remains on display at the National Space Centre in Leicester today.

Having lost interest in Blue Streak as an MRBM, London supplied it as the first stage of the Europa satellite launcher, the European Launcher Development Organisation's (ELDO) first and only attempt at a pan-European launch system. Blue Streak was the first stage, with a French second stage, a West German third stage, and an Italian test satellite. It failed but sowed the seeds for the formation of the European Space Agency (ESA) in 1973, which eventually went on to develop the successful Ariane rocket family. Britain also developed the Black Knight and Black Arrow Space Launch Vehicles (SLVs). The Black Arrow, known as the "lip stick" due to its bold red satellite fairing, successfully launched the British satellite Prospero from Australia in 1971.

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4 Bleddyn E. Bowen, *Original Sin*: *Power, Technology and War in Outer Space* (Oxford University Press, 2023), pp. 68-70

5 Peter Hennessey, *The Secret State: Preparing for the Worst, 1945-2010* (Penguin, 2010), pp. 50-51

6 Richard Moore, "Bad Strategy and Bomber Dreams: A New View of the Blue Streak Cancellation", *Contemporary British History*, 2013, 27:2, pp. 147, 149, 158

Yet Britain cancelled both its Blue Streak and Black Arrow projects and withdrew entirely from the European rocket business by the time ESA came about. Much of the reason for abandoning the SLV effort lies in the UK's military, economic, and political relationship with the US. Unlike the rest of Europe, the UK benefitted from a genuine "Special Relationship" in nuclear, missile, and space technologies as well as in intelligence sharing and cooperation to a level no other European had. The UK was given launcher access for all its satellite needs, whereas the US in the 1960s was reluctant to offer military and commercial launch services to Western Europe, instead offering launches for only 'scientific' satellites. Though the US would open up its launcher access to other NATO allies, it vindicated the Gaullist approach to nuclear, missile, and, by extension, SLV technology development.[7]

A crucial military factor in the cancellation of Blue Streak was that it was seen by some in Whitehall as inherently vulnerable to a Soviet first strike, being a land-based deterrent. Such concerns were first raised in 1957 in the Ministry of Defence.[8] Following the Skybolt and Polaris nuclear missile decisions of the 1960s, Britain no longer had the need for an MRBM or any heavy ballistic missile capability as it could rely on the United States to provide cutting-edge delivery systems at a fraction of the cost of sovereign British equivalents. The Polaris and subsequent Trident deals would ensure that the UK could build nuclear-powered ballistic missile submarines (SSBNs) under licence. With the nuclear deterrent issue resolved, an all-British ballistic missile programme lost its *raison d'etre*. Access to US imagery and signals intelligence from satellites also took away a driver for sustaining a British ballistic missile and SLV programme. Alongside this, Britain became a crucial node in the US Ballistic Missile Early Warning System (BMEWS) with the RAF Fylingdales radar site and invested in the Skynet SATCOM system. These were exceptions to the general rule of dependency on the United States on the military front and integration with Europe on industrial and scientific endeavours.

Space and Nuclear Empires

The origins of humanity's space age cannot be divorced from historically expansive centralised industrial states; nuclear weapons and missile technology; and the damage of nuclear testing and rocket developments on local, marginalised communities and

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7 Bowen, *Original Sin*, pp. 72-74

8 John Boyes, *Blue Streak: Britain's Medium Range Ballistic Missile* (Fonthill, 2019), pp. 104-105

peoples of the global periphery. Like most contemporary space powers, Britain had an imperial and colonial legacy that shaped its early space development. Britain is not in an optimal zone for equatorial launches – but Australia provided what was deemed to be ample ground for missile/SLV test sites and more equatorial launch points. Woomera was a major test site, but it negatively impacted the aboriginal communities that lived there. Little consideration was given to the impact of the test site itself or to the socio-economic and environmental impact of settling a town of 4,500 Europeans and White Australians in such a location. The use of imperially gained settler-colonial territories in space industry is not unique to Britain. France in Algeria and Guiana, the US across the Pacific and Diego Garcia, the Soviet Union in Kazakhstan, China in Xinjiang, and the USA and Italy in Kenya all show a common thread of imperial practices and space technology. In this context the reversal in technological capabilities between Britain and India is remarkable – today, British companies are paying the Indian Government to launch British satellites into space.

As the work of Alice Gorman and Peter Redfield show,[9] the metropole "suddenly" found geographical sites of supreme interest in the periphery, sites that had long either been of little value or home to penal systems. Now the Space Age demanded these locations, and the imperial centres pushed forward Space Age development at the further expense of people and communities that had already been marginalised or decimated by centuries of empires that were now reaching beyond the atmosphere. Our intention is not to explore such things in depth, but this highlights the impacts of the Global Space Age on the ground in very real and tangible ways on communities that are often invisible when we think, speak, and act in 'space'. Such marginalised perspectives and experiences need to be remembered and integrated into the histories that we are more familiar with: the histories of the centres 'reaching out'. It is no less true when considering politics and strategy in space. Looking ahead to the maturing years of the 21st century, this should serve as a reminder that many Global North states are not ideally located for heavy-lift equatorial launches or reaching deep space. Such states will continue to rely on access to distant locations and may rely on vulnerable logistics chains (e.g. Korou and Wenchang spaceports).

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[9] Alice Gorman, "La terre et l'espace: rockets, prisons, protests and heritage in Australia and French Guiana", *Archaeologies*, 2007, 3:2; Peter Redfield, *Space and the Tropics* (University of California Press, 2000)

Major UK Space Policy Documents

Throughout the remainder of the Cold War, the UK deepened its military dependencies on the United States in space whilst participating in the economic and scientific integration of the Western European space sector, notably through the ESA and later the EU. There was no major national civil UK 'space programme' as it was instead a range of projects carried out by British universities and small high technology industries as part of European and American collaborative projects. On the military side, Skynet SATCOMs remained the UK's general exception to wholesale dependence on the U.S. regarding space-based military and intelligence platforms. Commercially, UK industry remained significant globally for telecommunications (e.g. Inmarsat) and maintained niche component manufacturing, downstream application, and service strengths in the space industry.

It was not until the 2010s that the UK Space Agency was formed to oversee most UK science and research space activities. The following years saw a range of UK Government space policy documents released for the first time, including the 2014 National Space Security Policy, the 2015 National Space Policy, the 2021 National Space Strategy (NSS), and the 2022 Defence Space Strategy (DSS) and Joint Doctrine Publication 0-40 UK Space Power. Collectively these documents, overseen during almost a decade and a half of mostly Conservative Party governments, have institutionalised space policy in all its forms in the British state's bureaucratic machinery. 2021 saw the formal inauguration of UK Space Command, incorporating the many duties of the former Joint Forces Command. It is now the primary point of training, public communications, operations, and capability acquisition for space in the Ministry of Defence. Indeed, contrary to my own argument penned in 2018, it is fair to say that, as of 2025, spacepower is no longer as much of a "missing link", or a neglected domain, in official British strategic thinking, professional vernacular, and official policy processes related to wider security and defence decision-making.[10]

The 2021 National Space Strategy (NSS) set out a general plan for £10bn of spending over 10 years. Half of this – around £5bn – is being spent on Skynet 6. Approximately £1.4bn was allocated to other Ministry of Defence space projects, including the ISTARI space-based Intelligence,Surveillance and Reconnaissance (ISR) research, development, and testing programme in particular. The 2022 DSS, the first of its kind in the UK, emphasised the "own, access, collaborate" approach to space capabilities. This recognises

[10] Bowen, 'British strategy and outer space'.

the rather limited unilateral capability the UK has in space and its long-established dependencies on the US and integration with Europe. The Integrated Review of Defence and Security in 2021 was notable in the prominence it afforded to spacepower in the all-of-defence document and dedicated several pages to space-specific defence issues.[11] This kind of attention and profile for space in the Ministry of Defence (MoD) was unthinkable 15 years ago but falls in line with the general European trend of converging with U.S. policy and discourse on military space and potential threats from China and Russia due to their military modernisation and anti-satellite weapons development.[12] Prior to the 2010s the UK did not conceive of space policy as a particular area that needed explicit and public Government statements, language, or central direction. This institutionalisation of space policy has also reached the Devolved Administrations, with the Scottish and Welsh Governments releasing their own space strategies in 2022 and 2021, respectively.

The NSS, Space Industrial Plan, and devolved space strategies emphasise that the UK Government, prior to the Labour government entering in summer 2024, was primarily interested in using space for economic growth, services and manufacturing exports, and foreign direct investment. Given the growth-focused rhetoric of the new Labour government, it would not be surprising to see a continuation of the major strands of current UK space policy. The 2025 SDR does not indicate a significant shift in priorities, though it mentions a possible interest in space and Earth-based weapons for the first time. However, the SDR is not a firm programmatic commitment but more a summary of general views and recommended courses of action. Government policy and decisions will need to be more specific and engage with trade-offs in a way that the SDR cannot. The Labour Government has already reconfirmed its commitment to the building of the military Deep-Space Advanced Radar Capability (DARC) radar in Wales and has continued to invest further public funds into UK small launch capabilities in Scotland and Shetland.[13]

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[11] UK Government, "Global Britain in a Competitive Age: the Integrated Review of Security, Defence, Development and Foreign Policy", 16 March 2021, https://www.gov.uk/government/publications/global-britain-in-a-competitive-age-the-integrated-review-of-security-defence-development-and-foreign-policy (accessed 28/01/2025)

[12] Bleddyn E. Bowen, "How to Approach Nato Deterrence and Defence Aspects", in Nicolò Fasola et al, *Space: Exploring NATO's Final Frontier* (IAI, 2024)

[13] UK Government, "Deep Space Advanced Radar Capability (DARC)", 8 August 2024, https://www.gov.uk/guidance/deep-space-advanced-radar-capability-darc (accessed 28/01/2025); UK Government, "Scottish rocket launch boost to get Britain back into space race", 29/01/2025 (accessed 29/01/2025)

2023 National Space Strategy in Action

In 2023, the UK Government released an update to its 2021 NSS – the NSS in Action.[14] It contains a 10-point plan, which is a useful overview of the then-Government's priorities and helps give a taste of UK space policy. The 10-point plan is:

1. Capture the European market in commercial small satellite launch
2. Fight climate change with space technology
3. Unleash innovation across the space sector
4. Expand our horizons with space science and exploration
5. Develop our world-class space clusters
6. Lead the global effort to make space more sustainable
7. Improve public services with space technology
8. Deliver the UK Defence Space Portfolio
9. Upskill and inspire our future space workforce
10. Use space to modernise and transform our transport system

The list is very broad and ambitious, covering almost every sector of space activity, from launches to defence, the workforce, and terrestrial transport. There is nothing particularly objectionable within these priorities in general and on their own terms. Therefore, there is ample material for the Labour ministers and secretaries of state to work with in crafting a new UK space policy. However, questions remain on the coordination of such efforts and activities – for example, interest in UK launches is not matched by an ambitious UK-funded satellite programme to provide the assured demand for such launch services, which would stimulate private investment in the UK launch sector. Whilst the UK MoD is interested in fielding more satellites, they are of a class and orbital regime that cannot be serviced by UK launches. Continued financial difficulties in the British higher education system, [15] which is highly regulated by the state, directly challenge UK Government ambitions regarding the development of a capable workforce and the technologies and innovations needed to keep Britain's space and science industries globally competitive.

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[14] UK Government, "National Space Strategy in Action", 2023, https://www.gov.uk/government/publications/national-space-strategy-in-action/national-space-strategy-in-action (accessed 28/01/2025)

[15] Tom Williams, "Public funding rebuke leaves universities looking for small wins", *Times Higher Education*, 27 January 2025, https://www.timeshighereducation.com/news/public-funding-rebuke-leaves-universities-looking-small-wins (accessed 29/01/2025)

The UK is continuing with the development of spaceports for very small satellites and polar orbits. The UK Government has provided tens of millions of pounds of funding but also is hoping that commercial interest will develop the financial support necessary for companies like Orbex and Skyrora to complete the development of their small SLVs. The ESA has also contributed various funds to UK launch companies. At the time of writing, there is no discernible or announced MoD interest in such launch capabilities. The DSS states, "Though we will not develop our own independent launch systems, we will continue to support the UKSA in the advancement of UK-based space launch activities".[16] This suggests that UK launches are not intended to satisfy any UK military needs, but the UK Government has more recently boasted of UK launch contributions to a new NATO initiative – STARLIFT – to increase launch capacities in the alliance. Therefore, foreign military needs might be targeted for UK launches before UK military needs.[17]

Defence Highly Assured Capability Areas

Of particular note within the NSS in Action document is a section that highlights Defence Highly Assured Capability Areas. These highlight main areas of interest for the UK MoD in "assured" capabilities. Some of these are owned, others are collaborations with trusted partners, and many are foreign-owned but are trusted as offering assured access for UK needs, such as systems fielded by NATO allies:

- SATCOMs
- Space Domain Awareness
- Intelligence, Surveillance and Reconnaissance
- Space Control (resilience, 'defensive space control')

These translate into more detailed Technical Priority Areas, where the UK has varying degrees of existing capabilities. In addition, these areas will likely be open to further development or expansions in the future. SATCOMs are one area where the UK

[16] UK Government, "Defence Space Strategy: Operationalising the Space Domain", 1 February 2022, https://www.gov.uk/government/publications/defence-space-strategy-operationalising-the-space-domain (accessed 28/01/2025), p. 32

[17] UK Government, "UK to support NATO space launch capabilities and artillery supplies", 17 October 2024, https://www.gov.uk/government/news/uk-to-support-nato-space-launch-capabilities-and-artillery-supplies (accessed 29/01/2024)

provides major investment, namely the Skynet constellation. Two 4th generation Skynet satellites are being phased out, and it is likely that three 6th generation Skynet satellites will be deployed to join the five 5th generation Skynet satellites currently in orbit. The UK is also home to several SATCOM companies, including Inmarsat. Together with other companies that include Airbus, the UK does have a good position relative to its overall capabilities in space with the telecoms sector, which would provide a solid industrial basis for any expansion of UK SATCOMs for assured capabilities and services.

In 2020, the Johnson Government bailed out the OneWeb megaconstellation company for $500m alongside a similar investment from the Indian company Bharti Telecom. The UK held a majority of shares in the 600-satellite company, which had manufacturing premises in Florida. However, in 2022, OneWeb was merged with EUTELSAT, which reduced the UK's overall share proportion in the new venture.[18] In February 2024, EUTELSAT sold the OneWeb venture to Airbus, which now is the sole owner of the company, with the UK Government retaining 19% of shares as well as the right to veto clients based on security grounds.[19] It was estimated in early 2024 that the value of those shares is half of their value when the Government bailed out OneWeb in 2020.[20] It is unknown what role OneWeb will have in future UK plans – civil or military – if any at all. The French President Emmanuel Macron announced that the French Ministry of Defence is interested in developing OneWeb as a SATCOM provider as part of EUTELSAT, and the next 100 OneWeb satellites will be built in France.[21]

Space Domain Awareness (SDA), previously known as Space Situational Awareness (SSA), is another area where the UK has existing strengths and capability and is investing more. A major part of the US Ballistic Missile Early Warning System (BMEWS) is the RAF Fylingdales Phased Array Radar in the North Yorkshire Moors. Whilst this is first and foremost a ballistic missile radar, its secondary mission is to detect and track objects in space. This information is fed into the US Space Surveillance Network, where combined US and UK information is transmitted to the National Space Operations Centre at RAF

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18 UK Government, "OneWeb merger with Eutelsat", 26 July 2022, https://www.gov.uk/government/news/oneweb-merger-with-eutelsat (accessed 28/01/2025)

19 Alun Williams, "Airbus buys out OneWeb from AOS jv, satellite manufacturing facility", *Electronics Weekly*, 12 February 2024, https://www.electronicsweekly.com/news/business/airbus-buys-out-oneweb-from-aos-jv-satellite-manufacturing-facility-2024-02/ (accessed 28/01/2025)

20 UK House of Commons Treasury Committee, "Oral evidence: Work of UK Government Investments, HC 494", 6 February 2024, https://committees.parliament.uk/oralevidence/14262/pdf/ (accessed 28/01/2025)

21 Rachel Jewett, "France to Increase its Stake in Eutelsat, Military Reaches Agreement for LEO Access", *Via Satellite*, 18 June 2025 (Accessed 18/07/2025)

High Wycombe.[22] This general BMEWS and SSA/SDA arrangement emerged in the early years of the Space Age and is an important manifestation of the US-UK "Special Relationship" and the Mutual Defence Agreement.

As part of AUKUS Pillar II, a UK-based DARC programme was announced during the Sunak government[23] and then re-confirmed with the Starmer government.[24] The proposed site is at Cawdor Barracks, Pembrokeshire, on the south-west Wales coastline. This barracks is home to the British Army's 14th Signals Regiment, a major electronic warfare unit. This would be Britain's first *dedicated* military space tracking facility once local planning is approved. Lockheed Martin has been awarded $200m for the fabrication of the radar hardware, with the entire site to be completed by 2030.[25] The DARC system includes three such sites, with another in Australia and the third in the United States. Together these facilities provide greater global radar coverage of the geostationary belt, including a sensor in the southern hemisphere. They will be staffed and operated by 100 MoD personnel from 14th Signals and presumably civilian contractors.

Regarding ISR, the UK has embarked on the ISTARI programme. It consists of four research and development satellites contracted with Surrey Satellite Technology Ltd (SSTL) to test systems and sensors in low-Earth orbit. Tyche is an electro-optical visible light imagery intelligence (IMINT) satellite and was launched in 2024. Juno is scheduled for launch in 2027 and is also an IMINT satellite. Titania is an experimental laser communications satellite, and Oberon is a Synthetic Aperture Radar (SAR) satellite. Titania and Oberon are expected to be launched in 2025 or 2026. These are research and development satellites and should not be viewed as a full operational constellation due to their small numbers and staggered deployment. It is unclear what the next steps for a space-based ISR system will be for the UK. Given budgetary and workforce constraints, it is unlikely the UK could field a large constellation of a single type of these satellites quickly, let alone multiple types. In addition to the challenges of constructing and operating a large fleet of ISR systems, the analytical burden of a new ISR constellation (as

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22 UK National Space Operations Centre, "About us", https://www.gov.uk/government/organisations/national-space-operations-centre/about (accessed 28/01/2025)

23 UK Government, "New deep space radar will transform UK security", 2 December 2023, https://www.gov.uk/government/news/new-deep-space-radar-will-transform-uk-security (accessed 28/01/2025)

24 UK Government, "Deep Space Advanced Radar Capability (DARC)", 8 August 2024, https://www.gov.uk/guidance/deep-space-advanced-radar-capability-darc (accessed 28/01/2025)

25 Mikayla Easley, "Northrop Grumman awarded $200M deal for deep-space radar that will be hosted in Wales", *Defense Scoop*, 23 August, 2024, https://defensescoop.com/2024/08/23/space-force-darc-radar-site-wales-cawdor-barracks-northrop-grumman/ (accessed 28/01/2025)

well as increased SSA sensors) remains a challenge to address given the highly specialised technical nature of such analysis as well as general staffing and recruitment issues faced by Western militaries.

Space control remains ill-defined at this stage, but the NSS in Action document does refer to hardening and resilience measures for satellites against electronic warfare and laser dazzling, among other forms of satellite interference. It also refers to manoeuvring capabilities, which is a reference to increasingly sophisticated and possibly belligerent Russian and Chinese proximity and orbital operations in recent years. These would correspond to defensive space control operations as well as passive and active variants as described in the UK Ministry of Defence's space doctrine.[26] Though the UK doctrine recognises and defines offensive space control, there is no evidence in writing that the UK is pursuing offensive anti-satellite capabilities of any kind, including "soft-kill" mechanisms (i.e. electronic warfare, cyber operations). The UK has signed the US test ban moratorium on direct-ascent kinetic kill ASAT systems. Therefore, a hard-kill capability of that kind remains off the table for the UK for the foreseeable future.

Position, Navigation, and Timing (PNT) systems are not included in such a capabilities list, but PNT investments do feature prominently in the 2024 Space Industrial Strategy. However, it lacks detail on what kinds of PNT developments the previous UK Government may have been interested in when it penned that strategy. Whilst a GNSS such as GPS or Galileo or even an augmenter such as QZSS or EGNOS are beyond the reasonable means of the UK for the foreseeable future, there are other PNT technologies, particularly non-space-based systems, that could act as resilient home island backups in the event of widespread GNSS failure, such as eLORAN radio beacons and cellular network positioning systems.

The Global Space Age

Now that the UK space security situation has been looked at in some detail, it is important to put Britain into its contemporary geopolitical context. As you can see in Table 1, the UK holds or has registered 653 satellites as of May 2023. Of those, 588 are OneWeb satellites that are manufactured in Florida and owned entirely by Airbus, a transnational European company. The extent to which it is truly a 'British system' is

[26] UK Government, "UK Space Power (JDP 0-40)", 19 October 2022, https://www.gov.uk/government/publications/uk-space-power-jdp-0-40 (accessed 28/01/2025)

up for debate. However, that still leaves 65 satellites held within Britain, the majority of which are commercial SATCOMs.

At the European scale, the above is not insignificant. However, on the global level, the UK is not the most capable state based on numerous indicators. Whilst Japan enjoys a similar level of satellite registrations (OneWeb excepted), it also, like India, possesses a viable heavy lift Space Launch Vehicle (SLV) industry and capacity that guarantee sovereign access to space, which could be ramped up in the future should circumstances require and budgets allow. China and the US are of course in different categories, with the US perhaps in a category of its own. Yet China remains firmly in second place as it can already field all forms of spacepower at a significant scale. Russia remains a significant space power but is in long term decline as it continues to rely on its Soviet heritage and struggles to modernise key infrastructures, such as the GLONASS GNSS.

Collectively, Europe is significant on paper, but its fragmented and complex political structures hold back its collective material potential. That said, where the EU can forge a consensus and assemble budgets, it is difficult to stop once it is in motion. The EU has developed important systems such as the Galileo GNSS and the Copernicus imaging system while also creating institutional demand for the Ariane SLVs. Once an agreement is reached on the fundamental architecture and funding, there is little reason to doubt that the EU will eventually succeed in deploying the new IRIS^2 secure SATCOM constellation. Few other space powers could match the industrial scale of such a project on a unilateral basis. Whether Britain could participate in any way or access such important systems in the future remains subject to wider UK-EU post-Brexit settlements.

Yet much military satellite capability remains focused on Member States and bilateral cooperation. Furthermore, European states compete as often as they collaborate on commercial and industrial matters in space. Nevertheless, in a crisis or war situation, there is a pool of resources that many European allies can draw upon, which NATO is taking a role in facilitating and integrating now that it has recognised outer space as an operational domain and explicitly stated that an attack on a satellite could trigger an Article V response.

Actor	Total Satellites (Owned/Registered Within)
USA	8,241
EU, European Space Agency, plus Member States	1,204 (of which in UK: 58)
China	978
Russia	290
Japan	110
India	71
Canada	52
Republic of Korea	38
Türkiye	28
Republic of China (Taiwan)	18
United Arab Emirates	18
Brazil	16
Others	300

Table 1: Satellites by State as of March 2025[27]

The table above shows the proliferation of space systems not only from China and the U.S. but importantly the rest of the world as well. Whilst calling such a world multipolar may be going too far, the reality is that there are more independent centres of spacepower now than 40 years ago, with significant impacts for future space development. Already, China can provide high quality and a broad spectrum of space services and joint cooperative ventures for states that may wish to avoid U.S. or European entanglements. With Japan, India, South Korea, and the United Arab Emirates increasing their own spectrum of competencies in a range of space technologies and industries, the forthcoming years of the 21st century will provide yet more opportunities for space developments and business beyond the direct control and influence of the US and China.

Whilst such states clearly have an interest in developing greater sovereign space capabilities, they will also seek export opportunities in the global market. Whilst Britain will remain an exporter of commercial SATCOM capabilities as well as some specialised commercial imagery and small satellite buses, it remains to be seen whether it will be

[27] Jonathan C. McDowell, General Catalog of Artificial Space Objects, 18 March 2025

able to compete in the areas the EU, Japan, India, and South Korea will choose to invest the bulk of their resources in. The UK has to recognise its relatively modest sovereign capabilities in a century where an increasingly large proportion of space developments, investments, and innovations will occur in Asia.

The SDR: Caught in a Binary System?

The UK therefore must act at all times with regard for its allies and partners, and it has no independent access to outer space and relies for the most part on satellite and space services provided by allied states and private sector entities. The UK is dependent on the USA for military and intelligence space systems, which is a tangible manifestation of the "Special Relationship" between London and Washington. The UK continues to enjoy privileged access to US nuclear, missile, and intelligence technologies, information, processes, and practices that no other state can boast. RAF Fylingdales and RAF High Wycombe are specific examples of the embedded nature of the UK in this nexus, where information flows rather freely between the two states in the space-nuclear dimension. Government Communications Headquarters (GCHQ) and the US National Security Agency (NSA) also enjoy a close partnership, an intelligence partnership that transmits heavily via secure SATCOMs. The UK MoD is entirely dependent on the USA for most overhead ISR capabilities and of course for military GPS services.

Whilst this has generally served the UK well by avoiding the need to duplicate space systems with its minimal resources, there are always tensions inherent in such a dependent relationship, which can flare up when transatlantic relations are stressed. During the Falklands War, the reluctance of the U.S. to share all space-based intelligence, including Signal Intelligence (SIGINT), as required by the MoD led PM Margaret Thatcher to explore the potential for a UK SIGINT satellite called Zircon – in the face of persistent Cabinet opposition.[28] Should the U.S.-UK relationship be strained in the future, the impacts on the UK's military space access would be difficult to overstate and could ensnare the rest of the Five Eyes states as well.

Whilst the UK relationship with the US in the military and intelligence dimension can be described as one of dependency, the UK's relationship with 'Europe' (broadly defined) can be labelled as 'integrated'. This label accurately describes the situation both before and after the Brexit process began in 2016. The UK has traditionally pooled

[28] Bowen, *Original Sin,* pp. 137-138

resources in space industry and science with Europe – firstly with the ELDO, the European Space Research Organisation (ESRO), and the ESA. As a founding member of these organisations and one of their larger states, the UK has maintained a significant presence in the high technology industries and university research ecosystems that have driven the main missions and achievements of ESA and, until recently, the EU in space. Without European cooperation, British companies and Universities would struggle to find customers or collaborative projects that their specialised capabilities could contribute towards. Traditionally 75% or so of the UK civil space budget goes directly to ESA and returns as part of large collaborative projects that the UK could not do on its own.

At present the UK is the 5th largest contributor to the ESA budget – after the EU, Germany, France, and Italy. Recently the UK has been jostling in position with Italy, but a jump in Italy's contribution seems to have concluded that budgetary struggle within ESA. The contributions for ESA are extremely important due to its principle of "georeturn", where ESA attempts to ensure that contributing states receive a 1:1 return on investments. However, that principle may be revisited in the near future.[29]

The status of EU-ESA relations remains in flux due to the increasing weight of the EU as a major space actor and ESA's status as its primary contractor and biggest contributor. The UK's exit from the EU has changed the dynamics of ESA as now there is a major member of ESA outside the EU bloc. Switzerland and Norway were in this category before as well, but they are smaller and much more integrated in the wider European economic and customs system. With Britain's departure from all EU structures, the UK and ESA are still finding their way in this new political-institutional reality. The EU's expansion of the GNSS Space Agency (GSA) into the Agency for the European Union Space Programme (EUSPA) in 2022 has raised some concern that, in the longer term, this may displace ESA as the major 'European' space institution. In EU-funded space projects, participation and contracts are not guaranteed to be open for competition or negotiation, and there can be no participation in security-related dimensions of such programmes for non-EU members. This reality was evident in 2019 during the Galileo exit row between London and Brussels.[30]

With a revanchist Russia seizing territory by force of arms and right of conquest;

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[29] Jeff Foust, "ESA to use launch competition to test georeturn reforms", *Space News*, https://spacenews.com/esa-to-use-launch-competition-to-test-georeturn-reforms/ (accessed 29/01/2025)

[30] UK House of Commons Exiting the EU Select Committee, "Oral evidence: The progress of the UK's negotiations on EU withdrawal, HC 372", 9 May 2018, https://committees.parliament.uk/oralevidence/7948/pdf/ (accessed 28/01/2025)

11,000 North Korean troops fighting in Europe; and an increasingly isolationist USA, concerns about European contributions to NATO are in the ascendancy once more. NATO is not pursuing sovereign capabilities of its own, but it can still play an important role in pooling the resources of its members and facilitating the processes of interoperability and compatibility between terrestrial military forces and space systems. The 2022 Strategic Concept and 2019 Space Policy have elevated the salience of space security and space warfare for the alliance in light of Russian aggression and anti-satellite weapons development. For now, at least, much of NATO is "singing from the same hymn sheet" regarding the bigger picture of the threat of space warfare, which is a sea change from 20 years ago, when Europe and the United States could not agree on the existence, let alone the nature of, chronic threats in the space domain.[31]

The UK's dependency on the US puts it in an important position in NATO as a very experienced user of US space systems, and the UK will therefore be able to assist with the development and training of NATO militaries that may not be as integrated in US space systems. However, this also places Britain in a more compromised position should wider transatlantic NATO relations break down in the years to come. Even if British investments in its space system continue, it will still have a long way to go to reach the level of sovereign operational space capability that France, Italy, Germany, and Spain have possessed for many years. These European states have long had bilateral or multilateral military space capabilities, usually in SATCOMs or ISR, that the UK has traditionally not participated in. That said, the UK has much to offer with its space industry and military experience should there be an appetite for more international cooperation within or outside Europe after its testing phases of ISTARI are complete in the coming years.

The Russian-Ukrainian War has again shown the value of space systems in major conventional operations or "high intensity wars". In my view, much of the discourse surrounding the "lessons learned" from the use of space systems seems to echo the language of the so-called "First Space War" of the 1991 Gulf War regarding the use of space systems by the U.S. military against Iraq as well as some of the more hyperbolic claims about "transparent battlefields", "net-centric warfare", and "information dominance" from the "Revolution in Military Affairs" (RMA) literature of the 1990s and 2000s. Once again, the value of a space 'backbone' of C4ISR systems has shown how even an ad-hoc assembly of such services can be instrumental in blunting the advances

[31] Bowen, "How To Approach", p. 80

of heavy, massed formations and demonstrated the effective use of limited personnel and ammunition reserves.

Of course, it is important to learn the technical-tactical details of current and new systems and how they enable new techniques and opportunities. However, the larger strategic forces at work with the use of space systems have not diverged dramatically since the 1990s – space systems can still make military forces more efficient, lethal, mobile, and survivable.[32] But this does not diminish the need for competent terrestrial military forces, joint and combined arms warfare, or a political centre that demands only feasible achievements for policy. These things were true at the dawn of the Global Space Age and remain so now. The participation of private actors also does not transform this, as private suppliers and combat units in warfare are also long realities in European political-economic models.

With Asia now home to three major space powers (China, Japan, and India) and five launching states, there may be ample opportunity for the UK, India, Japan, and South Korea to explore security and industrial cooperation and partnership. The UK and Italy have embarked upon a 6th generation fighter project – the Global Air Combat Platform. The UK and Japan signed a Terms of Reference Agreement in 2023, which should enable more focused discussion on military-to-military cooperation in the future.[33] South Korea is embarking on a significant space investment. In 2023, South Korea increased its general space spending by approximately 19.5% as part of the 4th Space Development Promotion Basic Plan.[34] This includes a new SLV and a suite of satellites, including a form of GPS augmentation satellites, called the Korean Positioning System (KPS). Both KPS and Japan's QZSS may provide important "lessons learned" for the UK, which may consider specific PNT investments of its own at some point.

The 2025 SDR is yet to result in major decisions on spending and acquisitions for British spacepower. The SDR is a continuation of rather than a departure from the 2022 Defence Space Strategy. The handful of pages devoted to space in the SDR lists almost

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[32] For example: Colin S. Gray, *Strategy for Chaos: Revolutions in Military Affairs and the Evidence of History* (Routledge, 2003); Colin S. Gray, *Another Bloody Century: Future Warfare* (Weidenfeld and Nicholson, 2005)

[33] UK Government, "UK and Japan sign arrangement to cooperate in space", 17 March 2023, https://www.gov.uk/government/news/uk-and-japan-sign-arrangement-to-cooperate-in-space (accessed 28/01/2025)

[34] Park Si-soo, "South Korea sets record space budget to bolster industry, develop new rocket", *Space News*, 31 March 2023, https://spacenews.com/south-korea-sets-record-space-budget-to-bolster-industry-develop-new-rocket/ (accessed 28/01/2025); Robert S. Wilson and Nicholas J. Wood, "Country Brief: South Korea", August 2023, Aerospace Corporation, https://csps.aerospace.org/sites/default/files/2023-08/Wilson-Wood_SouthKorea_20230802.pdf (accessed 28/01/2025)

every capability area, and introduces a new explicit reference to space-based weapons which was not seen in past official documentation. Britain cannot afford to develop and deploy all the capability areas the SDR has listed, therefore the difficult choices over prioritisation and funding for capabilities that go beyond demonstrators and research and development systems – such as ISTARI – remain. It is impossible therefore to outline at this stage where Government thinking is regarding space and defence, and in particular UK Space Command investments, beyond the previously mentioned Skynet, DARC, and UK launch projects that have been reconfirmed since the new Labour government took office. As other powers, notably India, Japan, France, and South Korea embark on larger communications or ISR constellations, Britain risks falling behind without cooperating more with such partners, or developing its own large-scale, operational constellations.

Despite the opportunities provided by some Asian space powers for British cooperation, the reality is that the UK will be shaped by the space policies of the US and Europe the most. The UK will need to adjust its relationship to them as the situation continues to evolve in both continents. It was ever thus in British astropolitics – Britain has long been shaped by the binary system of the US and Europe and has always had to negotiate a delicate balance of dependency and integration across the military, political, economic, and scientific dimensions.

Successive UK governments depended on the U.S. for military space in the early Cold War yet retained a role as a major player in European space science and industry. Today, an increasingly erratic United States, a more politically fraught Europe, the conventional military threats from Russia and China, and the consequences of Brexit are testing both planks of the UK's traditional role in space caught between these two giant centres of spacepower. It remains to be seen whether a revanchist Russia and over 11,000 North Korean troops fighting in Europe will focus minds soon. If not, the UK will face greater challenges in accessing and developing the space capabilities it believes it needs in an increasingly deteriorating security environment in its immediate neighbourhood.