Satellite technology and the new geopolitical frontier

Analysis of national space policies suggests challenges ahead for the management of sovereign data entitlements.

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Since the launch of Sputnik I in 1957, state-sponsored space programmes have been a source of national pride and identity for countries with vision and resources enough to venture skyward. Space technoscience, much like nuclear weapons, football teams and airlines, became a blue riband indicator of national power and international prestige. By the end of the Cold War, some 25 states had orbital assets of varying functionality and longevity. The number has since more than trebled. Satellites, especially with the advent of the Internet and the development of a global service economy, have become integral components of civilian and national security infrastructures. The satellite technology sector has also enjoyed robust commercial growth. It is no surprise that states that don't have them, want them, and states that already have them, want more. They hoover up, create and broadcast information, and in a global economy increasingly defined and driven by data, they have taken on outsized importance – becoming potent if largely invisible symbols of political and economic clout.

Sovereign Data examines current trends in satellite technology, and explores the political and economic drivers motivating state behaviour in outer space.

Governance: Who owns outer space?

The UN Environment Programme refers to outer space, like Antarctica and the open seas and skies, as part of a "global commons" – a resource domain beyond the sovereign control of any state and to which all states have the right of access.[1] States may extract value from the global commons but cannot exert territorial claims over them nor by their actions prevent others' access. Conflicts over access to pieces of the global commons are not unusual and in the contemporary case of the South China Sea, for instance, are at the heart of emerging geopolitical conflict.[2] Laws and norms have evolved to regulate behaviour in the commons, most recently for outer space, the lower boundary of which is customarily defined as that point beyond which objects can be maintained in regular orbit about the Earth. The United Nations 'Outer Space Treaty' (OST, 1967) provides the principal framework for international space law and condones the use of outer space for peaceful purposes whilst placing constraints on its military use.[3] The provisions of the OST were tested throughout the Cold War, as the superpowers sought to exert strategic control over outer space, but neither breached the central OST proscription on deployment or use of nuclear weapons in outer space.

In recent decades, the wholesale hi-tech modernisation of state militaries has led to the development by many countries of space-enabled C4ISR systems.[4] Space is cluttered with hundreds of satellites with military functionality and accusations of militarisation of space are not without foundation.[5] Space law has evolved too slowly to cope with these developments and states have found creative ways to exploit legal loopholes to facilitate their strategic interests.[6] For example, neither a Chinese demonstration of anti-satellite (ASAT) capabilities in 2007, nor the destruction of a malfunctioning satellite by the US Navy in 2008, were illegal.[7] The OST is silent on the use of conventional weapons in space or against orbital assets, so these actions were against the spirit of the OST but not its letter. In addition, the Chinese test also created an orbital debris field that put it in potential breach of a UN convention on 'space junk'.[8]

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Infrastructure: Orbital growth

Most deployments of orbital assets are civilian rather than military, notwithstanding their frequently dual-use character. All satellites and their 'general function' must be registered with the UN under the 1976 'Registration Convention', although many are not.[9] Of the roughly 1300 satellites that are currently operational, over 50% are for communications purposes and 26% for 'earth observation' and military surveillance. Commercial owner-operators are responsible for 52% of the total, governments 30%, and 27% have military users, overlapping figures reflecting the multiuse character of these assets.[10] Satellite industry figures indicate annual growth of ca. 4%, with a global revenue base in 2014 of USD203 billion across the launch, manufacture, ground control, and services sectors. Some 57 countries operate at least one satellite, either alone or in regional consortia. In 2014, 208 satellites were launched, almost double the number launched in 2013. Civil-military communications account for roughly one-third of new market value so generated, military surveillance another third.[11]

The emergence of multiple commercial players threatens the dominance of traditional market leaders like the US. China, in particular, is a leading provider of satellite technology and services to a host of countries developing space-based civilian and military capabilities.

All figures suggest continuing US dominance of satellite manufacture, launch and service provision, but the sector is increasingly diversified. More countries are investing in satellite capabilities, particularly for surveillance, navigation and communications. Developments in the first two months of this year alone are illustrative. On 15 January, Belintersat-I, Belarus' first telecommunications satellite, was launched from southwest China. Purchased from China with Chinese loans, the satellite is aimed at the African market, particularly Nigeria, but much of its capacity has also been leased or sold to Chinese customers.[12] A few days later, India launched the fifth of seven satellites for its indigenous Indian Regional Navigation Satellite System.[13] At the beginning of February 2016, China put the 21st satellite of its independent Beidou navigation system into orbit.[14] Further launches are planned for the first quarter of 2016, involving a wide range of countries from senior industry players US, China and Russia, to smaller countries like India, Japan, Kazakhstan (a major launch provider), Luxembourg and Sri Lanka.[15] Attracting current attention is North Korea's plan to launch an earth observation satellite in February 2016, in what is widely believed to be a cover for ballistic missile technology development and therefore in contravention of international sanctions.[16]

Stakeholders: Asserting sovereignty

The emergence of multiple commercial players threatens the dominance of traditional market leaders like the US. China, in particular, is a leading provider of satellite technology and services to a host of countries developing space-based civilian and military capabilities. Emerging economies like Nigeria identify China as a key partner in encouraging domestic hi-tech industry and investment.[17] China responds favourably to these overtures and is reportedly on the cusp of investing USD15 billion into the Nigerian information communications sector, which includes satellite technology.[18] Others, like North Korea, may have more nefarious intentions but other dynamics are also at work. India and China – and Japan and the European Union – are developing satellite navigation systems. These will boost their internal hi-tech markets and promote export opportunities but also directly challenge the global informational superiority of the US, which owns and operates the Global Positioning System (GPS). China's upgraded Beidou system will provide global coverage for civilian and military applications by 2020, specifically to circumvent US dominance of satellite-enabled navigation infrastructure. This desire is articulated specifically in China's 2011 space white paper and will close one of the US-China capability gaps driving Chinese military modernisation since the early 1990s.[19]

Brazil, whose long-running space program was transferred to civilian control in 1994, is currently developing its geostationary SGDC system, reportedly to achieve 'sovereignty in civilian and military strategic communication'.[20] Scheduled for launch in 2016, this will also provide satellite broadband for domestic consumption and export. Brazil has a chequered history with the US over its use and transfer of rocket and space technologies, and it continues to prefer Russian and Chinese strategic

partnerships to those with the US.[21] It is tempting to read Brazilian assertions of information sovereignty against the backdrop of post-Snowden concerns with US Internet surveillance practices.[22] Unrealised Brazilian proposals to develop a parallel Internet infrastructure to avoid US-based Internet chokepoints may thus obliquely inform Brazil's current space policy, which, whilst not openly antagonistic to US economic and political ambitions, is not exactly complementary.

Conclusion

Satellites are nodes in this global information infrastructure, itself often described as a global commons. It is not formally recognised as such, nor do current state practices with respect to the Internet component of this putative resource encourage optimism that it will attain such status any time soon.[23] Physically, information infrastructures will continue to expand. So too will the volume of data they carry, and their economic value, even in the face of problematic state behaviours. In contrast, there are very real constraints on expansion in space, with varying implications for the technologies involved.

A limited number of satellites can occupy Earth orbits safely. The heavens have become increasingly cluttered and the problem of 'space junk', including decaying and decommissioned satellites, is sufficiently serious to have encouraged international concern and cooperation.[24] Debris-generating satellite collisions, such as occurred in 2009, reinforce concerns. There is as much opportunity as risk in these developments, as commercial space ventures such as Deep Space Industries and Planetary Resources, two US companies, begin to emerge and mature. They also raise the prospects for satellite activity well beyond earth orbit, which will undoubtedly challenge, if not change, the calculus involved in management of the commons.

In the shorter term, countries will continue to invest in satellite and allied technologies for political and economic ends. As with the nascent Internet commons, states are moving to counter US supremacy in space, a domain it views as a 'new geopolitical frontier'.[25] Dual-use technologies and a creaking legal framework suggest that the cosmos will, in space policy parlance, become increasingly congested, competitive and contested.[26] Its exploitation will also expand conceptually and practically, as private companies and small countries like Luxembourg plan for resource extraction from celestial bodies beyond Earth orbit.[27] In the absence of a hegemonic 'guiding hand' to push through new and binding international regulation – the US favours no such programme – assertions of sovereignty in extra-planetary jurisdictions will become more frequent, creative and problematic.

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Notes

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