

THE SPACE BETWEEN ALLIANCE AND SELF-RELIANCE: THE EVOLUTION OF THE AUSTRALIA-US DEFENCE SPACE RELATIONSHIP

DR TRISTAN MOSS | AUGUST 2023





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UNITED STATES STUDIES CENTRE

Institute Building (H03), City Rd
The University of Sydney NSW 2006
Australia

+61 2 9351 7249
us-studies@sydney.edu.au

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Cover photo: Lift-off of NROL-199 on board Rocket Lab’s Electron launch vehicle from the company’s Rocket Lab Launch Complex 1 in New Zealand (Rocket Lab, with permission)



EXECUTIVE SUMMARY

- › No discussion of Australia's involvement in space is complete without reference to the United States, which looms large in Australia's space past and future. No matter what direction Australia seeks in space, the nature of the Australia-United States relationship in space, its drivers, and how it is managed is of crucial importance to how Australia *does* space.
- › The relationship between Australia and the United States in space is founded on a long history in which Australia has leveraged its geography for access to space-based capabilities. This history, its benefits and its inertia wind their way through the current relationship. Any change in Australia's space efforts and any change to the relationship will have to address these elements.
- › The last 10 years have seen Australia slowly centre space in defence thinking, yet despite great fanfare, these steps are best seen as the first among many. Significantly, Australia is still in the process of articulating what it needs in defence space; it must further develop this if it is to best manage and leverage the space relationship with the United States.
- › The United States, long the most significant actor in space, has at the same time increasingly opened its doors to allies in the hitherto closed world of space. This represents opportunities for countries like Australia not just for better access, but also for a greater role in the space partnership.
- › There are two broad types of space engagement between Australia and the United States. The first is based on legacy projects initiated by the United States, epitomised by Pine Gap, and the second is framed around those projects in which Australia seeks its own path in space.
- › These relationships represent a spectrum of interaction in defence space, from which Australia might seek an appropriate way to balance a desire for self-reliance with the expensive nature of space by drawing on American experience and capability.
- › Australia developing its own sovereign capability is not a zero-sum game but instead fits in with US concepts for working with partners to build collective resilience in space.
- › The degree to which Australia seeks its own path in space will be shaped both by its own goals and the challenges inherent in the relationship. As Australia implements its strategy in space, both civil and military, it must address the degree to which the United States allows Australia 'inside the tent' in space and the delicate balance between local development and less resource-intensive options for procurement.

ACRONYMS

1RSU: No. 1 Remote Sensor Unit	NASA: National Aeronautics and Space Administration
ADF: Australian Defence Force	NGA: National Geospatial Intelligence Agency
AGO: Australian Geospatial Organisation	NOFORN: Not Releasable to Foreign Nationals
ASAT: anti-satellite weapons	NRO: National Reconnaissance Office
ASA: Australian Space Agency	NSA: National Security Agency
ASD: Australian Signals Directorate	PNT: position, navigation and timing
ASG: Allied System for Geospatial Intelligence	RAAF: Royal Australian Air Force
AUKUS: Australia-United Kingdom-United States trilateral security pact	RSSC-PAC: United States Regional Communications Support Center-Pacific, Wheeler Army Airfield in Hawaii
AUSMIN: Australia-United States Ministerial Consultations	SATCOM: satellite communications
AUSSpOC: Australian Space Operations Centre	SDA: space domain awareness
CIA: Central Intelligence Agency	SIGINT: signals intelligence
COMINT: communications intelligence	SSA: space situational awareness
CSIS: Center for Strategic and International Studies	SSR: space surveillance radar
CSpOC: Combined Space Operations Centre	SST: Space Surveillance Telescope
DNI: Director of National Intelligence	SSU: No. 1 Space Surveillance Unit
DRCS: Defence Research Centre Salisbury	UHF: ultra-high frequency
DSCO: Defence Space Coordinating Office	USSF: United States Space Force
DSR: Defence Strategic Review	VHF: very high frequency
DSS: Defence Space Strategy	WASSSPO: Wide Area and Space Surveillance Systems Program Office
DSTO: Defence Science and Technology Organisation	WGS: Wideband Global SATCOM
DSTG: Defence Science and Technology Group	WRE: Weapons Research Establishment
DSU: Defence Strategic Update	WRESAT: Weapons Research Establishment Satellite
ELDO: European Launch Development Organisation	
ELINT: electronic intelligence	
GEOINT: geospatial intelligence	
GPS: Global Positioning System	
ISR: intelligence, surveillance and reconnaissance	
ITAR: International Traffic in Arms Regulations	
JOC: Joint Operations Command	
JORN: Jindalee Operational Radar Network	

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INTRODUCTION

In March 2022, the Australian Defence Force (ADF) stood up the Defence Space Command, following trends in the United States, where the United States Space Command and United States Space Force (USSF) were created in 2019. Defence Space Command, and the Space Strategy that it launched at the same time, were a watershed moment in Australian space that marked the emergence of the domain into thinking on defence strategy and everyday business. In this, the decisions taken by the Australian Department of Defence reflect a broader expansion of Australia's space efforts, not least in the 2018 creation of the Australian Space Agency. Nonetheless, while this has seen space enter into the national consciousness like never before, Australia is still in its early days of understanding what it wants from space as a nation.

The Anthony Albanese government's *Defence Strategic Review (DSR)*, the unclassified version of which was released in late April 2023, confirms the new place of space in Australian defence thinking that coalesced over the preceding decade. The Department of Defence has now accepted that space is critical to what it does, rather than one among many options for addressing certain needs. Moreover, the Department of Defence and the government have agreed that Australian control over space capabilities is not just desirable, but worth pursuing. While there is still a long way to go – the ADF's space assets and workforce are small and its conceptual framework is still under development – the creation of Defence Space Command provides Australia with the tools to begin to operate in this new domain. While for much of the Space Age, Australia could



Australian Defence Force and Department of Defence personnel from the Defence Space Command and the Defence Science and Technology Group work alongside an industry team led by SABER Astronautics in the Responsive Space Operations Centre at LOT 14 in Adelaide (Department of Defence)

not justify procuring its own military satellites, the lowering of barriers to space and the increasing number of space actors globally means that it now must contemplate such a move. However, accessing space remains technically difficult and expensive. In the past, Australia has mitigated these barriers by accessing space through and alongside allies, overwhelmingly the United States. Despite a desire for Australian sovereign control over a vital element of its defence, this path remains central to Australian space thinking. This longstanding tension is recognised in the DSR's treatment of space, which states:

As Australia's civil and military space capabilities progress, Defence must consider the level of sovereign capability needs. This must be offset by the cost requirements of such capabilities against opportunities to collaborate with the United States and other partners.¹

No discussion of Australia's involvement in space is complete without reference to the United States, which looms large in Australia's space past and future. The nature of the Australia-US relationship in space, its drivers, and how it is managed is of crucial importance to how Australia does space. Many of Australia's early, and still continuing, forays into space technology and operations were in support of the United States, while space has been used as a medium through which Australia might contribute to the alliance. Australia looks to the United States for technology, experience and space-derived data. At the same time, the United States sees Australia as a smaller partner useful for its geographic position and, increasingly, for its capacity to burden-share and increase space resilience. Indeed, geography is at the very centre of Australia's space history, its relationship with the United States, and where it might go in space. The description of Australia's geography as the "pot of gold at the end of the rainbow" by one senior United States Space Force officer is a testament

to this centrality.² It is also a reminder that the space relationship is transactional, and it is American interest in Australia's geography more than anything else that shapes the relationship.

American interest in Australia has allowed for significant Australian access to US space capabilities in certain areas, which can be leveraged as Australia grows its ability to act in the space domain. Indeed, if it is to grow its space capabilities cost-effectively, it must work with partners. There are, however, obstacles to Australian efforts to forge its own path in space in this way. The still-developing Australian strategy in space, both civil and military, the degree to which the United States allows Australia 'inside the tent' in space, and the delicate balance between local development and less resource-intensive options for procurement are all barriers to overcome. Nonetheless, this is not a zero-sum game. Cooperation is an avenue for creating Australia's own space capability, not a limiter of it, if it is done in a nuanced manner that clearly links national objectives with available space options.

How Australia addresses the tension raised in the DSR rests on the answer to a range of questions. On what foundations does the space relationship between the two countries rest? What is Australia's approach to space in service of its national security? What does it want from space, and what is it willing to achieve? How does this interact with what the United States wants from Australia in space, with American approaches to space, and how is that reconciled? These are not new questions. Importantly, the answers to each are also subject to a broader government understanding of the alliance and Australia's place within it, as well as what national resources it wishes to commit to space in the context of Australia's broader defence needs. These ques-

NO DISCUSSION OF AUSTRALIA'S INVOLVEMENT IN SPACE IS COMPLETE WITHOUT REFERENCE TO THE UNITED STATES, WHICH LOOMS LARGE IN AUSTRALIA'S SPACE PAST AND ITS FUTURE.

tions are outside the scope of this report, influenced by economic considerations, the delicate balance between a range of security priorities, and politics. In this way, we should be careful to recognise that space is little different from other policy areas, as much as space advocates might see space as transformative, new and exciting.

AUSTRALIA IS UNLIKELY TO COMPLETELY GO IT ALONE IN SPACE; CONSEQUENTLY, IT WILL HAVE TO DECIDE ON WHICH AREAS IT WANTS TO FOCUS ON AND WHICH CAPABILITIES ARE BETTER SERVED THROUGH COOPERATIVE ARRANGEMENTS WITH OTHERS.

As John Sheldon and Colin Gray argue, 'space is a place,' subject to the same mundanities of politics, conflict and cultural perception as other areas of human activity.³

Nonetheless, despite space being a smaller part of broader policy concerns, Australia's future use of space for national security ends is important and necessarily involves the United

States, if only because of how deeply Australia is enmeshed in the American space enterprise. It is here that this report turns its attention to an understanding of the US-Australia relationship in space, its structures, challenges, and future. An understanding of the space relationship assists in laying a foundation for any future effort in space. If Australia continues on its path of developing its own space assets, it will necessarily look to the United States. If Australia decides to develop its own capability to act independently, then the close connection with the United States will need to be navigated and leveraged. Australia is unlikely to completely go it alone in space; consequently, it will have to decide on which areas it wants to focus on and which capabilities are better served through cooperative arrangements with others. Indeed, if Australia expands its space relationships with other nations, there are lessons to be found in the US-Australia relationship. Wherever Australia decides to go in space, Australia's deep reliance on its larger partner ensures that an understanding of the US-Australia relationship is a vital part of the conversation about Australia's future there.

Outline

An examination of the experience of how Australia has sought to balance a desire to be self-reliant and the cost of doing so reveals a range of space engagements with the United States. These reflect the broader context and cost of Australia's defence, its own needs, and the degree to which it has been willing to procure space capabilities through the United States to gain access to technology and capabilities it would have found difficult or impossible to access on its own. Australia has been making these calculations in relation to space for the entire space race, and the answers it has found in relying on the United States continue to shape Australian space activities today (examined in chapter one). This cooperation was born from an Australian interest in alliance maintenance, on the one hand, and the United States' desire to use the geographic position of Australia, on the other hand.

More recently, there has been a shift in Australian thinking on space in the face of a changing space environment and a growing understanding of the domain's importance to Australia's national security (Chapter 2). This has occurred alongside an evolving American desire to include allies in their space endeavours in the pursuit of the benefits of joint planning, resilience and burden-sharing (Chapter 3).

The direction Australia might take in space should be informed by an examination of the wealth of examples of past and current space cooperation. There has been an array of interactions with the United States in space that exist on a spectrum of sovereignty, cost and access to capabilities. There are broadly two types of cooperative space endeavours. The first are 'legacy' arrangements, rooted in a long history of space cooperation (Chapter 4). These were originally built on an American desire to use Australia's favourable geography for its own space ends,

and an Australian understanding that, as a result, space could be used as a medium through which to strengthen ties with the United States. Pine Gap, intelligence relationships and the insertion of Australian personnel into American institutions fall within this category.

In the 21st century, new arrangements have been established that better reflect Australian conceptions of how it might use space for its own defence (Chapter 5). These still leverage the relationship with the United States. Cooperative arrangements include cooperation on military communications, space domain awareness and intelligence satellites. In each case, Australia has sought technology and expertise from the United States as a potential first step to developing its own capability. An important part of this is the use Australia makes of the longstanding defence

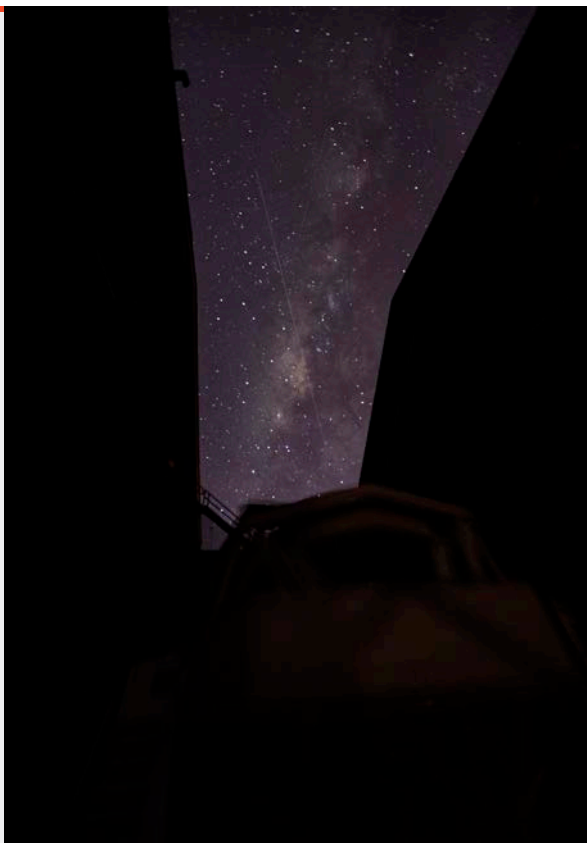
relationship to enhance its own training and experience, by sending personnel to the United States. These relationships offer opportunities for Australia to seek some degree of self-reliance in space but also open up a new avenue of contribution to the alliance through burden-sharing and growing resilience.

Nonetheless, there are challenges to this path. The inertia imposed by legacy forms of interaction in space on the relationship, the complexity of the American space architecture and its hesitancy to change, and crucially the need for Australia to better understand and articulate its needs in space will all shape the relationship. How well Australia deals with these challenges will decide where it goes in space and the degree to which the alliance will be a launching pad for its space future (Chapter 6).

What is space?

At its most basic, 'space is a place,' a unique environment in which humans can act. It is usually defined as 100 kilometres above sea level, where aeroplanes cannot generate lift, and where humans need assistance to survive. 'Space' in popular understanding is made up of different and overlapping areas, such as science, human travel, remote sensing, communications, position, navigation and timing (PNT), command and control and terrestrial infrastructure and launch technology. 'Space' also forms part of other earth-based functions; financial transactions, navigation and weather prediction are common examples.

Photo: An internal view of the telescope inside the dome at Harold E. Holt Satellite Sensor Site facility near Exmouth (Department of Defence)



1. THE LONG RELATIONSHIP: AUSTRALIA AND THE UNITED STATES IN SPACE HISTORY

When the United States Congress passed a motion praising Australia's creation of a space agency in 2018, it was no coincidence that its first page reflected entirely on the two countries' military relationship.⁴ It is impossible to understand any of Australia's space experience, civilian or military, without reference to its longstanding relationship with the United States. Australia's relationship with "great and powerful friends," first the United Kingdom and then the United States, was central to its first foray into space. Indeed, those elements of Australia's space past that are celebrated today would not have been possible without these relationships. This history has a real bearing on Australia's current space trajectory. The current engagement with the United States in defence space is shaped by longstanding historical cooperation on the ground put in place in the late 1960s. Pine Gap and other joint projects with the United States exert a powerful influence over the relationship. Similarly, the interpersonal and institutional relationships on which the space and military relationship rely have been built up over decades.

Space as alliance management: The Cold War

Australia was involved in humanity's efforts to explore and make use of space from the start as a result of its relationships with the United Kingdom and the United States. In 1947, Australia and the United Kingdom jointly formed the Long Range Weapons Research Establishment to research and test rockets and related weapons in Australia. In 1955, the organisation became the Weapons Research Establishment (WRE), based at Salisbury outside Adelaide and Woomera, in the South Australian desert. At Woomera, the two countries made use of the world's largest rocket range to test a variety of weapons, particularly guided missiles. Woomera was seen by the Australian Government not just as a source of weapons technology, but as a crucial part of

Australia's contribution to the defence of the British Commonwealth. Britain had hoped to test intercontinental ballistic missiles at Woomera, but these were cancelled just before the first flight. In place of this project, Australia joined the European Launch Development Organisation (ELDO) which tested the Europa rocket at Woomera during the 1960s.⁵ While civilian in nature, the Australian Government was interested in ELDO largely because it kept Woomera in operation, rather than because it explicitly desired to be part of the launcher project.⁶

American interest in Australia as a space partner from the mid-1950s, by contrast, began with civilian space. Nonetheless, this interest was a reflection of broader geopolitical concerns within a United States grappling with the Soviet Union. In turn, Australia saw American interest in terms of its efforts to build a closer relationship with the Western superpower with whom it had signed the ANZUS Treaty in 1951. Indeed, it was Australia that first offered to host American military tracking stations at the 1956 ANZUS Council, although this offer was not taken up.⁷ In 1957, the year the Soviet Union launched the world's first satellite, Australia was approached by American scientists hoping to place satellite ground stations in Australia, to which the Menzies government agreed.⁸

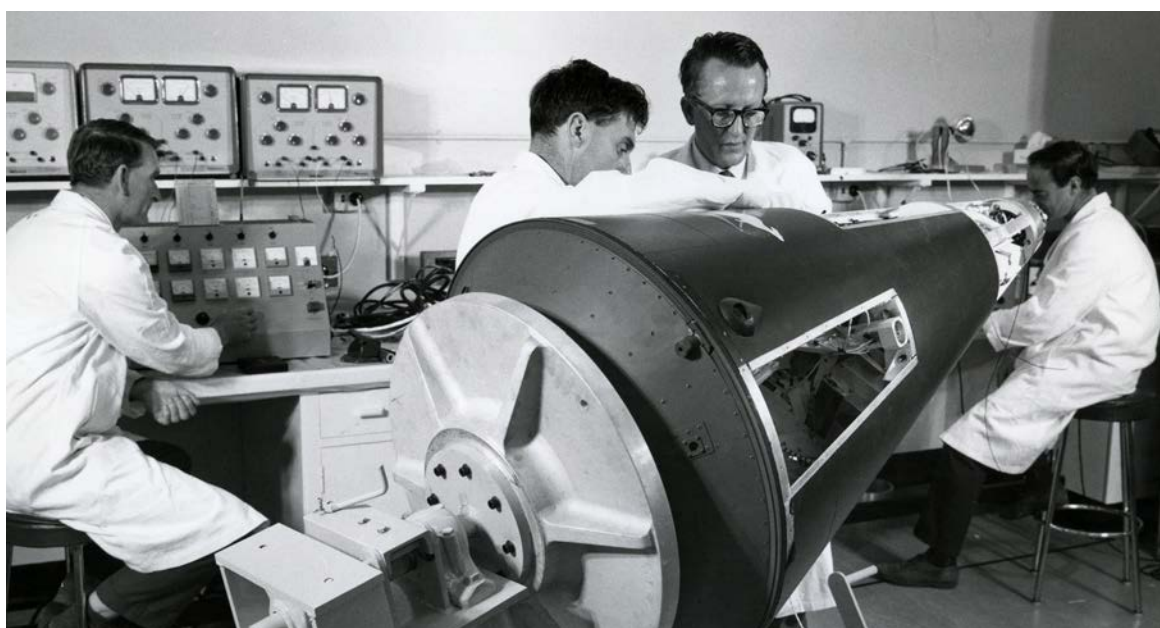
The first ground station was followed by a number of others during the 1950s and 1960s. Whether military or civilian, all were seen by the government and defence planners overwhelmingly in terms of strengthening the alliance with the United States. The same applied to the range of cooperative testing conducted at Woomera. The most well-known, Project Sparta, saw a surplus American Redstone rocket launch Australia's first satellite, the Weapons Research Establishment Satellite (WRESAT). Here, space was largely perceived as the medium in which Australia sought to encourage United States interest. In the words of the Defence and Exter-

nal Affairs Ministers in 1966, Alan Fairhall and Paul Hasluck, respectively, this interest was to be encouraged not only when there was a direct scientific or defence benefit to Australia, but also

in all those areas that the United States saw as important, “irrespective of their potential benefit to the Commonwealth.”⁹

Figure 1. Key milestones in space in Australia’s defence

1955	Weapons Research Establishment created at Woomera and Salisbury, South Australia
1957	First American tracking station established, Woomera
1967	Launch of Australia’s first satellite, WRESAT
1970	Joint Facility Pine Gap becomes operational
1979	Shoal Bay Receiving Station established
1981	First ground terminal for the US Defence Satellite Communications system opened, Watsonia, Victoria
1981	First satellite communications on RAN ships
1988	First Australian trial of Global Positioning System
1993	Australian Defence Satellite Communications Station, Korajena opened
1995	Formation of the Defence Space Directorate
2007	Australia joins Wideband Global SATCOM; first satellite launched
2009	Defence White Paper identifies space as an area of strategic interest
2010	‘Space’ first mentioned in Australia–US Ministerial Consultations (AUSMIN)
2018	Creation of the Australian Space Agency
2022	Space Command created, first Australian Defence Space Strategy



Working on WRESAT at the University of Adelaide (Photo courtesy of Prof John Carver, Department of Defence)

“Suitable pieces of real estate”: Pine Gap

Australia began its relationship with US defence space programs in earnest during the 1960s. Indeed, the US Department of Defense and other agencies have had a presence in Australia without break since that decade. The first such support was given through the hosting of a ground station for the Transit navigational satellite program, which supported US Navy ballistic missile submarines.¹⁰ In the 1960s, Australia agreed to one of its most recognisable, important and controversial defence engagements with the United States with the establishment of Joint Facility Pine Gap, which was negotiated in 1966 and opened in 1970. This station and others, such as Joint Defence Facility Nurrungar, were essential to American intelligence gathering and ballistic missile early warning and were greeted with interest by an Australian Government keen to encourage a stronger US relationship.



Joint Facility Pine Gap (WikiCommons)

Pine Gap was established to support a joint Central Intelligence Agency (CIA) and National Reconnaissance Office (NRO) satellite program codenamed Rhyolite (later Aquacade), which intercepted telemetry from Soviet and Chinese missile tests and very high frequency (VHF) and ultra-high frequency (UHF) communications. Nurrungar served the US Air Force Defense Support Program, which provided early warning for Soviet missile launches through geosynchronous satellites, the first of which was launched in 1970.¹¹ Pine Gap and Nurrungar also had a role in enhancing American offensive nuclear power, through the provision of targeting information.¹² The United States' interest in Australia as a site for these stations was the same as for NASA tracking stations: Australia was situated favourably in the southern hemisphere. In addition, situated deep within the Australian landmass, the position of these stations made them largely immune to seaborne jamming, compared with other sites in the Pacific.¹³ This made Australia a “suitable piece of real estate,” in the late Australian scholar Desmond Ball’s famous characterisation of this relationship.¹⁴

On the operational level, Australia was interested in both the intelligence collected at Pine Gap and ensuring an appropriate level of participation in the facilities. While the CIA was willing to give Australia access to intelligence products and raw data, it was less interested in Australian access to the entire facility.¹⁵ Indeed, in a 1966 memorandum to the Secretary of State, one American official’s description of the base during the negotiation phase reflected American views on its own primacy in the relationship: “Although the facility will ostensibly be a joint operation, it will in fact be financed and managed almost entirely by the United States. Australia will supply the land and certain services.”¹⁶ This attitude was reflected in the initial reluctance to include Australians in the more sensitive areas of Pine Gap, not least by obscuring the ratio of Americans to Australians

by including gardeners and housekeepers in the figures, although Australian participation would increase over time.¹⁷

Space in the background: 1970s to the 2000s

From the 1970s to the early 2000s, the Australian Government considered space as a means to other ends rather than a policy area in and of itself. It sought to meet its needs by buying capabilities off the shelf but did not seek to build up a space sector. Within the Department of Defence, Australia was also a consumer of space. While the ADF used space to support its activities, it was content to meet its needs by accessing space through allies and the commercial sector. Space was seen in terms of its supporting function, rather than as a domain in its own right in which the ADF might operate. Nor was space a key part of the Department of Defence's strategic thinking or force structure priority during the 1980s and 1990s.¹⁸ Not mentioned at all in the 1976 Defence White Paper, space itself was also absent from the 1987 White Paper; Pine Gap was referenced, but in terms of the station's objectives rather than the medium in which it occurred.¹⁹ Space was more prominent in the 1994 White Paper, with Defence noting that the lowered cost of space assets warranted an "examination" into what "may well become a cost-effective means of meeting national surveillance and communications needs."²⁰ That the White Paper discussed space as one of the "available options" reflected the place of space in Defence thinking: useful, but only insofar as it was one of many paths to a specific goal, not a domain warranting Australian attention.

There were organisational changes from the 1970s as well. In 1975, with the closure of the cooperative project at Woomera, defence space research was transferred to the Defence Science and Technology Organisation (DSTO) under the

Department of Defence and the engagement with NASA was transferred to the Space Projects Branch at the Department of Science. DSTO became Defence Science and Technology Group (DSTG) in 2015. The Weapons Research Establishment continued as a separate organisation, renamed Defence Research Centre Salisbury (DRCS) until it too was transferred to DSTO in 1980.²¹

Long before Defence Space Command, Defence was alive to the balance between cost and sovereignty inherent in space capabilities. For instance, in an early assessment of military communications satellites, it acknowledged that while it was in the country's interest to maintain control over its own communications, wherever they may be based, the sheer cost was prohibitive, particularly when cooperation with the United States was an option. Besides, the investigating committee found the risk was not so much denial of access as being relegated to second-tier status in the event of an emergency.²² By the late 1970s, the Department of Defence had agreed to use the government-owned AUSSAT communications satellite for some of its needs, although it later lost interest in further iterations because of the cost and concerns around working with a civilian system.²³

The first sustained use of military satellite communications came with the construction of a ground terminal for the US Defense Satellite Communications System in Victoria, later supplemented by commercial links. The Global Positioning System (GPS) was also first trialed by the ADF in 1988.²⁴ Operation Desert Storm during the Gulf War in 1991 has been described as the "first space war" because of the centrality of space assets to combat.²⁵ Yet, even as the ADF's access to space-based information and

LONG BEFORE DEFENCE SPACE COMMAND, DEFENCE WAS ALIVE TO THE BALANCE BETWEEN COST AND SOVEREIGNTY INHERENT IN SPACE CAPABILITIES.



Australia's AUSSAT communications satellite is deployed from the payload bay of the space shuttle Discovery (NASA)

capabilities grew during the 1990s, only a few defence planners addressed the role of space in Australia's defence. Australia sought space capabilities to fill specific needs, and the reliance on the United States continued unexamined. In 1992, Ball wrote of "a lack of any single coherent or comprehensive Defence perspective on space matters – let alone any single Defence focal point."²⁶

One exception to the use of space was in the creation of sovereign-controlled signals intelligence capabilities at the Shoal Bay Receiving Station outside Darwin in 1979. One of this facility's functions was the interception of communications from Indonesian satellites. This was augmented by the opening of the Australian Defence Satellite Communications Station at

Korajena, outside Geraldton, Western Australia. This site also collected and continues to collect intelligence from the satellites under whose orbit it sits. Both of these sites are entirely Australian-managed, with the site at Korajena feeding into the Five Eyes intelligence network.²⁷ While information from Shoal Bay is likely also shared, in 2000, shortly after the Five Eyes relationship was publicly revealed, it was reported that Australia was not sharing raw intelligence data from Shoal Bay with partners.²⁸ Australia is often portrayed as a latecomer and slow-mover when it comes to space. In the case of Shoal Bay, however, the country not only built its own facility but held the information it produced close to its chest. Here, in the tensions with Indonesia and the perceived Australian need for intelligence on its nearest neighbour, it is possible to see Australia's threshold for embarking on its own space efforts.

During the 1990s there were at least 12 broad areas within Defence that had some interest or oversight over space policy, capabilities, planning and acquisition, in addition to individual service units with interest in space. While coordination was good, "there was no machinery for reconciling the diversity of interests and goals."²⁹ This ad hoc arrangement was in part addressed by the creation of a Defence Space Directorate, which by the early 2000s served to coordinate all things space, excluding policy. This move reflected a growing acceptance in the Department of Defence of what space could do for the ADF, and a diminishing of the view that engaging with space was simply too expensive.³⁰ Nonetheless, space was mentioned only tangentially in the 2000 White Paper, and largely in terms of cooperative programs and broader technological, rather than space, development.³¹ Space was there, but it was not seen as an area of defence interest in its own right and with few exceptions, was assessed on an as-needed, off-the-shelf, basis through the United States.

2. SPACE IN AUSTRALIA'S NATIONAL SECURITY

The decade and a half to 2023 was a period of transition in the use of space in Australia's defence. Australia's engagement with national security space grew in pace from the mid-2000s, culminating in Australia well and truly embracing space as a vital domain of national security, albeit while remaining in the early stages of strategy and capability development. It also saw the Department of Defence articulate what it wanted in space, rather than simply which individual space capabilities it required. As discussed in Chapter 5, this resulted in a shift from legacy space cooperation arrangements begun at the instigation of the United States to new avenues of cooperation that saw Australia use the alliance to build its own defence space capability.

The increasing reliance on space in Australia, the development of a nascent space industry, greater commercial and strategic competition in space, and subsequent public and government appreciation of these issues spurred change.³² There was no single reason for the growth in Australia Government and defence interest in space, but rather a "coalescence of events and activities" that saw a departure from the status quo of space as a useful, but background, domain.³³ The first step was perhaps, in retrospect, the 2008 Senate inquiry into Australia's space science and industry, titled *Lost in Space*.³⁴ While not the driver of significant change itself, this inquiry marked the start of a slow development in the discussion of space as both a national interest and integrated into a wide range of national activities. However, this occurred in fits and starts and, in 2023, is still very much uncompleted. In the Department of Defence, these changes were most evident at the strategy level, through White Papers and public messaging on space domestically and internationally. For Australian civilian space, the creation of the Australian Space Agency (ASA) in 2018 established a coordinating body for space policy and helped to focus public attention on space. Nonetheless, the place of the

ASA within the Department of Industry, Science and Resources reflects the agency's focus on industry, and the *Australian Civil Space Strategy 2019–2028* emphasises jobs and the commercial benefits of space. Crucially, despite the growth of interest in space, as of 2023 there is no national space strategy that approaches space from a whole-of-nation perspective and bridges the civil-military divide in space, and there is inadequate conversation on Australia's needs in space that are based on rigorous analysis rather than enthusiasm for all things space.

Organisationally within the Department of Defence, the shift in perception of space took almost a decade to translate into the creation of structures designed to oversee the ADF's approach to the domain. The issues that have plagued civil and military space activities – lack of a strategy, fractured organisations, the dearth of a space workforce, and others – have not been solved. However, in 2023, Australia's needs in space are being more prominently discussed within the Department of Defence and in public, while the organisational tools are starting to be put in place to translate strategy into operation. It is this translation, from ideas to outcomes, that will shape Australia's future in space, and the balance between local development and international collaboration.

The first steps towards space as a focus: 2009–10

The 2009 Defence White Paper, the first since 2000, was the first to note that space itself, rather than the capabilities that happened to reside there, was an area of importance and interest.³⁵ Part of fostering the Department of Defence's space capabilities was 'self-reliance,' alongside the acknowledgement that the sheer cost of space-based assets would require international collaboration.³⁶ Australia's relationship with the United States and its potential future was made

clear: “We rely on the United States for much of our space advantage, but we should also seek ways to develop our nascent but growing expertise in space capabilities.”³⁷

It was telling that the Australia-United States Ministerial Consultations (AUSMIN) were the second site of enhanced messaging around the importance of space to Australia. In 2010, space was given a prominence it had not enjoyed previously in these discussions, and both Australia and the United States expressed concern in their joint communique about “the increasingly interdependent, congested, and contested nature

FROM 2010, SPACE WAS GIVEN A PROMINENCE IT HAD NOT ENJOYED PREVIOUSLY IN THESE DISCUSSIONS.

of outer space.”³⁸ One result of Australian and American thinking was the release of a *Space Situational Awareness Partnership Statement of Principles* and a joint statement on space security that acknowledged the crucial nature of satellites to defence activities.³⁹ This close cooperation was continued in the 2012 AUSMIN meeting. There, Australia and the United States signed a Memorandum of Understanding in relation to space, committing to a joint facility in Australia, in exchange for the transfer of a space radar and space telescope to Australia.

Space structures within the ADF coalesced more slowly than higher-level messaging. Despite the tentative moves towards better integration of space across the Department of Defence, an ADF Space Review, commissioned by the Chiefs of Staff Committee, found that across the Department of Defence, there was a lack of understanding of space, fragmented and uncoordinated management, and a lack of a space culture or policy. Following this review, the Defence Space Coordinating Office (DSCO) was established as a joint office with ADF HQ in September 2006. DSCO’s mission was to act as “a Defence-wide coordination, monitoring and consideration” of all things space.⁴⁰ Space was also integrated into

operations. In the late 2000s, the Department of Defence created the Joint Space Operations Cell within Joint Operations Command (JOC), which then became the Australian Space Operations Centre (AUSSpOC). In its early days, AUSSpOC had a staff of just 14 and focused on command and control of space operations in support of JOC’s wider responsibilities. The Centre also acted as a conduit to American and allied space commands. AUSSpOC is also envisaged as a repository of space expertise within JOC, available to provide the Chief of Joint Operations with advice on space issues.⁴¹

From passive to active space actor: White Papers, Defence Strategic Update and AUKUS

The 2013 Defence White Paper noted that a secure nation was reliant upon “assured access to space systems,” pointing to a need for both self-reliance as well as cooperation.⁴² The White Paper also emphasised the alliance with the United States to a greater extent than its 2009 predecessor, while also referring to the need for independent or self-reliant capabilities.⁴³ The 2013 White Paper’s view of space reflected an increasing understanding within the Department of Defence of space’s importance not only to its own needs but also to the growing competitiveness of a congested domain and the “profoundly dual use” nature of the environment.⁴⁴ Nonetheless, the Department of Defence’s space policy continued to “lack coherence.”⁴⁵ Only slight changes were made in the space organisation side of the house: after the 2014 Defence First Principles Review, DSCO was moved to the Vice Chief of the Defence Force Division.

The 2016 Defence White Paper represented a further shift in the gradual process of Australian defence space thinking, moving Australia away from merely accessing space services through others, to assessing what local capability it could



Deputy Prime Minister and Minister for Defence, the Honourable Richard Marles MP, and the Minister for Defence Industry, Minister for International Development and the Pacific, the Honourable Pat Conroy MP with Chief Defence Scientist, Defence Science and Technology Group, Professor Tanya Monro (Department of Defence)

purchase or create.⁴⁶ The 2016 Defence White Paper identified space as one of six themes that the Department of Defence was to pursue. In the White Paper, the then-Minister for Defence, Marise Payne, committed to “invest in modern space and cyber capabilities and the infrastructure, information and communications systems that support defence capability.”⁴⁷ She noted that “[n]ew and complex non-geographic security threats in cyberspace and space will be an important part of our future security environment.”⁴⁸

As part of the recommendations from the White Paper, the Department of Defence created the Information Warfare Division within the Joint Capabilities Group in 2017, which included space, although space received less attention than did the Division’s cyber-focus. The period after the 2016 White Paper saw the Australian Government announce a series of sovereign space

projects, designed to enhance Australia’s ability to make its own choices in space. Perhaps the most crucial of these is Joint Project 9102, which sees Australia acquiring a defence satellite communications system.⁴⁹ In 2017 the government announced that it would seek its own intelligence satellite, under Defence Project 799.⁵⁰

The 2020 Defence Strategic Update (DSU) was intended to outline Australia’s responses to the challenges that had arisen in the four years since the 2016 White Paper; in space, this meant still more emphasis on the importance of the domain to the ADF. The DSU stressed that space was “critical to ADF warfighting effectiveness, situational awareness and...communications.”⁵¹ As a result, the Department of Defence saw a need to increase its space capabilities and work more closely with industry and the Australian Space Agency. Specific changes were laid out in the Force Structure Plan, including enhanc-

ing Australia's space communications, improving space domain awareness and investing in terrestrial operations in contested space, namely space control.⁵² The formal recognition of space as an operational domain of vital importance to Australia and a domain in which free and uncontested access was not a given represented a significant step from the 2016 White Paper. However, the absence of a Department of Defence space strategy in the public domain created an "information vacuum" in discussions of Australian defence space policy.⁵³ One significant change came in July 2021 when the government stated that it was exploring space

electronic warfare capabilities under Defence Project 9358.⁵⁴

The September 2021 announcement of the trilateral AUKUS security pact reaffirmed much of Australia's pre-existing perception that its security is best met through a close relationship with the United States and the United Kingdom.⁵⁵ While space is explicitly not part of the AUKUS relationship (none of its 17 working groups covers space, at least not publicly), the focus of the relationship on high technology such as cyber, hypersonics and submarines makes it a strong avenue for space cooperation.⁵⁶ The 2021 AUSMIN Joint Communique, released on the same day as the announcement of AUKUS, reinforced and detailed the relationship in space, with the two countries presenting the alliance as a means by which to "ensure a safe, stable, and secure space domain."⁵⁷ The Joint Communique also made references to the development of a Space Framework Agreement between the United States and Australia, which would facilitate interaction between the two countries on all the different elements of space activities. The 2022 AUSMIN Joint Communique also further committed the two countries to enhancing "space cooperation and space domain awareness and strengthen assured access."⁵⁸

Although the high-technology-focused AUKUS agreement lays a strong foundation for space cooperation, little detail has been forthcoming.⁵⁹ Moreover, the agreement centres on the transfer of technology and know-how between the three nations (for Australia, this flow will be overwhelmingly one-way). Aside from the challenge of delivering submarines and other capabilities within a tight timeframe and stretched industry capacity, the barriers of US export controls that have long bedevilled cooperation in this area heighten the "risk that AUKUS will meet the same disappointing fate" as other similar efforts to facilitate the transfer of technology.⁶⁰



Personnel take up position in the Space Operations Section of the No. 1 Remote Sensor Unit at RAAF Base Edinburgh (Department of Defence)

A structure and a strategy: Defence Space Command

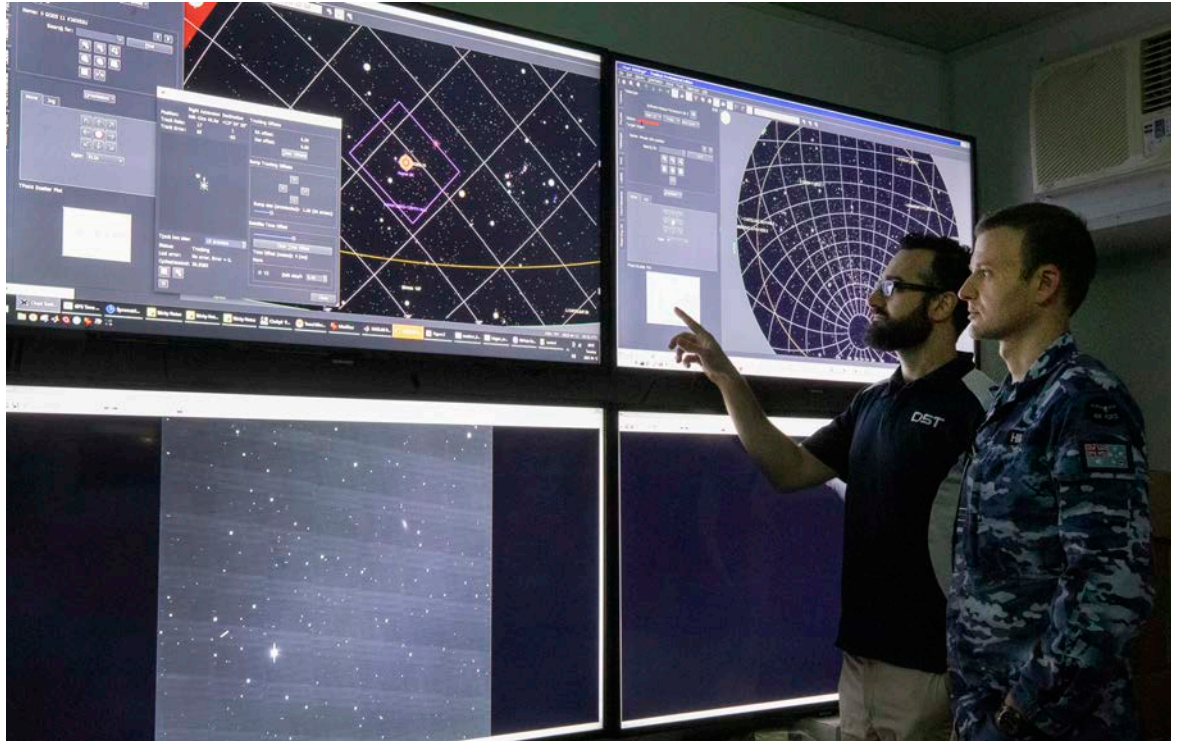
Not only is the creation of Defence Space Command a vital milestone in the ADF's management of its space capabilities and future, but it is also symbolic of the place now afforded to space in its own right in Australia's defence thinking. The Command provides a repository of expertise, a point of advocacy and centralisation of policy, capability management and analysis, and a single point of contact for working with allies. Like the Australian Space Agency, the creation of the Command signals to the public, the ADF and allies that space has a serious part to play in Australia's defence and has the potential to act as a lightning rod for thinking around space, whereas before there was no public face for the domain.

At the same time as it launched Space Command, the ADF released its 'Space Strategy' and 'Space Power Manual.' To say these documents were long overdue is an understatement. The Space Strategy is the first stand-alone Department of Defence treatment of space and its importance to Australia's national security. While there have been internal considerations of the space domain, the unclassified nature of this strategy will address a lack of broader coherence within the Department of Defence and across government and will aid in the Strategy's goal of growing understanding of space. Nonetheless, the Strategy is but the first articulation of Australia's approach to defence space, where before there was none. The broad nature of the document, and the absence of space expertise in the ADF that it rightly highlights, means that the Strategy represents the first of many steps.

The Space Strategy's goal is to identify how it will achieve the space missions outlined in the 2020 Defence Strategic Update, and how it will do so with the capabilities planned for in the 2020 Force

Structure Plan. In this way, the Space Strategy answers the question of how the Department of Defence will use space within the umbrella of its broader strategy. However, the capabilities it will use to do so have already been identified; what will hopefully be the final time Australia's space capability cart is put before its space strategy horse. The Space Strategy focuses on five lines of effort: enhancing Defence's space capability, integrating across government and with allies, growing the nation's understanding of the criticality of space, advancing Australia's sovereign space capability, and ensuring a coherent, efficient and effective use of space.⁶¹ Like cyber, the plan is for Space Command to grow as a new capability in the ADF; as of 2022, there are just over 100 personnel within the Command, many of whom are contractors.

The Strategy directly contrasts Australia's lack of sovereign capability and reliance on space with the view that space is increasingly congested and contested. Assuring Australian access to space is at its forefront, and this can be achieved through partners or alone. The Strategy is clear about the importance of these partnerships and centres them in its appreciation of Australian access to space. Far more than preceding policies and announcements, however, is the clarity with which the Department of Defence has acknowledged that there are limits to what it can achieve in Australian interests solely through cooperation with partners.⁶² The Strategy also acknowledges alternative routes to space security and advocates for diplomatic efforts to regulate space.⁶³ This is a sign of nuance and maturity in the new organisation, as well as an acknowledgement of Australia's reliance on international law and norms, given its light weight as a space power. As a latecomer to space, the Department of Defence also leaves the door open to new approaches to space, such as small satellites and "plug and play" payloads.⁶⁴



Senior Researcher Dr Jason F. Alvino and Defence Space Command, Space Control Group Coordinator Squadron Leader Justin Hill preparing the DSTG 50cm SDA Telescope for collecting observations of satellites and debris in orbit around earth (Department of Defence)

The release of an Australian Space Power Manual concurrent with the Space Strategy is the first official discussion of space power and Australia, although as an introductory document, it is general and aimed at a broad military audience. Its existence is a direct attempt to address long-standing concerns that there is a lack of understanding of space matters within the Department of Defence. Setting out to explain and shape how Australia uses space for its national security, it defines space power as one part of military power, and “the total strength of a nation’s ability to conduct and influence activities to, in, through and from space to achieve its objective.”⁶⁵ Its view of space power is pragmatic, emphasising that from the ADF’s standpoint, all domains are joint. This is a recognition of Australia’s relative lack of weight in space combined with the fact that even the major players in space do not have the power

in space for it to be decisive on its own. Four roles are envisaged for space power in Australia: Space Domain Awareness, space control, support to the joint force, and space logistics. Nonetheless, the document is relatively brief and light on engagement with the growing field of space strategy. Further conceptual thinking about Australia and its role in space is needed as part of a broader whole-of-government approach to space.

Defence Strategic Review 2023

The 2023 *Defence Strategic Review* (DSR) reflected and built on the newfound place of space in Australian defence thinking, rather than drastically changing it. The DSR itself is the most significant reconceptualisation of Australian defence posture in more than three decades. Where before space was seen in terms

of support for other domains, actions in and through space are now more firmly seen as an important focus for the ADF. The Review also re-emphasises the centrality of the relationship between the United States and Australia, stating that the “United States will become even more important in the coming decades” and Australia should seek greater cooperation in science, technology and industry, which is particularly relevant in a field such as space.⁶⁶

The DSR is clear in its recommendation that Australia should focus on communications in space, as well as “capability assurance.” Neither is surprising as a direction. The communications emphasis reflects the criticality of this area first identified in the 1970s; the need for military satellite communications has only increased since. Equally these assets will be subject to increased threats as the number of actors in space, and their capabilities, increases. Finally, choosing two areas on which to focus in space reflects Australia’s finite resources.

Both communications and capability assurance foci are the subject of Department of Defence projects that depart from the approach that saw Australia as a space consumer, discussed further in Chapter 5. Here, the DSR also raised concerns about how Space Command procures space capability, highlighting a mismatch between the pace of technological development and an overly slow procurement process. It advocated for Space Command to move to the Joint Capabilities Group (which occurred in July 2023), the creation of a centralised capability and management function, and importantly, the creation of a means by which to produce a trained space workforce within the Department of Defence. Reflecting calls by a number of commentators for a national space plan, the DSR also recognises that space is a whole-of-government issue.⁶⁷

At the same time as centring space within the DSR, the Albanese government redeployed funding from Australia’s civil space sector to other budget priorities, cutting the \$1.2 billion National Space Mission for Earth Observation, along with funding for spaceport construction and other programs.⁶⁸ Funding for defence satellites and space facilities has remained. While many advocates for space activities in Australia decried the move, seeing it as a lack of government foresight, this is in keeping with the calculations of cost against national need long made by Australian governments. National security has always been at the forefront of Australia’s interests in space, while the arguments for developing a national space industry are less persuasive, not least because concerns over the government’s 2023 funding cuts show that this sector requires significant government support to be viable. The Australian Government has long been aware of the utility of space and the movement of funding away from space is not a renunciation of space’s usefulness. Rather these funding cuts might be seen as a shifting of the threshold at which the government believes Australia should develop its own capability rather than relying on others. After all, this is not the only means by which to access these services. While perhaps cautious, Australia’s relatively slow path to developing its space power is nonetheless reflective of a governmental understanding of the country’s limited resources and its access to the far greater space expertise, capability and power of partners, not least the United States.

3. THE UNITED STATES IN SPACE

THE CREATION OF THE UNITED STATES SPACE FORCE SEEMED TO SOME TO REPRESENT A FOREGROUNDING OF THE MILITARY ASPECTS OF SPACE, AT THE INEVITABLE EXPENSIVE OF PEACEFUL COOPERATION IN SPACE.

The United States is central to how a number of countries think about space, not least Australia. The United States is the largest player in space, shaping technology, law, cultural perceptions of space and, of course, the security environment. Not only is the United States the source of most of Australia's current space capabilities, but US industry and technology are also likely to be at the forefront of any Australian space

expansion. The United States has its own approaches to space in service of its national interests, shaped by a desire to be the preeminent global space power and an understanding that space is crucial to its national security. As a close ally and junior partner, Australia will seek to follow, complement, and leverage

these approaches. How Australia will do this is shaped by a growing US interest in international engagement with partners in space in service of its national security but hampered by the limitations of legacy structures and institutions.

National security at the centre: United States space history

For the United States, space is inherently linked to national identity. For many Americans, space is both a reflection of national power and the strength of the US democratic and economic system, as well as a vital cornerstone of national security.⁶⁹ US space strategy was born during the competition of the Cold War, with the country using both civilian and military means to establish a pre-eminent position in space. NASA, established in 1958, is as much a part of the United States' national security as its extensive military space program, with space maintaining a "remarkably consistent" position of importance in the country's national security strategy.⁷⁰ After an initial flurry of interest in space as the ultimate

high ground and in putting uniforms in space, a desire to limit the extraordinary cost of a space arms race led to a degree of strategic restraint in US defence space policy. While there was a huge investment in military space capabilities, these were overwhelmingly passive rather than offensive in nature.⁷¹

There was a change in the tone of US security policy after the September 11 attacks in 2001 and in response to the growth of Chinese space capability during the first decade of the 21st century which shifted the strategic space environment for the United States. The Bush administration led a shift in the country's approach to space security, in which the United States moved towards a more unilateralist approach in space that privileged military considerations above civil considerations and the United States above others in messaging about space.⁷² The Obama administration took a more "restraintist approach" to space security after 2008, seeking more international cooperation and less of the now-dropped 'space dominance' focus that had been sought under Bush.⁷³ The growing competition in space afforded by the lowering of barriers to access to space saw a renewed US interest in cooperation. In this way, the 2010 *National Space Policy* emphasised that space was a shared environment, in which adherence to shared norms helped ensure the security of all actors.⁷⁴ The 2011 *National Security Space Strategy* likewise saw cooperation with allies discussed as an important part of US space security, in direct contrast to the little attention previously paid to allies in the space sphere.⁷⁵

The belligerent and isolationist rhetoric of the Trump administration worried US partners in space. The creation of the United States Space Force (USSF) seemed to some to represent a foregrounding of the military aspects of space, at the inevitable expense of peaceful cooperation in space. Equally, many of the cooperative initiatives begun under the Obama administration continued or were expanded under his succes-

sor, such as the Combined Space Operations Centre, discussed further below.

Space and national security in the United States today

Unlike Australia, the United States has a space policy that links the myriad aspects of its space activities and decision-making. The United States Government's overarching guidance on space is clear, direct and truly whole-of-government. Written under the Trump administration but accepted by the Biden administration (one of the few such policies), the *National Space Policy* recognises that US space activities encompass "three distinct but interdependent sectors: commercial, civil, and national security," explicitly cross-sector guidelines alongside sector-specific guidelines.⁷⁶ International cooperation is also a key part of the policy. Since NASA's creation, the role of space in diplomacy has been stated explicitly and interwoven within US policy, a recent exemplar being the Artemis Accords (which Australia signed in 2020). By contrast, while relationships are key to Australian uses of space, they are not integrated into its civil strategy other than as a way to further industrial growth.

The June 2020 *Defence Space Strategy* (DSS) sets out how the United States seeks to ensure its defence in and through space over the next ten years. The DSS states that the United States' goals are to ensure that space is "secure, stable and accessible," that the use of space is underpinned by "comprehensive military strength," and that the US military can use space to employ its national power. The DSS has three objectives, through which it will achieve these aims: maintaining space superiority, providing support to national, joint and combined space operations, and ensuring space stability. There is an emphasis on US space superiority and leadership, but not as much as might be expected from a document written under the Trump administration. Allies are important within the Strategy, although the United States is still firmly the leader of any action.

US national security space structures

The American national security space structure is large, complex and spread across a variety of agencies, representing a challenge for smaller space actors interacting with the United States.

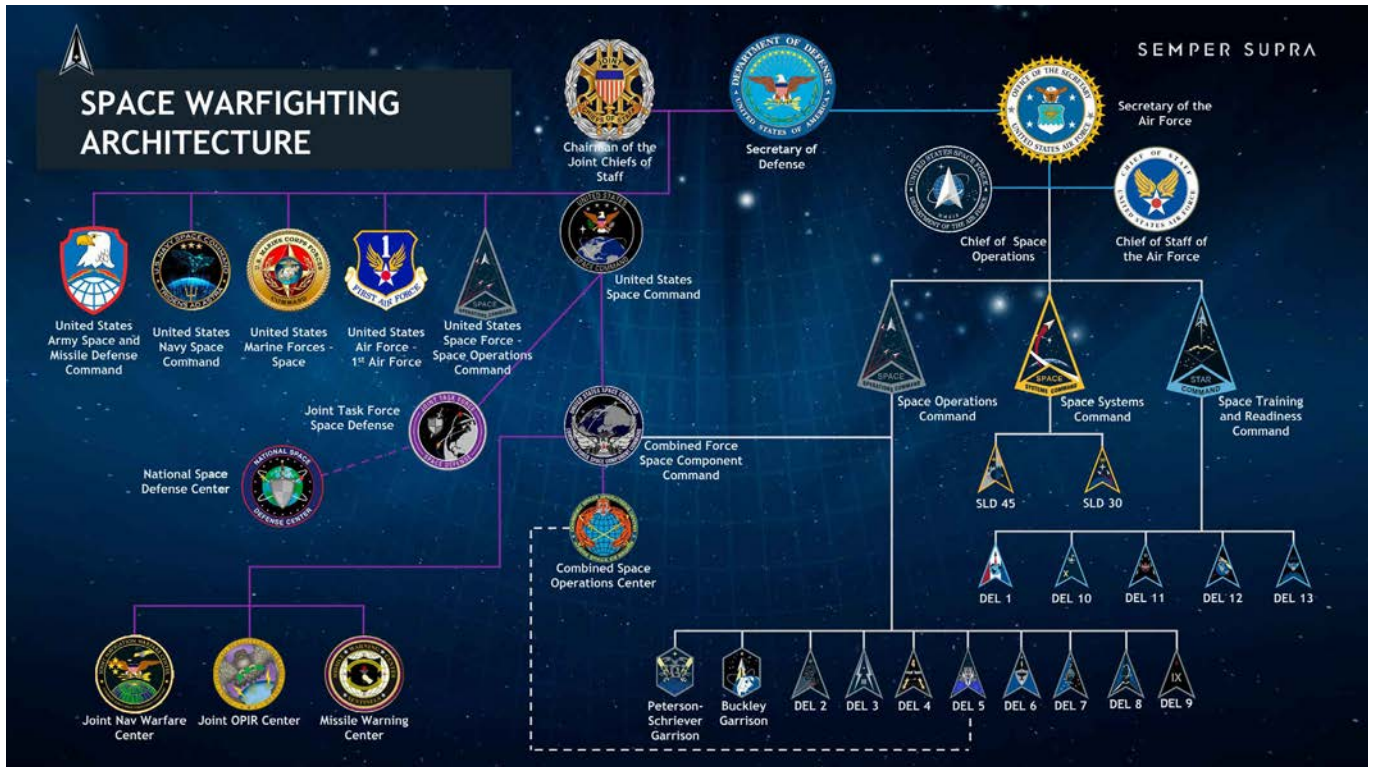


Seal of the Combined Space Operations Center



Seal of the Combined Force Space Component Command

Figure 2. US space warfighting architecture



Source: <https://media.defense.gov/2022/May/02/2002988204/-1/-1/0/220502-F-FE269-001.JPG>

The most well-known is the USSF which organises, equips and trains space units to serve US interests in space, such as through satellites and ground stations. USSF generates forces for the combatant commander, principally Space Command, which has command and control of space operations (that is, above 100km) and provides space services to the other 10 combatant commands.

Yet, responsibility for certain aspects of US defence space activities is spread throughout other agencies, which can make the relationship between smaller countries such as Australia difficult to manage. The Office of the Director of National Intelligence (DNI) has responsibility for intelligence sharing, much of it derived from space, and the National Geospatial-Intelligence Agency (NGA) oversees space imagery and training.⁷⁷ Each branch of the armed services also has

its own space commands. The National Reconnaissance Office (NRO), established in 1961 but only publicly acknowledged in 1992, also plays a significant role. The NRO is responsible for the development, acquisition, launch and operation of US Intelligence, Surveillance and Reconnaissance (ISR) satellites, and the provision of satellite intelligence to other US agencies, such as the National Security Agency (NSA).⁷⁸

Increasingly looking outwards: US cooperation in defence space

Cooperation with partners is a growing element of US national security space policy. Before 2010, for instance, national space policy made no mention of the benefits of bringing allies more closely into certain aspects of the US military space program.⁷⁹ Historically, American interest

had been more in accessing favourable sites for its own facilities than in engaging in cooperative arrangements with partners. The lead the United States enjoyed in space over other nations, and its partners' willingness to let the United States bear that burden, also contributed to its unilateral approach.

Shifts in who has access to space, and to what extent – the cliched congested, competitive and contested – have pushed the United States to consider working with allies more closely. This is particularly the case as a number have developed significant space capabilities, particularly among Europe's larger countries, as well as Japan and South Korea. These countries are also willing and capable of contributing funds to work cooperatively, offering more expansive outcomes than the United States might have been able to achieve alone.⁸⁰ The growth in commercial space, too, has allowed broader access to space than before, and has had the effect of “reshaping traditional definitions of space power.” This in turn expands the number of potential partners and potential avenues for partnership for the United States.⁸¹ For Australia, there has been an important shift in the United States' approach to it as a space partner from simply coveting its geographic position (although this is still the most important aspect of the space relationship). Instead, Australia and allies like it are now potential partners who might contribute to US efforts in space in a variety of ways.

International cooperation is now an important part of US space strategy and operations. In 2014, the 'Five Eyes Combined Space Operations Initiative' was launched in a joint statement by the five nations, following two years of trialling the initiative.⁸² This arrangement saw increased sharing of not just space-derived intelligence but also information about the space environment and objects within it.⁸³ The 2017 Department of Defense International Space Cooperation Strategy detailed the Department's approach

to “invigorating cooperation and collaboration with trusted allies and partners.”⁸⁴ The strategy acknowledged the importance of “leveraging allies' and partners' capabilities” to enhance “space mission assurance” and build interoperability across domains.⁸⁵ The strategy is also clear in its goals to encourage and assist allies to develop, procure and maintain space capabilities that “augment” or “complement” the interests of the United States in space. One goal is the production of a “common policy, strategy, and operational framework for the use of space in dissuading and deterring adversaries, to de-escalate crises, and to ensure coalition success should deterrence fail.”⁸⁶

More broadly, the concept of ‘integrated deterrence,’ the latest new term central to the 2022 *National Defense Strategy*, the *Nuclear Posture Review* and the *Missile Defence Review*, emphasises coordinated planning between US government agencies and with allies and partners.⁸⁷ In this way, the *National Defense Strategy* also emphasises working with partners. It emphasised interoperability, coalitions (and enablers), and combined and collaborative force planning. Importantly, the Strategy also recognised some of the barriers to working with allies and acknowledged the importance of sovereignty to those who work alongside the United States. It also addressed institutional barriers to collective planning, information sharing, intelligence and the all-important controls on exports.⁸⁸ In space as in other areas of defence, the network of allies available to the United States represents an advantage not available to its primary potential adversaries, China and Russia, and offers an avenue to a wider array of space assets, more resilient systems, access to favourable geography, joint planning and the shaping of international norms around space.

**HISTORICALLY,
AMERICAN INTEREST
HAD BEEN MORE
IN ACCESSING
FAVOURABLE SITES FOR
ITS OWN FACILITIES
THAN IN ENGAGING
IN COOPERATIVE
ARRANGEMENTS
WITH PARTNERS.**



Squadron Leader Jamiee Maika of the Royal Australian Air Force operating at the CSpOC at Vandenberg Air Force Base, California, August 2019 (United States Space Force)

The International Traffic in Arms Regulations (ITAR) regulatory regime plays an important role in the way in which the United States interacts with other nations. The ITAR regime was introduced in 1975 to limit the transfer of certain arms and associated technologies. In 1999, fears over nuclear, satellite and rocket secrets making their way to potential adversaries saw ITAR significantly strengthened. This caused a significant decline in the US share of the satellite market, from 75 per cent to just 45 per cent, as customers sought less restricted products elsewhere, thereby diversifying the market and access to space.⁸⁹ ITAR can represent a significant check to other nations procuring US space technology for their own use. Equally, ITAR constrains cooperation between the United States and others on shared projects, as partners are limited in their access to the underlying technology.

A policy of increased cooperation is irrelevant if not carried through 'on the ground.' Here, there has been some recent change in US-allied space cooperation, the most significant of which is the increasing integration of allies into United States space operations. In 2018, the Joint Space Operations Centre was redesignated the Combined Space Operations Centre (CSpOC) to this end. Based at Vandenberg Air Force Base, California, CSpOC exercises command and control of US space forces and is one of four space-related centres under the CFSCC.⁹⁰ While the majority of CSpOC's day-to-day role is in managing US space assets to support combatant commanders, the change in name, from Joint to Combined, reflected the willingness of the United States to accept allies into this space in a formal way and to share plans with those who would most likely have some role in their execution (or the operations they would support).

In 2018 allies were included in Operation Olympic Defender, the standing United States Space Command operation for projecting space power and defending US and allied on-orbit assets.⁹¹ In 2019, all Operation Olympic Defender nations commenced full-time participation in the multiple weekly headquarters-level operations and intelligence briefings, and Commander United States Space Command's update brief, which synchronises coalition space strategy and activity across the domain, while a UK Royal Air Force officer was also made Deputy Director of the CSpOC that same year.⁹² Nonetheless, it is important to note that CSpOC is still an American 'show' and retains some Not Releasable to Foreign Nationals (NOFORN) aspects.

The inclusion of allies in CSpOC is useful to the United States for a number of reasons. The integration of space into all military operations means that space, in turn, will be a part of any coalition engagements. Bringing partners into CSpOC is a recognition of this fact. Equally, broadening out those involved in American space operations has the potential to increase redundancy and resilience, which in turn can have a deterrent effect (although it can have an escalatory one if others perceive themselves as falling behind).⁹³ In 2018, for instance, General John Hyten, commander of US Strategic Command at the time, expressed his concern at some of the gaps in US space capabilities, particularly situational awareness. By bringing allies into the fold in a more significant way, Hyten hoped to grow the range of options for US defence space. Having allies at CSpOC also improves interoperability. By being invited into the room, according to Hyten, allies could tell the United States: "You know, I can help you right here, and I can help right here, and this is how I can participate. I can do these missions; I can't do those missions."⁹⁴ Finally, creating partnerships with allies represents a significant strength for the United States over its rivals in space, China and Russia, who have thus far failed to grow anything

similar.⁹⁵ Indeed, the United States and its close partners comprise 11 of the 15 largest spenders on space.⁹⁶

There are also challenges to US efforts to integrate allies into its space activities. The organisational complexity of the US space security ecosystem can contribute to issues of coordination between US entities, multiple and confusing points of entry for external actors, and differing attitudes towards working with foreign partners. There is a broad cultural shift that needs to occur to fully integrate allies into all aspects of space, given the incredible sensitivity of this domain relative to others. The high classification of many space capabilities or their restriction as US-only or NOFORN, for instance, can be a significant barrier to day-to-day cooperation.⁹⁷ That space is intimately tied to intelligence, and that intelligence space activities are still managed by the NRO, are also significant barriers. Cooperation, moreover, needs to occur on all levels, not just in strategic policy. Commanders might be alive to the importance of cooperation, however, those in the middle of an organisation might be more reticent in the face of entrenched cultures of US primacy and secrecy. Finally, while allies might be integrated at the operational or tactical level, their presence in strategic decisions, or during procurement discussions, is more limited.

THERE ARE ALSO CHALLENGES TO THE AMERICAN EFFORTS TO INTEGRATE ALLIES INTO ITS SPACE ACTIVITIES.

4. THE RELATIONSHIP IN SPACE: THE LEGACY ON THE GROUND

PINE GAP LOOMS LARGE OVER ANY DISCUSSION OF SPACE IN AUSTRALIA, BOTH IN THE PUBLIC MIND AND IN THE WAY IN WHICH DEFENCE SPACE IN AUSTRALIA HAS BEEN HITHERTO ASSOCIATED WITH INTELLIGENCE.

The defence space relationship between Australia and the United States also occurs within existing alliance structures and relationships built over decades, not least between the two country's militaries and intelligence agencies. The two countries maintain a relationship in space through two different structural forms, bilateral and multilateral, with the former being more common. The Australian Defence Organisation manages its operational space relationship

with the United States under Operation Dyrura.⁹⁸ Within the space relationship, there is a multitude of memoranda of understanding and agreements which allow for a range of interaction types.⁹⁹ For Australia, cooperative space engagements between Australia and the United

States operate on a spectrum of Australian ownership, agency and sovereign capability. On one end of the scale are 'buy-in' engagements, in which Australia accesses a larger system. On the other are Australia's nascent plans to develop its own satellites.

It is no accident that those cooperative activities that arose out of alliance maintenance and Cold War concerns occur on the ground. This is where Australia's utility to the United States lies: in its geography, aided by Australia being a small but reliable and technically proficient partner. That is not to say that Australia does not derive significant benefit from these arrangements – not least in the vital intelligence pipeline – but that it does so as a consumer or as a contributor to a broader architecture, rather than as an actor in space. Moreover, alliance maintenance is a consideration alongside space interests. Pine Gap, the broader intelligence relationship and Australia's contribution to space domain awareness fit into this category. Each sees different degrees of Australian contribution and agency.

But they each have their origins in American initiative, rather than Australian, and each reflects a buying-in to an American system.

The 'linchpin' of the alliance: Pine Gap

Pine Gap is the product of an era in which Australia, as a largely passive space actor, leveraged its geography in the pursuit of a closer alliance with the United States. Like the Five Eyes relationship more broadly, Pine Gap and other Joint Facilities might be better seen through the lens of alliance or intelligence studies rather than those of space.¹⁰⁰ Nonetheless, Pine Gap looms large over any discussion of space in Australia, both in the public mind and in the way in which defence space in Australia has been hitherto associated with intelligence, and as a result shaped by the specific requirements of that area of national security.

The end of the Cold War did not see the importance of Pine Gap and other sites diminish; on the contrary, they grew in importance and physical size during the Global War on Terror. While there were issues surrounding the extent to which Australia fully cooperated in Pine Gap in its early decades, these have largely been resolved, with Australians "completely enmeshed into the management and structure of the station." As Ball, Robinson and Tanter point out, this reflects the efforts of successive governments, but also the changed nature of the military and intelligence relationship between Australia and the United States.¹⁰¹

Pine Gap is a genuine 'joint' facility in its personnel. Australia also reaps significant benefits from access to intelligence emanating from the facility, which it could not hope to replicate in any other way. However, Pine Gap remains overwhelmingly American-directed and funded. The Australian contribution to costs is 'minuscule,' at

around \$14 million in 2011. The ground facilities, the satellites they connect to, and the broader ecosystem of technology, industry and agencies into which the facility fits are all American; Australia is a small part of a much larger US-run system.¹⁰²

As government officials are quick to point out, Australia has “full knowledge and concurrence” when it comes to operations at Pine Gap and places much emphasis on this phrase as an answer to public concerns about the asymmetry of the Pine Gap, intelligence and defence relationship. Nonetheless, the controversies of Pine Gap cast a shadow over discussions of space, defence and US facilities. As one member of DSTG has stated, the legacy of this is “an ongoing suspicion among some quarters in Australia of any new engagement with the US that involves space, defence and sites in Australia. This makes establishing joint defence facilities for surveil-

lance of space politically sensitive, even given their obvious importance for civilian space programs.”¹⁰³

That Pine Gap is seen as central to the alliance and to Australia’s intelligence and security needs is without question. It will remain important for the immediate future. New areas of negotiation and change in the nature of Australia’s relationship in defence space with the United States will therefore occur in other areas. Australia’s involvement in other forms of space engagement, discussed below, heralds a future in which the relationship can expand past a focus on the secretive domes outside Alice Springs. The range of these engagements outside the reflexively secretive world of intelligence presents opportunities for broader technological, training and operational benefits to the wider Defence Organisation while also offering varied opportunities for burden sharing and the benefits that might accrue.



Australian Defence Satellite Communications Station at Korajena, near Geraldton, Western Australia (Wikimedia)



An internal view of the telescope inside the dome at the Harold Holt Satellite Sensor Site facility near Exmouth, Western Australia (Department of Defence)

Not just a consumer? Intelligence and space-derived data

Space-based data is one of the most important products of any space hardware. Indeed, most of Australia's current and future space activities consist of space-derived information, but for most of its space history, Australia has been a consumer of space data rather than a producer. This data includes earth observation, a term that encapsulates a vast array of information from a range of different instruments, for different purposes, serving different areas of national interest such as intelligence gathering, mapping and weather. Position, navigation and timing information is vital to defence activities, in providing the position of friendly forces, and allowing for the targeting of adversaries.¹⁰⁴ The US-run Global Positioning System, on which

Australia relies, also provides precision timing and enables command and control.

Australia relies on allies for access to intelligence information from space. Space fits into a far broader intelligence relationship that includes a range of different sources for raw intelligence, centres of analysis and avenues for cooperation. Intelligence is perhaps the most well-known element of space-derived data in the national security arena, while simultaneously the most secret. This data comes in a variety of forms. Geospatial intelligence (GEOINT) includes information on weather, topography, oceanography, intelligence mission data, human geography and targeting.¹⁰⁵ Signals intelligence (SIGINT) is also conducted from space-based hardware, which provides information on non-communications emissions, such as radars and beacons

(ELINT) and the opportunity to access and potentially eavesdrop on communications (COMINT). While derived from space, this type of information has typically been seen as an intelligence matter, rather than a space one. Much of the information derived from space might be viewed alongside a wealth of other sources, which are then combined and analysed to create a final finished product. As a result, Australia has treated space-derived intelligence as a matter for the intelligence organisations, rather than as a space issue.

Consequently, cooperative arrangements, not least Five Eyes, are central to Australia's use of space-based information and intelligence. Australia is "overwhelmingly a consumer" of intelligence from Five Eyes.¹⁰⁶ There are two outcomes from Five Eyes access that Australia most values. The first is the mass of intelligence to which Australia would not otherwise have access, including from satellites that would be, for Australia, prohibitively expensive to replicate even on a small scale. Second, "the density of interactions in the multilateral Five Eyes context promotes deeper trust at the bilateral level with members."¹⁰⁷ The close relationship allows Australia to request support from the United States – an example being the reported repositioning of a SIGINT satellite to better cover the Indonesian archipelago during the 1999 East Timor crisis.¹⁰⁸

Burden sharing is an important element of Australia's Five Eyes intelligence relationships. Only the United States and Canada currently operate ISR satellites, with the other three countries contributing through the provision of intelligence collected closer to the ground. In the case of SIGINT, Australia maintains a number of facilities run by the Australian Signals Directorate (ASD), including Korajena and the Cocos (Keeling) Islands, which are well-placed to intercept signals in the Indonesian archipelago and beyond.¹⁰⁹ Burden sharing such as this allows

Australia to better claim access to allies' intelligence. In this case, Australia's arrangements to share in space-derived intelligence are better seen in terms of the intelligence relationships, rather than those in space, as it is the intelligence structures that govern the interaction.

Australia and other countries also contribute by providing analysts to interpret the vast volume of information produced by US intelligence-gathering satellites. Australia, through the Australian Geospatial Organisation (AGO), is a partner with the US National Geospatial Intelligence Agency (NGA). Through this relationship, which sees an NGA presence in AGO, Australia coordinates joint requirements and contributes resources that aid the United States to analyse Pacific region data. The then-NGA Director, Robert B Murrett, referred in 2008 to the "sheer amount of effort" required to sift through this data and the close relationship that this necessitated with Australia.¹¹⁰ Australia also cooperates on geospatial intelligence within the Allied System for Geospatial Intelligence (ASG) alongside Five Eyes countries. Coordinated by the ASG Senior Management Council, this arrangement sees the five countries synchronise efforts, facilitates interoperability and addresses one of the key challenges of defence capabilities requiring highly skilled personnel by providing a network through which allies might "share and surge their talent."¹¹¹

AUSTRALIA AND OTHER COUNTRIES ALSO CONTRIBUTE BY PROVIDING ANALYSTS TO INTERPRET THE VAST VOLUME OF INFORMATION PRODUCED BY AMERICAN INTELLIGENCE-GATHERING SATELLITES.

Building on Australia's geography: Space Domain Awareness

Space Domain Awareness (SDA) is fundamental to enabling other aspects of space power and is an important part of the space relationship.¹¹² For United States Space Command, SDA

IN THE CASE OF SPACE DOMAIN AWARENESS, AUSTRALIA IS NOT CONTRIBUTING TO A CAPABILITY THE UNITED STATES COULD HAVE UNDERTAKEN ALONE BUT IS INSTEAD ENHANCING AMERICAN – AND ALLIED – ABILITY TO MONITOR THE SPACE ENVIRONMENT.

is defined as “identification, characterization and understanding of any factor, passive or active, associated with the space domain that could affect space operations and thereby impact the security, safety, economy or environment of our nation.”¹¹³ SDA is not simply sensors that face space: it also includes cataloguing objects into databases, building an understanding of the types of objects of interest and their characteristics, and the fusion of this information with

other sources.¹¹⁴ In 2019 the United States abandoned the narrower definition of Space Situational Awareness (SSA) in favour of a more holistic approach to space as a domain.¹¹⁵ Australia has followed suit. SDA includes not just tracking human-made and natural objects in space (SSA’s focus), but all elements that might affect an actor’s ability to operate

in that domain, including space weather, and intelligence. Foreign satellites are one area of interest for a variety of reasons, including intelligence collection on spacecraft capabilities or the provision of “safe window intelligence” (when friendly forces are free from observation).¹¹⁶ Equally, debris tracking is a key part of SDA, as these objects pose a hazard to the use of space and have the potential not just to disrupt space operations, but also to generate exponentially more debris through collisions.

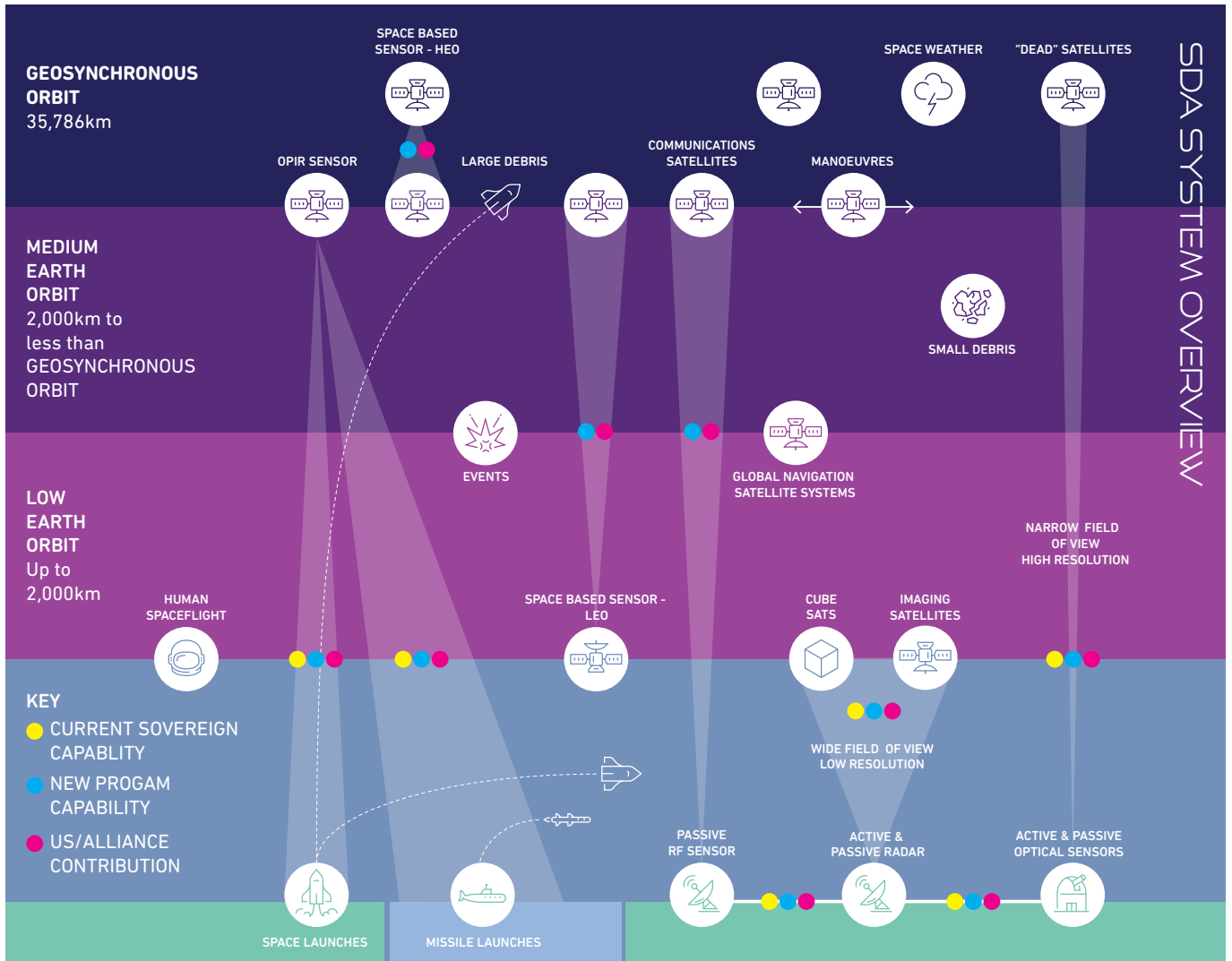
Tests of Chinese and Russian anti-satellite weapons (ASATs) and events like the 2009 collision between Iridium and Cosmos satellites increased US interest in SSA. However, the SSA task is exponentially more difficult without ground stations in other nations, and as a result, the United States signed agreements with five nations in the first few years following these events.¹¹⁷ By 2023, it had signed SSA agreements with 33 nations, as well

as 129 with commercial partners and seven with academic institutions.¹¹⁸ As a result, identification and tracking have increasingly become a realm in which the United States has sought to cooperate with other nations. For its part, Australia’s geographic position has meant that SSA has been at the heart of its space activities, not least through the hosting of US ground stations.¹¹⁹

Australia’s SDA capabilities are directly integrated into those of the United States. In 2010, Australia signed the *Space Situational Awareness Partnership Statement of Principles* with the United States, which recognised the importance of SSA to space security and the gaps in global coverage that Australia might fill.¹²⁰ Two space surveillance assets are based at the Harold Holt Naval Communications Station near Exmouth in Western Australia: the Space Surveillance Telescope (SST) (declared operational in September 2022) and a C-Band space surveillance radar (SSR) (operational since 2017).¹²¹ Both were operated by the Royal Australian Air Force’s (RAAF) No. 1 Remote Sensor Unit (1RSU) which also operates the Jindalee Operational Radar Network (JORN) and is managed by the Wide Area and Space Surveillance Systems Program Office (WASSSPO) in Adelaide, South Australia. In July 2023 Australia’s first joint space unit, the No. 1 Space Surveillance Unit (SSU), sitting under Joint Capability Group, assumed control of the SST.

For Australia, the presence of SDA assets in-country as joint facilities allows for a small country to gain experience in this field. The AUSMIN memorandum of understanding stated simply that the then-proposed facilities “will give Australia valuable opportunities to gain both expertise and capability in space situational awareness through access to US data, training and advice.”¹²² While Australia’s SSA capabilities are integrated into those of the United States, awareness of the space domain is a crucial cornerstone of Australia’s future satel-

Figure 3. Australia's Space Domain Awareness system



Source: 2022 Australian Defence Space Strategy, p.39. <https://view.publitas.com/jericho/australias-defence-space-strategy/page/1>

lite fleet. As Air Vice Marshal Catherine Roberts explained to the Senate Committee on Foreign Affairs, Defence and Trade: “We need to know what the satellites are doing, we need to know whether they’re operating effectively, and that allows us to then determine whether something such as space weather has affected them versus something which is caused by an anti-satellite attack.”¹²³ By being part of the United States’ SDA initiatives, Australia is also able to access American expertise.

What does the United States receive from the SDA relationship? One RAAF officer from 1RSU posted to the United States, Flight Lieutenant James Pak, summed up the answer simply: “In return, what we can provide is resources, personnel, other assets, but more importantly, unique geography.”¹²⁴ Lieutenant General Nina Armagno, Director of Staff, Headquarters Space Force, was clear in her December 2022 statement that Australia “is prime country for space domain awareness” going so far as to say it “seems as [if]

Australia is sitting on a pot of gold at the end of the rainbow, really, for our common national security interests.”¹²⁵ By contrast, little reference was made by Armagno to building Australian industry or the ability to develop space capabilities locally. In the case of SDA, Australia is not contributing to a capability the United States could have undertaken alone but is instead enhancing US – and allied – ability to monitor the space environment. It is worth noting that among Space Force’s capabilities, two of the five ground-based SSA stations are located in Australia, representing a large slice of USSF capability. Australia is therefore an important node in the US system, and as it uses US-produced sensors, produces data that is more easily integrated and trusted. Geography continues to be Australia’s most important strength when it comes to working with the United States.

As discussed further in the next chapter, the legacy cooperative arrangements offer a means through which Australia can develop its own capability. Protecting its own assets and demonstrating the ability to threaten those of other actors has been recognised by the Australian Government as an integral part of sovereign space capability. Understanding the space domain, and the ability to exert influence on it are two sides of the same coin, and Australia is pursuing both. Joint Project 9360 (JP9360), announced in 2020, brings together six projects including the SST and SSR to enhance Australia’s SDA.¹²⁶ This includes tracking human-made and natural objects, threat identification and warning, and attribution. Space domain awareness delivered through the range of capabilities within JP9360 is aimed at providing Australia with independent sources of information about objects and events in space. This allows commanders and the government to make decisions informed by their own sources without reliance on others, as well as contribute to US SDA architecture.¹²⁷ However, it is not clear if this independent source of information will be as zealously guarded as the data from sources such as Korajena.

5. THE RELATIONSHIP IN SPACE: THE ALLIANCE AS LAUNCHING PAD

The 2023 *Defence Strategic Review* unequivocally focuses the ADF's space efforts on "capability assurance and communications provision."¹²⁸ This is a distillation of the three lines of defence effort in sovereign space capabilities stated in 2021: earth observation, space control and space services (which include navigation and communications).¹²⁹ Much is already underway in joint projects, although no project is yet completed. Nonetheless, the fact that the ADF is now in the process of exploring and in some cases procuring its own space capabilities, where before it had largely relied on others, represents a significant change in how defence space is thought about in Australia. Even if space is conceptualised as supportive of other domains or seen in terms of other cooperation frameworks, as in the case of space-based intelligence, the need for the ADF to physically manage space assets has already engendered structural changes in the creation of Defence Space Command. Hopefully, the ADF will also see a deeper examination of the conceptual underpinnings of its approach to space, not

least how space strategy applies to a nation of the size and outlook of Australia.

Compared to legacy projects such as Pine Gap, these new foci are largely initiated by Australia for Australian ends but are also deeply reliant on the United States for their development. In this way, the space relationship with the United States is a launching pad from which Australia might build its own capabilities. This should not be surprising given that not only is the United States Australia's closest partner, but so too is US space technology world-leading. This is not to say that these projects are not in the United States' interests. They either directly contribute to US systems or fit in with the newer US focus on building allied capability and resilience in space. Moreover, the inertia of the long relationship can exert pressure on these cooperative projects. Classification, export controls, institutional cultures and a sometime tendency to revert to the space relationship status quo are all challenges to the development of Australian self-reliance in space.



Senior space officials from Australia, Canada, the United Kingdom and the United States pose for a photo during a Commander's Conference at Vandenberg Air Force Base, November 2019 (US Space Command)

Australians in the room: multilateral engagement and secondments

Building a cohort of service personnel with space experience is recognised as one of the key challenges for Defence Space Command. Australia has therefore embraced the opportunity to send personnel to the United States, following decades of sending personnel as liaison officers, secondees, on exercises, for education and training and for a range of other duties. With the significant Australian buy-in to the WGS satellite program, the number of Australians in the United States in support of defence space has risen modestly but significantly, with ADF

EVEN WHEN AUSTRALIA ACTS BY ITSELF, IT MUST CURRENTLY RELY ON SYSTEMS AND CAPABILITIES SUPPLIED BY THE UNITED STATES.

members sent for training and to the headquarters tasked with operating the WGS satellites in Hawaii and Colorado.¹³⁰ Other Australians are based at Space Command, Space Force and Space Operations Command, the US Air Force and the Penta-

gon, although in relatively small numbers.¹³¹ In 2022, just eight RAAF personnel were embedded in the Space Force (and two members of the Space Force were with the RAAF in return).¹³² More broadly, uniformed and civilian defence personnel work with the US Department of Defense in space matters, such as at the Pentagon or through the Australian Embassy. Yet more Australians are based at intelligence agencies, such as the NRO. Finally, in a number of cases, Australians have been sent to undertake specific training or higher education.¹³³

Australian personnel and capabilities have also increasingly participated in US-led space exercises over the past decade, such as Global Sentinel, Space Flag and the Schriever Wargame (run by Space Command). Australians also participate in exercises run by other areas of the US military, that might include space elements, such as the Global Lightning exercise focused on strategic deterrence.¹³⁴ Equally, US service personnel

have participated in Australian exercises, such as the deployment of members of the US Space Command to Exercise Talisman Sabre in 2021.¹³⁵

Not only do these exercises provide the various nations with an opportunity to test space capabilities and decision-making, but they also help identify capability gaps, exercise international organisational structures for space activities and grow familiarity with different structures and systems among allies. The 2019 iteration of the Schriever Wargame, for instance, sought to explore ways in which to break down barriers to space coordination, such as different national space architectures, across military, civilian and commercial space, across different classification levels, and integrate whole-of-government approaches to space.¹³⁶

Having Australians in the room will aid coordination of future operations and activities. Space will play a role in any bilateral or multilateral military activity, from joint exercises to humanitarian operations to crisis and war. The ADF has long known that personal relationships and having people ‘inside the tent’ are vital to smoothing the way during operations. Even when Australia acts by itself, it must currently rely on systems and capabilities supplied by the United States, such as communications and intelligence; the WGS example discussed further below, shows the value of a good relationship in meeting Australia’s needs. Having an Australian in the room may help to subtly influence allied decisions, even if only as a reminder of Australia’s existence, and by developing trust their presence may help to dismantle barriers to sharing information. This is particularly important given the United States’ sensitivity, harking back to the Cold War era, to all matters pertaining to national security space. In times of crisis, understanding an ally, their structures, doctrine and decision-making processes is vital. As Todd Harrison of the Center for Strategic and International Studies (CSIS) noted: “Any allied country needs to have their own experts so they understand our response – they need folks who

can say, ‘Yes, I understand why the Americans are escalating over this.’”¹³⁷

As an emerging space actor, the access to information, training and experience that Australians gain from being in US space structures cannot easily be replicated. Without it, Australia cannot build its space capabilities at the pace it desires. As a relative latecomer to space, Australia can leverage the experience in the United States to build its own space workforce which, while not as costly as equipment, is recognised as crucial in the Australian Space Strategy. There are potential pitfalls, however, in overreliance on a single partner for experience, particularly when the size, focus and funding of that partner’s military are markedly different.

Having Australians in the US space structure is also a way to facilitate interoperability. This is particularly the case given that Australia’s starting point for much of its space capabilities is whether it works within the broader US space architecture. Both Australian and American space personnel have been quick to point out how Australia has been invited to the table not just in using space capabilities but procuring and designing them too.¹³⁸ In 2021, Lieutenant General Nina Armagno, Director of Staff, Headquarters Space Force, spoke of how the relationship had changed:

*We kind of used to think of allied partnership as: ‘Hey, Australia, why don’t you buy the next satellite, if you will?’ Today, we’re talking about getting together from concept, from design and working together on future capabilities and projects.*¹³⁹

However, it is unclear how this works in practice, and how much the vast US defence apparatus will include the needs or desires – or voice – of a country the size of Australia on capabilities that have long been among the most secretive of national security areas, covered by NOFORN and ITAR. What an Australian part in these discussions looks like remains to be seen.

Buying into satellite communications: WGS and JP9102

Satellite communications are a vital part of Australia’s national security and were one of the earliest space capabilities investigated by the Department of Defence. It should be no surprise that satellite communications have been one of the areas in which Australia has invested the most resources in recent years. However, the path to achieving this goal has been and will be a long one. Australia has used a number of approaches to its communication needs, shaped by the requirements of the ADF, funding and opportunities. Australia has taken a shared approach, as in the case of defence payloads on the Optus C1 satellite, a constellation approach in the US Wideband Global SATCOM (WGS) case, a hosted payload approach, in which Australia contracted with US company INTELSAT to host military communications payloads on their civilian satellites, negotiated access to allied communications capabilities, and finally commercial leases with civilian satellites.¹⁴⁰

The WGS program, also known as JP2008, was not only a significant improvement in Australia’s satellite communications capacity but the largest cooperative space engagement with the United States. It represents a significant investment in an American system: upwards of \$1 billion.¹⁴¹ It also saw exchanges of personnel, information and investment in ground stations. Most importantly, it was perceived in Australia as a step towards a locally-owned communications satellite. Under JP9102, the contract for this satellite was awarded to Lockheed Martin in 2023 and is the country’s largest space project.¹⁴² The path from managing Australia’s access to the WGS system to JP9102, perhaps more than any other program, provides an insight into the utility and challenges of the space relationship.

In 2007, Australia signed an agreement with the United States to gain access to their WGS system,



Launch patch for Wideband Global SATCOM WGS-6 in 2013 (Wikicommons)

funding the equivalent of one of the 10 satellites in the system (although not owning it), which in turn gave Australia access to coverage that extended across the globe. Australia is the largest contributor to the WGS after the United States.¹⁴³ Other partners, including Canada, Denmark, Luxembourg, the Netherlands and New Zealand are also involved in the consortium, but combined only contributed the cost of a single satellite. The 2008 *US-Australia Military Satellite Communications Partnership Statement of Principles* committed the two countries to further technical collaboration, without which, the 2009 Defence White Paper pointed out, Australia “would have to devote significantly more resources to develop the intelligence and communication capabilities we need.”¹⁴⁴

The first satellite in the constellation of ten was launched in 2007, and the last in 2019.¹⁴⁵ Australia has a significant allocation of the total bandwidth of the WGS system, substantially enhancing its satellite communication capability. This, however, is balanced against the need to work within a system that, ultimately, is managed by the United States. Australia’s access to the WGS system is concentrated in its region. While

Australia receives 10 per cent of the total bandwidth as a baseline resource allocation, 95 per cent of this is used in the Australia coverage area as this is where the majority of the ADF is operating at any given time. Nonetheless, Australia can access the system around the world, which is of great use to deployed ADF assets.

Resource allocation within the WGS is managed as part of the US Department of Defense SATCOM planning process, “with AS DoD participation.”¹⁴⁶ In practice, this means that Australia requests access from the US Regional Communications Support Centre-Pacific (RSSC-PAC) at Wheeler Army Airfield in Hawaii, which manages satellite communications in the Indo-Pacific. Requests must be made with at least 24 hours’ notice. This process has been largely smooth, and the relationship is such that in times of need, the process can be faster, such as during the 2020 Australian bushfires.¹⁴⁷ Australia can also allocate its bandwidth to a third party. In all cases save where a member of the WGS consortium is participating in an exercise or operations with Australia, the US and Australian departments of defence must “mutually determine any allocation” to a third party.¹⁴⁸

Australia’s involvement in the WGS program is emblematic of both the trajectory of Australia’s defence space capabilities in recent years, as well as the balance it sought to strike between sovereignty, cooperation and cost at that stage of its space efforts. As is common with large projects in a new area of defence interest, elements of the WGS program have encountered issues. In particular, problems with the provision of ground stations in 2014 saw JP2008 Phase 3F be placed on the Projects of Concern list. There are hints that the strict adherence to the United States’ requirements for ground stations may have caused some of these issues.¹⁴⁹ In turn, this points to the unique procurement arrangement for the WGS. Under the agreement with the

United States, Australia has no direct relationship with the company building the satellites (Boeing). Instead, it deals only with the United States as the prime contractor, reflecting the importance of ITAR to such arrangements. One result is that Australia has “limited insight into the program,” including the review process of design data.¹⁵⁰

Apart from the benefit derived from accessing a constellation of communications satellites at a reasonable cost, Australia’s involvement in the WGS program has additional advantages. Australia has had access to training in the United States in the satellite systems it uses. The embedding of ADF personnel in the management of the WGS allows “the ADF to gain further WGS operational knowledge and realise the full capability potential of the WGS system.”¹⁵¹ This experience is invaluable in exposing Australian service members to the new capabilities and the complex systems and organisational structures that manage them. Moreover, as with many defence capabilities, Australia can never hope to replicate the scale on which the United States operates in space. Finally, one benefit of the long-running WGS partnership, intentional or otherwise, has been to start the ADF on a learning curve in space in a relatively uncontroversial area of space activities. Unlike offensive or intelligence-gathering space capabilities, communications perhaps attract less political sensitivity. The skills gained in the WGS program, however, would help in building Australia’s other space capabilities in the future.

The JP9102 program is in its early days, and its initial operating capability is projected for 2027. The Lockheed Martin system will be comprised of more than one satellite, ground stations, an integrated satellite communications management system and two satellite communications operations centres.¹⁵² The Lockheed Martin website emphasises the values that guide the project, “sovereignty, agility, and flexibility,” point-

ing to the benefit the system will bring to Australian access to military communications.¹⁵³ The need to no longer ask for access and the deeper control over every aspect of its design and use will go a long way to addressing the issues associated with reliance on others for military communications.

Nonetheless, even though this satellite will be under Australian control, the relationship with the United States will undoubtedly shape its procurement and use. The chosen contractor is an American prime which has long been the primary contractor for US military communications satellites.¹⁵⁴ Australia will have to draw on the United States for the creation of a trained workforce, which represents one of the major challenges for Australian sovereign space capability.¹⁵⁵ Depending on the precise profile of the satellite, its capabilities and its orbit, Australian forces will likely still rely on a range of communications arrangements as it currently does, particularly when operating outside the region. In turn, the satellite itself may be used by US forces operating under its orbit.

Leveraging the long relationship: offensive space

Australia is now seeking offensive space capabilities as a way to exert force and deter potential adversaries in the space domain. In 2022, the Australian Government announced that it would develop the ability to attack space assets under JP9358, such as through electronic warfare or lasers to blind satellites.¹⁵⁶ Notably, the Australian government has emphasised that these capabilities do not create debris and that Australia remains committed to international norms when it comes to space, which speaks to an awareness of public sensitivity about weapons in space, and deliberately contrasting Australia with countries such as China.¹⁵⁷ The Department of Defence



Leading Aircraftman Nick Brown from No. 3 Control and Reporting Unit monitors the satellite link back to RAAF Williamtown from the Corindi showgrounds during Exercise Lightning Storm 20 (Department of Defence)

has also explained these developments in terms of protecting Australian space capabilities from attack by hostile assets, rather than in purely offensive terms.¹⁵⁸

The intertwining of Australia's hopes for sovereign capability and its relationship with the United States is clear in its plans for offensive space. As with other space capabilities, the ADF has sought to leverage US strengths to gain experience in managing offensive space assets. For instance, the 2021 Australia-US Exercise Talisman Sabre saw the deployment of the US Space Command's Counter Communications System, which is a "transportable space control electronic warfare system that reversibly denies adversary satellite communications."¹⁵⁹ That this was the first time the system was deployed overseas is perhaps a mark of the close relationship.

Equally, any offensive space capability will be underpinned by SDA and as a result the broader US SDA network. An actor cannot attack a space asset if it is unable to find it; defending against attacks is similarly difficult without situational awareness of the space environment. Australia is seeking to develop its own SDA capabilities, as discussed above, but it will also rely on its integration into the far larger US SDA network for coverage of far more of the space domain. In turn, Australia will be able to burden share in both SDA and the offensive capabilities it supports should it develop these capabilities, enhancing the network as a whole. However, with integration at the core of both SDA and offensive space, there are important questions of sovereignty facing Australia. There has been little corresponding discussion of the political and diplomatic structures, formal and informal, in which Australia might use them. Would Australia, for instance, consider using such capabilities unilaterally?

Status quo or boldly go? Working with the United States on spy satellites

As with other space capabilities, Australia's nascent plans for ISR satellites highlight the delicate balance being struck between developing Australia's own capacity for action in space in service of its national aims, and the need to work with the United States to build these capabilities. Space-derived intelligence is perceived and managed through Australia's long-standing intelligence relationships rather than through the prism of space, as noted above. However, the advent of Australia's own space-based ISR capability will likely shift this perception. At the very least, these assets will need to be designed, procured, operated and protected; to do so requires an understanding of the space domain. An analogy might be an intelligence-gathering ship: the data might be combined with other sources and disseminated through intelligence relationships, but the ship would require input from those with knowledge of the maritime environment and would be managed by the navy. Equally, the National Intelligence Community may wish to maintain control over what has long been their purview, ensuring that some space capabilities are managed outside Defence Space Command.

Australia is seeking to expand its own capabilities in ISR space with Project DEF799, a concept first introduced in the 2016 Defence White Paper. It plans to do this first working with commercial partners in Phase 1 to gain better access to imagery and other data, while under Phase 2, it will seek to develop a sovereign GEOINT space surveillance system.¹⁶⁰ The benefits of doing so are obvious: Australia would have sovereign control over its own source of intelligence, to be tasked as and when needed. This could remove any issue of scheduling space assets in a cooperative arrangement in which Australia was the junior partner to the more extreme, but not impossible, case in which the intelligence

interests of Australia and its partners differed enough to cause friction in the relationship or the restriction of access.

Contributing to the broader intelligence and space relationships of which Australia has long been a part is also a key outcome of the pursuit of ISR satellites. An Australian ISR satellite represents a substantial upgrade to the Australian contribution to its US-Australia and the Five Eyes relationships, enhancing Australia's intelligence capability in the region. Nonetheless, the cost and difficulty associated with this project are significant, although there are suggestions that the Department of Defence will leverage a pre-existing US project.¹⁶¹

The first steps have already occurred. Australia and the United States also

cooperated on two satellites launched by Rocket Lab from its New Zealand launch facility in mid-2022, NROL-162 and NROL-199.¹⁶² While the nature of these payloads is classified, that they were developed with the NRO points towards certain in-space capabilities with which Australia has hitherto not had a great deal of experience. The NRO's own fact sheet on the launch suggested that the acquisition process was also of interest to the Australian Department of Defence, and the launch provided "an opportunity to partner with an experienced space acquisition organization as it prepares to acquire its own national security satellite capability towards the end of the decade."¹⁶³ The two countries' cooperation on these two satellites reflects that Australia is now increasingly allowed 'inside the tent' not just with intelligence data, but collection as well, and that Australia is willing and able to contribute to a new (at least for Australia) capability.

THE RELATIVELY LITTLE FANFARE AROUND THE NRO LAUNCHES SPEAKS TO THE ADDITIONAL LAYER OF SECRECY AUSTRALIA HAS ALWAYS REFLEXIVELY PUT ON TOP OF ANY AMERICAN CONCERNS. THIS STIFLES DISCUSSION IN AUSTRALIA.

Moreover, this cooperation is tangible evidence of the US desire to expand allies' capabilities to add depth to its own. As NRO Director Dr Chris Scolese stated, the launch "bolsters our partnership and strengthens the foundation for future coordination," while also securing and expanding the US intelligence advantage.¹⁶⁴ That this also involved coordination with New Zealand, Australia's other close partner, Five Eyes member and in 2023 the only operational launch site in the region, should not be overlooked.

However, the NRO launches speak to some of the challenges inherent in the way in which Australia does space with the United States. The relatively little fanfare around the launches speaks to the additional layer of secrecy Australia has always reflexively put on top of any US concerns. This stifles discussion in Australia.¹⁶⁵ Similarly, the common response to such criticism that the public, press, or commentators simply do not understand the sensitivities involved is an argument for better explanation, not more secrecy. Such secrecy also reflects the centrality of the intelligence agencies in space activi-

ties in Australia, which represents a barrier not just to public discussion (not always a priority in defence headquarters), but also to coordinated and appropriate space policymaking within the Department of Defence, as not all space falls under the purview of Defence Space Command.

Finally, the partnership on intelligence satellites with the United States, while useful in its access to US technology and experience, potentially represents a step away from building local capability. At best these arrangements are opaque, but an appropriate way for Australia to access certain capabilities. At worst, they are an automatic default to an alliance partner at the cost of a coordinated approach to building the space industry at home. The relatively poor discussion of space, particularly intelligence space, in Australia contributes to a sometimes-disjointed approach to the domain, as does the lack of a whole-of-government space policy. The benefits and pitfalls of this program are clear reminders of the delicate balance between building Australia's capabilities and operating within an important alliance relationship.



Payload integration for the NROL-199 mission taking place within Rocket Lab's satellite cleanroom at the company's private Rocket Lab Launch Complex 1 in New Zealand (Rocket Lab, with permission)

6. THE FUTURE

The United States is at the heart of how Australia has done space and how it pursues its space objectives today. The space relationship is deeply rooted in a history that began in the 1950s and saw Australia deeply engaged in US space activities in order to strengthen the alliance. In the past two decades, Australia's interest in space in its own right has progressively increased, with the Department of Defence slowly but inexorably embracing space and space capabilities. Whatever direction it takes, Australia's immediate national security space future will involve the relationship with the United States: the two countries' long history working together and Australia's reliance on its ally makes that country inevitably part of the conversation.

There are important advantages and challenges in this state of affairs. As Australia pursues sovereign space capabilities, cooperation with the United States need not represent a binary choice between greater independence and a closer alliance. Rather, provided Australia has clearly articulated and publicly supported space objectives, the relationship with the United States can be used to give Australia more options in space, rather than fewer. Australia can take advantage of being a late mover in space with the world's pre-eminent space power as its ally. Equally, there are limits to this relationship, including the asymmetry in the alliance, the willingness of the United States to allow Australia access to space capabilities and technologies, and the degree of control Australia is able to exert if it relies on an ally to meet its capability needs.

Lessons for Australia

The question of what shape Australia's space future should take, and what the nature and extent of the relationship with the United States should be, must be answered in the same way as any other question of Australia's security. What does Australia need, what is the best way to meet this

need, and what is the Australian public willing to pay, in money and effort, to achieve these goals? Australia's position as a latecomer and relatively small player in space makes answering these questions slower. The nature of space capabilities – diffused across multiple areas of defence, often misunderstood, and seen with no small degree of scepticism by the public and politicians – can frustrate space policymaking. Equally importantly, the space relationship with the United States cannot be divorced from the broader relationship with that country, nor the context of Australia's place in its own region. At the same time, the nature of the relationship in space with the United States has already been moving away from simply being a matter of alliance management. Given the ever-lowering barriers to space, Australia can now ask the question of what capabilities it might want and has a relatively easier path to acquiring them. Growing competition in space will only spur these efforts.

In this way, Australia faces two fundamental questions with respect to its national security space future, which are overlaid with a series of challenges to managing the relationship. The first is which capabilities does it want to use to meet its national security objectives? This question must be answered in the broader context of other defence priorities. Here, Australia must be careful in assessing the utility of certain space capabilities against the broader financial, strategic and political context. A fleet of ISR satellites or sovereign launch capability might be desirable and possible. But with limited resources Australia might be better served with other platforms. This is a policy question, not a technical one.

Australia should ensure that, as far as possible, it is free to make its own choices when it comes

AS AUSTRALIA PURSUES SOVEREIGN SPACE CAPABILITIES, COOPERATION WITH THE UNITED STATES NEED NOT REPRESENT A BINARY CHOICE BETWEEN GREATER INDEPENDENCE AND A CLOSER ALLIANCE.

THE FIRST QUESTION IS WHICH CAPABILITIES DOES AUSTRALIA WANT TO USE TO MEET ITS NATIONAL SECURITY OBJECTIVES?

to security. Australia should be able to create its own intelligence product so it can make informed national security decisions. It should aim to maintain control over the means of communication with its military forces and ensure that it has access to sensor data that are so vital during national emergencies, such as fires or floods, or during conflict. In the future, the Australian Government should have the option to embark

on offensive space operations on its own initiative, just as it can in other domains. However, space is inherently expensive, and Australia's defence budget must be balanced across a range of capabilities. Australia will not be able to "go it alone"

in space in any meaningful way but must find the balance between ensuring its own security in and through space, and its ability to afford it.

The second question is therefore what constitutes an appropriate degree of Australian control over space capabilities. This question, too, must reflect the nation's defence priorities. The answer is not an either/or proposition, in which Australia either chooses to work with the United States (or another ally) or not. Rather, there are shades of cooperation and sovereignty, which are already evident in much of Australia's space engagement today. These range from being an end user of an American system or product, contributing financially to a US-led project, providing infrastructure and expertise, or acquiring an Australian-owned but US-built space capability. Moreover, Australia might also decide to seek sovereign control in one capability area, while contenting itself to work closely within US architecture in another. Its focus on communications satellites, for instance, reflects this approach. Finally, it is important to note that Australia gains a great deal from contributing to cooperative defence arrangements and that these, in and of themselves, are useful avenues to achieve security goals.

Challenges

Beyond the substantial barriers of cost and technology development to raising new space capabilities, the challenges to the space relationship between Australia and the United States are old ones.¹⁶⁶ Many of these challenges are similar to those found throughout the defence relationship, such as a lack of understanding of the scale of the ADF among US defence personnel, a misunderstanding of Australia's interests in and concerns over sovereignty and the somewhat fractured nature of the US Department of Defense when dealing with Australia.¹⁶⁷

The asymmetry of the relationship is perhaps the largest barrier to overcome. One of the challenges facing Australia is negotiating its place in space in cooperation with a United States which invariably centres its own interests. The Australian Government and the Department of Defence should be careful to acknowledge that US cooperation only occurs when this serves its own needs. Australia is useful for its geography. This is not to say that Australia is being used; as the long history of Australia-US cooperation shows, the Australian Government has long been cognisant of the benefits of trading its location for access and security.

At the same time, Australia's geography might not always be as vital as it now is to the United States, as space actors take advantage of large satellite constellations to increase coverage and enhance the network of data transmission, as well as space (rather than terrestrial) based surveillance. Moreover, the narrowly-focused nature of this relationship will come into starker focus as Australia branches out into other areas of space capability. Australia may come to realise that US support for Australian growth in space is centred on certain capabilities that fit within a broader American system. What will happen when Australia pushes for US support in other areas? Both partners are unused to this part of the relationship, albeit for different reasons.



US Army General James Dickinson, US Space Command commander, and Royal Australian Air Force Air Vice-Marshal Catherine Roberts, commander of the Australian Defence Space Command, sign an enhanced space cooperation memorandum of understanding (US Space Command)

As Wade Huntley, an American space expert, notes, the United States tends to perceive smaller states' space policies "through the lens of US desires," such that US "willingness to collaborate depends on the degree those others' ambitions accord [with] US space aims" and which capabilities and specialisations that country can offer to enhance overall US security.¹⁶⁸ While scholars and commentators tend to overlook and conflate the agency of smaller nations, that the United States is the (much) larger partner in a space relationship need not obstruct all agency for countries such as Australia. Canada, for instance, has walked a path that saw it closely aligned with the United States in civilian space (as evidenced in the space shuttles' Canadarm), while also having pulled back from military space planning.¹⁶⁹

The challenges to the relationship – and any Australian growth in space – are not only at the

diplomatic and strategic level. As at higher levels of the relationship, the United States holds the reins in space during joint projects and operations, deciding the nature and extent of any interaction. Combined headquarters serve US interests, and while they are increasingly integrated, will necessarily (and understandably) be dominated by the United States. Information sharing, both in terms of classification levels and releasability restrictions, will continue to be an issue.¹⁷⁰ Space has in the past been a wholly American show; allies have been treated as consumers, not partners. This culture can be slow to change. Moreover, any Australian effort to develop its own space industry in the service of its security needs will require, at the minimum, input from US industry, from technology transfer to contracts to build space systems and equipment. For Australia to develop sovereign capabilities from launch to satellites on its own is improbable;

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to do so without foreign technology and research is impossible. Even for smaller efforts, then, the barrier of ITAR will be significant. While AUKUS represents a potential avenue for reform of US export control regulations, the problems facing the parties are not new and the barriers to change are longstanding.¹⁷¹

The sheer size of the American space community means that change needs consensus across a wide range of organisations, each of which can act as a barrier to cooperation. Within organisations, attitudes towards cooperation can change

across levels; the so-called “frozen-middle” can be risk-averse when it comes to areas that have traditionally been a highly classified US purview. Relationship building is one action Australia can take. Indeed, Australia is adept at placing its person-

nel where they might be seen, heard and effect some small cultural change; it is also forced to do so, in the race to build local experience by leaning on partners. However, change in the relationship will likely be led by the larger partner.

Barriers to Australia achieving its own ends exist in Australia as well. The first is a lack of clear direction in Australia’s space plans (discussed further below). The Department of Defence also runs the risk of falling into old habits and relying on the United States for certain capabilities, as in the case of work with the NRO. While easy in the short term, this potentially undermines local, long-term, capability building. Conversely, there is a balance to be struck that ensures that industry, with its commercial interests, does not dominate the discussion of Australia’s national security needs. Australia has promised a great deal when it comes to space capability, which invites disappointment among the public when complex procurement projects run over budget

and overtime. Failure to deliver also holds the potential to generate frustration within the United States over burden sharing, as Australia needs space assets in order to maintain its place at the space table it has enthusiastically claimed.

The path to addressing Australia’s space security questions

Space is not just about satellites and ground stations. A crucial element of the space discussion for Australia is in refining its own needs and approach to space at the national level. In short, Australia needs a stronger space strategy. The Defence Space Command is a step towards this, as is the *Defence Strategic Review*’s focus on two capabilities. These are the first steps. Australia also needs a strategy that both acknowledges the technical, financial and diplomatic limitations on Australia’s space trajectory and breaks down the silos between defence and civilian space that are unworkable in a country the size of Australia. Even as significant technical challenges remain to be overcome, these are not possible without understanding what Australia needs, and how it may resource these needs. With a clear strategy, Australia can begin to make decisions about how much it wants to go it alone, or to what extent it should rely on the United States.

Space is far from simply a technical matter, and significant gaps in Australia’s understanding of its place in space remain. Deeper analysis is needed on a range of issues, while much of the workforce that will address Australia’s space challenges still needs to be recruited, trained and retained. The small size of space expertise currently is also a barrier to developing Australian space thinking. An understanding of the region and its space needs and challenges, the relationship between industry and defence, and the role of AUKUS and other cooperative defence arrangements is needed. Where on the reliance/sovereignty spectrum the Australian Government decides

to land, either in space as a whole or for individual capabilities, is ultimately a political question. Analysis of what the Australian public might accept, the nature of the subsequent policy and the diplomatic and technical questions raised by its implementation all deserve analysis. So too does what the United States want from Australia and what is it willing to offer: in war, the enemy gets a say, and in Australia's peacetime procurement, so too do allies.

This analysis must be layered. Internal Department of Defence planning and policy may well have addressed some of these issues, although this is usually behind closed doors. This is both appropriate, given the highly classified nature of many things in space, and also only ever a partial means by which to answer Australia's space security questions. Whole-of-government approaches, academics and universities, industry and the broad group of security commentators and think tanks all have a role to play. Importantly, public discussion of space between these groups, facilitated by open government communication on space issues, is vital. While over-classification and government reticence to release information is a broader problem, the cutting-edge technology involved in space and the significant overlap with intelligence collection should not be an excuse for limited discussion of how the country uses and thinks about space.

Equally, each stakeholder in space has their own agenda which should be considered. Industry, for instance, is perhaps one of the louder voices in discussions of space in Australia; while an important player in any local space development, it is also the most self-interested. One additional, and crucial, difference between space and other procurement areas is what might be termed the "enthusiastic" nature of space advocacy, much of which should be approached with healthy scepticism. The excitement over rockets, satellites and space as an end in and of itself adds another

layer to the traditional defence commentator's enthusiasm for 'big boys' toys' over less flashy, but ultimately more important, defence expenditure. Wide-ranging, inclusive, deep analysis that is publicly available will go far to counteract the belief that space is a unique and special area of defence procurement and foster the understanding that space-based capabilities should only ever be pursued as a tool to achieve specific policy objectives, and not as an end in and of themselves.

The United States is central to any discussion of Australian space. This holds true irrespective of which direction Australia might take in space, whether emphasising sovereignty on the one hand or engaging deeper with the United States on the other. The two countries' shared history and their current deep engagement in defence matters ensure that any analysis of Australia's future in space must necessarily focus on cooperation with the United States as a starting point. However, acknowledging the importance of the United States is not accepting the status quo, but can provide a starting point from which Australia can develop its own path in space while striking the balance between self-reliance and the alliance.

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ABOUT THE AUTHOR



DR TRISTAN MOSS

Senior Lecturer in History at the University of New South Wales, Canberra

Dr Tristan Moss is a senior lecturer in history at the University of New South Wales, Canberra. He researches Australian space history and the history of the Australian Defence Force and is currently writing a history of Australian space activities, from 1957 to the present. He is the author of *Guarding the Periphery: The Australian Army in Papua New Guinea, 1951-75* (Cambridge University Press, 2017), and co-editor of *Beyond Combat: Australian military activity away from the battlefields* (NewSouth Books, 2018) and *Fighting Australia's Cold War: the Nexus of Strategy and Operations in a Multipolar Asia, 1945-1965* (Australian National University Press). He is also the editor of *The Foundations of Australia's Space Policy* (Griffith Asia Institute Regional Commentary, 2023).

Dr Moss has previously worked at the Australian Command and Staff College, on the Official History of Peacekeeping, Humanitarian and Post-Cold War Operations, and on the Official History of Australian Operations in Afghanistan, Iraq and East Timor at the Australian War Memorial. He is a Fulbright Senior Scholar (Fulbright Professional Scholarship in Australian-US Alliance Studies) and winner of a Discovery Early Career Researcher Award, titled 'Australia and Space: Government policy and public imagination, 1957-2021.' He is a member of the Australian Centre for Space Governance. He received his Bachelor of Arts with Honours in history and politics from the University of Melbourne and his PhD in history from the Strategic and Defence Studies Centre at the Australian National University.



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Institute Building (H03), City Rd
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+61 2 9351 7249

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