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Antarctica and U.S. Policy: A Strategic Evolution Amid Global Shifts

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Abstract: This article explores the evolution of U.S. policy on Antarctica, focusing on its legal, environmental, and geopolitical aspects. It aims to identify changing U.S. priorities in this regard. The Antarctic Treaty System (ATS) governs the region, emphasizing peace, scientific cooperation, and environmental protection. The U.S. has issued four major memoranda on Antarctica in 1982, 1994, 2020, and 2024. The article highlights growing geopolitical competition, particularly with China and Russia. China frames Antarctica as essential to its global rise, using dual-purpose technologies that blur the line between science and strategic military interests. Similarly, Russia's activities in the region raise concerns about potential violations of the ATS's peaceful purpose mandate. The U.S. maintains its leadership in Antarctic diplomacy, advocating for environmental preservation and scientific cooperation. The article concludes by emphasizing the need for international collaboration to address climate change, resource exploitation, and rising strategic tensions, ensuring Antarctica remains a region dedicated to peace and science.

Antarctica: The Untamed Continent and Its Strategic Importance

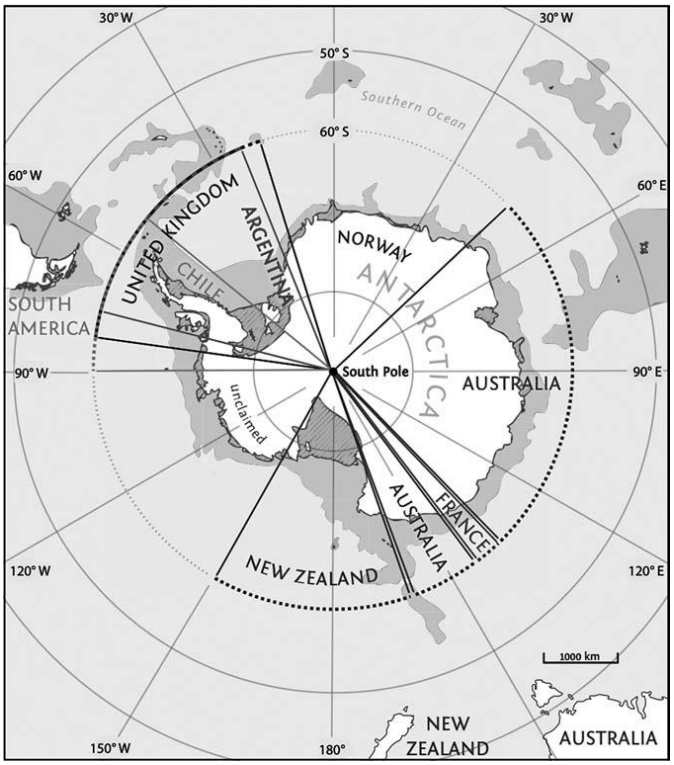
Antarctica, long seen as a frozen wilderness of peace and science, is now at the heart of a quiet global contest. As nations like China and Russia assert their presence in this unclaimed frontier, the U.S. faces mounting pressure to protect its strategic and environmental interests in the world's last great commons. Antarctica covers an immense area, comprising 32 million km² of surrounding ocean and 14 million km² of continental land and islands. This region, which includes the Southern Ocean (formally designated as the fifth ocean in 2000 – Desonie 2008, 21), hosts a non-permanent population that varies seasonally between 1,000 and 4,000 residents (Vassiliou 2021; Hemmings 2021, 14; Chaturvedi 2012, 271; Elzinga 2017, 104).

The Encyclopedia of the Antarctic (Riffenburgh 2007, 47) highlights the varying definitions of Antarctica's boundaries, which depend on their intended purpose. Under the Antarctic Treaty, the northern boundary is defined at the 60th parallel south latitude, a politically convenient yet arbitrary line that excludes sub-Antarctic islands located north of this point. By contrast, the Convention on the Conservation of Antarctic Marine Living Resources adopts a boundary tied to the Polar Front, an oceanographic zone where cold Antarctic waters meet warmer waters from neighboring oceans. This natural demarcation, also endorsed by the Scientific Committee on Antarctic Research, acts as a critical climatic and ecological divide, shaping the habitats of marine life and the reach of the Antarctic Circumpolar Current. Although the Polar Front is widely regarded as the most appropriate natural boundary, practical and legal considerations often rely on less precise delineations (Riffenburgh 2007, 47; see also Dodds 2012b).

In the light of international law Antarctica is an area beyond national jurisdiction. According to Art. IV of the Antarctic Treaty (1959), states-parties 'froze' their territorial claims to Antarctica – they did not renounce them, the issue of recognition or non-recognition of such claims was not decided but states-parties cannot assert 'new claim, or enlargement of an existing claim, to territorial sovereignty in Antarctica'[1]. Overall, seven states have made territorial claims to parts of Antarctica, which have not been universally acknowledged, including by the U.S., which in itself does not mean the claims are not valid (Scott, 2021a; Scott 2021b, 494). These countries included Argentina (1940), Australia (1933), Chile (1940), France (1924), Norway (1939), New Zealand (1923), and the United Kingdom (1908) (Medeiros & de Mattos 2019, 105; see the map below). The claims of Australia, the UK, France, New Zealand, and Norway were primarily based on discovery and the principle of effective control over unclaimed land (*terra nullius*). In contrast, Argentina and Chile supported their claims through discovery, occupation, and administrative actions, including efforts to establish human presence via orchestrated births and marriages. They further cited historical Spanish territorial rights derived from a 1493 Papal Bull (Bray 2016, 5; see Vigni 2024, 34-38 for additional details). In light of the above mentioned Art. IV, such territorial claims were made but they are frozen and claimant-states

[1] Art. IV of the Antarctic Treaty (1959) states: '1. Nothing contained in the present Treaty shall be interpreted as: (a) a renunciation by any Contracting Party of previously asserted rights of or claims to territorial sovereignty in Antarctica; (b) a renunciation or diminution by any Contracting Party of any basis of claim to territorial sovereignty in Antarctica which it may have whether as a result of its activities or those of its nationals in Antarctica, or otherwise; (c) prejudicing the position of any Contracting Party as regards its recognition or non-recognition of any other State's right of or claim or basis of claim to territorial sovereignty in Antarctica. 2. No acts or activities taking place while the present Treaty is in force shall constitute a basis for asserting, supporting or denying a claim to territorial sovereignty in Antarctica or create any rights of sovereignty in Antarctica. No new claim, or enlargement of an existing claim, to territorial sovereignty in Antarctica shall be asserted while the present Treaty is in force'.

cannot extend their sovereignty over parts of Antarctica. They are exercising their jurisdiction but rather personal one – over their citizens and research stations. Hence, while Antarctica is beyond national jurisdiction, states-parties' nationals are under national jurisdictions of their states (albeit Scott (2021b, 503) indicates that recently, for example, Australia 'asserted a general territorial basis of jurisdiction').



Antarctic territorial claims. Source: Hemmings 2012, 71.

The Antarctic Peninsula has long been a focal point of territorial disputes, with Argentina, Chile, and the United Kingdom laying overlapping claims to the region (Scott 2021a, 3). During the Cold War, the USSR and the United States maintained a significant presence in Antarctica, reserving the right to stake future territorial claims. In the 1960s, the United States constructed Palmer Station on the Antarctic Peninsula, followed shortly by the Soviet Union's establishment of Bellingshausen Station. These stations, named to highlight historical ties to Antarctic exploration, symbolized the superpowers' enduring strategic interests and reminded claimant nations of their historical roles in the region, stretching back to the 19th century. Naming locations and establishing research stations became a common tactic for asserting territorial connections (Hemmings 2012, 87; Dodds 2012a, 101).

Internationally, the United States has taken a less active role in Antarctic affairs for a long time but has recently shifted its stance. During the first Trump and Biden administrations, two

memoranda on Antarctica were issued in 2020 and 2024, respectively. The recently released Antarctic National Security Memorandum (2024) marks the most significant U.S. policy update on Antarctic interests in three decades and is a much-needed development. While the U.S. maintains the largest presence in Antarctica and plays a leading role in Antarctic diplomacy, its Antarctic interests have often been overlooked at higher government levels. This clear articulation of U.S. priorities on political and environmental issues is a positive step forward.

The research aim of this article is to trace the evolution of the U.S. policy on Antarctica in order to identify changing U.S. priorities in this regard. To achieve that, the following four documents will be analyzed: a Presidential Memorandum 6646 regarding Antarctica issued by President Reagan in 1982, a Presidential Decision directive/nsc-26 issued by President Clinton in 1994, a Memorandum on Safeguarding U.S. National Interests in the Arctic and Antarctic Regions issued by President Trump in 2020 and a National Security Memorandum on United States Policy on the Antarctic Region issued by President Biden in 2024 with accompanying Fact Sheet. Hence, this article employs legal-institutional analysis and comparative analysis to examine the evolution of U.S. policy on Antarctica. The legal-institutional method examines four key strategic documents issued by U.S. presidents from 1982 to 2024, providing insights into the legal and policy frameworks shaping U.S. engagement in Antarctica. The comparative analysis is used to identify shifts in U.S. priorities by systematically comparing these documents, assessing their content, and highlighting changes in strategic focus over time. The article's main contribution lies in evaluating the 2024 National Security Memorandum in the context of previous U.S. policy statements, some of which needed an update. Identifying key policy shifts demonstrates a growing emphasis on security concerns in the U.S. approach to Antarctica. This study enhances understanding of how U.S. Antarctic policy has adapted to geopolitical, environmental, and national security challenges, providing a timely assessment of evolving priorities.

The article's structure comprises a brief literature review and an outline of the legal framework for Antarctica followed by an examination of the four memoranda indicated above against a broader background of security challenges in this unique region of the world.

Emerging Geopolitical Tensions Involving China and Russia – Brief Literature Review

Concerning the Antarctic, research focuses primarily on geopolitical competition and threats resulting from climate change. Examples are the chapter by Jardine and Clack (2024), which explores the potential geopolitical and security disruptions caused by the rapid warming of the area; Buchanan (2022) and Burke (2023). In another work, Burke (2022) highlights the security

threats posed by Russia and China in the polar regions and suggests a strategy for the United States to address these challenges. Considering that the Antarctic is often overlooked compared to the Arctic, an essential contribution of Burke's research is its focus on security issues in both these areas. Burke argues that the high latitudes should receive greater attention in international security discussions, as both regions will likely become areas of contention in the future. Another significant threat indicated by researchers is the militarization of Antarctica: a chapter by Jeffrey McGee et al. (2022) and Kökyay (2022). The less recent works include *Mineral Resources: Potential of Antarctica,* edited by Splettstoesser and Dreschhoff (2009), attempting to summarize knowledge and available scientific data related to the issue of mineral deposits in Antarctica; Berkman (2002) which includes chapters devoted to international legal regulations (the Antarctic Treaty System), international cooperation in the Antarctic, sustainable use of Antarctic resources, and the environmental protection of the region (closely connected with the environmental/ecological security concerns); *Antarctic Security in the Twenty-First Century: Legal and Policy Perspectives* (2012), edited by Hemmings, Rothwell, and Scott, especially the chapters written by the editors: "Antarctic Security in a Global Context" and, "The Search for 'Antarctic Security'"; and last but not least, *Handbook on the Politics of Antarctica* edited by Dodds et al. (2017), in particular Nyman's chapter "Contemporary Security Concerns."

With reference to the analysis of legal issues connected with Antarctica one may indicate Scott (2013), (2021a and 2021b) on the territorial claims to Antarctica and their recognition, and Scott and Oriana (2014, 2019) where the authors examine International Court of Justice's cases relevant to Antarctica (namely Japanese whaling in Antarctica opposed by Australia and New Zealand).

How is this literature relevant to the subject matter of this article? The geopolitical competition in Antarctica, particularly involving China, Russia, and the United States, is closely linked to the evolution of U.S. policy on the region, as examined below. The growing emphasis on security concerns in U.S. Antarctic policy aligns with the broader research on geopolitical rivalry and militarization in Antarctica discussed by Burke (2022, 2023), Buchanan (2022), and McGee et al. (2022). Burke (2022) emphasizes that Russia and China pose security threats in Antarctica, arguing that the polar regions are becoming key areas of international contention. Additionally, studies on territorial claims (Scott 2013, 2021a, 2021b) and legal disputes at the International Court of Justice (Scott & Oriana, 2014, 2019) provide context for the legal dimension of geopolitical tensions. This brief but representative literature review shows that Antarctica is no longer just a site for scientific cooperation but an emerging front in global geopolitical struggles, particularly involving China, Russia, and Western nations.

Legal framework for Antarctica

The governance of Antarctica is overseen by the Antarctic Treaty System (ATS), a framework of legal agreements that includes the 1959 Antarctic Treaty (AT) and related conventions such as the 1972 Convention for the Conservation of Antarctic Seals, the 1980 Convention on the Conservation of Antarctic Marine Living Resources, and the 1991 Protocol on Environmental Protection to the Antarctic Treaty. The U.S.A. ratified all four conventions (Antarctic Treaty Database 2024). These agreements focus on environmental protection and regulating activities involving the region's living and mineral resources. The ATS aims to prevent conflicts in Antarctica, restricting activities to peaceful purposes. As a result, Antarctica is one of the most demilitarized regions in the world. The establishment of military bases, weapons testing, and military maneuvers are expressly forbidden. However, the Treaty does permit the use of military personnel or equipment for non-aggressive purposes, such as conducting scientific research (AT 1959, Art. I). The Treaty barred new territorial claims or the expansion of existing ones (Art. IV(2)), established significant demilitarization measures (Art. I), and designated the region as a nuclear weapons-free zone (Art. V). While this prohibition on nuclear activities was the Treaty's only direct provision addressing environmental security, the Antarctic Treaty System has since expanded to include detailed environmental protections.

The AT was established primarily to preserve stability and security in the southernmost region of the globe, which had drawn the attention of global and regional powers during the 1950s. The AT set aside sovereignty disputes (Art. IV), ensured the freedom of scientific research, and promoted international cooperation in science (Arts. II and III). It prohibited any use of Antarctica for purposes other than peaceful activities (Art. I) (Rothwell, Scott, and Hemmings 2012; Brady 2020). The AT initially did not address resource exploitation. This was later resolved through the Protocol on Environmental Protection, known as the Environmental Protocol, which declared Antarctica a natural reserve dedicated to peace and science (Art. 2 of the Protocol). The Protocol also banned all mineral resource activities, except for scientific research purposes (Art. 7). This ban will remain in place for at least 50 years, starting from 1998, when the Protocol came into effect (Wyrozumska 1995, 184–185; Press 2020, 8).

Adopting the Antarctic Treaty reduced Antarctica's importance as a geopolitical flashpoint for nearly three decades. However, interest in the region resurfaced in the early 1980s with discussions on regulating its mineral resources. In 1983, Malaysia raised the "Question of Antarctica" at the United Nations General Assembly, initiating a series of international debates

on the region's governance and resource management (Hemmings, Rothwell, and Scott 2012, 5).

Tracing U.S. Antarctic Policy: Key Memoranda Over Four Decades

In 1982, President Reagan issued the first Memorandum, the Presidential Memorandum 6646, regarding Antarctica. It was very brief, and its main provisions stated that the U.S. Antarctic Program will be sustained at a level that ensures an active and impactful presence in Antarctica, aimed at advancing the full spectrum of U.S. interests in the region and that this presence will involve conducting research across key scientific disciplines, maintaining year-round operations at the South Pole and two coastal stations, and providing the necessary logistical support to facilitate these activities. The Memorandum devoted some place to research and science, providing that the National Science Foundation (NSF) will continue to oversee and manage the entire U.S. Antarctic program, including logistical support, as a unified effort. It will fund university research and federal agency projects related to Antarctica, utilize government logistics on a cost-reimbursable basis, and employ commercial services when cost-effective and aligned with national interests. Other agencies may fund and conduct short-term Antarctic scientific projects, subject to the Antarctic Policy Group's recommendation and budget review, with coordination through the NSF's logistical framework (Presidential Memorandum 1982).

The 1994 Clinton Presidential decision directive/nsc-26 was similarly brief but concerned both polar regions, Antarctica and the Arctic. At the beginning, it stated that "[t]his Presidential Decision Directive directs the implementation of United States policy related to the Arctic and Antarctic regions. Our policy reflects the importance of protecting both these unique and fragile environments, including their potential for scientific research on regional and global environmental issues. It also recognizes the need for cooperation in both regions and the role for U.S. international leadership in these cooperative international efforts" (Presidential decision… 1994, 1-2).

Concerning Antarctica, the Memorandum (1994, 5) formulated the following four key U.S. objectives:

1. Safeguarding the pristine environment of Antarctica and its ecosystems.
2. Supporting and advancing scientific research to enhance understanding of Antarctica and global physical and environmental systems.
3. Ensuring Antarctica remains a zone of international collaboration dedicated solely to peaceful purposes.

4. Promoting the conservation and sustainable management of the living resources in the surrounding oceans.

Even though climate change relevance was known by 1994, it was not included expressly. The only traces of climate change are indirect, visible in objectives 1 and 4 above. The reasons for this are given below.

To achieve these objectives, the United States expressed its strong support for the AT, which designated the region as a zone of peace and international cooperation. The U.S. has played a leading role in negotiating and implementing agreements related to Antarctica and its surrounding waters. Regarding the Convention on the Conservation of the Antarctic Marine Living Resources, the U.S. should continue to lead efforts in advocating for a cautious and risk-averse approach to the exploitation of fisheries in the area. At that time, President Clinton announced that the U.S. would ratify the Madrid Protocol of 1991 as soon as possible (Presidential decision… 1994, 5), which occurred in 1997.

For the next 26 years, the policy on Antarctica was not updated. Nevertheless, even then the U.S. Antarctic program were still developing, albeit concentrated on research and science. The U.S. Antarctic Program (USAP) Blue Ribbon Panel, an independent committee established in 2011 by the National Science Foundation (NSF) and the White House Office of Science and Technology Policy, was to assess and recommend improvements for the U.S. Antarctic Program to ensure its effectiveness over the subsequent two decades. Its 2012 key findings and recommendations included: 1. Infrastructure modernization: the panel identified that aging facilities and logistical systems were hindering scientific research. It recommended significant investments to upgrade infrastructure, particularly at McMurdo Station, to enhance operational efficiency and support for scientific endeavors; 2. Logistical efficiency: the report emphasized the need to streamline logistics, suggesting a reduction of contractor personnel in Antarctica by approximately 20%, with a focus on minimizing populations at field camps. This aimed to optimize resource allocation and reduce operational costs; 3. Enhanced coordination: the panel recommended establishing a small systems engineering and cost analysis group within the NSF's Office of Polar Programs. This team would continuously seek opportunities for cost reduction and improved support for scientific activities (Report of the U.S. Antarctic Program Blue Ribbon Panel, 2012). Moreover, one of the recommendations was to assess and update, if necessary, the existing Antarctic Policy frameworks – specifically Presidential Memorandum 6646 (1982) and Presidential Decision Directive 26 (1994) – along with their implementation mechanisms. This revision should reflect contemporary challenges, emphasizing policy and

national considerations rather than operational aspects (Report of the U.S. Antarctic Program Blue Ribbon Panel, 2012, 18).

In response to these recommendations, the NSF initiated the Antarctic Infrastructure Modernization for Science project. This multi-year initiative focuses on revitalizing McMurdo Station's infrastructure to ensure it remains a viable platform for supporting Antarctic science for the next 35 to 50 years (Future USAP, n.d.).

In 2020, President Trump issued a very brief Memorandum on Safeguarding U.S. National Interests in the Arctic and Antarctic Regions, which could be called supplementary as it mainly outlines plans to acquire a polar security icebreaking fleet to maintain a consistent U.S. presence and safeguard national interests in both regions. This fleet is expected to align with U.S. National Security and Defense Strategies, ensuring the country's ability to operate in contested or competitive domains like Antarctica. Nevertheless, Trump's Memorandum signaled a renewed focus on both polar areas.

Finally, in 2024, President Biden issued the National Security Memorandum on United States Policy on the Antarctic Region, which outlined the U.S. policy for the Antarctic Region, replacing Presidential Decision Directive/NSC-26 from 1994. Biden's memo defined the primary objectives and strategies for U.S. leadership and engagement in activities related to Antarctica. The key objectives are analogous to those from the 1994 Memorandum: "1) to protect the relatively unspoiled environment of the Antarctic Region and its associated ecosystems; (2) to preserve and pursue unique opportunities for scientific research and understand the Antarctic Region's relationship to global environmental changes; (3) to maintain the Antarctic Region as an area of international cooperation reserved exclusively for peaceful purposes; and (4) to assure the protection and conservation of the living resources in and ecosystems of the Antarctic Region" (National Security Memorandum… 2024, section 1 (b)).

The Memorandum emphasizes the critical need to safeguard the Antarctic Region, along with its delicate ecosystems and resources, from the growing impacts of human activity. As a key component of the global climate system, Antarctica is home to distinctive species and ecosystems and serves as an exceptional site for environmental research. Through leadership within the ATS, the U.S. remains committed to fostering international collaboration to ensure the region is preserved for peaceful purposes, its largely untouched environment is protected, and scientific exploration continues (National Security Memorandum… 2024, section 1 (a)).

Similarly to the 1994 Memorandum, in section 2, President Biden expressed U.S. firm support for the AT and confirmed U.S. "steadfast position of not recognizing sovereignty claims". To ensure the continued success and resilience of the ATS, the U.S. will actively enhance efforts

to promote transparency, foster cooperation, encourage compliance, share best practices, and uphold relevant standards among all ATS members. As a party to the Convention on the Conservation of Antarctic Marine Living Resources, the U.S. will remain committed to advocating for the conservation of Antarctic marine ecosystems and using the best available scientific data to guide decision-making regarding marine living resources. The U.S. is dedicated to ensuring the sustainable management of Antarctic ecosystems and marine resources. In cases where these resources are exploited, the U.S. will promote a precautionary, science-driven approach that considers the entire ecosystem to protect the targeted species and those closely connected. Moreover, the U.S. emphasizes the importance of establishing and effectively managing extensive marine protected areas, enforcing their protection, and adapting strategies as needed to conserve both Antarctic marine life and the broader ecosystems that support them (National Security Memorandum… 2024, section 2 (d) and (f)). In line with the supplementary Trump 2020 Memorandum, President Biden stated that the U.S. would expand and modernize the nation's polar icebreaker fleet, which would be used for advancing the objectives outlined in the Memorandum, particularly in supporting the scientific and operational goals of the U.S. Antarctic Program and facilitating inspections in Antarctica (National Security Memorandum… 2024, section 2 (d); see also Fact Sheet 2024).

Biden's memorandum largely echoes the objectives of the 1994 statement but expands on U.S. policy and future engagement within the ATS. A key addition is explicitly reaffirming the U.S. stance on Antarctic sovereignty. While the 1994 document did not mention sovereignty in detail, the 2024 memorandum makes a strong public declaration that the United States does not recognize any existing territorial claims in Antarctica but reserves its potential rights throughout the entire region. This position aligns with Art. IV of the AT. By issuing this as a 'national security' memorandum, Biden's statement underscores Antarctica's growing strategic significance, reinforcing U.S. interests in the region while reaffirming a commitment to peace and stability (Press, 2024b).

For the first time, climate change was prominently featured in a document outlining U.S. policy on Antarctica. Section 2 (e) states that in light of ongoing climate change and its associated impacts – such as ocean warming, sea level rise, ocean acidification, stratospheric ozone depletion, pollution, biodiversity threats, and the potential collapse of the West Antarctic ice sheet – the U.S. acknowledges the value of scientific research in the Antarctic Region. The collapse of the West Antarctic ice sheet is regarded as one of the climate tipping points. The research efforts aim to benefit all participants in the ATS (see also Fact Sheet 2024).

According to the 2024 Memorandum (section 2 (e)), the U.S. will actively foster collaboration across federal agencies, international partners, academic institutions, and public-private partnerships to enhance and share knowledge about Antarctica and its significance in Earth's systems. For instance, the U.S. Global Change Research Program unites federal agencies to advance research on global change, engage with the public, promote international cooperation, and support informed decision-making on risks, mitigation, and adaptation to global environmental changes.

Inclusion of the issue of climate change in the policy on Antarctica is essential as climate change is the gravest threat, which reflects a kind of closed-loop where climate change is caused by human activity, and as such, negatively affects Antarctica, while the consequences of climate change threaten those same humans and their survival.

Finally, the 2024 Memorandum stipulates that the U.S. National Science Foundation will continue overseeing and financing the U.S. Antarctic Program, which includes three year-round research stations (South Pole, McMurdo, and Palmer stations) and collaborative scientific efforts. The U.S. will continue to engage in high-quality research that aids policymakers in achieving the goals set out in this Memorandum, in alignment with the ATS (National Security Memorandum… 2024, section 2 (c)).

Table 1 compares the four Memoranda.

Memorandum	Peaceful purposes	Research/ Science	Environmental issues/Conservation/ Sustainable management	Climate change	Support for the AT
1982 Presidential Memorandum 6646 regarding Antarctica	No	Yes	No	No	No
1994 Presidential decision directive/nsc-26	Yes	Yes	Yes	No	Yes
2020 Memorandum on Safeguarding U.S. National Interests in the Arctic and Antarctic Regions	No	No	No	No	No
2024 National Security	Yes	Yes	Yes	Yes	Yes

Memorandum on United States Policy on the Antarctic Region					

Table 1. Comparison of the U.S. Memoranda on Antarctica

These documents show the evolution of the U.S. policy on Antarctica, which partly reflects the new challenges or threats. Climate change is most pertinent here. The absence of climate change in earlier U.S. policy documents on Antarctica, despite its known relevance by 1994, can be attributed to several geopolitical, strategic, and institutional factors. The 1982 Presidential Memorandum and the 1994 Presidential Decision Directive were framed during and immediately after the Cold War, when the U.S. Antarctic policy was primarily focused on geopolitical stability, scientific research, and maintaining U.S. influence under the ATS. Climate change was already recognized as a global issue but had not yet become a central focus of national security and foreign policy. Instead, Antarctica was viewed through a strategic and territorial lens, emphasizing scientific presence, governance under the ATS, and preventing military activities in the region.

Moreover, the recognition of climate change as a national security threat evolved. The United States did not always consider climate change a critical national security issue. While it appeared in some military and security reports as early as the 1980s, policymakers did not until the early 2000s that policymakers began to acknowledge its impact on military readiness and global stability. The Obama Administration was the first to emphasize climate change as a security threat actively. A key moment came in 2007 when a group of retired military leaders released National Security and the Threat of Climate Change, warning that climate change could intensify existing security challenges. The report called for integrating climate risks into military planning and national security frameworks, highlighting its role as a "threat multiplier" that could destabilize volatile regions. Despite recognition from various government agencies, the report urged for a greater sense of urgency in addressing climate-related security threats (Koch, Carle, Noone 2024, 34).

The 2022 National Security Strategy, issued by the Biden-Harris Administration, highlights climate change as the most significant existential challenge confronting humanity collectively (National Security Strategy 2022, 9; U.S. Framework for Climate Resilience and Security 2024, 1). This shows that the Biden administration treated climate change as a grave threat, not only

to national security but to the whole of humanity. Including in the 2024 National Security Memorandum on Antarctica is consonant with this approach.

In summary, integrating climate change into U.S. Antarctic policy documents reflects a broader evolution in recognizing environmental issues as central to national and global security.

Leaving climate change aside, the 1994 and 2024 Memoranda have much in common, including analogous key objectives. The crucial areas of reservation of Antarctica for peaceful purposes, research and science, environmental issues, conservation and sustainable management, and support for the AT are covered by both documents. So, these provisions are constant and reflect the long-term priorities of the U.S. in Antarctica. The general conclusion is that the U.S. attempts to maintain the *status quo* with the ATS as Antarctica's leading legal and governance framework. This priority opposes Chinese and Russian revisionist ambitions, which will be discussed in the next section.

The latest Memorandum reaffirms the U.S. long-standing policies, including promoting peace and security, rejecting territorial claims, protecting the environment, and supporting sustainable fisheries management. The policy strongly emphasizes Antarctica's role in addressing climate change, highlighting its growing importance in global environmental discussions (Bloom 2024).

Antarctica as a Strategic Arena: Challenges for U.S. Policy

The four examined memoranda constitute a line of documents outlining U.S. interests in Antarctica. One may wonder why it took the U.S. so long to adopt an updated policy on Antarctica after 26 years. Actually, Biden's 2024 Memorandum may be considered a policy proper as the 2020 Trump Memorandum was merely complementary, focused on only one issue – the U.S. polar icebreaker fleet. This renewed focus or interest is connected with Russia and China's competitive dynamics. Both nations have demonstrated a willingness to challenge international norms – Russia through territorial invasions and China through aggressive rhetoric and activities pushing international law's boundaries. Antarctica is one of the few regions where the U.S. faces potential simultaneous competition with both nations. The polar regions' geopolitical significance is underscored by their strategic role in space operations, resource exploration, and global influence.

The U.S. strategy also reflects growing concerns about the activities of Russia and China in Antarctica. Russia has leveraged its bases for space-related activities with potential military applications. With reference to China, concerns about the transparency of Chinese operations were raised, particularly regarding the dual-use nature of its research and infrastructure. The

Trump Memorandum's emphasis on icebreaker acquisition and strategic basing highlights a broader effort to counter these developments and maintain a stable, rule-based order in Antarctica. Rivalries among major powers pose significant risks to political stability in Antarctica and the ATS. Burke (2022, 10) describes "great power competition" as a global security environment where rising states challenge the U.S.-led world order. Although this perspective is U.S.-centric, the broader competition among superpowers threatens the stability of Antarctica and the ATS. Strategic tensions, particularly between China and nations like India and Japan, are becoming increasingly evident in Antarctic activities (Dodds & Collins 2017, 64).

China is intensifying its focus on the Indian Ocean while India works to establish its role in the Pacific. In 2018, China announced its intention to incorporate Antarctica into its Belt and Road Initiative (BRI), signaling a strategic push to enhance its global influence. These developments have raised concerns about escalating geopolitical competition in the region (Bateman 2012, 120). While the connections may not involve physical infrastructure like roads or ports, the BRI framework encompasses research, resource exploration, and geopolitical influence, aligning with China's broader strategic interests. The examples of including Antarctica within this Initiative embrace Polar Silk Road framework and Beidou satellite system. In 2018, China officially incorporated the Arctic and Antarctic regions into its Polar Silk Road, a subset of the BRI. This initiative seeks to establish China as a leading polar power by strengthening infrastructure, scientific research, and partnerships in polar regions (Stanway 2021). China's Antarctic stations have been used to enhance its BeiDou satellite system, a critical component of the BRI (BeiDou is a dual-use technology akin to GPS). This system supports global navigation and positioning services, essential for BRI projects worldwide, and has potential military applications, raising concerns about dual-use technologies. These examples highlight how China's activities in Antarctica align with its broader BRI goals of expanding global influence and positioning itself as a major scientific and geopolitical power (Millner, Maksim & Huhmann 2022).

As to the dual-use nature of technologies and activities conducted at Antarctic bases, such activities are a growing challenge to the peaceful purposes clause under the AT. Facilities such as China's Kunlun Station at Dome A, renowned for its optimal conditions for astronomy and home to the PLATO Observatory, highlight this complexity. While such bases support genuine scientific research, the dual-purpose nature of satellites and related technologies raises concerns about their potential military applications. For example, space observation or satellite communication technologies may also serve military functions like missile tracking or

intelligence gathering (Bateman 2012, 128; see also Berkman 2002, 219-222). This dual-use challenge extends to other activities, such as mineral resource exploration, under the guise of scientific research. Such activities call into question whether they align with the AT's mandate for peaceful purposes and whether the current verification mechanisms are robust enough to detect covert military intentions.

Brady (2017, 285) identifies the primary narratives China emphasizes in its Antarctic affairs when addressing domestic audiences. These include China's historical exclusion from Antarctic science and governance, the view of Antarctica as a „treasure chest" of mineral resources, its status as a global commons, its role as a climate change indicator, and its significance in China's rise as a global power. Notably absent from these narratives are two perspectives commonly promoted by other Antarctic states: the idea of Antarctica as a unique wilderness requiring protection and the potential negative consequences of development in the region. In contrast, the narratives China presents to international audiences focus on positioning itself as a legitimate participant in Antarctic governance and as a leader in Antarctic scientific research.

China's Antarctic ambitions align with its broader global strategy, as seen in its emphasis on resource exploration and statements by President Xi Jinping about exploiting the continent's potential. This has led to significant investments from both China and other nations, driven by the pursuit of economic opportunities or fears of being outpaced by competitors (Jardine & Clack 2024). These developments underscore how geopolitical rivalries are shaping the future of Antarctic governance and resource management.

As to other stakeholders, according to Dodds and Collins, Australia has adopted a firm stance regarding its claimed Antarctic waters. However, under the AT, Japan does not recognize Australia's territorial claims and continues to treat these waters as international, creating conflicts over territorial rights (Dodds & Collins 2017, 64). On the other hand, in the context of Japanese whaling, Scott and Oriana (2019) argue that Australia has consistently opposed Japan's Antarctic whaling since the 1930s, making efforts to regulate, restrict, or halt the practice entirely. Over time, its motivations have evolved, ranging from protecting its coastal whaling industry and national security. In recent decades, economic interests, particularly the whale-watching industry, and environmental concerns have played a growing role. Since the 1970s, when environmental awareness became a major policy driver, Australia's anti-whaling stance has closely aligned with the positions of non-governmental organizations advocating for whale conservation (for more details, see Scott and Oriana, 2014; Scott, 2013).

Emerging powers such as Brazil, India, and Russia are expanding their Antarctic research programs, signaling a shift in the balance of influence within Antarctic governance. This mirrors

a broader global trend of economic power shifting eastward, accompanied by rapid growth in scientific and technological expertise (Bateman 2012, 121). The number of research facilities in Antarctica continues to grow, with approximately 110 bases currently operational. These include about 40 year-round stations and 70 seasonal or inactive ones, managed by 29 countries under the AT framework (Jardine & Clack 2024; Antarctic Research Stations 2024).

Asian countries, including China, India, Japan, and South Korea, are ramping up their activities in Antarctica. For instance, South Korea recently selected Terra Nova Bay near the Ross Sea as its second research base site. China and India also have ambitious plans to expand their Antarctic programs. China established its third station, Kunlun Station, in 2009 at Dome A, one of the coldest and highest points on the continent, the fourth one Taishan in 2014 (Global Times, 2014), and in 2024 its fifth Qinling Station (near the Ross Sea) (Young, 2024a). Notably, two of China's Antarctic bases are located within the Australian Antarctic Territory. This may have prompted Australia to increase funding for its Antarctic initiatives, including an additional AUS $800 million allocated in 2022 to reinforce its territorial claims amid growing competition with China (Bateman 2012, 121-122).

Intensified U.S. interest in Antarctica is also linked to the risk of militarization of Antarctica. The likelihood of militarization or military confrontations in Antarctica remains relatively low for the time being. Under the AT, military operations in Antarctica and its surrounding waters are restricted solely to supporting and providing logistical assistance for scientific missions. Countries such as Argentina, Australia, Brazil, Chile, China, New Zealand, Russia, and the United States use their military forces in these capacities, as permitted by the Treaty (Brady 2020, 15–17; Martin 2016, 11). Nonetheless, the potential for military activities disguised as scientific endeavors, mainly through applied research, poses a concern. Kökyay (2022, 168) highlights that Article I of the AT is "the most fundamental element underlying the risk of militarization of the Continent". Article VII (5)(c) of the AT requires states to provide detailed reports on any military personnel or equipment deployed to Antarctica. While most Treaty members comply with this requirement, China has been criticized for failing to report the extent of its military involvement in the region and for not disclosing some of its scientific activities' military applications (Kökyay, 2022, 168).

AT Annual Reports suggest China's military presence in Antarctic projects has steadily increased (Brady 2020, 15). For instance, during the 2013-14 season, a logistics expert from China's People's Liberation Army (PLA) supported the BeiDou-2 satellite system. However, China omitted details of this military activity from its AT Annual Report (2014). Similarly, during the 2007-08 season, PLA personnel assisted in building a pier and a high-frequency

radar station at Zhongshan Station, a facility allegedly capable of interfering with U.S. polar satellites. While these developments were publicized domestically, China left relevant sections of its AT report incomplete, excluding mention of military involvement (AT Annual Report 2008; Brady 2017, 13–14). China's polar research stations play a crucial role in enhancing the military capabilities of the PLA. These facilities support China's command, control, communications, computers, intelligence, surveillance, and reconnaissance (C4ISR) systems, which include missile timing and positioning functions enabled by the BeiDou satellite system. In its 2012-13 polar policy report, China underscored the strategic importance of the polar regions for C4ISR operations, highlighting their role in improving precision missile strikes and satellite communications. The polar regions are also essential for ensuring global coverage of the BeiDou network (Brady 2017, 15). On the other hand, some analysts, like Claire Young from the Lowy Institute, consider that the Antarctic ground stations are not as important in the military context as other commentators perceive. She argues that "[it] is unclear what […] ground stations in Antarctica would add to current substantial Chinese ability to observe – and presumably spy on – the Indo-Pacific region" (Young 2024 b).

Like several other nations, China takes advantage of Antarctica's unresolved sovereignty to establish space tracking and ground-receiving stations that might face opposition if placed within other countries' sovereign territories. These research stations serve civilian and military purposes, assisting in weather prediction and strengthening coastal defense. Russia and India but also Norway operate similar facilities in Antarctica (Brady 2017, 15).

Russia has also increasingly approached Antarctic governance from a securitized perspective, raising concerns about potential breaches of the AT's "peaceful purposes" principle. Its ground-based space research initiatives and Global Navigation Satellite System installations in Antarctica are suspected of supporting military intelligence operations, including missile tracking (Dodds & Boulegne 2022).

Are there any instruments of verification whether the states-parties respect the ban on "measures of a military nature"? Antarctic regulations rely on three primary enforcement mechanisms: inspections, prior notification of activities, and the exchange of scientists. However, the number of inspections conducted at Antarctic research stations under the AT has been relatively low. Some stations, including inactive ones, have never been inspected. Among the most frequently inspected stations, Russia's Bellingshausen Station leads with 15 inspections, followed by Uruguay's Artigas Station and China's Great Wall Station with 12 each, Poland's Henryk Arctowski Station with 11, and Brazil's Comandante Ferraz Station with 10. Other stations have only been inspected between one and eight times since the Treaty's

implementation. Additionally, the COVID-19 pandemic resulted in no inspections in 2021 and 2022 (Secretariat of the Antarctic Treaty n.d.; Kökyay 2022, 173). While no breaches of the AT were identified during previous inspections, these inspections are often brief, and inspectors may lack the specialized knowledge necessary to detect complex violations, particularly in areas such as advanced military space research. A key concern is whether using Antarctic bases to transmit command signals to satellites that control weapons is permissible. Furthermore, as mentioned, questions have been raised about the accuracy and transparency of activity reports, especially those from China, which are often criticized for being vague and potentially concealing military activities. Although China claims that no military personnel are stationed in Antarctica, reports from countries such as the United States and New Zealand suggest significant military involvement in their operations (Bateman 2012, 130; Annual Reports can be accessed on the Secretariat of the Antarctic Treaty website: https://www.ats.aq/devAS/Ats/InspectionsDatabase?lang=e).

In the future, upholding the ban on "measures of a military nature" and ensuring Antarctica remains dedicated to peaceful purposes may become increasingly difficult. This challenge is exacerbated by growing strategic competition in a multipolar world, particularly between China and India, as they rise as dominant powers in Asia. Ambiguities surrounding the definition of "military measures" could complicate enforcement. Moreover, the expanding use of Antarctic research stations for dual-use scientific purposes with potential military applications – such as managing offensive weapon systems – further adds to the complexity. It is worth stressing again that the American Memoranda express strong support for the ATS and the peaceful purposes clause.

In the area of militarization, the strategic connection between Antarctica and space has become increasingly evident, mainly as military forces around the globe rely more heavily on space-based infrastructure for communication, navigation, and operations. This is especially true for nations like China and India, which will likely use their Antarctic bases to support space-related activities. Japan's 2008 amendment to its Basic Law on Space to permit defense applications further illustrates the growing intersection of space and military strategy. Antarctica's unique geography and atmospheric conditions make it ideal for supporting satellite operations. U.S. stations such as South Pole, McMurdo, and Palmer play critical roles in the Global Navigation Satellite Systems (GNSS) essential for precise orbital calculations and weapon guidance systems. Similarly, China's Kunlun Station at Dome A is strategically situated for satellite communication and data interception, offering an advantage in global space operations. Antarctic bases enable satellites in low-Earth orbits to download data and be re-tasked in real-

time, enhancing command and control capabilities. The continent's clear skies and geographic positioning also make it well-suited for observing phenomena such as missile exhaust plumes, providing a strategic edge for detecting and tracking missile launches. These advantages underscore Antarctica's growing role in space and missile defense systems (Bateman 2012, 126).

Bateman (2012, 126) highlights a distinction between the militarization and weaponization of Antarctica. While militarization refers to the use of military personnel and resources for peaceful or logistical purposes, weaponization involves the development or deployment of offensive technologies. The potential weaponization of Antarctica is of significant concern, particularly as nations like the U.S., China, Russia, and India continue to invest in anti-satellite (ASAT) missiles and other offensive space technologies. Although the AT permits research conducted by military personnel as long as it is for peaceful purposes, the line becomes blurred when the research is linked to the development of offensive space capabilities. The increasing focus on space as a future battleground suggests the push toward weaponizing Antarctica may become a contentious issue. If offensive technologies are developed or deployed on the continent, it would fundamentally violate the Treaty's principles and pose far greater challenges than the current concerns over militarization (Bateman 2012, 129).

Antarctica's Future: Balancing Cooperation and Competition in a Changing World – Concluding Remarks

As geopolitical competition in the polar regions intensifies, the AT's peaceful purpose mandate will face increasing scrutiny. Ensuring compliance with this mandate will require enhanced verification systems and international cooperation to address the challenges posed by dual-use technologies and the ambitions of major powers like China and Russia. U.S. strong support for the ATS and peaceful purposes clause sends an important signal to other states, China and Russia in particular: "The U.S.A. is firmly committed to the Antarctic Treaty System. In a time of rapidly evolving global geopolitics, and increasing impacts of climate change, this commitment by the country that facilitated the negotiation of the Antarctic Treaty underpins the importance of Antarctica to the global community" (Press 2024a). The shifting balance of power and rivalry between key countries, such as the U.S., and the increasing prominence of China and India will likely have major consequences for how Antarctica is governed. According to Brady (2017, 13), military activities carried out by China and other leading nuclear powers, which use their Antarctic bases to oversee offensive weapon systems, could destabilize the

strategic balance that has maintained peace in both the Asia-Pacific and Antarctic regions for nearly 70 years.

This article explored the evolution of U.S. policy on Antarctica, focusing on its legal, environmental, and geopolitical dimensions. Over the last four decades, the U.S. issued four key memoranda on Antarctica: in 1982 by President Reagan, which prioritized a strong U.S. presence and scientific research; in 1994 by President Clinton which broadened objectives to include conservation, sustainable fisheries, and international collaboration; in 2020 by President Trump which highlighted the acquisition of a polar icebreaker fleet to strengthen security and presence; and finally in 2024 by President Biden which reaffirmed prior commitments while emphasizing Antarctica's role in addressing climate change and supporting global environmental research. The U.S. maintained its leadership in Antarctic diplomacy through the years by advocating for environmental preservation and international scientific cooperation. The shared values underpinning the ATS increasingly clash with the competitive strategies of Russia and China, both of which are now openly challenging the ATS framework's authority. While the 2024 U.S. Memorandum prioritizes safeguarding the Antarctic environment and preserving the region, Russia and China advocate for a contrasting "rational use" approach, which effectively prioritizes resource exploitation over environmental conservation (Boulègue 2024).

This article identified changes in the priorities in U.S. policy on Antarctica, in the direction of the increasing national security focus in U.S. Antarctic policy, which has evolved from a primarily scientific and environmental approach (as seen in the 1982 and 1994 U.S. policy documents) to a strategy incorporating geopolitical and military concerns (especially in Trump's 2020 Memorandum and Biden's 2024 National Security Memorandum). The U.S. has historically opposed territorial claims in Antarctica, but as competition over resources, strategic presence, and influence intensifies, legal and policy frameworks become increasingly relevant. Importantly, for the first time, the 2024 Biden National Security Memorandum explicitly included climate change, signaling a fundamental change in how the U.S. perceives Antarctica – not only as a geopolitical and scientific arena but also as a climate-critical region with global consequences. This inclusion aligns with broader U.S. national security strategies that increasingly recognize climate change as a threat multiplier, affecting global stability, resource competition, and geopolitical dynamics.

Hopefully, the new Trump administration will maintain support for the ATS and not join the states desiring to change the ATS and claim parts of Antarctica. This unique part of the globe should still be reserved for peaceful purposes such as research and science. Considering climate

change's increasingly urgent and severe consequences, including the potentially devastating effects of sea level rise, states should cooperate and not compete in this region. The 2024 U.S. Memorandum finally noticed this problem in the specific area of the Antarctic.

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