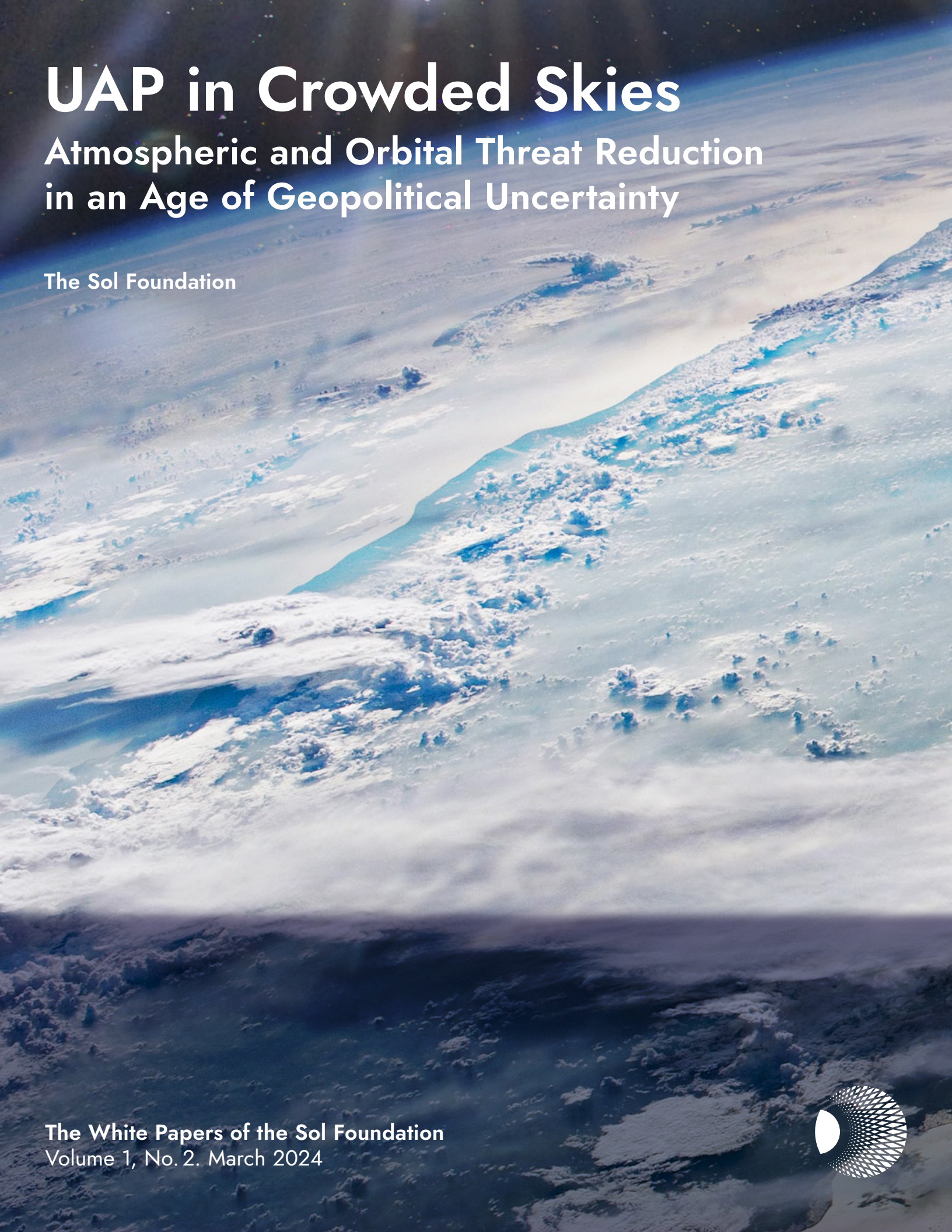
UAP in Crowded Skies

Atmospheric and Orbital Threat Reduction in an Age of Geopolitical Uncertainty

The Sol Foundation



The White Papers of the Sol Foundation
Volume 1, No. 2. March 2024

UAP in Crowded Skies

Atmospheric and Orbital Threat Reduction in an Age of Geopolitical Uncertainty

The Sol Foundation

The White Papers of the Sol Foundation
Volume 1, No. 2. March 2024

Contents

Executive Summary

In an effort to bypass contentious debates over disclosure and the existence of extraterrestrial life, the Sol Foundation commissioned this report to explore policy reforms that could help the United States and other governments address the challenge of unidentified aerial (or anomalous) phenomena (UAP) while building bridges between potentially interested constituencies and existing stakeholders.

Despite these objectives, this paper does not present evidence or data to support a particular theory of UAP or quantitatively establish their existence.[1] Instead, the authors simply take as fact that thousands of UAP are reported every year by citizens around the world and that many national governments have disclosed significant military and civilian encounters with unidentifiable craft or aerial phenomena. These events have sparked panic, wonder, military responses, and governmental and scientific investigation. The question of what UAP *are* or *are not* does not change the very real outcomes of UAP events.

This paper accordingly outlines a possible reform agenda that can have significant value to national governments and publics alike, independent of verification or disclosure of what *causes* UAP phenomena. To some extent, this paper is also a mapping exercise to show the breadth of serious policy discourse that is possible beyond the questions of UAP existence and disclosure. Methodologically speaking, we treat UAP as a "black box"—an unknown or poorly understood entity that nonetheless produces clear effects in its environment—and hope thereby to show that the opaque character of UAP in no way precludes a national and international policy reform effort to address them.

Policy reform should focus on the public safety and national security risks that UAP events pose in increasingly unstable aerospace and outer space control regimes. These events are of broad interest to leaders and participants in civil and military aviation, defense, scientific, and commercial outer space endeavors as well as national governments facing a tense geopolitical environment. Moreover, public safety and national security are the two areas where a lack of action on developing robust UAP policies has the most significant consequences, irrespective of UAP identity. The unpredictability of the phenomena poses a considerable flight hazard to individual aviators, and their interaction with new, disruptive technologies such as drones, commercial and military space vehicles, and hypersonic missiles creates broad risks to international order.

The current low-trust climate of technological change and geopolitical competition, however, leaves governments poorly prepared to respond to UAP. The crowding of the skies by not only UAP but drones, surveillance balloons, and hypersonic missiles is causing existing norms and multilateral conventions to reach their limit for effective coordination and control. In near-Earth orbit and outer space, commercialization and renewed geopolitical competition combined with an endemic space junk crisis further complicate transparency and predictability. As more and more vehicles cross thresholds between territorially sovereign airspace and the commons of atmospheric and outer space, the potential for cataclysmic accidents and miscal-

culations caused by UAP increases. The current predicament suffers from a series of irreconcilable boundary problems under current regimes such as the 1944 Convention on International Civil Aviation and the 1967 Outer Space Treaty. While divisions between civilian and military aviation control have resulted in few catastrophic accidents, technological changes and the distribution of those technologies make a future without such events unlikely.

Moreover, preventing accidents from becoming geopolitical crises rather than mere tragedies will require consistent and transparent surveillance for effective and trustworthy attribution. In a moment when public trust is low and international norms and cooperation are waning, attribution becomes much more difficult. Unlike the Cold War period, when efforts were made to build infrastructure and practices for de-escalation, such as nuclear hotlines, protocols for incidents at sea and submarine bumping, and prohibitions on anti-satellite weapons, the last decade has seen a sharp increase in states and non-states pushing the limits or outright violating norms and international law regarding airspace. During this same escalation period, we have also witnessed a dramatic increase in the number of actors who can participate in these domains and an increase in incidents for which no attributable actor can be ascertained.

Without a renewed multilateral effort to improve cooperation in surveillance, the potential for crisis and even catastrophe is high. This paper will accordingly examine existing international regimes for aerospace surveillance, control, and threat reduction and make recommendations for reforms that can accommodate the complex layers of aerial phenomena on the planetary and orbital scale in which UAP events occur. In brief, these recommendations are as follows.

1. The development by the International Civil Aviation Organization of an annex to the Chicago Convention treaty containing guidelines for how civilian aircraft should report and respond to UAP encounters as well as binding amendments that would obligate states to report military encounters with UAP that could affect civil aviation safety, ensuring that such reports both respect national security boundaries and provide provisions for the investigations of such incidents.

2. An international UAP working group in the United Nations Committee on the Peaceful Uses of Outer Space (COPUOS) by which states would develop and implement a process for data- and information-sharing about UAP events in space as well as a voluntary protocol for reporting such events that would not undermine participants' national security. Additionally, COPUS could amend a key international space agreement, the Outer Space Treaty, to require its signatories to participate in these measures and to undertake peaceful, nonmilitary UAP investigation and related scientific research.

3. International, military-to-military measures for preventing UAP events from accidentally triggering incidents between states that might lead to conventional or nuclear war. Such measures include bilateral or multilateral UAP communication protocols; ballistic nuclear submarine patrol pattern and Nuclear Posture Review adjustments; the upgrading of command, control, communication, and intelligence (C3I) systems to include enhanced UAP discrimination capabilities; the integration of UAP scenarios into nuclear command exercises; and a joint UAP study and information exchange.

As many of these recommendations are not immediately feasible in the atmosphere of distrust and tension wrought by great power competition, the conclusion to this paper offers a starting point. International collaboration among scientific, aviation, amateur astronomy, and other civil society organizations could be used to found a supranational UAP research and study organization. It could serve as a forum through which states might reestablish trust and eventually participate to their mutual benefit, which in turn could lead them to participate in state-based and military-to-military measures. For the time being, we can only hope that national governments will consider the need to prioritize reforms during this divisive era in national and international politics.

Note: Congress recently redefined UAP as "unidentified anomalous phenomena," after a few years of using this acronym to mean "unidentified aerial phenomena" and, briefly, "unidentified aerospace–underwater phenomena." Because the term "unidentified anomalous phenomena" is vague enough to apply to all sorts of apparent entities—in fact, it could signify *any* phenomenon falling outside established systems for classifying entities, not just aerial phenomena—we have retained the older meaning of UAP, by which we nonetheless mean undersea, space-based, and transmedium phenomena that are like their aerial counterparts. We sense that it soon may be necessary to adopt a term like nonanthropogenic vehicle (NAV) for the "phenomena" discussed here. For now, however, we await research findings sufficient to confirm the validity of such a term.

Introduction

Over the past six years, official government actions and releases of information concerning unidentified aerial phenomena have opened a new era of acknowledgment and scrutiny of the phenomena by the US Congress, the US Department of Defense, and other government entities. This shift toward greater seriousness and transparency began with the watershed moment of December 16, 2017, when the *New York Times* reported on the existence of the Advanced Aerospace Threat Identification Program, a previously undisclosed Pentagon program investigating UAP.[2]

After the *Times* report, the DOD began releasing official statements confirming the integrity of specific UAP incidents. Most notably, on April 27, 2020, the Pentagon confirmed the authenticity of three US Navy videos, already in public circulation, that were captured in 2004 and 2015 and show unidentified objects that display exceptional speed and/or maneuverability.[3] The events the videos document—the 2004 USS *Nimitz* incident and one of several 2015 encounters by pilots from the USS *Theodore Roosevelt*—became seminal cases in the public's awareness of UAP.

The candid discourse kindled by these acknowledgments led to further federal government engagements, culminating in an unclassified UAP report delivered to Congress on June 25, 2021. This report, prepared by the interagency UAP Task Force and released through the Office of the Director of National Intelligence, provided an analysis of 144 UAP reports (eighty of which involved multiple sensors) reported by military aviators, but could find no attributable cause for all but one case and ruled out significant classified Russian, Chinese, and classified US aerospace technologies.[4] The task force also indicated that advanced technology was evident in twenty-one reports.

In reaction to this report and growing concerns over the national security implications of UAP, Congress held hearings and passed legislation. The hearings included one on May 17, 2022—the first on UAP in Congress in over fifty years—held by the House Intelligence Subcommittee on Counterterrorism, Counterintelligence and Counterproliferation, and another, convened by the House Oversight and Government Accountability Committee, dealing with pilot and whistleblower testimony.[5] As for the UAP legislation passed since 2021, it encompasses no fewer than eight distinct amendments to the National Defense Authorization Acts (NDAA) for the 2022, 2023, and 2024 fiscal years and the Intelligence Authorizations Acts for the 2024 fiscal year. Among other things, these acts established a DOD UAP research office, the All-Domain Anomaly Resolution Office (AARO) that must issue annual reports to Congress. These unprecedented events marked a decisive moment in the destigmatization and prioritization of the subject within Congress.

The rising political interest in UAP culminated in Senate Majority Leader Charles Schumer's introduction in July 2023 of draft legislation that sought to institute increased transparency and a formal investigative processes concerning previously classified executive branch activities concerning UAP.[6] Known as the Unidentified Anomalous Phenomena Disclosure Act of

2023, this amendment to the NDAA for the 2024 fiscal year was cosponsored by several other senators active on UAP issues, including Kirsten Gillibrand, Michael Rounds, and Marco Rubio. Its purpose was to establish a process for the expedited review, declassification, and release to the public of classified UAP records. That work was to be undertaken by an elite panel composed of academics and retired government officials holding or provided with security clearances, vested with the authority to obtain relevant classified records, and acting on behalf of Congress and the President. The panel was to be given such wide-ranging access and presidential backing to ensure its success with agencies holding UAP information and, just as important, to ensure collaboration between the executive and legislative branches on a contentious issue of secrecy. In these respects, Schumer's legislation was constructed to bring about serious reform in a way that would involve and benefit all relevant areas of federal government.

Yet despite the increasing legitimization of the UAP topic in the political sphere and the groundswell of public and institutional interest, the UAP Disclosure Act failed to pass in its original form (only a significantly stripped-down version, unrecognizable to its authors, was included in the 2024 NDAA). This legislative defeat underscores the complexity and controversy surrounding UAP, even as official acknowledgment grows. These phenomena may intrigue and puzzle some of the most serious actors in federal government, but the amendment's failure shows that substantial institutional hesitancies, differing opinions on the significance of UAP, and jurisdictional friction hinder policy efforts in this arena. More precisely, the fate met by the Disclosure Act is a sign that staking UAP policy reform on disclosure and increased congressional oversight alone may not be the best way forward.

Federal UAP Policy Should Be about More Than Disclosure

If that statement comes as a surprise, consider that the discourse surrounding UAP within the US government is currently dominated by two significant areas of dispute: the extent of disclosure appropriate for public consumption—a debate about transparency that encompasses concerns over national security, scientific interest, and the public's right to know—and a bureaucratic tug-of-war over who should oversee UAP study, data, and preparedness: a contention between executive branch agencies and Congress over which branch of government has the right expertise, access to and ability to protect classified information, and means to ensure interagency collaboration.

In the dispute over disclosure, advocates argue that the public deserves a detailed understanding of potential UAP risks, the government's responsive capabilities, and how much it has known and for how long. This call for openness strives to hold public officials accountable and ensure a democratic approach to a matter of widespread interest and potential significance for humanity. On the other, those who champion a more restrained release of information point to the sensitive nature of UAP encounters, many tied to military operations and technologies, that could compromise national security if exposed.

Meanwhile, the interbranch conflict concerns who will take the helm in UAP investigation efforts. While the DOD has played a historical role in such inquiries due to their defense implications, there is a push for civilian and congressional oversight, perhaps by a dedicated nonmilitary office within the executive branch or a select congressional committee. Some

argue that the expertise and existing infrastructure of the DOD is most suited to addressing the problem, while others fear this could result in a lack of civilian oversight and transparency, excess focus on the defense applications of data, and the neglect of potential public benefits.

As important and urgent as these debates over disclosure and jurisdiction are, they may be detracting from an equally vital and more pragmatic agenda: addressing the immediate safety and security challenges posed by UAP. It is crucial to prioritize the development of protocols for encounter response, technological research to enhance detection and identification capabilities (and thereby the classification of subtypes of UAP), and mitigation strategies to manage potential UAP-related disruptions or threats to aviation safety and national security. Moreover, interagency information-sharing, the bolstering of data analysis capabilities, and international cooperation on UAP research can lead to better-informed defense posturing and strategic planning.

In short, the US government's response to the UAP phenomenon could benefit tremendously from shifting some of its focus away from the heated debates over disclosure and oversight and constructing a comprehensive, practical framework for UAP encounter preparedness. This approach would reinforce the integrity of national airspace and security and foster a scientific environment conducive to understanding and addressing the multifaceted and still unknown challenges raised by UAP.

An Urgent yet Practical UAP Agenda: Recommendations for Airspace, Outer Space, and Defense Policy

By strategically prioritizing such pragmatic considerations, the US government can ensure that its responses to UAP are guided by such stable endeavors as airspace safety, scientific inquiry, and defense strategy rather than the oscillations of political controversy. In the rest of this paper, we will accordingly examine how UAP intersect with issues of aviation integrity, the use of outer space for defense and science, and, most important, increasingly volatile geopolitics. The point will be to outline a set of policy measures that form the basis for a broad, pragmatic agenda.

More precisely, the public safety and national security risks of UAP are heightened in today's increasingly unstable aerospace and outer space control regimes. Faced with drones, hypersonic missiles, and surveillance balloons, relevant norms and multilateral conventions quickly reach their limit for effective coordination control. In near-Earth orbit and outer space, commercialization and renewed geopolitical competition combined with an endemic space junk crisis further complicate transparency and predictability. With more and more vehicles crossing thresholds between territorially sovereign airspace and the commons of atmospheric and outer space, the potential for cataclysmic accidents and miscalculations caused by UAP events increases. The current predicament suffers from a series of irreconcilable boundary problems under current regimes, such as the 1944 Convention on International Civil Aviation, the associated International Civil Aviation Organization, and the 1967 Outer Space Treaty. While divisions between civilian and military aviation control have resulted in few catastrophic accidents, changes in technology and the distribution of those technologies make a future without such events unlikely.

Furthermore, preventing accidents from becoming geopolitical crises rather than mere tragedies will require consistent and transparent surveillance for effective and trustworthy attribution. In a contemporary moment when public trust is low and international norms and cooperation are waning, attribution becomes more difficult. Unlike during the Cold War period, when the United States and the Soviet Union made efforts to build infrastructure and practices for de-escalation, such as nuclear hotlines, protocols for incidents at sea and submarine bumping, and prohibitions on anti-satellite weapons, the last decade has seen a sharp increase in states and non-states pushing the limits or outright violating norms and international law regarding airspace. During this same period of escalation, we have also witnessed a dramatic increase in the number of actors who can participate in these domains, as well as an increase in incidents for which no attributable actor can be ascertained.

Without a renewed multilateral effort to promote cooperation and transparency in aerospace surveillance and invest in confidence-building measures, the unpredictable and often unclassifiable nature of UAP poses a grave risk to public safety and international order. This paper will accordingly consider existing international regimes for surveillance and control and threat reduction and make recommendations for reforms that can accommodate the complex layers of aerial phenomena on a planetary and orbital scale where UAP occur.

Finally, the conclusion of this paper will propose a practical starting point by which these and similar recommendations can eventually be implemented. The great power competition of the last decade, and increasing international distrust it has engendered, make cooperation over sensitive air, space, and defense issues so difficult that some groundwork will first have to be laid for the regulatory and information-sharing measures envisaged here. We will therefore consider how civil society collaborations between scientists, amateur astronomers, and aviators might lead to the formation of a supranational UAP research organization that could facilitate trust and cooperation between states.

Beyond Faith and Denial: A Balanced Approach to UAP Study

Beyond the political and technical complexities of UAP events, these policy recommendations also require developing new methodological tools for research. A schism is taking root within the science and policy communities of the United States concerning a subject that teeters between dismissal and sensationalism. At the heart of this divide is a fundamental disagreement over the approach towards UAP: should the focus be on what these phenomena fundamentally are, or should it be on what they do? The focus on the nature (or "ontology") of UAP may be overshadowing more pragmatic discussions about their behavior and practical implications, leaving a gap in collective understanding that could otherwise inform policy direction and national security protocols.

Compounding the stalemate is the secretive cloak that shrouds many UAP incidents. While classified information is undoubtedly held under such protection for reasons of national security, this restriction on access to data hinders a full and open discourse, trapping potentially invaluable information behind government vaults. Consequently, the public narrative is driven by the fragmented information that bubbles to the surface, which reinforces conjecture instead of substantive research.

An enduring stigma further complicates the atmosphere surrounding UAP studies. Scientists and policymakers who express interest in the subject risk marginalization, their professional credibility called into question by a culture that demeans their curiosity as ludicrous. Such stigmatization is a significant barrier, skewering the risk–benefit analysis for potential researchers considering entering the field and stifling what could be a valuable stream of scholarly inquiry.

Given this backdrop of excess speculation, continued secrecy, and stigma, there is an urgent need to craft an approach that transcends the polarity of so-called true believers—who sometimes take it on faith that UAP events have nonhuman origins instead of seeking substantiation—and denialists—who dismiss outright any phenomena that challenge the status quo of understanding. This paper proposes that the impasse can be broken by fostering open-minded inquiry that prioritizes empirical observation over speculative inquiry while leaving room for exploration.

Put differently, we propose the need for an evolution in thought—a median path that can nurture a more practical and effective debate concerning UAP. We aim to foster an open-minded inquiry that both maintains a rigorous commitment to empirical evidence and remains receptive to a spectrum of potential explanations. In doing so, we hope to shift the conversation from fringe theories or outright dismissal to one that can have significant implications for national security, technological innovation, and the advancement of scientific knowledge.

The significance of the challenges before us should not be underestimated. The increasing number of UAP events, which range from as many as thousands each year by civilian reporting and about a hundred a year according to official DOD statements, take place in a planetary setting rife with geopolitical mistrust, insufficient regulatory and surveillance capabilities, and an excess of identifiable flying objects. The already noisy environment increases the already significant risk that unanticipated events involving genuine UAP will lead to accidents, miscalculations, crisis escalation, and even war.

As this paper is meant to bring together many different stakeholders, from the citizen and the strategist to the scientist and the legislator, technical jargon and concepts have been avoided as much as possible. As a result, some sections provide information obvious to some. The goal is to build a broad knowledge and information base across multiple sectors to foster the interdisciplinary collaboration that UAP policymaking requires. The hope is that rational but adequately creative international measures result.

1. A Methodology for Action without Belief: Utilizing "Radical Empiricism" for UAP Study and Policy Formulation

As we saw above, stigma and sensationalism alike make it difficult to maintain the kind of academic rigor about UAP needed for balanced inquiry and effective policymaking. In grappling with airborne enigmas that defy conventional classification, a transformation in approach is warranted, which this paper will argue should be informed by what American philosopher William James called "radical empiricism."[7]

William James's radical empiricism posits that knowledge stems from raw, immediate experience and that understanding is rooted in perceiving the relationships within and between experiences, not in ascribing to them any predetermined essence.[8] Applied to UAP research, this paradigm directs investigators to assess directly observable attributes—shapes, kinds of movement, patterns of interaction with the environment—while leaving to the side more intriguing yet less fruitful questions about the nature of UAP. Taking distance from the focus on what UAP might intrinsically be—that is, their "ontology"—allows for an open but restrained approach, one that privileges what is directly observed over what is hypothesized. Or, to put it more simply, for this paper we are concerned with what UAP *do* rather than what they *are*.

This method is complemented by James's philosophy of pragmatism, the core tenet of which is that the merit of an idea is rooted in its practical effects and application.[9] Policies and strategies can be crafted that focus on managing the interactions of UAP within national airspace, evaluating their impact on the use of outer space, and examining their influence on defense protocols, all while remaining independent of more esoteric queries about their ultimate nature. Moreover, by centering policy development on reliable empirical patterns and regularities, one can also forge alliances for practical solutions rather than further divide research and policy communities based on belief and disbelief. Data can serve as the common denominator of UAP-related policy in a variety of domains, regardless of whether decision-makers in those domains take the data to show that UAP are of nonhuman and possibly extraterrestrial origin.

It should be said, however, that the radically empirical and pragmatic approach taken here is not the only way to study UAP. The point is not to use it to ridicule or sideline more fundamental inquiries about what UAP are. In fact, too much empiricism could unduly prioritize fragmentary, uncorrelated data and fail to discern patterns that might clear up the mystery surrounding some of these objects. Thus, while the operative principles of radical empiricism can create a path forward for UAP studies, a balance must be struck within this research

paradigm between an unprejudiced and neutral mindset about the data and genuine openness to the disturbing discoveries it may yield.

Beyond its concern to use raw data for practical ends, there is another reason to adopt a radically empirical approach to UAP: it resonates with security studies and risk analysis, which are both paramount if the United States and other governments are to deal with UAP. These fields are no strangers to engaging with the domain of the uncertain and the unprecedented, as many phenomena of profound importance to national and global security are never observed in their full potentiality. Despite this, these phenomena must be studied, planned for, and understood as best as possible within the constraints of our experience. Radical empiricism thus suits the necessity of preparing for and mitigating risks from known and unknown threats.[10]

A well-known example of the use of an experienced-based approach in security studies and risk analysis is global nuclear warfare. Even though war of this kind has never occurred, it is one of the most heavily modeled phenomena among nation–states. By focusing primarily on empirical data to craft strategic policies and possible responses, defense planners have learned that not having firsthand experience of any of the modeled scenarios is reason to anticipate (rather than ignore) a broad range of them. This sort of rational yet flexible stance has allowed the United States and other states to assess risk and prepare for contingencies using known patterns of action of adversaries rather than conjecture and guesswork.

As UAP present us with more questions than answers and a dearth of historical precedents, a similarly empirical approach to related issues of security and risk will enable analysts and policymakers to draw on observable data to inform readiness and response without first having a definitive ontological assessment. This can allow us to normalize the study of these phenomena within the rigorous frameworks of security and risk analysis while also demonstrating the importance of those fields for understanding the myriad uncertainties of the global security landscape. Thus approached, the UAP phenomenon becomes integrated into the larger tapestry of strategic studies, forming an enigmatic yet important point of inquiry that is ripe for objective analysis and pragmatic policymaking. Just as both relevant historical data and theoretical models have been invaluable tools for maintaining peace and preparing for worst-case scenarios of nuclear warfare, so must our approach to UAP be informed by both rigorous investigation and contingency planning. With regard to that imperative, radical empiricism does not merely offer a method for engaging with UAP; it affirms a well-established tradition within security and risk analysis that eschews dogma in favor of direct experience and conjecture in favor of actionable evidence.

In sum, this focus on empirical data, unaffected by prejudgment, is critical to academic fidelity and policy formation. It creates a foundation where policies are established in direct correspondence to the best data available rather than the data we wish we had. Just as crucially, when the stakes are high and the unknowns are many, it remains vital that a balance be struck between empirical research and the requisite planning for scenarios that have yet to—and may never—materialize.

2. What Are Unidentified Aerial Phenomena, and Which States Are Studying Them?

Despite rigorous investigation, there is not yet social consensus about the exact nature and origins of unidentified aerial phenomena. As a figure of inquiry, UAP are a blend of anecdotal reports, stigmatized accounts, and inconclusive evidence. However, the lack of a clear understanding does not preclude the possibility of a systematic examination of their behaviors and manifestations. By adopting a radical empiricist approach, we can build policy based on the extensive cataloging of UAP occurrences, drawing from observed data points to sketch a summary outline of the behaviors and types of UAP significant for policymaking.[11]

This process is akin to ethology, the scientific and objective study of animal behavior, usually focusing on behavior under natural conditions. Just as ethologists describe animal behaviors in terms of their observable patterns, mechanics, and contexts, UAP researchers can compile a taxonomy of UAP characteristics and behavioral types—considering shape, size, kinematics, and other measurable traits—without preconceived notions about their underlying causes.

Gathering this empirical evidence allows for a structured understanding that transcends the prerequisite of knowing where UAP come from or what they may be. This "ethology of UAP" does not require us to unlock the profoundly hidden secrets of their existence; it merely necessitates a disciplined observation of their "behaviors" and an educated interpretation of the data gathered. From this, we can infer patterns, frequencies, and potential significant public safety and security risks.

Policy recommendations, therefore, can be informed by a set of identified behavioral phenomena. By focusing on what UAP do rather than exclusively on why they do it, governmental bodies, aviation authorities, and military organizations may devise effective response protocols, reporting procedures, and, where necessary, defensive measures. This empirical foundation ensures that policy is built on the solid ground of observed data, enabling a balanced and pragmatic stance in the face of the UAP enigma. This position is both scientifically grounded and strategically prudent.

An Outline of UAP Behavior and Morphology

We have chosen the behaviors that recur most prominently in civilian and military reporting that are most relevant for public safety and security.[12] UAP often exhibit behaviors that challenge conventional understanding of aeronautics and physics, making them difficult to categorize and track. This is due to several factors:

1. **Unpredictable Flight Paths.** UAP often display nonlinear and erratic navigation, making real-time tracking and predicting future locations difficult. As exemplified by the widely publicized 2004 "Tic Tac" incident, UAP may change directions abruptly or move in ways that do not appear to follow the typical laws of motion.
2. **High Speed.** Some UAP have been reported to travel at speeds significantly exceeding that of known aircraft, sometimes without any visible means of propulsion. This behavior poses a challenge in tracking and understanding the propulsion mechanism behind such speeds.
3. **Unprecedented Acceleration.** Some UAP have been observed accelerating rapidly to speeds that current aircraft technology cannot achieve without experiencing catastrophic g-forces that would harm human pilots and aircraft structures.
4. **Low Observable Characteristics.** UAP may have stealthy profiles that are difficult to detect with radar or other surveillance systems. Additionally, some seem to emit little to no heat, complicating detection by infrared sensors.
5. **Apparent Ability to Appear and Disappear.** UAP sometimes appear to vanish from sight or radar and then reappear at a different location. This ability to seemingly disappear and reappear poses significant challenges for monitoring and threat assessment.
6. **Transmedium Travel.** As noted in federal legislation, some UAP appear move effortlessly between different environments, such as from air to water or from air to space.

As for the apparent and likely forms of UAP, these include but are not limited to discs, sphere and orbs, cigar shapes, lights, and a variety of other, often unappreciated shapes:

1. **Disc-Shaped or Saucer-Like.** These are the classic "flying saucers" often reported and popularized in media. An example is the Kenneth Arnold sighting in June 1947, which is widely considered the genesis of modern UAP encounters and spurred the term "flying saucers." Notably, however, before the Arnold incident and the ensuing media coverage, reliable observers had already reported metallic, disk-shaped objects. According to government records, "trained and experienced U.S. Weather Bureau personnel ... sighted strange metallic discs" on four occasions during routine observations of weather balloons several months prior to the Arnold encounter.[13]
2. **Spherical or Orb-Like.** From "foo fighters" and "silver colored spheres" reported by aircrews during World War II to the "metallic orbs" described by former AARO director Sean Kirkpatrick as being observed "all over the world ... making very interesting apparent maneuvers," spherical objects have been a consistent staple in US government UAP reporting for nearly a century.[14]
3. **Cigar-Shaped.** Long and sometimes reported to be quite large, these UAP often lack visible wings or propulsion. Some reports suggest that such objects may be disc- or other similar-shaped objects that are viewed edge-on.
4. **Light Formations.** These UAP appear as unexplained lights that move in formation or perform maneuvers in the sky. The Phoenix Lights incident in 1997, where thousands observed stationary and moving lights, is a well-documented example.
5. **Other Shapes.** The above list is not meant to be comprehensive, as many others reported UAP forms exist and even fall into distinct kinds. These include shapes like boomerangs, cuboids, bells, and diamonds.

The unpredictability, advanced performance characteristics, and elusive nature of UAP represent a significant challenge to civilian air traffic control and military threat assessment. Their operation in or near sensitive airspace without identification presents a safety risk and a national security concern. Given these complexities, UAP require an approach to monitoring distinct from those used for conventional aircraft and missile threats.

International Discoordination, Unshared Data: The UAP Study Efforts of Nation–States

Given the anomalous behavior of UAP and their potential for disruption, many states have developed national programs for investigating the phenomena. However, given that at least some UAP are experimental devices of one's own country or an adversary, the structure and findings of these national programs are opaque to different degrees. Yet despite the effort to remain clandestine, there is public knowledge and some media coverage of at least twelve national UAP monitoring and research programs.

1. **United Kingdom.** The United Kingdom has had its own UAP study efforts; in fact, the term UAP originates from one of them. Project Condign, as it is known, was undertaken by the UK's Defence Intelligence Staff between 1997 and 2000, and its report, "Unidentified Aerial Phenomena (UAP) in the UK Air Defence Region," was made public in 2006 through a Freedom of Information Act request. Although the report was inconclusive,[15] it stated, "That UAP exist is indisputable. Credited with the ability to hover, land, take-off, accelerate to exceptional velocities and vanish, they can reportedly alter their direction of flight suddenly and clearly can exhibit aerodynamic characteristics clearly beyond those of any known aircraft or missile—either manned or unmanned."[16] Files from the National Archives confirm that the UK's Ministry of Defence maintained a "UFO Desk" until 2009, but the British government has not reconstituted any publicly acknowledged UAP analysis effort in recent years.[17]

2. **France.** The French government houses in its space agency a long-standing scientific UAP research program called the Group for the Study of Unidentified Aerospace Phenomena (GEPAN).[18] A related nongovernmental group comprising retired air force generals, scientists, and a former head of the French space agency, the Committee for In-Depth Studies (COMETA), provided the French Prime Minister in 1999 with a report, "UFOs and Defense: What Should We Prepare For?" showing that several UAP events that occurred in France were unattributable to misidentified natural or technological entities. COMETA also concluded that the extraterrestrial hypothesis best accounts for the facts of those and other such cases.

3. **Chile.** The Chilean government has set up an agency called the Committee for the Study of Anomalous Aerial Phenomena, which operates under the General Directorate of Civil Aviation and investigates UAP sightings reported by credible witnesses, including pilots and air traffic controllers.[19]

4. **Peru.** Peru has an office within its air force, the Peruvian Air Force Anomalous Aerial Phenomena Research Department, tasked with investigating UAP.[20]

5. **Brazil.** Brazil has engaged in UAP research in the past. The Brazilian Air Force conducted Operation Prato in the 1970s, collecting and occasionally releasing reports on UAP incidents.[21]

6. **India.** The Indian government has not conducted any known, publicly acknowledged investigations of UAP. However, in 2012 authorities reported over a hundred sightings of "Unidentified Luminous Objects" along the China–Tibet border. Indian Army troops observed even more UAP in 2013.[22]

7. **Japan.** In 2020, Japan's Self-Defense Forces issued new protocols for encounters with UAP that pose a potential threat to national security.[23]

8. **Uruguay.** The country has an Air Force Commission for the Reception and Investigation of Complaints of Unidentified Flying Objects, which was recently reported to be actively investigating UAP events.[24]

9. **China.** China's interest in unidentified flying objects can be traced back to civilian and government reports over several decades. The specific program dedicated to UAP within China is not publicly well-documented. China's approach to UAP is likely to be conducted under the umbrella of its military and scientific establishments, perhaps involving aerospace, astronomical, and military agencies. The PRC has publicly disclosed the use of artificial intelligence in the tracking and monitoring of UAP.[25]

10. **Russia.** Russia has a history of researching anomalous aerial phenomena that dates back to the Soviet era. The USSR operated such agencies as "Setka MO" and "Znaniye" that collected information on UAP, but the current names and structures of any Russian successor programs remain largely undisclosed. After the fall of the Soviet Union, several Russian researchers continued to study UAP both independently and in more official capacities. Russian media and some related documentary materials have referred to these efforts, but most claims about them remain conjectural without clear official statements.[26]

11. **Canada.** In response to a request from Parliament, Canada's national science adviser formed Sky Canada Research, housed within the National Science Office and devoted to the scientific, defense, and historical study of UAP. Sky Canada is due to release a report in the autumn of 2024.

12. **United States.** Despite the high level of classification applied to UAP data by the United States, considerably more detail is known about the history of its programs compared to other nation–states. One of the earliest official UAP (then referred to as UFOs) investigation projects was Project Sign, established by the US Air Force in 1948, followed by Project Grudge and the more widely known Project Blue Book, which operated from 1952 until its termination in late 1969. Blue Book collected, analyzed, and interpreted UAP data, ultimately compiling reports of more than twelve thousand sightings or events, approximately seven hundred of which it deemed to be unknown or unidentified.

    Even after the public closure of Project Blue Book, investigations into UAP are likely to have continued in several government agencies, although any that occurred are shrouded

in secrecy. The notable exceptions are the Advanced Aerospace Weapon System Application Program, which was founded in 2007 and reportedly ran until 2012; and the less-formal Advanced Aerospace Threat Identification Program, which ran from 2012 until 2017. The existence of these programs was not known to the public until they were revealed in the December 2017 *New York Times* report.

In response to these revelations and subsequent legislative interest, in June 2020 the Senate Select Committee on Intelligence (SSCI) formally requested that the Director of National Intelligence, in consultation with the Secretary of Defense and other agency heads, submit a report on UAP. This was to include observed airborne objects that had not been identified and posed potential national security risks. Following this, the Pentagon announced in August 2020 that it was forming the Unidentified Aerial Phenomena Task Force, charged with "detecting, analyzing, and cataloging UAPs that could potentially pose a threat to U.S. national security," according to a Department of Defense press release.[27] By June 2021, the Office of the Director of National Intelligence had released a preliminary assessment on UAP that was prepared by the UAP Task Force and presented its analysis of 144 UAP reports (most of which had been received in the previous two years). The report acknowledged that the nature of most UAP sightings could not be explained and classified them into five potential explanatory categories: airborne clutter, natural atmospheric phenomena, US government or industry developmental programs, foreign adversary systems, or a catchall "other" designation.

In December 2021, Congress took a step toward even greater transparency about UAP and their formal investigation by passing legislation within the National Defense Authorization Act (NDAA) for Fiscal Year 2022. This act included the establishment of an office within the US Department of Defense, AARO, to detect, identify, and attribute objects of interest as well as to assess and mitigate any associated threats to flight safety and national security.[28] As of October 2023, AARO had received over eight hundred UAP reports.[29]

With so many countries engaged in UAP data collection and analysis over such a long period of time, one might expect more consensus about the nature of the phenomena and more intergovernmental collaboration in their study. The sensitive, often classified nature of the air and space vehicles, operations, and sensors by which much of the data are gathered, however, make governments reticent to acknowledge—let alone share—such information. That reluctance has undoubtedly hindered the development of serious scientific research and informed public understanding about UAP. But it also has had the equally problematic effect of preventing states from developing shared measures for contending with the challenges raised by the phenomena.

As we will see below, these challenges are inherently international and occur in the areas of aviation safety; the military, commercial, and scientific use of outer space; and the tense geopolitics of US–China–Russia competition. Without a joint effort from national governments and civil society to address UAP using current international agreements and institutions, the anomalous and often unpredictable nature of the phenomena could endanger safety and security to the point of accidentally triggering global war.

3. From Crowded Skies to Crowded Orbits: International Regulation in Airspace and Outer Space and UAP Problem-Solving

Understanding the history and provisions of existing air and space treaties is crucial for developing frameworks for international collaboration on UAP. In this section, we will examine how UAP safety, security, and research issues pose a challenge to air and space governance practices that are already in need of being updated. These can be addressed through two pertinent treaties: the Chicago Convention, which established the International Civil Aviation Organization (ICAO); and the Outer Space Treaty. Together, these treaties provide a context for discussing and negotiating the arenas of international cooperation concerning UAP. They create an existing legal and cooperative infrastructure that can serve as a starting point for dialogues on UAP safety and research. Despite a multitude of barriers to broader international cooperation on UAP, an informed understanding of these treaties will allow nations and organizations to work within and possibly extend these frameworks to develop protocols specific to UAP encounters, ensuring that safety and cooperative research can be handled with an approach that respects national sovereignty, promotes transparency, and maintains the peaceful use of airspace and outer space. Without a grasp of these legal instruments, discussions on international UAP strategies will lack a foundation in established law, leading to ad hoc and likely ineffective measures that fail to safeguard global aviation or advance scientific and practical understanding of UAP in the atmosphere and space.

As UAP pose a basic air safety and airspace governance challenge, we will begin by examining this aspect of the UAP quandary and the Chicago Convention. This will serve as a natural entry point for a discussion of the space commons, the Outer Space Treaty, and their relation to UAP.

UAP and Air Safety: A Further Challenge to Drone-Crowded Skies

The problem raised by UAP for air governance is multifaceted, encompassing a wider range of issues than just flight safety risks. These are, in sum, continued obstacles to reporting; the impacts the objects have on pilot decision-making; their challenge to airspace sovereignty and management; the absence of protocols for communication with air traffic control; and the need for a standard international approach to investigation and analysis.

1. **Safety Risks.** UAP can pose collision risks to commercial, private, or military aircraft. Such dangers are highlighted by a widely reported 2014 incident, where two US Navy F/A-18 Super Hornets nearly collided with a UAP amid naval aviators' frequent encounters with unknown objects off the US East Coast. A navy hazard report described the incident, along with aviators' recurring interactions with UAP, as a "critical risk" and a "severe threat to Naval Aviation."[30] The 1948 Chiles–Whitted incident serves as another example of how unexpected UAP encounters can cause near misses or compel pilots to take dangerous evasive maneuvers, which lead to loss of separation within a tightly controlled airspace system regulated by the ICAO.[31] As noted in the US Office of the Director of National Intelligence's first public UAP report, military aircrews reported eleven near misses with unknown objects. The number of such incidents has almost surely increased since 2021.
2. **Severe Underreporting.** Stigma and skepticism surrounding UAP observations have led to severe underreporting and a lack of data. The reluctance to report such sightings stems from concerns about professional repercussions and potential discrediting amid a deeply ingrained culture of ridicule. In July 2023 testimony before the the House Committee on Oversight and Government Reform, former US Navy fighter pilot Ryan Graves estimated that only 5 percent of UAP incidents are reported by pilots and aircrew.
3. **Impact on Pilot Decision-Making.** UAP encounters can distract or distress pilots, potentially affecting their decision-making. This challenge was exemplified in recent years with frequent reports of pilots observing UAP, later identified as Starlink satellite flares (and, to a lesser degree, the more widely recognized Starlink "trains"), for extended periods of flight time. Similarly, during the 1986 Japan Airlines flight 1628 incident, an airliner observed and reported a UAP, causing the crew to become disoriented and subsequently alter their flight path.[32] Under such circumstances, pilots must remain focused on operating the aircraft and effectively managing any potential interactions with UAP, necessitating enhanced training and procedures.
4. **Airspace Sovereignty and Management.** UAP entering sovereign airspace can trigger national security and safety of flight concerns and responses, which may disrupt civil aviation operations. For example, according to former US Navy fighter pilot Ryan Graves, the frequency of UAP sightings off the US East Coast led aviation authorities to issue several Notices to Air Missions warning aircrew operating in the area of the presence of, and collision risk posed by, the unknown objects.[33] Such actions can complicate air traffic management and potentially violate the rights to overflight and access to airspace established by international agreements.
5. **Communication with Air Traffic Control.** Pilots encountering UAP may need to communicate with air traffic control to alter their intended flight paths or report the phenomena. For example, in early 2024, pilots from multiple commercial aircraft flying over central Canada reported UAP to ATC over the course of several hours.[34] Absent clear acknowledgment of UAP and protocols for communication about them, dangerous incidents and catastrophic accidents are likely.
6. **Investigation and Analysis.** There is no standardized international approach for investigation and analysis of UAP flight incidents. Unless and until one is developed and implemented, understanding and coordination remain low.

Serious discussion of this fundamental airspace governance challenge is often artificially isolated from discussion of another, equally fundamental problem: the rapid proliferation

of military and consumer unamend aerial vehicle, or "drone," technology in the aviation environment. Drones are arguably the greatest air safety challenge since the advent of civil aviation, and regulatory bodies worldwide are still attempting to adapt to the global democratization of such technology.

Militaries broadly adopted unmanned aerial technologies in the early 2000s, and by the mid- 2000s drones slipped out of military exclusivity as consumer models trickled into the public sphere. Over the next decade, their prevalence skyrocketed as technological advancements shrank drones down to a size and price point where they became commercially viable. Soon thereafter, the first small, quadcopter-style drones were made available to consumers, sparking a hobbyist boom. Suddenly, anyone with a few hundred dollars could purchase a device that once cost thousands and required specialized knowledge to operate. UAVs became ubiquitous in even remote areas.

As civilian drone use burgeoned, pilots and air traffic controllers faced an expanding array of concerns, including UAVs when they evade radar, escape their operators' control, or fly at unexpected altitudes and places. By the mid-2010s, the ATC narrative changed considerably in response. As traditional radar systems were not designed to detect such small objects, blind spots dotted the skies. At the same time, UAVs often traversed the same altitudes as helicopters and general aviation aircraft, introducing new risks for collision or distraction. Regulatory bodies scrambled, rewriting rulebooks on the fly. One notable example was the Federal Aviation Administration's initiation of a mandatory drone registration in December 2015. There also were significant developments in commercial drones at this time, with companies envisioning a future where deliveries and services would be performed by these mechanical couriers. The FAA accordingly enacted in August 2016 a regulation known as the Part 107 rule, which integrated these devices safely into the national airspace while still encouraging innovation.

Yet despite this and parallel efforts to regulate and manage drone air traffic in the EU and elsewhere, no international regulatory framework and management system exists. This poses an enormous airspace hazard due to the preponderance of such vehicles near international airports and along international flightpaths. National drone management approaches—where they exist—may work for pilots and flights native to the corresponding countries, but the risk of accidents and collisions increase when foreign aircrews are not familiar with local regulations and reporting protocols. While incidents involving drones are rare, the risks remain enormous due to this lack of international coordination.

The need to address air safety issues raised by UAP becomes even more urgent when the broad danger of drones already affecting the international aviation system is considered. The national and international airspace is under strain from drones, and the relevant international framework and guidelines are therefore in need of a thorough update that also could accommodate and address UAP. Additionally, civilian UAP detection, monitoring, and reporting will remain difficult until the same activities can be done effectively at an international level with drones. Lastly, drones are easily misidentified and sometimes misreported as UAP, which is a significant hindrance to developing accurate reporting and analysis protocols that can mitigate the aviation safety problems posed by the phenomena.

The Chicago Convention and the International Civil Aviation Organization

There are two primary means for dealing with the problem that UAP raise in skies already crowded with drones: the Chicago Convention and the International Civil Aviation Organization. Formally known as the Convention on International Civil Aviation, the Chicago Convention was signed in 1944 and laid the foundation for the ICAO, which was established in 1947. Setting out the rules of airspace, aircraft registration, and air safety, the treaty governs not only the sovereignty of airspace over countries but also the principles by which aircraft are operated for the safety and management of international air traffic.

As for the ICAO, it is a specialized agency of the United Nations that sets international standards and regulations for air safety and security to ensure the safe, efficient, and orderly expansion of international civil aviation. Headquartered in Montreal, the ICAO boasts 193 member states, placing it among the best-represented multilateral organizations. As such, the ICAO has been largely successful at regulating and standardizing global air safety and airspace governance practices for nearly eight decades.

However, neither ICAO nor the Chicago Convention have reacted in a particularly nimble fashion to the proliferation of civilian drone technology. Despite the emergence of national regulatory frameworks governing drones, such as the FAA's primary initiatives (i.e., UAV registration, Part 107, and the UAS Traffic Management ecosystem), the Chicago Convention has not yet been modified to reflect the unambiguous air safety challenge posed by drones. While the ICAO did release a set of guidelines (known as Circular 328) that states that a drone should demonstrate equivalent levels of safety as manned aircraft, along with Model UAS Regulations (Parts 101, 102, and 149), this has not led to broader regulatory or airspace governance action within the treaty framework despite the agreement's eight revisions since 1944.[35]

Changes are necessary given the urgency of the situation, and they could be used to address UAP as well. Although UAP are not currently receiving sufficient global attention to warrant significant changes to a multilateral, consensus-based framework such as the Chicago Convention, a sudden and undeniable UAP event could prompt international action, for which the ICAO and the Chicago Convention could serve as a foundation or entry point.

Regardless of whether such a radical challenge to the status quo occurs, the aviation community can enhance reporting and data-sharing, improve pilot decision-making, safeguard airspace sovereignty, establish effective communication protocols, and formulate a standardized international approach for investigating and analyzing UAP and drone incidents with the adoption of a series of straightforward, proactive measures.

Potential Solutions: Adapting the Chicago Convention and ICAO to Account for UAP

1. **Reporting and Data-Sharing.** To address the challenge of the deep-seated stigma associated with UAP, improved international coordination and incident reporting mechanisms,

such as those in ICAO's Annex 13, would encourage pilots and air traffic controllers to provide detailed and accurate information about UAP incidents via a standardized reporting process. ICAO should subsequently make all relevant information about specific UAP events publicly accessible for open-source analysis. Additionally, ICAO, in conjunction with organizations such as the Air Line Pilots Association and the International Federation of Air Traffic Controllers' Associations, should develop pilot- and air traffic controller–focused communication and outreach products to mitigate the barrier that stigma creates to timely, accurate reporting of UAP incidents.

2. **Communication with Air Traffic Control.** With guidance and regulatory support from ICAO, national and supranational pilot and air traffic control organizations should standardize pilot–to–air traffic control UAP reporting procedures. At the same time, these organizations should develop comprehensive education programs to familiarize pilots and air traffic controllers on known, location- or time-specific phenomena frequently reported as UAP, such as drones, balloons, and Starlink flares and trains.

3. **Investigation and Analysis.** To address the lack of a standardized international approach for UAP investigation and analysis, a comprehensive strategy should be formulated, aligning with ICAO's existing incident investigation framework outlined in Annex 13. This would involve collaborative efforts by aviation authorities, scientific institutions, and relevant experts to collect, analyze, and share data on UAP incidents, leading to a better understanding of these phenomena and the development of appropriate safety measures. Moreover, to aid in UAP analysis and investigation, ICAO, in tandem with the Air Line Pilots Association and the International Air Transport Association, should consider encouraging pilots and air carriers to carry or install additional recording tools (e.g., imagery equipment) on the flight deck and to capture and preserve UAP-related data when such actions would not impede safe operation of the aircraft.

International Regulation and the Orbital Environment

Now that the UAP airspace challenge has been discussed, we can move to the related issue of the impact of the phenomena on the international use of outer space. Federal legislation defines UAP as "transmedium vehicles," objects capable of transitioning between space and the atmosphere and between the atmosphere and the oceans and other bodies of water. Although there is little public information to confirm that UAP are indeed detected by the US government in space, several historical and contemporary government sources indicate that UAP are observed by radar in outer space or descending from there into the atmosphere.[36] Taken together, federal UAP legislation and such testimony warrant serious consideration of how agreements that regulate the orbital environment can be utilized as a basis for international efforts in scientific UAP research and data-sharing. As will be seen below, UAP might serve as a common cause between nations seeking to strengthen such accords.

The Outer Space Treaty

The primary such international agreement is the Outer Space Treaty of 1967, formally known as the "Treaty on Principles Governing the Activities of States in the Exploration and Use of

Outer Space, Including the Moon and Other Celestial Bodies." At the time the agreement was established, the space race and geopolitical tensions between the United States and Soviet Union had intensified fears about the potential militarization of outer space. The prospect of extending Cold War confrontations beyond Earth's atmosphere provided a powerful impetus for the two superpowers and other nations to agree on a legal framework to govern space activities.[37]

The Outer Space Treaty was the outcome of international negotiations that involved significant compromise and careful balancing of the interests of spacefaring- and non-spacefaring nations. Successfully adopted under the auspices of the United Nations and shaped within the COPUOS framework, the treaty stands as a triumph for diplomacy. It declared outer space a global commons to be accessed and used for peaceful purposes and the benefit of all humanity.

Certain fundamental tenets of the treaty—the non-appropriability of celestial bodies, prohibition of weapons of mass destruction in space, the requirement for authorization and continuous supervision of space activities by states, and the facilitation of international cooperation—outlined a vision shaped by ideals of peace and collective progress. This framework led to cooperative achievements in space science, collaboration on projects like the International Space Station, and accords on joint missions and data-sharing for research on outer space phenomena and the search for extraterrestrial life.

Given its core principles and the international cooperation that has already resulted from it, the Outer Space Treaty provides a suitable basis for collaboration between states on UAP. Moreover, the vision of the treaty for space science faces specific contemporary challenges that could be addressed through international UAP research and data-sharing.

The Militarization of Space and Its Impact on International Science and Cooperation

It should be no surprise that the cooperative spirit of the Outer Space Treaty has been repeatedly tested. The fact that the treaty prohibits the placement in orbit of only weapons of mass destruction rather than all conventional weapons and military activity left open a significant gray area that became a point of contention among member states. While the treaty encourages using outer space for peaceful purposes, some signatories raised questions about whether self-defensive military activities could be included under that heading. This has contributed to the increasing weaponization of space during the last decades and undermined orbital and other space-based scientific research.

The development and testing of anti-satellite (ASAT) weapons exemplifies how military competition has affected the cooperative edicts of the Outer Space Treaty. The United States and the Soviet Union first pursued ASAT capabilities during the years of the treaty's establishment, with the Soviets first testing co-orbital weapons and the United States following with air-launched missiles. Both states continued in the ensuing decades to develop and implement such weapons before other states joined them. By 2007, the PRC had demonstrated its ASAT might by conducting an unnotified destruction of one of its satellites that created a debris field, sparking international rebuke.[38] India followed suit in 2019 by destroying a satellite in a low-Earth orbit, thereby asserting its entry into the club of ASAT-capable nations.[39] Not to

be outdone, Russia conducted a 2021 ASAT missile test against one of its defunct satellites, unleashing space debris that jeopardized the International Space Station and other satellites and led to condemnation from multiple nations.[40]

These developments directly affect the sorts of scientific ventures in astrobiology, experimental physics, and deep space astronomy that the Outer Space Treaty was designed to support. Apart from congesting space with dangerous debris, military posturing in space creates an atmosphere of distrust and potentially diverts attention and resources away from scientific inquiry and toward strategic defense. Moreover, the dual-use nature of space technology complicates efforts to distinguish between civilian and military activities. While certainly beneficial for scientific research and global communication, advances in satellite technology have served military surveillance and targeting purposes, blurring lines that the Outer Space Treaty sought to define. Finally, the allocation of resources to military endeavors in space leads to missed opportunities for projects that lend themselves to international cooperation, such as the search for microbial life on Mars or the exploration of Europa's subsurface ocean. The undermining of science and international cooperation by space militarization foregrounds the need for enhanced diplomatic engagement and the establishment of supplementary agreements to the Outer Space Treaty. These should specifically address recent military technologies, space debris, and their impact on scientific endeavors. To preserve the integrity of the treaty and the safety of space for current and future generations, diplomacy, commitment to principle, and renewed focus are needed.

A Potential Solution: Amending the Outer Space Treaty for UAP Research and Monitoring

Implementing a renewed framework in the fraught context of competition in the orbital environment, however, requires striking a delicate balance between legitimate security interests and the international cooperation envisioned by the Outer Space Treaty. UAP could be the common cause by which the necessary policy could be developed. Although this is not likely at the present juncture, international collaboration on UAP might provide a necessary alternative to the increased weaponization of space.

This is foremost because the gray area for military activity left open by the Outer Space Treaty could affect UAP research. Increased military interest in the phenomena might co-opt for defense purposes otherwise purely scientific and civilian investigations of UAP events, shrouding these in secrecy and preventing an investigation approach.[41] To meet the UAP challenge, national governments need civilian science. The treaty would be a helpful means to ensure that such collaboration can happen in the context of space.

Of course, the Outer Space Treaty does not explicitly address UAP. However, its provisions have implications, both positive and negative, for research and monitoring related to UAP. On the one hand, certain *possibilities* for UAP research and monitoring are opened by the treaty's express commitment to the following principles and values:

1. **Freedom of Exploration and Use of Space.** Article I states that outer space is free for exploration and use by all countries, which implies that states have the right to investigate

UAP in space without any discrimination, provided they do so in a manner that does not interfere with the activities of other states.[42]

2. **Cooperation and Assistance.** Overall, the treaty emphasizes cooperation and mutual assistance, which could provide a framework for collaborative efforts in UAP research and monitoring. Ideally, international cooperation would be conducted equitably to enable sharing of data and resources for investigating UAP.
3. **Transparency.** Article XI requires parties to the treaty to inform the United Nations and the international community of the nature, conduct, locations, and results of their space activities. As such, it lays the groundwork for information-sharing that could be relevant to UAP research if such phenomena are encountered during national space activities.

Yet the Outer Space Treaty may also impose significant *limits* on UAP research and monitoring, including:

1. **Non-armament of Outer Space.** Article IV of the treaty prohibits the placement of weapons of mass destruction in orbit or on celestial bodies. This creates a limitation on the type of equipment or monitoring devices that can be placed in space, potentially restricting the full range of instruments that might be used for UAP detection if these are classified as weapons.
2. **Non-sovereignty.** The treaty declares that outer space is not subject to national appropriation by claim of sovereignty, ruling out the possibility of a country claiming an area of space or celestial body for conducting exclusive UAP research. This clause also implies that space should remain a neutral zone, which might complicate the establishment of monitoring stations that a state might wish to control for UAP investigations.
3. **State Responsibility.** Article VI of the treaty holds that states are responsible for national space activities, whether carried out by governmental or nongovernmental entities. This implies that any UAP research or monitoring activities would need to be conducted in a manner consistent with international law and overseen by the state to ensure treaty compliance.
4. **Environmental Considerations.** Article IX indirectly imposes limits through its requirement to avoid harmful contamination of space and celestial bodies, which may influence the types of experiments or monitoring tools deployed for UAP research to ensure they do not generate space debris or other forms of contamination.
5. **Lack of Enforcement Mechanism.** There is no direct enforcement mechanism within the Outer Space Treaty to ensure compliance or to manage disputes related to UAP research and monitoring. This lack of enforceability means that while states are encouraged to cooperate, there is no direct means to compel sharing of UAP-related data or to resolve disputes over interfering activities.

While these limitations in the treaty do portend obstacles to UAP research, two of them—the provisions concerning non-sovereignty and state responsibility—also could be helpful. Together, they could lead states to operate monitoring stations in shared, nonexclusive fashion while still devoting financial, infrastructural, and human resources sufficient for their operation and maintenance.

In light of the possibilities and limitations for UAP research entailed by the Outer Space Treaty, certain measures can be taken to strengthen and even amend the treaty.

Suggestions for Strengthening the Treaty

1. **Collaborative Working Group.** A UAP working group could be formed under COPUOS, focusing on how states can coordinate and share relevant information.
2. **UAP Encounter Protocol.** A voluntary protocol for the reporting of UAP encounters in space could be established. This would make it easier for states to collectively investigate such incidents and share their findings without compromising national security.
3. **Regular Symposia.** Regular symposia could be convened through the United Nations or other international fora to discuss UAP occurrences and data, scientific research, and potential implications for security and space law.

Possible Amendments to the Outer Space Treaty

1. **Peaceful Purposes (Article IV).** The article could be amended to include a clause concerning the identification and management of UAP, emphasizing peaceful research and response to these unknown entities.
2. **International Responsibility (Article VI).** An amendment here could detail procedures for both the collective investigation of UAP within the context of space activities as well as guidelines for public data-sharing.
3. **UAP-Specific (New Article).** An amendment could be added that would bind signatories to cooperatively detect, track, research, and coordinate responses to any types of UAP determined to be vehicular and of nonhuman provenance.

In conclusion, because the Outer Space Treaty sets a foundation for international cooperation and peaceful exploration, it could facilitate multinational efforts in UAP research and monitoring in ways the Chicago Convention and other airspace treaties are not equipped to do. However, its provisions, while broad and subject to interpretation, establish parameters that may limit the scope and methods of such research activities, given the national security competition among states. As states continue to encounter UAP and interest in understanding the phenomena grows, discussions of the treaty's applicability could lead to the development of additional protocols or agreements that specifically address the nuances of UAP research in the context of space law.

Conclusion

The Chicago Convention, the ICAO, and the Outer Space Treaty are established regulatory agreements and frameworks that could be leveraged for a comprehensive approach to the unique challenges posed by UAP. At present, however, such an undertaking faces significant challenges. Absent some extraordinary and widely publicized development, UAP do not garner the attention or scrutiny required for significant alterations or amendments to these multilateral, consensus-based frameworks. Indeed, despite the unambiguous threat to air safety posed by the rapid democratization of drone technology, the ICAO has responded only in limited fashion. At the same time, the Chicago Convention has not been amended by member states to address this hazard.

However, given a number of recent incidents and developments, including the eleven near-midair collisions with UAP reported by the US government in 2021 and commercial pilots being perplexed and potentially distracted by seemingly anomalous phenomena such as flaring Starlink satellites, several practical measures should be integrated into the ICAO framework. First, ICAO should collaborate with organizations such as the Air Line Pilots Association and the International Federation of Air Traffic Controllers' Associations to establish internationally standardized UAP reporting procedures and requirements. Such processes should account for the observations about UAP characteristics of witnesses to incidents, along with radar, weather, and other relevant data. To aid in investigation and analysis of UAP incidents, the ICAO, the Air Line Pilots Association, and the International Air Transport Association should encourage pilots and air carriers to carry or issue supplemental recording equipment. With training and guidance to ensure that data-capturing during a UAP incident does not interfere with the safe operation of the aircraft, this effort will turn commercial aircraft into powerful UAP observation and data collection platforms.

By mandating reporting of UAP incidents and engaging in a well-structured communication and outreach strategy, organizations such as ICAO can also reverse the decades of stigma that long precluded fulsome reporting of UAP. Furthermore, a robust, ICAO-led education effort in identifying seemingly anomalous phenomena, such as Starlink flares and trains, can reduce both the number of "false positive" UAP reports and the likelihood that pilots and air traffic controllers will be distracted by prosaic phenomena.

At the same time, a dramatic UAP incident would likely prompt rapid multilateral action in the air and space governance domains. Depending on the exact nature of such a development, the tenets, principles, and international collaboration fostered by the Chicago Convention, the ICAO, and the Outer Space Treaty could serve as a foundation for broad cooperation in investigation and analysis of UAP incidents. In particular, the letter and spirit of the Outer Space Treaty sets the tone for robust international action on UAP in the areas of reporting, monitoring, information-sharing, and scientific research.

4. From Known Unknowns to Unknown Unknowns: The Challenge of UAP in Twenty-First-Century Geopolitics

In the post–Cold War landscape, the initial euphoria surrounding the potential for a new era of international cooperation gave way to a resurgence of great power competition. The last decade in particular has witnessed an intensifying rivalry among major states, manifesting in the spheres of trade, technology, and territorial disputes. This competitive drive has been compounded by a resurgence of nationalist sentiments and unilateral pursuits, undermining the multilateralism that once aspired to maintain international order.

Russia and the United States—once engaged in a continuous, albeit strained dialogue during the Cold War through hotlines and treaties—now face a gulf widened by the war in Ukraine, allegations of treaty violations, and diplomatic expulsions.[43] Meanwhile, China's rise as a global power and its pursuit of modernization across all dimensions of its military—including strategic nuclear forces—has injected a fresh dose of unpredictability into international relations. The ensuing rivalry extends beyond mere defense posturing, touching on issues of economic might, technological dominance, and ideological influence, further complicating the possibility of candid dialogue.

In this tripartite ballet of waning trust, UAP are not merely curiosities or fodder for conjecture but potential sparks for conflict—an unexplained stimulus that might provoke a skittish system into catastrophic action.[44] Defense apparatuses, fine-tuned for rapid responses to traditional threats, now face something outside their lexicon of warfare, against which their rehearsed responses may be wholly inadequate or disastrously misapplied. As nation–states modernize their nuclear forces and develop new technologies for warfare at breakneck speed, the risk of miscalculation increases. This march toward better, faster, and stealthier capabilities has created an environment ripe for accidents. In the fog of accelerating competition, a UAP could inadvertently become the proverbial butterfly that, by flapping its wings, sets off a hurricane of reaction.[45]

To understand exactly why, we will examine certain underappreciated aspects of great power competition, the most important of which is the accelerated development of hypersonic missiles. We will see that states are unprepared to deal with not only those weapons but events involving them caused by UAP, making urgent the sort of state-to-state communication and de-escalation protocols that existed during the Cold War.

Great Power Competition: Hypersonic Weapons and Air Incursions

The last decade has seen broad tensions and conflicts arise among China, the United States, and Russia. With news cycles moving haphazardly from one latent or realized crisis to another, it is easy to forget the sheer number of such flashpoints and the cascading effects they have set off.

Between the United States and China alone, well before the near crisis over Taiwan and the South China Sea, there has been strained relations and US sanctions over the human rights issues raised by treatment of Uighur Muslims in Xinjiang and the crackdown on democratic activists in Hong Kong. There was also the trade war that ensued in 2018 when the Trump administration imposed tariffs and other trade barriers on Chinese goods and China retaliated with similar measures against the United States. And in 2020, China imposed on Hong Kong a national security law that has been criticized as both a breach of the "one country, two systems" policy agreed on prior to the 1997 handover and a significant subversion of civil liberties.

The flashpoints in US–Russia relations need little introduction due to the ubiquity in public discourse of Russia's invasion of and war with Ukraine and the United States' subsequent provision of military aid and support to the country. Yet it should not be forgotten that Russia's annexation of Crimea in 2014 and military intervention in the Syrian civil war in 2015 on behalf of Bashar al-Assad marked a significant and rapid downturn in its relationship with the United States—a situation that only worsened after the US intelligence community concluded that Russia conducted a cyber and disinformation campaign to influence the 2016 US presidential election. Often absent from public discussion, moreover, is the fact that the Trump administration formally withdrew from the Intermediate-Range Nuclear Forces Treaty with Russia in August 2019, citing repeated Russian violations. This treaty had eliminated an entire class of nuclear-capable missiles, and its dissolution raised fears of a new arms race. (These concerns were only temporarily allayed by the Biden administration's move to extend the New Strategic Arms Reduction Treaty past its February 2021 expiration to 2026.)

Air Incursions

The great powers' strained relations and territorial brinkmanship have led to a number of significant air incursions. The DOD has issued statements that the number of "risky" aerial encounters has increased markedly in the last few years.[46]

In April 2001, one of the most well-known incidents occurred when a US Navy EP-3E ARIES II signals intelligence aircraft and a Chinese fighter jet collided in midair near Hainan Island, China. In the 2010s, the South China Sea became the epicenter for US–Chinese military encounters, with diplomatic relations mirrored in the skies as Chinese jets frequently intercepted US patrol aircraft over this contested body of water. For instance, on October 24, 2023, a Chinese fighter jet carried out what the Pentagon called an "unsafe" intercept of a U.S. B-52 aircraft over the South China Sea.[47] Similar incidents would recur throughout the decade as both nations conducted regular surveillance and patrol operations, with each claiming to uphold international laws and rights to free navigation and overflight.

At the same time, significant intercept incidents between US and Russian military aircraft are occurring. The skies over the Baltic Sea and the Black Sea have often served as a backdrop for such encounters, with NATO aircraft regularly shadowing Russian planes approaching European airspace. For example, on February 10, 2017, a US Navy P-3 Orion had an unsafe encounter with a Russian Ilyushin IL-38 over the Black Sea. In the High North, similar events unfold frequently enough. US and Canadian jets have intercepted Russian bombers and reconnaissance planes near the Air Defense Identification Zone (ADIZ) of North America. A notable instance of this occurred on August 1, 2019, when Russian Tu-95 bombers entered the ADIZ and were intercepted by US F-22 fighters.

Such events are keeping countries in high alert, effectively institutionalizing suspicion regarding unknown aircraft.

Nuclear Modernization and Hypersonic Weapons

The modernization of nuclear weapons and concurrent fractures in pertinent international commitments and regulatory frameworks exacerbates suspicion and distrust among superpowers. These trends are fomenting a steep decline in a unified approach to security and the rise of a climate of suspicion and rivalry reminiscent of the unstable, pre-détente Cold War period.[48] The grim pact that has long deterred major powers from nuclear holocaust—mutually assured destruction—is now in jeopardy.

The architecture of international arms control, painstakingly constructed over decades of negotiation, has exhibited signs of strain. A telling example is the unraveling of the Strategic Arms Reduction Treaty process, a cornerstone of US–Russia nuclear arms control that has had been instrumental in capping the arsenals of both countries.[49] The Nuclear Non-proliferation Treaty, despite its wide acceptance, faces challenges over its three pillars—non-proliferation, disarmament, and the right to peacefully use nuclear technology—due both to noncompliance from certain states and dissatisfaction with the pace of disarmament by nuclear-armed countries.[50] Finally, the Comprehensive Nuclear-Test-Ban Treaty, which aims to outlaw all nuclear explosions, has yet to enter into force due to non-ratification by key states.

Yet more significant than this weakening of treaties is what some have called the nuclear renaissance of the great powers.[51] The United States, Russia, and China have become embroiled in a three-way race to modernize their nuclear arsenals and develop innovative delivery systems that can evade or outpace current defensive capabilities. Among these, the hypersonic missile has emerged as the primary focus and point of contention.

Capable of traveling at speeds exceeding Mach 5 and maneuvering en route, hypersonic missiles present a challenge to existing defense systems that are calibrated to intercept predictable ballistic trajectories. The threat posed by such weapons is threefold: they compress the reaction window for a defensive response, potentially evade interception, and disrupt the strategic parity that has long been the bedrock of nuclear deterrence.[52]

The escalating pursuit of hypersonic missile technology began with an announcement that sent shockwaves through military establishments worldwide. In March 2018, President

Vladimir Putin unveiled to the world that Russia had developed what he called an "invincible" weapon—the Avangard hypersonic glide vehicle. Ostensibly a response to the United States' 2002 withdrawal from the Anti-ballistic Missile Treaty and continued development of missile defense systems, the Avangard is capable of cruising at Mach 20 and has a maneuverability that could render many existing defense systems obsolete.[53] Putin's announcement was the opening gambit in a new era of strategic competition.

As Russia conducted tests, including a December 2019 demonstration of the Avangard's readiness for warfighting, neither the United States nor China remained passive observers. The United States responded not only in words but in funds, expertise, and rapid development dedicated to not falling behind in this new arms race. Agencies like the Defense Advanced Research Projects Agency and the Missile Defense Agency were tasked with expediting American hypersonic research and defense capabilities.[54] Concurrently, China's own technological progress, exemplified by its DF-ZF hypersonic glide vehicle and other advancements, have made it a key player.[55] Some sources even hint that China surpasses the United States in the hypersonic development arena.

The significance of these developments should not be underestimated. For decades, the mutually assured destruction doctrine has held nuclear powers in a stalemate, with the understanding that any nuclear attack would guarantee the attacker's own destruction. However, hypersonics potentially erode that doctrine, sowing uncertainty and lowering the perceived thresholds for a nuclear exchange.

It is not just the velocity of the hypersonics that altered the strategic calculus; it is also their potential to destabilize the precarious balance that deterrence theory had held sacred. Policymakers and military strategists alike worry that these innovations could tempt a first-strike advantage scenario or risk miscalculations during crises. The cumulative effect has been to push the United States and its competitors into a mire of suspicion and rapid military development. With each test of a hypersonic missile, be it by Russia, the United States, or China, the pressure for a response escalates. This cycle of action and reaction, test and counter-test, could upend existing strategic frameworks and fuel a runaway arms competition.[56]

So, as nations hurtled toward a future where hypersonic missiles became a terrifying reality, the image of risk in geopolitics changed from a specter of potential threats to a fog of inevitability. Each development served as a reminder of the thinning ice on which modern nuclear deterrence stands. The risk was not necessarily from the weapons themselves but from the destabilization their pursuit brought to a world order that had kept nuclear conflagration at bay since World War II.

The Wild Card of UAP

As though hypersonic weapons, increased international aerial incidents, and ongoing territorial conflicts were not stress enough, geopolitical competition is further exacerbated by UAP. To the militaries of nuclear-armed nation–states, for whom the detection of a potential attack is measured in minutes if not seconds, speed is both a weapon and a harbinger of potential destruction. Characterized by their extraordinary velocities and apparent physics-defying

maneuvers, UAP present a peculiar kind of threat—not necessarily by their intent but by their potential to spark catastrophic misunderstandings.

The rapid and unpredictable nature of UAP invites the fog of war to descend on missile silos, submarines, and command centers that house arsenals capable of ending civilization. Picked up by early warning systems already hypersensitive to ballistic missile launches or stealth aircraft intrusions, these phenomena could easily be misconstrued as new, unaccounted forms of enemy assets. They travel at hypersonic speeds, after all, with trajectories and patterns that defy conventional flight. In the absence of identification and understanding, the default position is to assume threat.[57]

To understand this, imagine a scenario where an early warning system, whether in the vast plains of the American Midwest, the remote expanses of Siberia, or the secretive military compounds of China, flashes an alert. Satellite systems or ground radars have detected something they cannot classify, an object crossing into sovereign airspace with speed and movements that no known aircraft can replicate. Is it a new, secret hypersonic missile? Is it a stealth drone on a reconnaissance mission or, worse, an unknown weapon on a first-strike path?[58]

The chain reaction starts with the scrambling of interceptors, the lighting up of communication channels, and an adrenaline-fueled urgency in command posts. The nuclear-armed nations find themselves on a precipice, tiptoeing along the edge of potentially irreversible decisions. Launch-on-warning strategies—by which a retaliatory strike is initiated based on radar information alone—could mean that these unidentified phenomena trigger the unholy response of nuclear annihilation.

At the heart of this challenge is the degradation of trust in international relations outlined above. The cord that once bound these nuclear giants to a semblance of understanding—the doctrine of mutually assured destruction—depended on predictability and the rational actor model. Yet as trust wanes, the room for rationality diminishes; constricted by an atmosphere of suspicion, hair-trigger alerts could send missiles skyward on a trajectory born of misinterpretation. In such moments of potential misjudgment, communication becomes the critical barrier against the tide of escalation. Unfortunately, the path to open and clear communication has been obstructed by the deteriorating relations and arms agreements between the United States, Russia, and China. Dialogues and measures that once acted as safety valves for the pressures of nuclear brinkmanship have been neglected or outright abandoned. In such an atmosphere of waning trust, UAP stop being fringe oddities and become potential sparks for conflict: anomalous, unexplained stimuli that can set off catastrophic chain reactions within touchy systems.[59]

If that scenario seems unlikely, it should be noted that many UAP events have occurred in military contexts. Throughout the Cold War and post–Cold War eras, UAP were mistaken for hostile or spy aircraft, leading to alert scrambles and precautionary measures. A few of the more well-documented events are listed below, though hundreds of others could be added.

- **The Washington DC UFO Flap, 1952.** Multiple UAP were tracked on radar and spotted visually over the US Capitol building, leading to jet scrambles and a heightened alert status.[60]

- **Port Huron, Michigan, 1952.** A ground radar tracked a UAP at 625 miles per hour. An F-94 directed to intercept the UAP tracked the object on radar as the pilot observed a bluish-white light "many times brighter than a star." Despite chasing the UAP with full afterburner, the object accelerated to about 1,400 miles per hour, slowed down, and accelerated again multiple times until the F-94 had to break off the chase due to low fuel.
- **The RAF Lakenheath–Bentwaters Events, 1956.** Multiple radar stations tracked multiple objects, some stationary and some appearing to travel in excess of four thousand miles per hour. Ground and air visual sightings correlated with several radar tracks. The RAF scrambled two DH 112 Venom aircraft, which subsequently obtained radar and visual awareness of the UAP, one of which chased the first DH 112. The Condon Committee concluded that "the probability that at least one genuine UFO was involved appears to be fairly high."[61]
- **The Kecksburg Incident, 1965.** A small, bell-shaped object crashed near this Pennsylvania town, which led to a US military response, investigation, and potential recovery.[62]
- **The Shag Harbour Incident, 1967.** An incident in Nova Scotia, Canada, where a UAP crashed into the water, prompting a Canadian Coast Guard and military response.[63]
- **The Tehran Incident, 1976.** Iranian fighter jets were scrambled to intercept a UAP, which reportedly disabled their avionics.[64]
- **UAP Incursions over US Nuclear Facilities, 1975.** UAP "hovered over nuclear weapons storage areas and evaded all pursuit efforts" over the former Loring AFB. The Joint Chiefs of Staff received "numerous daily updates" and the National Military Command Center reported on the incidents, which also included UAP incursions at Malmstrom AFB, Minot AFB, Wurtsmith AFB, and Wurtsmith AFB. Ground personnel at Malmstrom AFB, for example, watched as UAP lights dimmed as F-106 fighters closed in on the object and then rebrightened after.[65]
- **The Belgian UFO Wave, 1989–1990.** The Belgian Air Force scrambled F-16 fighters to intercept suspected UAP, with radar locks obtained yet no concrete identification made, fueling public interest and concern. The Belgian Air Force released a report on the radar and visual sightings of UAP, which can be found in NATO archives and related publications.[66]
- **The USS Nimitz Encounter, 2004.** The USS Nimitz carrier strike group encountered what is now known as the "Tic Tac" object, which exhibited many of the unusual capabilities now thought to be characteristic of UAP. This encounter received substantial public attention after a 2017 New York Times article and the subsequent DOD release of UAP video footage in 2020.[67]
- **East Coast Encounters, 2014–15.** Navy pilots reported repeated UAP sightings off the US East Coast, capturing evidence of these on advanced sensors and infrared video. The events led to the release of gun camera footage and formal reports.[68]

It may be chance alone that prevented these UAP events from setting off international incidents and even misdirected military responses. It is therefore vital to minimize the likelihood of such dangerous and potentially catastrophic outcomes.

Scenarios for the Unthinkable: UAP Events in Global Conflict Zones

Before considering preventative policy measures, we will illustrate the need for them by presenting four possible scenarios in which UAP events tip tense international relations into

outright war: (1) an accidental conventional war triggered by a UAP encounter; (2) an accidental nuclear war triggered by a UAP encounter; (3) an accidental space war or nuclear war caused by UAP in outer space; and (4) an accidental naval conflict and nuclear war brought about by UAP.

Scenario 1: Accidental Conventional War Triggered by a UAP Encounter

Background

As previously mentioned, the 2004 USS *Nimitz* UAP event was an encounter by US Navy pilots with a capsule-shaped UAP, now known as the "Tic Tac," that demonstrated advanced aerodynamic capabilities. Suppose a similar event occurs in a geopolitically sensitive area where tensions are high, like the South China Sea, which is closely monitored by the military assets of several nations.

Early Warning Systems Involved

- **Radar Systems.** Countries in such a volatile region would have land, sea, and airborne radar systems, such as the AN/SPY-1 phased array radar used on Aegis-equipped ships and the People's Liberation Army's JY-27A long-range air surveillance and guidance radar.
- **Satellite Surveillance.** Overhead reconnaissance satellites, such as the KH-11 series used by the United States or the Yaogan series operated by China, could detect and track unusual aerial activities.
- **Electronic Intelligence (ELINT) Stations.** These facilities, often part of a larger signals intelligence apparatus, would monitor electronic emissions from potential threats, including UAP, if they emit any detectable signals.

Unfolding Scenario

1. **Sudden UAP Appearance.** A UAP, similar in characteristics to the Tic Tac, is detected by multiple radar systems operated by country A, showing erratic movements and high-speed travel inconsistent with known aircraft profiles.
2. **Alert Status Raised.** Helmed by AI-driven early warning systems designed to filter out false positives and reduce human error, country A's defense network raises an alert of a probable advanced stealth aircraft potentially belonging to country B, a regional opponent.
3. **Misidentification and Escalation.** The UAP's maneuvers resemble a reconnaissance pattern in country A's perception, presenting a possible precursor to military aggression. As a result, country A's military increases its DEFCON level and scrambles fighters to intercept.
4. **Communication Breakdown.** As country A's interceptors approach, the UAP performs maneuvers that are interpreted as hostile. Meanwhile, country B, observing the scramble through its SIGINT operations and satellite assets, perceives this as a show of force or a preparation for an incipient attack.
5. **Incident Amplification.** Country B, in turn, raises its alert status and deploys its own interceptors and naval assets to the perceived intrusion zone. During this time, the UAP's

erratic behavior leads to a near collision with country A's fighters, which is broadcast via open military communication channels and misinterpreted by country B as an act of aggression.

6. **Retaliatory Posturing.** Amid high tensions and the fog of war, country B's automated defense systems, mirroring the semiautonomous nature of country A's AI-driven alerts, suggest a high probability of an impending first strike. Country B's command authorizes a launch-on-warning (LOW) posture for its ballistic missiles and places its submarine fleets on high alert.
7. **False Alarms and System Vulnerabilities.** ELINT systems, designed to spot and categorize electronic signatures, fail to classify the UAP due to its lack of emissions. This unknown factor exacerbates the situation, as the lack of a recognizable electronic signature feeds theories of a new stealth technology being tested or used by the opponent.
8. **Cyber Conflicts and Peripheral Incidents.** Cyber warfare units of both countries initiate protocols to thwart potential electronic warfare, launching cyberattacks against each other's military networks to preempt electronic countermeasures. These attacks inadvertently disrupt civilian infrastructure, leading to public outcry and further escalation of hostilities.
9. **Unintended Consequences.** The UAP, still engaged by country A's interceptors and now being observed by country B's forces, suddenly accelerates at hypersonic speeds, triggering automated missile defense systems. False readings from hyperspectral imaging satellites contribute to the belief that a high-speed launch has occurred, leading to the automatic deployment of antiballistic countermeasures.
10. **Conventional War Threshold Breached.** As antiballistic interceptors cross into territory, a defensive response is mistaken for an offensive action. Both countries, now on the highest alert and under the impression of being under attack, launch a coordinated conventional strike against perceived military assets, inadvertently leading to an outbreak of war.

Scenario 2a: Accidental Nuclear Wars Triggered by a UAP Encounter

Background

Drawing on the USS *Nimitz* UAP event from 2004, we imagine a similar UAP sighting occurring in a region with high nuclear tension between two nuclear-armed states, such as the border area between a NATO country and Russia.

Early Warning Systems

- **Radar and Satellite Systems.** Both countries operate sophisticated early warning radar systems designed to track ballistic missile launches, such as the US Ballistic Missile Early Warning System (BMEWS) and the Russian Voronezh radar systems. Additionally, they use infrared-sensing satellites, for example, the US Space-Based Infrared System (SBIRS) and Russia's Tundra satellites, as part of the EKS system, to detect the heat signature from missile launches.
- **Automated Decision Support Systems.** Systems such as the United States' NC3 (nuclear command, control, and communications) or Russia's Kazbek command and

control system are semiautomated and designed to aid leaders in making rapid decisions by processing incoming threats and suggesting possible responses.

Nuclear Scenario Planning and Launch-on-Warning Protocols

- Both nations maintain a LOW posture, which means they might use their own strategic weapons upon detecting that an adversary has fired a weapon at them without waiting for an actual impact.

Unfolding Scenario

1. **UAP Detection.** Suppose a UAP with characteristics similar to the Tic Tac is picked up by a ground-based early warning radar in a NATO country near Russia's border. It demonstrates anomalous flight patterns, such as abrupt changes in direction and hypersonic accelerations, which are atypical for conventional aircraft or missiles.
2. **Alert Escalation.** The NATO radar system, confused by the UAP's unconventional maneuvers, categorizes the object as a "fast mover." This could potentially be a new form of hypersonic vehicle or a technology unknown to current military analysts.
3. **Nuclear Command and Control Notification.** The anomalous radar track is quickly communicated up the chain of command to the National Military Command Center (NMCC) in the United States and the equivalent in Russia due to reciprocal detection by Russian radars. The UAP's erratic movements suggest a strategic nuclear weapon. The misinterpretation of a UAP could potentially escalate to a nuclear confrontation, exposing the complexities and potential vulnerabilities within early warning and nuclear decision-making systems.

Scenario 2b: Airspace over the Baltic Sea, Where NATO and Russian Interests and Military Assets Often Intersect

Early Warning Systems and Protocols

In such a scenario, both NATO and Russia would rely on their advanced early warning systems to detect threats, including:

- **Radar Systems.** Systems like the NATO AN/TPY-2 and the Russian Voronezh radar would be the first to detect and track ballistic missile threats.
- **Satellite Surveillance.** NATO and Russia use sophisticated satellite networks equipped with infrared sensors—for instance, the US SBIRS and Russian EKS (Tundra) satellites—to detect the heat signatures indicative of missile launches.
- **Decision-Making Protocols.** Early warning information is processed through automated and semiautomated systems designed to assist high-level decision-making. These include the US NC3 and Russian Kazbek system, which would be engaged in this scenario.
- **Launch on Warning.** Both the United States and Russia maintain a LOW posture. Detecting what they believe to be an incoming nuclear strike, they might respond with their own nuclear forces without waiting for impact—a process that can unfold within minutes.

Unfolding Scenario

1. **Sudden UAP Detection.** An object exhibiting erratic flight patterns similar to the Tic Tac UAP is detected by the radar systems of a NATO member state's Aegis-equipped destroyer in the Baltic Sea. Simultaneously, Russian early warning radar along its western border classifies the object as a potential hypersonic vehicle due to its high speed and maneuvers.
2. **Alert Status and LOW Activation.** Misinterpreting the UAP's movements as a potential prelude to an imminent strike, both the NATO and Russian military command elevate their alert statuses. Strategic forces are put on increased readiness, and LOW postures are contemplated.

Scenario 2c: Border Area between a NATO Country and Russia

Early Warning Systems

- **Radar and Satellite Systems.** Both countries operate sophisticated early warning radar systems designed to track ballistic missile launches, such as the US BMEWS and the Russian Voronezh radar systems. Additionally, they use infrared-sensing satellites, for example, the US SBIRS and Russia's Tundra satellites, as part of the EKS system, to detect the heat signature from missile launches.
- **Automated Decision Support Systems.** Systems such as the US NC3 or Russia's Kazbek command and control system are semiautomated and designed to aid leaders in making rapid decisions by processing incoming threats and suggesting possible responses.

Nuclear Scenario Planning and Launch-on-Warning Protocols

- Both nations maintain a LOW posture, which means they might use their own strategic weapons upon detecting that an adversary has fired a weapon at them without waiting for an actual impact.

Unfolding Scenario

1. **UAP Detection.** Suppose a UAP with characteristics similar to the Tic Tac is picked up by a ground-based early warning radar in a NATO country near Russia's border. It demonstrates anomalous flight patterns, such as abrupt direction changes and hypersonic accelerations, which are atypical for conventional aircraft or missiles.
2. **Alert Escalation.** The NATO radar system, confused by the UAP's unconventional maneuvers, categorizes the object as a potential hostile hypersonic vehicle or a low observable cruise missile.
3. **Nuclear Command and Control Notification.** The anomalous radar track is quickly communicated up the chain of command to the NMCC in the United States and the equivalent in Russia due to reciprocal detection by Russian radars. The UAP's erratic movements suggest a strategic reconnaissance or a precursor to a first-strike capability.

Scenario 2d: The Airspace around the Kola Peninsula in Russia, an Area with Dense Nuclear Strategic Assets and Early Warning Systems

Early Warning and Nuclear Launch Systems

1. **Ground-Based Early Warning Radars (EWR).** Both the United States and Russia maintain ground-based early warning radars designed for missile launch detection (e.g., Russian Voronezh radar or the US PAVE PAWS system). These systems could pick up UAP with fast-moving signatures similar to hypersonic missiles.
2. **Space-Based Infrared System.** The U.S. SBIRS and Russian counterparts (like the Tundra or EKS satellites) aim to detect the infrared signature of a missile launch. However, a UAP with no heat signature might not be effectively categorized by these systems.
3. **Nuclear Command, Control, and Communications.** Both nations have NC3 infrastructure that would process an alert of potential incoming threats, escalate the threat assessment process, and, under extreme circumstances, prepare or initiate retaliatory responses.
4. **Launch on Warning Doctrine.** In a high-alert state, both superpowers' LOW policies might lead them to interpret the UAP's speed and maneuverability as an incoming first strike, prompting them to prepare for retaliatory launch orders.

Scenario 3: Accidental Space War or Nuclear War Caused by UAP in Outer Space

Background

In an era marked by increasing outer space militarization and the testing of ASAT weapons by various nations, the strategic stability underpinning nuclear deterrence faces new challenges. UAP that disrupt satellite networks or present as potential nuclear threats in outer space could significantly exacerbate these tensions, potentially triggering inadvertent nuclear escalation. This analysis outlines scenarios where UAP events, combined with the existing mistrust from recent ASAT tests, might lead to crisis escalation.

Scenario 3a: UAP Disruption of Satellite Networks

Background

Satellite constellations are integral to national defense and NC3 systems. The disruption of these satellite constellations, as well as GPS and early warning systems, could instigate an unintended escalatory spiral, cascading into a multi-faceted crisis.

- **Initial Disruption and Loss of Communication.** A UAP incident that disables or interferes with satellites—particularly those used for early warning or surveillance—might lead to a blackout of critical information. This could happen either due to physical interaction or because of electromagnetic interference from the UAP.

- **Misperception of ASAT Attack.** Following recent ASAT tests, the sudden and unexplained loss of satellite functionality might be misattributed to an intentional strike, suggesting a preemptive move in a burgeoning space conflict.
- **Nuclear Forces on High Alert.** With deteriorated space-based surveillance capabilities, nations could place their nuclear forces on heightened alert due to the perceived "blindness" and potential surprise attack, relying more heavily on terrestrial and airborne surveillance, which may lack the full-spectrum situational awareness provided by satellites.
- **Decentralized Command Decision-Making.** Decision-making cycles may face disruption if satellites, which play a crucial role in secure communication between national leaders and scattered nuclear forces, are compromised.. National leaders and military commanders might have to rely on preset protocols and automated systems, possibly leading to independent and preemptive actions based on incomplete information.
- **Loss of Credible Communications.** A UAP-induced satellite disruption would generate immediate confusion. Key stakeholders might struggle to determine whether the incident is a technical malfunction, a deliberate ASAT deployment, or a hostile act by a UAP.
- **Misinterpretation and Retaliatory Posture.** Given the recent ASAT tests, military planners could interpret the satellite disruption as a targeted attack, pushing nuclear forces to a heightened state of readiness. Commanders might order increased patrols of strategic bombers and alert status of land- and submarine-based missile forces, perceiving the potential for a decapitating strike.

Scenario 3b: UAP Appearance as an Orbital Nuclear Threat

Background

A UAP detected in near-Earth orbit and manifesting unconventional high-speed maneuvers, or flight patterns anomalous to typical satellite behavior, could very well raise alarms among space surveillance communities as a serious national security threat. If such a UAP is mistakenly identified as a nuclear offensive platform or missile, it could instigate a sequence of defensive measures elevating the risk of an accidental nuclear exchange or unintentionally signify an imminent nuclear strike resulting in a counterstrike.

Unfolding Scenario

1. **Initial Detection.** The scenario unfolds as space surveillance and tracking systems of one or more nations detect an unidentified object engaging in extraordinary maneuvers characterized by acceleration patterns and orbital adjustments that are not consistent with known aerospace technology.
2. **Early Warning System Activation.** Characterized as a high-velocity object with distinct infrared signatures akin to a missile launch, the UAP triggers automated early warning systems. These systems are fine-tuned to discern the heat signatures distinctive to ICBM launches, and an unidentified object on a concerning trajectory could be labeled as an immediate threat.
3. **Emergency Consultation and Strategic Assessment.** Given the atmosphere of distrust exacerbated by ASAT missile tests and militarization in space, the unidentified object is approached with heightened suspicion. Military and strategic command centers would

convene emergency consultations to assess the potential threat level. The ambiguity surrounding the UAP, combined with existing tensions, could fast-track the situation to a crisis level, whereby military and nuclear deterrent forces are put on standby or higher alert status.

4. **Communication Protocols and Potential Confusion.** As protocols dictate, the affected nation or nations may attempt to utilize existing communication channels to verify the nature of the object and to signal concern. However, the extraordinary dynamics of the UAP and the urgency of events could lead to a breakdown in normal communication protocols, inundating channels with conflicting information. There could also be hesitation to share information with potential adversaries due to operational security concerns.
5. **High Command Decisions under Duress.** The critical decision-making timeframe is severely reduced due to the perceived imminent threat of the UAP. The appearance of the UAP in orbital space could distort the clarity and credibility of threat assessments. Satellite disruptions, whether actual or presumed due to the UAP's presence, degrade situational awareness, causing data collection and interpretation to be flawed. Military strategists may face unreasonable time pressures to provide decision-makers with risk assessments, leading to potential overreactions based on incomplete or misleading information. In this pressured environment, national leaders and military high commands may consider precautionary measures, including mobilizing their nuclear forces as a deterrent or as preparation for a potential retaliatory strike.
6. **Failure of Discernment and Potential Launch-On-Warning.** If the UAP continues its trajectory, it will seem impervious to communications or warnings.
7. **Emergency Protocols Engaged.** Militaries might initiate LOW or fail-deadly protocols, given the nature of the threat. This would involve bringing all nuclear assets to a heightened state of readiness, and communications with allied nations would likely increase in search of corroborative tracking data.

Scenario 4: Accidental Naval Conflict and Nuclear War

Background

UAP encounters, particularly those involving transmedium vehicles capable of traversing both air and underwater domains, present unique threats because of the strategic importance of submarines in great power competition. This scenario assesses the unintended consequences and potential escalation to nuclear war that could arise from such encounters, focusing on the interplay between US and Russian nuclear submarine strategies and the significance of nuclear submarines in the triad of nuclear deterrence.

The United States maintains a robust nuclear submarine fleet as one of the pillars of its nuclear triad. These submarines serve as a critical element in ensuring a credible second-strike capability, providing the power to retaliate even if land-based ICBMs and strategic bombers are incapacitated. Stealthy and virtually undetectable, US nuclear submarines play a pivotal role in maintaining strategic stability.

Similarly, Russia relies on nuclear submarines to form a core component of its own nuclear triad. Their strategic positioning often poses a challenge to adversary surveillance and offers

a significant deterrence advantage. The Russian navy employs a "bastion defense" strategy, using submarines armed with ballistic missiles to defend their territorial waters and launch a formidable counterstrike if necessary.

Given the historical context of heightened tensions between the United States and Russia, any perceived threat to Russian territorial waters, especially from US submarines, may trigger a rapid escalation. The sighting of a transmedium UAP, converging with the presence of US submarines, could lead to an aggressive response from the Russian navy if it regards the UAP as a potential precursor to a covert attack.

- **Second-Level Escalation.** Operative nuclear ballistic missile submarine (SSBN) response protocols to perceived incursions can include evasive maneuvers and preparation for defensive or retaliatory measures, such as quieting ship routines or advancing to launch-ready status.
- **Third-Level Escalation.** A misinterpreted aggressive posture from either side could trigger automated or policy-induced command and control responses, potentially leading to unintended LOW or use-it-or-lose-it situations, especially during heightened tensions.
- **Impact of Strategic Waterways.** The encounter within strategic waterways, critical to the transit of SSBNs between home ports and open operational areas, further exacerbates these risks. The narrow passageways limit navigational choices and could force submarines into closer proximity, inadvertently giving an impression of adversarial tracking or engagement.
- **Breakdown in Command, Control, and Communications.** The confluence of transmedium UAP activity and subsequent military responses underscores the vulnerability of C3I systems to error or misjudgment. Advanced but opaque UAP capabilities could create confusion in interpreting intentions and actions, compounding an already complex decision-making environment.

Recommendations for Averting Accidental Warfare Triggered by UAP and the Obstacles Formed by Great Power Cooperation

Given the catastrophic consequences of nuclear warfare, thorough solutions must be considered. While this paper cannot detail all existing challenges and solutions for UAP threat de-escalation, the hope is that identifying the core obstacles and opportunities at this stage can lead to the formulation and implementation of collaborative, state-to-state policies.

Obstacles to Military-to-Military Cooperation: Secrecy and Technological Innovation

Where the specific problem of averting accidental military incidents and warfare is concerned, the international research and data-sharing necessary for advancing understanding of UAP is crucial. Yet the needed flow of information is hampered by a series of interrelated obstacles, which dramatically complicate cooperation across national boundaries. While some of the obstacles have already been discussed or touched on, the particular way they interfere with data-sharing between states should be elucidated. These obstacles are as follows.

1. **Secrecy and Technology.** This is a general barrier to the international collaboration on UAP needed to prevent the above scenarios. It goes without saying, of course, that states hesitate to share data that could reveal sensitive technologies and thereby undermine security. The reluctance of militaries and intelligence services to share information regarding UAP stems from this same worry about exposure, and their secrecy about UAP is likely reinforced by the caution among leaders in military research and defense about any loss of advantage.
2. **Operations Security.** Second, the delicate fabric of bilateral and multilateral military relations could experience strains due to the exchange of sensitive UAP information, risking otherwise stable cooperative defense engagements. Operations security procedures necessitate that incidents involving UAP remain under wraps to protect crucial military strategies and tactics from being deciphered. This complication is exacerbated by the common practice of information compartmentalization within militaries, which serves as a barrier to cross-agency and international collaboration due to the high clearance levels required to access UAP-related data.[69]
3. **Tension between Scientific Openness and Secrecy.** Faced with dichotomous and sometimes polarized interests in UAP research—namely, civilian/scientific openness and curiosity versus military/strategic secrecy and focus—governments generally lean toward secrecy. Open research endeavors could inadvertently compromise advanced technology, a risk most militaries are unwilling to take. Again, national security measures emphasize the need to keep a tight grip on UAP information to prevent the disclosure of any vulnerabilities or capabilities of their surveillance apparatus.[70]
3. **Counterintelligence and Psychological Warfare.** Counterintelligence risks also loom large, deterring the exchange of sensitive UAP information due to the fear of such cooperation being subverted for espionage purposes. Geopolitical forces quickly come into play here, as divergent national policies on UAP transparency could produce rifts among allies by aggravating existing asymmetrical power dynamics that would lead to disparities in UAP knowledge-sharing. More insidious kinds of information manipulation could arise for that reason, as great powers may sculpt UAP narratives to serve disinformation campaigns or wield them as propaganda tools, adding a layer of psychological warfare and further distrust to the UAP dialogue.
4. **National Differences.** Finally, institutional differences across nations—each with its own unique set of protocols, risk assessments, and strategic cultures—add yet another dimension of complexity to the mix. These factors collectively present a dense web of challenges that would have to be navigated by any serious effort toward international cooperation on UAP issues among military organizations.[71]

Policy Proposals

Some of the recommendations that follow are not politically feasible today, given the state of foreign relations and trust between great powers. However, where possible, these proposals can begin to inform a broader international reform agenda to minimize the turbulence created by UAP events in military contexts. Unanticipated UAP events that nearly trigger military conflict could accelerate the development of quick pathways toward realizing some of these proposals.

1. Establishment of a UAP Communication Protocol

- Develop and implement a bilateral or multilateral communication standard specific to UAP-related encounters. The emphasis will be on sharing pertinent information between nuclear powers to preclude the possibility of misidentification and miscalculation during UAP incidents in or near strategic and navigational waterways.
- Create a standard operating procedure for the assessment and dissemination of information regarding UAP encounters to minimize confusion and ensure prompt and accurate communication.

2. Upgrading of C3I Systems with Enhanced UAP Discrimination Capabilities

- Integrate advanced sensor technology and advanced, AI-driven analysis tools to distinguish between UAP and potential submarine threats.
- Develop fail-safes and verification standards within nuclear C3I systems that require multiple data points before escalation procedures are activated.

3. Nuclear Posture Review Adjustments

- Modify the current Nuclear Posture Review to account for the strategic implications of UAP phenomena. This amendment should entail blended strategies, incorporating the new variable of UAP activity with nuclear deterrent operations, promoting strategic stability, and preventing miscommunication.

4. SSBN Patrol Pattern Analysis and Adjustment

- Periodically review SSBN patrol patterns in light of UAP encounter data to minimize the risk of confrontational posturing with UAP or rival nuclear states.
- Develop evasive strategies and countermeasures to quickly de-escalate potential UAP-induced confrontations without compromising deterrence postures.

5. Joint UAP Study and Information Exchange

- Establish a research initiative, which would include both civilian scientific organizations and military agencies, to analyze UAP properties, movement patterns, and potential intents.
- Share findings internationally to build a database on UAP incidents that can assist in differentiating between potential threats and benign phenomena.

6. Integration of UAP Scenarios into Nuclear Command Exercises

- Update military exercises and war games to include UAP incidents as variables.
- Train personnel at all levels of the nuclear command structure to respond to UAP encounters with measured and informed actions. Amend current strategic command and tactical response exercises to incorporate scenarios involving transmedium UAP.

Training and simulations should aim at improving responses and decision-making under the uncertainty of UAP encounters. This would also include revising the rules of engagement to accommodate such contingencies.

7. Creation of an International UAP Incident Registry (Nation–State Based)

- Institute a secure and confidential platform for global militaries to log and share UAP encounters.
- Facilitate cross-referencing of incidents to identify patterns or recurring events and locations.

Conclusion: What Is to Be Done, and What Do We Do First?

Given the array of policy reforms so far discussed, this conclusion aims to identify a possible starting point in line with the pragmatic methodology set out earlier in the paper. Considering the low level of trust and frequent assumption of zero-sum competition between great powers at present, there is reason to believe that starting small is preferable to high-stakes initiatives. It may seem logical to begin instead with the problems with the greatest consequences, such as the failure to act on species-ending possibilities like accidental nuclear war or space weaponization. Yet in the present context, this would be unproductive. States are rarely capable of considering global goods when acting for their national security. Even catastrophic nuclear war is viewed in terms of relative gains.

If one hopes to build momentum and legitimacy for UAP policy reform, it is necessary to start where actors are relatively unconstrained by world-ending consequences or history-altering realignments of power. Put briefly, pragmatism works on two axes: what can be known, and what can be accomplished. The second axis requires that we get creative about actors and fora that can act on concerns that have broad convergence about collective goods, where interests are not easily parsed as trade-offs. There is a name for this kind of pragmatism in international relations: functionalism.

A Pathway to International Cooperation on UAP: Neofunctionalism and the Spillover Effect

The historian David Mitrany's theory of functionalism is an approach to international relations that emerged in the mid-twentieth century.[72] It offers an alternative perspective to traditional state-centric theories and aims to explain the process of regional and international integration. Mitrany argued that economic interdependence and cooperation in functional areas, such as trade, transportation, or the environment, can bring states or supra-state actors closer together. For him, the pursuit of cooperation over functional needs in one area leads to parallel cooperation in other, related areas. This process, which Mitrany referred to as "spillover," gradually softens national sovereignty to allow for significant—but still limited—supranational authority.[73]

Political scientist Ernst B. Haas later refined and developed Mitrany's theory into what is known as neofunctionalism. Haas proposed that economic and technical integration seen in distinct sectors such as coal and steel would inherently generate momentum for increasing cooperation in adjacent areas, which ultimately could lead to a comprehensive system of supranational governance.[74] Haas proposed that this happens through a specific spillover mechanism by which successes in one sector naturally encourage broader economic–technical integration, which then bears the potential to escalate into extensive political integration. He also argued that the resultant supranational institutions can eventually gain authority

and shift allegiances away from national governments and toward themselves. Moreover, he maintained that instances of this integration process will be self-sustaining due to the innate efficiencies provided by nonpolitical, technical cooperatives (Haas called this "technological automaticity").

The international postal system is a simple historical example of neofunctionalist spillover. Originally just a set of coordinated procedures for the successful delivery of postal communications across borders, the cooperation between national postal services evolved to encompass regulatory agreements and transnational postal laws. This led to the founding of the Universal Postal Union, the UN agency that manages and develops such measures. After many decades of focused technical cooperation, the postal system has recently become the site of a cultivated spillover, with state actors and institutions working deliberately to extend cooperation into the new areas of e-commerce, e-post, e-government, and e-finance and the broader integration these promise.

More pronounced is the case of the European Union, which is often taken as a perfect demonstration of successful neofunctionalist spillover. The European Coal and Steel Community (ECSC), a common market for those resources established in 1951, was a limited industrial cooperative venture. Nonetheless, it put in place the initial conditions for the broader European economic and political integration that followed. Not long after the ECSC was established, its trade, regulatory, and technical measures were used as a basis for the development of the European Economic Community (EEC) and the broad economic integration it yielded. In turn, the EEC engendered a functional need for the administrative, legal, and political integration that eventually came from the European Union. The emergence of a comprehensive political entity, with its own currency, parliament, and judicial system, from a series of economic agreements exemplifies Haas's vision of sector-specific integration sowing the seeds for extensive political integration.

In sum, neofunctionalism proposes that regional integration can be achieved through functional cooperation in specific policy areas, leading to the formation of supranational institutions by states. The core idea is that cooperation starts in the realms of material need and technical functions, such as transportation, communication, and trade, and supranational agencies provide a basis for further moves toward interdependence and peace.

Initiating Spillover in Civil Society: A Supranational Research and Study Organization

With potential efforts at international cooperation on UAP stymied by great power competition—again, American, Chinese, and Russian national security concerns and secrecy protocols are serious impediments—neofunctionalism offers a theoretical path forward. Strategic rivalry could be bypassed by international collaboration on UAP research and safety protocols, which could lead to shared governance structures and the integration of data collection, recording, and analysis efforts.

Cooperation of this kind could begin among nongovernmental experts and organizations in scientific and technical areas that are largely apolitical and thus sites where states can achieve

mutual benefit. By focusing specifically on UAP-related aviation safety measures and scientific study, an international organization could be established that might create a spillover effect. Such a group would share data and research techniques, establish monitoring systems, and form international, integrated committees or working groups to do its work. As trust is built and the fruits of cooperative labor become apparent, states might become willing to work alongside or through this organization to take additional steps, like policymaking and perhaps even the creation of agencies or frameworks to address broader concerns related to UAP.

A neutral, supranational UAP research organization comprising scientists, military experts, and civil society leaders could serve as a further means to navigate and overcome national rivalries. The technocratic nature of such a body, alongside its elite composition, could help ensure that cooperation in UAP research is insulated from larger geopolitical frictions. Furthermore, actors within this supranational organization could consciously extend the scope of integration, pushing from straightforward UAP research into establishing comprehensive aerospace and defense safety protocols, agreements, and regulations. This extension might involve a range of related issues, from the improvement of global airspace monitoring systems to detect UAP and the streamlining of transnational communication channels for UAP reporting to the global coordination of military UAP-response strategies.

Yet such a system of fluid cooperation and interdependence remains years away. To work toward it, we must begin with a civil society approach and the attainable goal of an international civil organization. Presently, there are a number of nongovernmental scientific organizations and projects committed to the study of UAP—Enigma Labs, the Interdisciplinary Research Center for Extraterrestrial Studies, the Galileo Project, the Scientific Coalition for UAP Studies, the Sol Foundation, and VASCO, to name just a few—as well as long-standing investigative groups, from the Mutual UFO Network and the National UFO Reporting Center in the United States to GEIPAN in Europe. However, there is not yet a truly international organization robust enough to facilitate the sharing of information across borders, the standardization of methodologies for identification and categorization, and the vetting, registration, and cataloging of UAP events.

Such an international organization could be formed by creating a federation of some of these scientific groups as well as others dedicated to related phenomena. The American Association of Variable Star Observers (AAVSO), for instance, is a global network of amateur and professional astronomers focused on the scientific study and monitoring of "variable stars" (stars with changing apparent magnitudes). AAVSO maintains an extensive database, data-sharing practices, and collaboration tools, all designed to facilitate the exchange of astronomical observations. Similarly, the International Meteor Organization (IMO) offers a platform for coordinating worldwide meteor observations and the collection and analysis of meteor sightings. By expanding the scopes of the AAVSO and the IMO to include UAP events and their study, amateur astronomers could report their sightings and contribute to a broader understanding of these phenomena. Beyond astronomical organizations, there are several national and international civilian aviation organizations, such as the American Institute of Aeronautics and Astronautics and the International Council of Aircraft Owners and Pilots Association (IAOPA), with missions and sufficient room to accommodate UAP reporting and study. The AIAA already formed a UAP working group at the behest of military and civilian aviators

who witnessed UAP events, and the replication of such a group in the IAOPA—which is the civilian observer to ICAO proceedings—would create an international forum. Last, international professional societies of social scientists and psychiatrists like the American Anthropological Society, the European Association of Social Anthropologists, and the World Psychiatric Association could form working groups on the psychological and social effects UAP events have on pilots, astronomers, and ground witnesses and thereby feed the broader organization a unique stream of narrative reports and richly qualitative data.

Such a civil society–based organization of scientists, amateur astronomers, and civilian aviators could then undertake projects in which states might eventually participate. The most urgent such project would be the construction of a global registry and database for UAP reports with a corresponding research project, as this could provide stimulus or even an eventual platform for international government collaboration. The project has four components that can be set up as follows.

International Civil Society Measure Recommendation: A Global UAP Reporting Registry, Database, and Research Initiative

1. **Reporting Mechanism.** A standardized international reporting system specifically designed for UAP events will need to be established, ideally under the auspices of the ICA, with collaboration and counsel from the Air Line Pilots Association, the International Air Transport Association, and national and supranational air traffic controllers' associations (i.e., the National Air Traffic Controllers Association and the International Federation of Air Traffic Controllers' Associations). This system should be simple to use and accessible to civil aviators, amateur astronomers, scientists and social scientists, mental health professionals, and ground observers around the world, allowing them to log sightings, associated data (time, location, observation conditions), and any supporting evidence (photographs, videos, sketches). At the same time, the ICAO, in collaboration with pilot and airline associations, should develop and disseminate guides for the identification of prosaic phenomena frequently reported as UAP (e.g., flaring Starlink satellites). The overarching goal of these initiatives is to reduce a deeply ingrained culture of stigma and ridicule associated with aircrew reporting of UAP.
2. **Data Validation and Analysis.** A robust data validation process should be developed and refined to improve the accuracy and reliability of UAP reports. This could involve collaborations with professional astronomers, scientific experts and institutions, and AI engineers to verify the submitted information and eliminate misidentifications or artifacts.
3. **Data Sharing and Analysis Platform.** An online platform that consolidates UAP data for comprehensive analysis also must be developed. This platform should enable data-sharing among contributors while maintaining privacy and security protocols. Additionally, it should contain analytical tools by which correlations and patterns within data can be identified.
4. **Collaborative Research and Science.** Collaborations between the amateur astronomers, professional scientists, and relevant research institutions involved should be undertaken, primarily through joint studies of data from UAP events in the registry. Conferences and publications dedicated to this research should follow.

Building a registry and database through global civil society could create the necessary public and scientific consensus necessary for scaling up to an international registry in which states might be willing to participate. Like the history of the Intergovernmental Panel on Climate Change (IPCC), extensive community-building among experts and stakeholders is likely necessary to create a proof of concept for something that could attract national and international buy-in. However, like the uneven success of the IPCC, efforts at cooperation are merely necessary preconditions for further action, not sufficient actions themselves.

Pragmatism, Progress, and Disclosure

Whether pursuing state cooperation or the building of a global civil society approach, the core concern is that we stop waiting for disclosure and begin UAP policy where it is most feasible. We should see approaches to cooperation, research, and threat reduction as necessary first steps to creating a world where it is possible for the United States and other governments to acknowledge UAP and disclose any significant data they hold about them. In such a world, institutions and actors would be able to adjust to UAP, making use of relevant data because they would already be familiar with UAP at a practical level.

As discussed at the beginning of this paper, there is another reason to consider a pragmatic approach. So much public discussion is driven not by concerns with the practical implications of UAP but by the demand for government transparency and democratic accountability about the nature of the phenomena. Although those values are essential in any liberal society, the current focus is undermining the very institutional trust that is needed if broad coalitions of institutional stakeholders are to work together toward viable policy. The demand for disclosure makes formal US government admissions about what it knows about UAP—especially about what they are—the winner-takes-all stakes of political competitions between and among interested institutions and actors, from party versus party to citizen versus state to state versus state. Recent government activity on UAP, from the 2023 House Oversight and Government Accountability hearings to the 2024 AARO report, show that there may be no winners if success is defined by disclosure alone.

In sum, gaining momentum on reform and demystifying the phenomena means finding a way around the media-fueled political spectacle of revelation, denial, and subterfuge. This can be done through a pragmatic methodology that focuses on understanding the effects of phenomena rather than their origins, and that builds policy not around what seems most desirable but what is most possible. We hope that established and new stakeholders can begin to work together by means of this approach, with the goal of deciphering the enigma of these phenomena.

Notes

1. For a comprehensive review of UAP event data in the United States please see the RAND Corporations report on UAP incidents and their geographic distribution (Posard, Gromis, and Lee 2023).
2. Cooper, Blumenthal, and Kean 2017.
3. CNBC Television 2020.
4. US Office of the Director of National Intelligence 2021.
5. US House of Representatives 2022.
6. US Senate 2023–24.
7. "William James" 2000.
8. James 2000.
9. James 2000.
10. Grove 2020.
11. The broad categories of types of UAP are derived from Lorenzen and Lorenzen 2017.
12. US Office of the Director of National Intelligence 2021; Dolan 2002; Kean 2011; Lorenzen and Lorenzen 2017.
13. US Directorate of Intelligence and Office of Naval Intelligence 1948.
14. "Floating Mystery Ball Is New Nazi Air Weapon" 1944; Stieb 2023.
15. Randerson 2007.
16. UK Ministry of Defence 2006.
17. "UFO Desk" n.d.
18. "GEIPAN UAP Investigation Unit Opens Its Files" 2007.
19. "CEFAA: Un Modelo Investigativo De fenómenos aéreos anómalos" 2021.
20. Reed 2013.
21. "Official UFO Night in Brazil" 2022.
22. Reiss 2023.
23. Ryall 2020.
24. "Uruguayan Air Force Investigating Flashing Lights in the Sky" 2023.
25. Chen 2021.
26. US Central Itelligence Agency 1989.
27. "Establishment of Unidentified Aerial Phenomena Task Force" 2020.
28. US Office of the Director of National Intelligence 2021.
29. Liebermann 2023.
30. The report can be found online at https://www.secnav.navy.mil/foia/readingroom/CaseFiles/UAP%20INFO/UAP%20DOCUMENTS/r_copy%20of%20Hazard_BUNO%20Unknown%20F18_VFA11_27APR2014(2).PDF.
31. Swords 2000.
32. Knuth, Powell, and Reali 2019.
33. Clarke n.d.
34. Otis 2024.
35. International Civil Aviation Organization. n.d.
36. The head of Project Blue Book in the early 1950s, Edward Ruppelt, recounts that a single UAP tracked in 1951 from Fort Monmouth, New Jersey, on then-advanced radar reached an altitude

of ninety-three thousand feet (Ruppelt 2011, 92). Kevin Day, a radar operator stationed on the USS *Princeton* at the time of the USS *Nimitz* event, has publicly testified that groups of UAP were several times picked up entering the atmosphere at his radar's limit of eighty thousand feet (Knuth, Powell, and Reali 2019).

37. Martinez et al. 2019.
38. Neuneck 2008.
39. Kosambe 2019; Rajagopalan 2011; Stroikos 2023.
40. Bugos 2021b; Stefanovich 2023; Anantatmula 2013.
41. Bugos 2021b; Stefanovich 2023; Anantatmula 2013.
42. Bugos 2021b; Stefanovich 2023; Anantatmula 2013.
43. Miller 2021.
44. Oxnevad 2022.
45. Sagan 2020.
46. Garamone 2023.
47. "Unprofessional Intercept of U.S. B-52 over South China Sea" 2023.
48. Giveh 2023.
49. Bugos 2023.
50. Pretorius and Sauer 2023; Anderson, Bell, and Tretter 2023.
51. Bousquet and Grove 2020.
52. Wortzel 2022.
53. Reny 2020.
54. Karako and Dahlgren 2022.
55. Bugos 2021a.
56. Zala 2019.
57. Emelyanov 1984.
58. Quester 2006.
59. Oxnevad 2022.
60. Maccabee 2018.
61. Condon 1968, 387.
62. David 2009.
63. "1967 Shag Harbour UFO Incident Revisited in 2001" 2001.
64. Axe 2013.
65. Sinclair and Harris 1979.
66. "Le mystère du célèbre OVNI des années 90 élucidé" 2011.
67. Cooper, Blumenthal, and Kean 2017; DiNick 2021.
68. Cooper, Blumenthal, and Kean 2019.
69. Imbrie and Fedasiuk 2020.
70. Mowery 2009.
71. Dolan 2002.
72. Mitrany 1943.
73. Mitrany 1948.
74. Haas 2004.

Bibliography

Allin, Dana H., ed. 2020. *Survival* 49.3. London: Routledge.

Anantatmula, Vishnu. 2013. "US Initiative to Place Weapons in Space: The Catalyst for a Space-Based Arms Race with China and Russia." *Astropolitics* 11, no. 3: 132–55.

Anderson, Kelso R., Mark S. Bell, and Cheyenne Tretter. 2023. "The End of Inhibition? Why US Nonproliferation Policy Is Becoming Less Effective." *Washington Quarterly* 46, no. 3: 127–47.

Andresen, Jensine. 2021. "Two Elephants in the Room of Astrobiology." In *Astrobiology*, edited by Octavio Alfonso Chon Torres, Ted Peters, Joseph Seckbach, and Richard Gordon, 193–231. Hoboken, NJ: Wiley. https://doi.org/10.1002/9781119711186.ch10.

Axe, David. 2013. "F-14s versus UFOs . . . in Iran." *Medium*, October 17, 2013. https://medium.com/war-is-boring/b9bded1d2580.

Bousquet, Antoine, and Jairus Victor Grove. 2020. "The Best of All Possible Nuclear Worlds (or How Matthew Kroenig Learned to Stop Worrying and Love the Bomb)." *New Perspectives* 28, no. 1: 89–94. https://doi.org/10.1177/2336825X20908461.

Bugos, Shannon. 2021a. "China Tested Hypersonic Capability, US Says." *Arms Control Today* 51, no. 9: 19–20.

Bugos, Shannon. 2021b. "Russian ASAT Test Creates Massive Debris." *Arms Control Today* 51, no. 10: 30–31.

Bugos, Shannon. 2023. "World Faults Russia's New START Suspension." *Arms Control Today*, April. https://www.armscontrol.org/act/2023-04/news/world-faults-russias-new-start-suspension.

Calandrillo, Steve, Jason Oh, and Ari Webb. 2020. "Deadly Drones: Why FAA Regulations Miss the Mark on Drone Safety." *Stanford Technology Law Review* 23, no. 1: 182–251.

"CEFAA: Un Modelo Investigativo De fenómenos aéreos anómalos." 2021. DGAC, October 1. https://www.dgac.gob.cl/cefaa-un-modelo-investigativo-de-fenomenos-aereos-anomalos/.

Chen, Stephen. 2021. "China Military Uses AI to Track Rapidly Increasing UFOs." *South China Morning Post*, June 4, 2021. https://www.scmp.com/news/china/science/article/3136078/china-military-uses-ai-track-rapidly-increasing-ufos.

Clarke, David. n.d. "Briefing Document." National Archives. https://cdn.nationalarchives.gov.uk/documents/briefing-guide-12-07-12.pdf.

CNBC Television. 2020. "Watch the Pentagon's Three Declassified UFO Videos Taken by US Navy Pilots." YouTube video, April 28. https://youtu.be/rO_M0hLlJ-Q?.

Condon, Edward. 1968. Final Report of the Scientific Study of Unidentified Flying Object." University of Colorado–US Air Force. https://apps.dtic.mil/sti/tr/pdf/AD0680975.pdf.

Cooper, Helene, Ralph Blumenthal, and Leslie Kean. 2017. "Glowing Auras and 'Black Money': The Pentagon's Mysterious UFO Program." *New York Times*, December 16, 2017.

Cooper, Helene, Ralph Blumenthal, and Leslie Kean. 2019. "'Wow, What Is That?': Navy Pilots Report Unexplained Flying Objects." *New York Times*, May 26. https://www.nytimes.com/2019/05/26/us/politics/ufo-sightings-navy-pilots.html.

Cracknell, Arthur P. 2017. "UAVs: Regulations and Law Enforcement." *International Journal of Remote Sensing* 38, nos. 8–10: 3054–67. https://doi.org/10.1080/01431161.2017.1302115.

David, Leonard. 2009. "Is Case Finally Closed on 1965 UFO Mystery?" *NBC News*, November 24.
DeLoughrey, Elizabeth. 2014. "Satellite Planetarity and the Ends of the Earth." Public Culture 26, no. 2: 257–80. https://www.doi.org/10.1215/08992363-2392057.
Deudney, Daniel. 2020. *Dark Skies: Space Expansionism, Planetary Geopolitics, and the Ends of Humanity.* New York: Oxford University Press.
DiNick, Jacquelyn. 2021. "Navy Pilots Recall 'Unsettling' 2004 UAP Sighting." *60 Minutes Overtime*, May 16. https://www.cbsnews.com/news/navy-ufo-sighting-60-minutes-2021-05-16/.
Dolan, R.M. 2002. *UFOs and the National Security State: Chronology of a Cover-Up, 1941–1973*. Charlottesville, VA: Hampton Roads.
Duvall, Raymond, and Jonathan Havercroft. 2008. "Taking Sovereignty out of This World: Space Weapons and Empire of the Future." *Review of International Studies* 34, no. 4: 755–75. https://www.doi.org/10.1017/S0260210508008267.
Eghigian, Greg. 2017. "Making UFOs Make Sense: Ufology, Science, and the History of Their Mutual Mistrust." *Public Understanding of Science* 26, no. 5: 612–26. https://www.doi.org/10.1177/0963662515617706.
Emelyanov, Vasily. 1984. "The Possibility of an Accidental Nuclear War." In *The Arms Race at a Time of Decision: Annals of Pugwash* 1983, edited by Alessandro Pascolini, Joseph Rotblat, 73–79. New York: Springer."Establishment of Unidentified Aerial Phenomena Task Force." 2020. US Department of Defense, August 14. https://www.defense.gov/News/Releases/Release/Article/2314065/establishment-of-unidentified-aerial-phenomena-task-force/.
"Floating Mystery Ball Is New Nazi Air Weapon." 1944. *New York Times*, December 14.
Garamone, Jim. 2023. "Defense Leaders See Increase in Risky Chinese Intercepts." US Department of Defense, June 8.
"GEIPAN UAP Investigation Unit Opens Its Files." 2007. CNES, March 26. https://cnes.fr/en/web/CNES-en/5866-geipan-uap-investigation-unit-opens-its-files.php.
Gerard Ruggie, John, Peter J. Katzenstein, Robert O. Keohane, and Philippe C. Schmitter. 2005. "Transformations in World Politics: The Intellectual Contributions of Ernst B. Haas." *Annual Review of Political Science* 8:271–96. https://doi.org/10.1146/annurev.polisci.8.082103.104843.
Giveh, Mohammadreza. 2023. "Concerns Mount over Possible New Nuclear Tests." Arms Control Today, October. https://www.armscontrol.org/act/2023-10/news/concerns-mount-over-possible-new-nuclear-tests.
Goldman, Emily O., and Leslie C. Eliason. 2003. *The Diffusion of Military Technology and Ideas*. Stanford, CA: Stanford University Press.
Grove, Jairus. 2020. "Bringing the World Back in: Revolutions and Relations before and after the Quantum Event." *Security Dialogue* 51, no. 5: 414–33. https://doi.org/10.1177/0967010620940113.
Haas, Ernst B. 2004. *The Uniting of Europe: Political, Social, and Economic Forces, 1950–1957*. Notre Dame, IN: University of Notre Dame Press.
Haas, Ernst B. 2008. *Beyond the Nation State: Functionalism and International Organization*. ECPR Press Classics. Colchester, UK: ECPR Press.
Haines, Richard. 2000. "Aviation Safety in American-A Previously Neglected Factor." National Aviation Reporting Center on Anomalous Phenomena, October 15.

https://static1.squarespace.com/static/5cf80ff422b5a90001351e31/t/5d02ea1772637c00014776c5/1560472092579/narcap.TR1.AvSafety.pdf.
Hammack, Kylie. 2021. "International Relations in Space: The Role of Miscalculation, Militarization, and Weaponization." *Astropolitics* 19, no. 3: 230–36.
Hardage, Anna Margarete. 2022. "The Security Dilemma in (Supra)Geopolitics: Great Power Politics in the Creation of Space Forces." Master's thesis, University of North Carolina. https://doi.org/10.17615/egn9-hm12.
Ikenberry, G John. 2024. "Three Worlds: The West, East and South and the Competition to Shape Global Order." *International Affairs* 100, no. 1: 121–38.
Imbrie, Andrew, and Ryan Fedasiuk. 2020. "Untangling the Web: Why the US Needs Allies to Defend against Chinese Technology Transfer." Brookings Institution and Center for Security and Emerging Technology, April. https://www.brookings.edu/articles/untangling-the-web-why-the-us-needs-allies-to-defend-against-chinese-technology-transfer/.
International Civil Aviation Organization. n.d. "Convention on International Civil Aviation—Doc 7300." https://www.icao.int/publications/pages/doc7300.aspx.
James, William. 2000. *Pragmatism, and Other Writings*. Edited by Giles B. Gunn. New York: Penguin.
Johnson, Christopher. 2017. "The Outer Space Treaty at 50." *Space Review*, January. https://thespacereview.com/article/3155/1.
Karako, Tom, and Masao Dahlgren. 2022. "Complex Air Defense: Countering the Hypersonic Missile Threat." Center for Strategic and International Studies, February 7. https://www.csis.org/events/complex-air-defense-countering-hypersonic-missile-threat.
Kean, Leslie. 2011. *UFOs: Generals, Pilots, and Government Officials Go on the Record.* New York: Three Rivers Press.
Khan, Ahmad, and Sufian Ullah. 2020. "Challenges to International Space Governance." *Handbook of Space Security: Policies, Applications and Programs*, 35–48.
Knuth, Kevin H., Robert M. Powell, and Peter A. Reali. 2019. "Estimating Flight Characteristics of Anomalous Unidentified Aerial Vehicles." Entropy 21, no. 10: 939. https://doi.org/10.3390/e21100939.
Kosambe, Santosh. 2019. "Mission Shakti Aka Project XSV-1: India's First Anti-Satellite Test (ASAT)." *Journal of Aircraft and Spacecraft Technology* 3, no. 1: 172–82. https://doi.org/10.3844/jastsp.2019.172.182.
Kruppa, CDR Joseph J., LTC Kristina Sanders, and MAJ Michael Martinez. 2021. "Achieving Space Superiority in an Era of Great Power Competition." *Journal of the Joint Forces Staff College*, October 22. https://jfsc.ndu.edu/Portals/72/Documents/campaigning/RA%20Kruppa%20Sanders%20Martinez%2022%20October%202021.pdf.
Lauer, Ritu S. 2022. "When States Test Their Anti-Satellite Weapons." *Astropolitics* 20, no. 1: 1–26. https://www.doi.org/10.1080/14777622.2022.2078194.
Launius, Roger D. 2009. "United States Space Cooperation and Competition: Historical Reflections." *Astropolitics* 7, no. 2: 89–100. https://www.doi.org/10.1080/14777620903073853.
Lembeck, Michael F., Dan Heimerdinger, Ryan Graves, Marty Snow, and Peter Reali. 2023. "Detection, Characterization, and Evaluation of Unidentified Anomalous Phenomena." Paper presented at AIAA AVIATION 2023 Forum, San Diego, June 8. https://www.doi.org/10.2514/6.2023-4322.
Liebermann, Oren. "US Is Receiving Dozens of UFO Reports a Month, Senior Pentagon

Official Tells CNN." CNN, October 18.
Loeb, Abraham. 2022. "'Down to Earth' Limits on Unidentified Aerial Phenomena in Ukraine (Comment on arXiv:2208.11215)." arXiv, October 5. https://www.doi.org/10.48550/ARXIV.2210.01972.
Lomas, Tim. 2023. "A Global Picture of Unidentified Anomalous Phenomena: Towards a Cross-cultural Understanding of a Potentially Universal Issue." *International Social Science Journal*, December. https://www.doi.org/10.1111/issj.12484.
Lorenzen, Coral, and Jim Lorenzen. 2017. *UFOs: The Whole Story—an Authoritative History of the Flying Saucer Enigma.* Self-pub., CreateSpace.
Maccabee, Bruce. 2018. *The Legacy of 1952: Year of the UFO.* Self-pub., CreateSpace.
Madi, Matteo, and Olga Sokolova, eds. 2020. *Space Debris Peril: Pathways to Opportunities: Capacity Building in the New Space Era.* Boca Raton, FL: CRC Press.
Martin, Alyssa, Brian Strzempkowski, Seth Young, Adam K. Fontecchio, and David A. Delaine. 2020. "Air Traffic Control (ATC) Technical Training Collaboration for the Advancement of Global Harmonization." *Journal of Air Transport Management* 89 (October): 101794. https://www.doi.org/10.1016/j.jairtraman.2020.101794.
Martinez, Peter, Peter Jankowitsch, Kai-Uwe Schrogl, Simonetta Di Pippo, and Yukiko Okumura. 2019. "Reflections on the 50th Anniversary of the Outer Space Treaty, UNISPACE+50, and Prospects for the Future of Global Space Governance." *Space Policy* 47 (February): 28–33.https://doi.org/10.1016/j.spacepol.2018.05.003.
McWhinney, Edward. 1969. "International Law and the Freedom of the Air: The Chicago Convention and the Future." *Rutgers–Camden Law Journal* 1, no. 2: 229–42.
Medina, R. M., S. C. Brewer, and S. M. Kirkpatrick. 2023. "An Environmental Analysis of Public UAP Sightings and Sky View Potential." *Scientific Reports* 13, no. 1: 22213. https://www.doi.org/10.1038/s41598-023-49527-x.
Miller, Steven E. 2021. "Nuclear Hotlines: Origins, Evolution, Applications." *Journal for Peace and Nuclear Disarmament* 4, no. S1: 176–91. https://doi.org/10.1080/25751654.2021.1903763.
Minami, Yoshinari. 2023. "Flight Characteristics of UAP (Unidentified Aerial Phenomena) from the Perspective of Propulsion Principle–Flight Performance Derived from Propulsion Principle." *British Journal of Multidisciplinary and Advanced Studies* 4, no. 3: 9–21. https://www.doi.org/10.37745/bjmas.2022.0215.
Mitrany, David. 1943. *A Working Peace System: An Argument for the Functional Development of International Organization.* London: Royal Institute of International Affairs.
Mitrany, David. 1948. "The Functional Approach to World Organization." *International Affairs* 24, no. 3: 350–63.
Moltz, James Clay. 2007. "Protecting Safe Access to Space: Lessons from the First 50 Years of Space Security." *Space Policy* 23, no. 4: 199–205. https://www.doi.org/10.1016/j.spacepol.2007.09.002.
Mowery, David C. 2009. "National Security and National Innovation Systems." *Journal of Technology Transfer* 34, no. 5: 455–73.
"Le mystère du célèbre OVNI des années 90 élucidé: 'Une supercherie.'" 2011. *RTL info*, July 26. https://web.archive.org/web/20110929132212/http://www.rtl.be/info/belgique/faitsdivers/812149/le-mystere-du-celebre-ovni-des-annees-90-elucide-une-supercherie-.
Nawaz, Rubab, Asma Bilal, and Maria Rehman. 2022. "United States-China Space Offensive:

A Dangerous Competition." *Astropolitics* 20, no. 1: 27–42.
Neuneck, Götz. 2008. "China's ASAT Test: A Warning Shot or the Beginning of an Arms Race in Space?" In *Yearbook on Space Policy 2006/2007: New Impetus for Europe*, 211–24. New York: Springer.
"The 1967 Shag Harbour UFO Incident Revisited in 2001." 2001. CBC, June 4. https://www.cbc.ca/player/play/1835169086.
"Official UFO Night in Brazil." 2022. Gov.br, May 20. https://www.gov.br/en/government-of-brazil/latest-news/2022/official-ufo-night-in-brazil.
Otis, Daniel. 2024. "Pilots Describe 'Bizarre' Lights and 'Triangles' Over Canada in Air Traffic Control Audio." CTV News, January 31. https://www.ctvnews.ca/sci-tech/pilots-describe-bizarre-lights-and-triangles-over-canada-in-air-traffic-control-audio-1.6748300.
Oxnevad, Ian. 2022. "The Truth Is Mostly Right Here: The Security Dilemma and the Earthly Logic of an Extraterrestrial Threat." *Journal of Military and Strategic Studies* 21, no. 3: 181–205.
Posard, Marek, Ashley Gromis, and Mary Lee. 2023. *Not the X Files: Mapping Public Reports of Unidentified Aerial Phenomena across America*. Santa Monica, CA: RAND Corporation.
Pretorius, Joelien, and Tom Sauer. 2023. "Ditch the NPT." In *Survival August-September 2021: Debating US Foreign Policy*, 103–23. New York: Routledge.
Quester, George H. 2006. *Nuclear First Strike: Consequences of a Broken Taboo.* Baltimore: Johns Hopkins University Press.
Rajagopalan, Rajeswari Pillai. 2011. "India's Changing Policy on Space Militarization: The Impact of China's ASAT Test." *India Review* 10, no. 4: 354–78.https://doi.org/10.1080/14736489.2011.624018.
Randerson, James. 2007. "Could We Have Hitched a Ride on UFOs?" *The Guardian*, February 22. https://www.theguardian.com/science/2007/feb/22/freedomofinformation.it.
Reali, Peter. 2023. "System Study of Constraints for the Creation of UAP Electromagnetic Signature Optimal Detection Systems." Paper presented at AIAA AVIATION 2023 Forum, San Diego, June 8. https://www.doi.org/10.2514/6.2023-4098.
Reed, Betsy. "Peru's UFO Investigations Office to Be Reopened." 2013. *The Guardian*, October 27. https://www.theguardian.com/world/2013/oct/27/peru-ufo-investigations-office-reopening.
Reiss, John. 2023. "A Comparative Survey of Security Approaches toward Unexplained Aerial Phenomena Across the Indo-Pacific." *Daniel K. Inouye Asia-Pacific Center for Security Studies Security Nexus* 24. https://dkiapcss.edu/nexus_articles/a-comparative-survey-of-security-approaches-toward-unexplained-aerial-phenomena-across-the-indo-pacific/.
Reitemeyer, Malte, and Felix Weinmann. 2022. "Detection of UAP with a Nano Satellite." Report of the Semester Project Spacecraft System Design, February 24. https://opus.bibliothek.uni-wuerzburg.de/opus4-wuerzburg/frontdoor/deliver/index/docId/26139/file/Research_on_UAP_1_Reitemeyer_Weinmann_Nano_Satellite.pdf.
Reny, Stephen. 2020. "Nuclear-Armed Hypersonic Weapons and Nuclear Deterrence." *Strategic Studies Quarterly* 14, no. 4: 47–73.
Rochlin, Gene I. 1991. "Iran Air Flight 655 and the USS Vincennes." In *Social Responses to Large Technical Systems: Control or Anticipation*, edited by Todd R. La Porte, 99–125. Dordrecht: Springer Netherlands. https://www.doi.org/10.1007/978-94-011-3400-2_5.

Rolf, Steve, and Seth Schindler. 2023. "The US–China Rivalry and the Emergence of State Platform Capitalism." *Environment and Planning A: Economy and Space* 55, no. 5: 1255–80. https://www.doi.org/10.1177/0308518X221146545.

Rooney, James J. 2020. "Weaponizing Space." *American Intelligence Journal* 37, no. 1: 87–97.

Ruppelt, Edward J. 2011. *The Report on Unidentified Flying Objects. The Original 1956 Edition.* New York: Cosimo Reports.

Ryall, Julian. 2020. "Japan Orders Military Pilots to Report UFO Sightings." *DW*, September 28. https://www.dw.com/en/japan-orders-military-pilots-to-report-ufo-sightings/a-55081061.

Sagan, Scott Douglas. 2020. *The Limits of Safety: Organizations, Accidents, and Nuclear Weapons.* Princeton, NJ: Princeton University Press.

Sayler, Kelley. 2015. "A World of Proliferated Drones: A Technology Primer." Center for a New American Security. https://www.cnas.org/publications/reports/a-world-of-proliferated-drones-a-technology-primer.

Schlosser, Eric. 2014. *Command and Control: Nuclear Weapons, the Damascus Accident, and the Illusion of Safety.* New York: Penguin.

Schrogl, Kai-Uwe, Christina Giannopapa, and Ntorina Antoni, eds. 2021. *A Research Agenda for Space Policy.* Northampton, MA, USA: Edward Elgar.

Sinclair, Ward, and Art Harris. 1979. "What Were Those Mysterious Craft?" *Washington Post*, January 18. https://www.washingtonpost.com/archive/politics/1979/01/19/what-were-those-mysterious-craft/1b9d1f3d-dddb-4a92-87b3-0143aa5d7a3e/.

Smagh, Nishawn S. 2020. "Intelligence, Surveillance, and Reconnaissance Design for Great Power Competition." *Congressional Research Service* 46389. https://crsreports.congress.gov/product/pdf/R/R46389.

Stares, Paul. 1985. "US and Soviet Military Space Programs: A Comparative Assessment." *Daedalus* 114, no. 2: 127–45.

Stefanovich, Dmitry V. 2023. "Russia's Vision for a Great Power Rivalry in Space." *Journal of Space Safety Engineering* 10, no. 4: 538–43.https://doi.org/10.1016/j.jsse.2023.10.007.

Steff, Reuben. 2020. "Nuclear Deterrence in a New Age of Disruptive Technologies and Great Power Competition." In *Deterrence: Concepts and Approaches for Current and Emerging Threats*, 57–75. New York: Springer.

Stieb, Matt. 2023. "Floating Metallic Orbs Are Everywhere—and 4 Other UFO Revelations from NASA." *New York*, June 1.

Stroikos, Dimitrios. 2023. "Still Lost in Space? Understanding China and India's Anti-Satellite Tests through an Eclectic Approach." *Astropolitics* 21, nos. 2–3: 179–205.https://doi.org/10.1080/14777622.2023.2277253.

Swords, Michael. 2000. "Project SIGN and the Estimate of the Situation." J*ournal of UFO Studies*, 27–64.

Syd Ali, Busyairah. 2019. "Traffic Management for Drones Flying in the City." *International Journal of Critical Infrastructure Protection* 26 (September): 100310. https://www.doi.org/10.1016/j.ijcip.2019.100310.

Tellis, Ashley J. 2007. "China's Military Space Strategy." *Survival* 49, no. 3: 41–72. https://www.doi.org/10.1080/00396330701564752.

"UFO Desk: Closed—Last Tranche of UFO Files Released." n.d. National Archives. https://cdn.nationalarchives.gov.uk/documents/final-tranche-of-UFO-files-released.pdf.

UK Ministry of Defence. 2006. "Unidentified Aerial Phenomena (UAP) in the UK Air Defence Region." May. https://webarchive.nationalarchives.gov.uk/ukgwa/20121110115327/http:/www.mod.uk/DefenceInternet/FreedomOfInformation/PublicationScheme/SearchPublicationScheme/UnidentifiedAerialPhenomenauapInTheUkAirDefenceRegion.htm.

United Nations. 1966. "Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies." Office for Outer Space Affairs. https://www.unoosa.org/oosa/oosadoc/data/resolutions/1966/general_assembly_21st_session/res_2222_xxi.html.

"Unprofessional Intercept of U.S. B-52 over South China Sea." 2023. US Indo-Pacific Command, October 26. https://www.pacom.mil/Media/News/News-Article-View/Article/3569987/unprofessional-intercept-of-us-b-52-over-south-china-sea/.

"Uruguayan Air Force Investigating Flashing Lights in the Sky." 2023. *TurfDef*, February 11. https://web.archive.org/web/20230930034552/https://www.turdef.com/article/uruguayan-air-force-investigating-flashing-lights-in-the-sky.

US Central Intelligence Agency. "USSR: Media Report Multitude of UFO Sightings." 1989. Foreign Press Note, November 22. https://www.cia.gov/readingroom/docs/DOC_0000042346.pdf.

US Directorate of Intelligence and Office of Naval Intelligence. 1948. "Analysis of Flying Object Incidents in the U.S." Air Intelligence Division Study No. 203. December 10. https://documents2.theblackvault.com/documents/100-203-79.pdf.

US House of Representatives, Permanent Select Committee on Intelligence, Subcommittee on Counterterrorism, Counterintelligence, and Counterproliferation. 2022. "Unidentified Aerial Phenomenon." May 17. https://www.congress.gov/117/meeting/house/114761/documents/HHRG-117-IG05-Transcript-20220517.pdf.

US Office of the Director of National Intelligence. 2021. "Preliminary Assessment: Unidentified Aerial Phenomena." June 25. https://www.dni.gov/files/ODNI/documents/assessments/Prelimary-Assessment-UAP-20210625.pdf.

US Senate. 2023–24. "S.2226—National Defense Authorization Act for Fiscal Year 2024." S. Amdt. 797, 118th Congress. https://www.democrats.senate.gov/imo/media/doc/uap_amendment.pdf.

Watters, Wesley Andrés, Abraham Loeb, Frank Laukien, Richard Cloete, Alex Delacroix, Sergei Dobroshinsky, Benjamin Horvath, et al. 2023. "The Scientific Investigation of Unidentified Aerial Phenomena (UAP) Using Multimodal Ground-Based Observatories." *Journal of Astronomical Instrumentation* 12, no. 1: 2340006. https://www.doi.org/10.1142/S2251171723400068.

Weinstein, Dominique. 2012. "Aviation Safety and Unidentified Aerial Phenomena: A Preliminary Study of 600 Cases of Unidentified Aerial Phenomena (UAP) Reported by Military and Civilian Pilots." National Aviation Reporting Center on Anomalous Phenomena International Air Safety Report. http://www.uapreporting.org/wp-content/uploads/2012/12/narcap_IR-4_DWeinstein_NEW_3-21-12.pdf.

"William James." 2000. *Stanford Encyclopedia of Philosophy*, September 7. https://plato.stanford.edu/entries/james/.

Wortzel, Larry M. 2022. "Hypersonic Weapons Development in China, Russia and the United States." Land Warfare Paper143, Association of the United States Army, March. https://www.ausa.org/sites/default/files/publications/LWP-143-Hypersonic-Weapons-

Development-in-China-Russia-and-the-United-States.pdf.
Zala, Benjamin. 2019. "How the Next Nuclear Arms Race Will Be Different from the Last One." *Bulletin of the Atomic Scientists* 75, no. 1: 36–43.
Zanidis, Themistoklis. 2023. "The New Space Race: Between the Great Powers of Our Era." *HAPSc Policy Briefs Series* 4, no. 1: 88–94.
Zhilyaev, B. E., V. N. Petukhov, and V. M. Reshetnyk. 2022. "Unidentified Aerial Phenomena II. Evaluation of UAP Properties." arXiv, November 13. http://arxiv.org/abs/2211.17085.

The Sol Foundation
www.thesolfoundation.org
information@thesolfoundation.org

Board Director: Dr. Garry Nolan
Executive Director: Dr. Peter Skafish

Design: Marta Ricci, superhappy.design