Anti-Satellite Capabilities and American Options for Strategic Deterrence in Outer Space

By

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Deterrence, which is traditionally associated with nuclear weapons, is becoming increasingly unable to address emerging technologies that sit beyond the scope of conventional weapons capabilities. A proposed category of capabilities termed "inferential" anti-satellite (ASAT) are altering the cost-benefit calculus of deterrence based on their generally non-attributable nature, causing issues to arise with perceptions of deterrence credibility and signaling.

Yet, due to several factors including the American moratorium on testing destructive ASAT weapons, concerns of environmental sustainability, and increased use of grey-zone tactics by adversaries, inferential and non-kinetic ASATs may be the primary means with which conflict in outer space is waged in the immediate future. Thus, emphasizing potential negative impacts upon strategic deterrence for both nuclear and space arenas is essential.

Contrasted with kinetic physical ASATs, which are highly attributable, cause permanent damage, and simultaneously signal both capability and the political will of the aggressor, inferential ASATs are a broad categorization comprised of capabilities that do not create debris fields and are significantly less visible to third-party observers. This grouping, which encompasses directed energy, electromagnetic, radiofrequency, and cyber capabilities, does not strictly align with the traditional categorizations of kinetic physical and non-kinetic physical ASATs, and can include non-kinetic physical attacks.

For example, military-use electromagnetic pulse (EMP) weapons are categorized as non-kinetic physical attacks but may be categorized as "inferential" because they are rapid, invisible, and can affect damage with indirect contact with a satellite. Considering this proposed categorization, changing technological environment, and increased used of grey-zone tactics in the space domain, it is time to take a hard look at the underlying theories guiding national security strategies such as strategic-level deterrence; specifically, its tenants of credibility and signaling, which could be negatively impacted by the inferential attributes of new weapons systems.

Successful deterrence theory and practice is contingent upon (1) credible psychological impact upon the adversary; (2) communication of an attributable weapon capability, wherein the ability to visibly detect or identify the negative consequences of attack are clearly signaled; and (3) the political will to carry out such an attack if attacked by an aggressor. The proliferation of inferential ASAT capabilities significantly alters this cost-benefit calculus due to the difficulty of attributing their use in attacks.

Moreover, since conventional weapons capabilities evolved to include virtually undetectable forms of attack with little progress towards attribution, it is reasonable to conclude that the successful operationalization of deterrence against inferential ASATs will be difficult to achieve in outer space.

Credibility and Signaling

Generally, credibility is characterized as the effective communication (signal) to an adversary through deterrence posture, so as to compel the adversary to believe the utility of the planned attack, thereby, psychologically registering the attack as a sufficient threat. Since the value of signaling lies in the opponent's perception, and because inferential capabilities engender difficulties in attribution, adversaries remain undeterred so long as the attack does not register as a threat.

Degradation of credibility occurs when signals are misinterpreted or misperceived, as well as if there are differing belief systems and intentional interference by the adversary. If present, these factors are likely to result in a weakened deterrence posture; this remains especially true when such signals are below the escalatory threshold of retaliatory response, as is the case with grey-zone tactics that employ inferential capabilities.

Proposed Solutions

A potential solution to the credibility and signaling problem in the space domain would be to bolster deterrence strategies with an integrative triad that combines special operations, cyber, and space force capabilities. While still largely in development, the triad could leverage space-based competencies such as space domain awareness, space forensics, dual-use spacecraft, proximity operations, or on-orbit servicing to fill the gap left open by weakened attribution capacity and to deter actions below the threshold of conflict without having to resort to kinetic-type ASAT.

The question here is whether such space-based capabilities, especially dual-use spacecraft, serve to deter or escalate conflict. In 2022, China's Shijan-21 docked with a defunct Chinese satellite and towed it into a graveyard orbit. This not only demonstrated China's technological advancement, but also its ability to conduct counter-space operations under the pretense of debris-removal operations. Such developments point to the trend of increased reliance on inferential capabilities by adversaries and negative implications of strategic-level deterrence in outer space.

In an explosive, technological growth environment, the non-demonstrable nature attributed to inferential ASATs are allowing an increasing number of non-state actors adverse to the United States to take self-motivated action in ways that hinder the successful application of deterrence strategies. While a deterrence triad can bolster credibility and signaling, inferential ASATs remain below the threshold for escalation, degrading the integrity and security of outer space systems over time. Thus, the salience for deterrence within this context in this discussion is not only meaningful for its theoretical applications, but also because its successful implementation implies that deterrence as a theory is highly adaptable, resilient, and will continue to remain relevant in formulation of the United States' national space strategies going forward.

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