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Limited Nuclear War Over Taiwan: An Initial Exercise

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KEY TAKEAWAYS

The purpose of tabletop exercise TIDALWAVE II: Azure Dragon was to identify critical gaps and deficiencies in U.S. military capabilities.

The goal is to develop solutions that enhance the U.S. ability to project and sustain forces while exploiting adversary vulnerabilities across multiple domains.

Theater nuclear conflict could prove indecisive. Initial U.S. reluctance to risk escalation ultimately proved counterproductive, resulting in conventional defeat.

In October, The Heritage Foundation hosted and facilitated a tabletop exercise (TTX) titled TIDALWAVE II: Azure Dragon. The scenario was designed to introduce nuclear escalation between the United States and China three weeks into a high-intensity conflict over Taiwan in 2030.

The results of the TTX and the post-TTX discussion provided strong directional evidence for the following insights:

- A high-intensity conflict over Taiwan would create compelling pressures for theater nuclear employment either through a Chinese invasion, or more particularly, through an American-led coalition defending Taiwan.

- Nuclear escalation could be contained below the level of a large-scale strategic exchange.

- Theater nuclear conflict could prove indecisive and protracted, especially if America fails to demonstrate sufficient resolve to achieve intra-war deterrence.

- The United States would face acute capability shortfalls in conventional precision-guided munitions (PGMs) and in non-strategic nuclear weapons (NSNWs).

- China's NSNWs and its fractional orbital bombardment system (FOBS) gives it a significant asymmetric advantage, potentially enabling it to achieve escalation dominance.

- The United States may struggle to demonstrate sufficient resolve to achieve intra-war deterrence.

Research Questions and Methodology

Azure Dragon develops and extends TIDALWAVE, an artificial intelligence (AI)–enabled simulation designed to identify gaps and deficiencies and corresponding solutions to resolve the anticipated shortfalls in the United States' ability to project and sustain forces and exploit adversary vulnerabilities in a protracted conflict with China. The purpose of Azure Dragon is to identify critical gaps and deficiencies in U.S. sustainment capabilities and to develop targeted solutions that enhance its ability to project and sustain forces while exploiting adversary vulnerabilities across multiple domains.

As a simulation focused on contested logistics, TIDALWAVE lacked a nuclear component. Azure Dragon expands TIDALWAVE's conventional model to demonstrate a U.S.–China conflict scenario under various nuclear escalation pathways. It follows a three-phase "nested" analytic design incorporating AI pilot simulations using large language models (LLMs) to generate directional hypotheses, a human TTX to probe mechanisms and trace decision processes, and further AI simulations to refine and stress-test the model at scale.

The study team formulated four research questions about a potential theater conflict between the United States and the People's Republic of China:[1]

1. What are the thresholds for nuclear first use?

2. To which extent could nuclear hostilities escalate?

3. How could conflict termination be achieved?

4. Which capabilities and policies would enable America to prevail?

Gameplay

The Heritage Foundation recruited 15 participants from policy, political, and defense backgrounds, ensuring a high degree of subject-matter expertise. The players were divided into Red and Blue Teams. Both were instructed to assume the role of an executive committee providing strategic advice in the form of Courses of Action to their national leaders. At the beginning of each turn, they received principal guidance and situation reports from the White (control) Team. All players were also asked to complete pre- and post-game surveys.

The order of battle was designed to reflect current estimates and included the following assumptions:

- China possessed a modest FOBS for its intercontinental ballistic missile (ICBM) forces, as well as more than 400 naval vessels and dual-capable DF-26 and DF-21 intermediate-range ballistic missiles (IRBMs).

- America possessed three carrier strike groups (CSGs), ballistic missile submarines (SSBNs) armed with low-yield W-76N nuclear warheads, a globally deployable squadron of nuclear-capable aircraft (NCAs) armed with B-61 gravity bombs, and an expanded stockpile of conventional long-range standoff munitions.[2]

Gameplay began three weeks into a full-scale Chinese invasion of Taiwan. China's People's Liberation Army (PLA) established a lodgment around Taichung with roughly 20,000 troops but failed to seize Taipei. The United States had intervened with varying levels of support from Japan, Australia, South Korea, and the Philippines, and was conducting long-range precision strikes from forward bases and Guam.[3] Both sides had already absorbed heavy losses: The PLA had disabled one U.S. carrier, while U.S. conventional strikes had hit Chinese dual-capable missile systems, air defenses, fuel and rail nodes, and kill-chain enablers. Munitions and fuel stockpiles were under pressure (working with less than 40 percent of needed munition and fuel in some U.S. categories), and both sides had elevated nuclear readiness: Beijing had voided its No First Use pledge and Washington had moved to

DEFCON 2. The core dilemma was therefore not only whether Taiwan could be held, but whether either side could compel the other to concede terms without triggering uncontrolled nuclear escalation.

In Turn 1, the PLA focused on achieving victory by conventional means, executing a large-scale amphibious surge which expanded its lodgment on Taiwan to 60,000 troops. This was accompanied by strikes against U.S. bases and naval assets, as well as asymmetric and political actions, such as cyberattacks against U.S. and allied ports, along with requesting enhanced Russian bomber patrols near Alaska and the mobilization of North Korean conventional forces. The United States responded with overt nuclear posturing but avoided vertical escalation: Washington moved nuclear-capable aircraft with B61s into Kunsan (South Korea) and Kadena (Japan) and conducted a modest series of conventional strikes "limited to invasion-related targets." America was hoping to isolate Beijing diplomatically and win support from Europe, the Middle East, and Central Asia to restrict Chinese commerce.

In Turn 2, fearing a U.S. nuclear strike on its lodgment, China adopted a nuclear posture premised on tit-for-tat retaliation. Beijing threatened to strike Guam and warned U.S. allies that hosting U.S. nuclear-capable assets on their soil made them legitimate targets for nuclear use. China paired this with the test launch of a nuclear-capable hypersonic system, further conventional strikes on U.S. naval assets, and increased horizontal hybrid escalation in coordination with Russia. (Moscow launched cyberattacks against the U.S. homeland and provided Beijing with additional IRBMs.) Meanwhile, Washington attempted to roll back PLA forces in Taiwan by deploying a Marine Air-Ground Task Force alongside Japanese, Philippine, and South Korean Marines. Washington also intensified attacks on Chinese sealift, airfields, and naval surface groups to slow further PLA build-up on the island, as well as deploying a squadron of B-21 NCAs to Royal Australian Air Force Base Darwin (Australia).

In Turn 3, PLA forces broke out of their beachhead and inflicted heavy casualties on U.S. and allied units attempting to relieve Taiwan. Beijing also executed a conventional FOBS strike against U.S. nuclear bombers in Darwin and employed Russian-supplied IRBMs against U.S. naval infrastructure in Yokosuka (Japan). In response, the United States employed all available conventional assets to break Chinese sea control and supply of Chinese forces on Taiwan. U.S. attack submarines and remaining conventional airpower succeeded in sinking or disabling the PLA Navy (PLAN) as an operational fleet. However, Washington failed to prevail against the PLA and PLA Air Force (PLAAF) on the island; it also appealed unsuccessfully to the North Atlantic Treaty Organization and India for enhanced military support.

In Turn 4, the final one, Beijing consolidated its hold over Taiwan in what it described as a "reverse porcupine," surging additional PLA and PLAAF assets into captured Taiwanese airfields, layering dense air and anti–cruise missile defenses to harden those positions, and aggressively hunting the remaining U.S. carrier groups with the aim of eliminating U.S. power projection within the First Island Chain. With its PGM and jet fuel supplies nearing exhaustion, the United States conducted a non-strategic nuclear strike to eliminate Chinese airpower: The American team instructed its B-21 fleet to drop a mix of B61 gravity bombs, nuclear-armed air-launched cruise missiles (ALCMs) and conventional munitions against PLAAF bases, including on the Chinese mainland, and Chinese positions in the South China Sea.

The hotwash discussion and postgame surveys provided no indication that America's actions would have caused Beijing to capitulate: Members of the Chinese team said they would have been prepared to absorb further non-strategic nuclear strikes and would have considered retaliating with FOBS-enabled ICBMs for nuclear airburst strikes on airbases in the continental United States. The Chinese team further indicated that some sort of nuclear retaliation was guaranteed for any U.S. response and that this policy had been agreed upon by the participants at every stage in the game.

Key Insights

The TTX generated a clear set of directional hypotheses and follow-on questions which the study team (the two authors of this *Issue Brief*) will further develop and refine with AI-enabled LLM simulations incorporating gameplay data.

Thresholds for Nuclear Use. A high-intensity conflict over Taiwan could create compelling pressures for theater nuclear employment. In sharp contrast to previous suggestions that nuclear first use would only occur during an existential conflict as a desperate act of last resort (the "gambling for resurrection" thesis), America's use of NSNWs represented a deliberate and instrumental attempt to neutralize Chinese conventional theater strike capabilities.[4]

The Red Team emulating American decision-makers judged that its best nuclear employment window was at the very start of the scenario: a limited NSNW strike against the PLA lodgment on Taiwan's beaches in Turn 1, when Chinese forces were still concentrated, exposed, and not yet fully defended. China explicitly stated in the hotwash discussion that this was the outcome it feared most. Despite this judgment, the Blue Team (the

United States) only employed NSNWs during the final turn of the game and was primarily motivated by the need to eliminate PLAAF airpower after exhausting its own conventional munitions and jet fuel supplies. In all postgame surveys, participants agreed with the statement: "If my side faces imminent conventional defeat in a high-intensity regional conflict, first-use of NSNWs could be justified." This implies a "capability-collapse threshold": Once conventional strike capacity and mobility degrade past a critical point, nuclear employment becomes thinkable as a compensatory tool, even absent imminent regime survival stakes.

This raises a question to be explored in further TTXs and simulations: Would China have resorted to nuclear use had it faced similar conventional and logistical pressures? As it occurred, the Red Team (China) never felt the need to employ first use and never seriously considered it because Chinese forces were winning conventionally. Members of the Red Team believed that "time was on their side" throughout the game, allowing them to prioritize conventional actions and not feel pressured into using nuclear weapons as their only option to achieve their principal's goals.

Escalation. Nuclear escalation could be contained below the level of a large-scale strategic exchange. When considering nuclear employment, both China and America showed a strong preference for counterforce targeting aimed at degrading each other's conventional capabilities. Both teams eschewed countervalue strikes on population centers. Moreover, three-quarters of the post-game surveys agreed with the statement that "NSNW employment can be limited to theater through selective targeting," and two-thirds agreed that "low-yield, high precision [nuclear] weapons reduce the risk of runaway escalation."

An additional question requiring further analysis is: Would escalation have remained limited in the event of more extensive or protracted nuclear use?

War Termination. Theater nuclear conflict could prove indecisive. America's initial reluctance to risk escalation ultimately proved counterproductive, resulting in conventional defeat and, if the game had continued after Turn 4, a large-scale nuclear exchange. Three-quarters of the post-game surveys agreed that "stalemate is more likely than decisive victory post-first-use," and the Chinese side made it clear in the hotwash discussion that it would have continued to fight on despite U.S. nuclear employment. Conversely, players on the American team concluded that employing NSNWs against the PLA lodgment earlier in the conflict would have yielded a more favorable outcome. According to one survey: "[I]t is possible for nuke usage to restrict conflict/lead to settlement.... U.S. needed to be more aggressive more quickly."

Follow-on questions include: Could employing NSNWs at the outset of the conflict bring hostilities to a close more quickly? What are the most decisive strategies for nuclear warfighting?

Capability and Policy Implications

The United States could face acute capability shortfalls in conventional precision-guided munitions and NSNWs. Washington comprehensively failed to defeat the PLA conventionally, and U.S. nuclear forces did not achieve intra-war deterrence. In contrast, China's extensive reserves of manpower and munitions, along with its use of NSNWs and its FOBS-enabled IRBMs, provided it with significant asymmetric advantages and enabled it to achieve escalation dominance. During the hotwash, participants agreed that America would have benefited from a diversity of theater nuclear options, especially forward-deployed nuclear-capable aircraft and road-mobile ground-launched systems, as well as deeper PGM stockpiles. These would have allowed the U.S. team greater ability to hold Chinese nuclear or conventional forces at risk, and thereby give the Chinese team pause before escalating the conflict or carrying out additional invasion waves. In contrast, the Chinese team's NSNW capabilities enabled it to adopt a nuclear posture of tit-for-tat retaliation against the United States and allies—with a discernible deterrent effect on the American team's decision-making. In Turn 3, for instance, the U.S team discussed "How to respect and navigate Chinese red lines," concluding, "Don't attack mainland" and "Don't nuke the beachhead."

A key follow-on question is: Which current and hypothetical nuclear and conventional capabilities would provide America with a competitive advantage over China?

Intra-war Deterrence. The United States may struggle to demonstrate sufficient resolve to achieve intra-war deterrence. Aside from a marked inferiority in key military capabilities, America also suffered from an asymmetry of stakes. The Chinese team repeatedly disregarded U.S. nuclear posturing, judging that Washington lacked the resolve to follow through with its threats, even if it faced conventional defeat. This was reflected in the post-game surveys, in which participants' confidence that the United States would prevail against China averaged at 32.6 percent (compared to 42.3 percent pre-game). During the hotwash, many framed the asymmetry of stakes as a question of political will, stemming from a failure to define China as a critical threat in the eyes of the American public. One participant from the Chinese side wrote: "I was shocked at how weak and indecisive the U.S. was."

Key follow-on questions are: What level of brinkmanship would alter China's risk perceptions? How can America's leaders maintain public support during a prolonged nuclear conflict?

Conclusion

TTX Azure Dragon demonstrated that NSNW advantage, as China had in this scenario, limits the options of the opponent. Conversely, if both sides have rough parity and symmetry in their arsenals, that advantage optionality is neutralized.

While the TTX provided useful insights in its own right, game data will be used to inform further LLM simulations. These will be replayed thousands of times, with the objective of generating additional insights into the behaviors observed in the scenario. Ultimately, the LLM will provide a sense of how a limited theater nuclear war could start, which nuclear thresholds may exist in similar crises, and how policymakers and defense planners can craft conflict-termination scenarios.

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Endnotes

1. Leo A. Keay and Robert Peters, "Learning to Love the Bomb? Non-Strategic Nuclear Weapons and Limited Nuclear War," Heritage Foundation *Backgrounder* No. 3920, August 7, 2025, https://report.heritage.org/bg3920.
2. A key source was U.S. Department of Defense, "Military and Security Developments Involving the People's Republic of China," *Annual Report to Congress*, December 18, 2024, https://media.defense.gov/2024/Dec/18/2003615520/-1/-1/0/MILITARY-AND-SECURITY-DEVELOPMENTS-INVOLVING-THE-PEOPLES-REPUBLIC-OF-CHINA-2024.PDF (accessed December 18, 2025).
3. Within the game, Australia and Japan entered the war as cobelligerents, while South Korea and the Philippines granted overflight and basing rights to the American-led coalition. During the course of the war, South Korea became a belligerent due to Chinese strikes on bases in Korea.
4. See Mark Cancian, Matthew Cancian, and Eric Heginbotham, "Confronting Armageddon: Wargaming Nuclear Deterrence and Its Failures in a U.S.–China Conflict Over Taiwan," Center for Strategic and International Studies, December 13, 2024, https://csis-website-prod.s3.amazonaws.com/s3fs-public/2024-12/241213_Cancian_Confronting_Armageddon.pdf?VersionId=WyqddCThZRiniczNwXHKcQHgOmUP8CH8 (accessed December 18, 2025).