VIEW

Denying Command of the Air

The Future of Taiwan's Air Defense Strategy

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Abstract

Russia's invasion of Ukraine in late February 2022 sparked growing concern among many that Taiwan may be the next nation to suffer from the revanchist policies of a totalitarian regime. As the war continues to drag on, it is becoming increasingly apparent that Taiwan can learn valuable lessons from Ukraine's ability to thwart Russia's military dominance, particularly in the air domain. How can Taiwan use the air domain to deter or defeat a potential Chinese amphibious landing asymmetrically? To address the question, this article examines contemporary Chinese military writings and doctrine and draws on Julian Corbett's theory of sea denial, applying the tenets of this theory to Taiwanese airpower strategy. Taiwan's overwhelming airpower disadvantage dictates that Taipei must abandon plans to contest the People's Liberation Army for air superiority and adopt a strategy of gradual air denial that will attrit People's Liberation Army Air Force aircraft and deny China the ability to seize control of the island quickly.

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Russia's invasion of Ukraine in late February 2022 sparked growing concern among many that Taiwan may be the next nation to suffer from the revanchist policies of a totalitarian regime.[1] As the war continues to drag on, it is becoming increasingly apparent that Taiwan can learn valuable lessons from Ukraine's ability to thwart Russia's military dominance, particularly in the air domain. Russia continues to fail at achieving air superiority in Ukraine, despite its air force's size and technological edge over the Ukrainians.[2] Taiwan faces a similar challenge as it maintains a much older and smaller air force, the Republic of China Air Force (ROCAF), than the People's Liberation Army Air Force (PLAAF). Current estimates place PLAAF fighter aircraft at approximately 1,600, with 700 dedicated to the Eastern and Southern Theaters directly adjacent to Taiwan. Meanwhile, the ROCAF retains a modest fighter inventory of only 400 aircraft.[3] Simply focusing on air force capabilities fails to consider the robust

[1] Michael Schuman, "Is Taiwan Next?," *The Atlantic*, 24 February 2022, https://www.theatlantic.com/.

[2] Maximilian Bremer and Kelly A. Greico, "In Denial About Denial: Why Ukraine's Air Success Should Worry the West," *War on the Rocks*, 15 June 2022, https://warontherocks.com/.

[3] Office of the Secretary of Defense, *Military and Security Developments Involving the People's Republic of China: 2021* (Washington, DC: Department of Defense, 2021), 162, https://media.defense.gov/.

ballistic and cruise missile inventories available for the People's Liberation Army's (PLA) preliminary strikes. The disparity in resources between the ROCAF and PLAAF begs the question: how can Taiwan use the air domain to deter or defeat a potential Chinese amphibious landing asymmetrically?

Taiwan's overwhelming airpower disadvantage dictates that it must abandon plans to contest the PLA for air superiority and adopt a strategy of gradual air denial that will attrit PLAAF aircraft and deny China the ability to seize control of the island quickly. Accomplishing the task of gradual air denial will require Taiwan to reorient its defense procurement to focus on the robotization of its air force and the deployment of a robust air defense network that relies on the stockpiling of short-range air defense (SHORAD) systems. Demonstrating the necessity for air denial and the changes in Taiwan's defense investment will first require a brief overview of China's airpower strategy and its theory of victory in the air domain. Second, this article will discuss the meaning of *air denial* and how it can help Taiwan deter or potentially defeat a Chinese amphibious landing. Last, the article will highlight several necessary changes Taiwan must undertake in its defense investments to employ an air-denial strategy successfully.

Chinese Airpower Strategy and Doctrine

In contrast to the US military, the PLA maintains a narrow definition of *air dominance*, enabling PLA forces to mass assets to achieve tactical air superiority over Taiwan instead of fighting to maintain strategic air dominance. The PLA frequently uses the phrase *command of the air* to refer to "'control of a given airspace over a given period of time.'"[4] Though this term does not align perfectly with US doctrine, it most closely resembles what the US military would call *air superiority*.[5] A 2011 RAND study describes the critical difference between the PLA's definition of *air superiority* and that of the US military. The PLA's goal is to achieve a level of tactical air superiority that will enable it to achieve its campaign or tactical objectives. PLA writings indicate that it does not believe strategic air superiority is possible but prefers to achieve "local air superiority" within a defined time and geographic space.[6] The PLAAF's reluctance to expand its definition of *air superiority* likely correlates to its perceived weaknesses regarding joint air-ground integra-

[4] Kenneth W. Allen and Cristina L. Garafola, *70 Years of the PLA Air Force* (Maxwell AFB, AL: China Aerospace Studies Institute, 2021), 73, https://www.airuniversity.af.edu/.

[5] Kenneth W. Allen and Derek Solen, "Command of the Air" (research document, China Aerospace Studies Institute, October 2020), 3, https://www.airuniversity.af.edu/.

[6] Roger Cliff et al., *Shaking the Heavens and Splitting the Earth* (Santa Monica, CA: RAND, 2011), 57–59, https://www.rand.org/.

tion and aerial refueling capabilities compared to Western powers like the United States.[7] Applying the PLA's definition of *command of the air* to a potential invasion of Taiwan indicates that the PLA will initially concentrate its time and resources on the suppression and destruction of Taiwanese air defense assets and not prioritize targeting foreign powers that can compete for dominance.

China's doctrine and professional writings indicate that the PLA will pursue a decapitation strategy in the initial stages of an amphibious invasion to obtain local air superiority. The *decapitation strategy* originates in John Warden's Basic Five Ring Model, which focuses on attacking the "centers of gravity" within each ring of the enemy's system.[8] Warden emphasizes attacking leadership because it can make concessions and decisions that affect the war's course.[9] In the 2006 publication *Science of Campaigns*, PRC strategists describe how the PLA will achieve air dominance during the advanced operations phase of a landing campaign. China will rely on the PLAAF and the PLA Rocket Force to execute long-range stand-off strikes to attack "critical targets, such as the enemy's command institutions, air and naval bases, missile positions, and air defense positions."[10] The PLA aims to diminish the enemy's command system by attacking critical targets, including political and military leaders, that will hinder operational capabilities.[11] An initial joint firepower strike campaign will use kinetic strikes to target command-and-control (C2) nodes before targeting air defense systems and then focus on destroying Taiwan's war-making capability.[12] China will rely on its immense stocks of ballistic and cruise missiles to overwhelm Taiwan's air defenses and destroy its aircraft on the ground.[13] China's targeting of Taiwan's fighter aircraft and runways indicates that it views these assets as Taiwan's air defense center of gravity. Properly defending or deterring China will require Taiwan to shift its strategy from a heavy reliance on crewed air platforms to a system that retains mobility and survivability.

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[7] Jonathan G. McPhilamy, "Air Supremacy: Are the Chinese Ready?" *Military Review* 100, no. 1 (January–February 2020), https://www.armyupress.army.mil/.

[8] Warden's rings are (1) leadership, (2) organic/system essentials/key production, (3) infrastructure, (4) population, and (5) fielded military forces.

[9] John A. Warden, III, "The Enemy as a System," *Airpower Journal* 9, no. 1 (Spring 1995): 7–9, https://www.airuniversity.af.edu/.

[10] Zhang Yuliang, Yu Shusheng, and Zhou Xiaopeng, eds., *Science of Campaigns (2006)*, trans. Project Everest (Maxwell AFB, AL: China Aerospace Studies Institute, 2006), 359, https://www.airuniversity.af.edu/.

[11] Zhang, Yu, and Zhou, *Science of Campaigns*, 360.

[12] Joel Wuthnow et al., eds. *Crossing the Strait: China's Military Prepares for War with Taiwan* (Washington, DC: National Defense University Press, 2022), 122, https://ndupress.ndu.edu/.

[13] Michael Lostumbo et al., *Air Defense Options for Taiwan: An Assessment of Relative Costs and Operational Benefits* (Santa Monica, CA: RAND, 2016), 13–18, https://www.rand.org/.

Taiwan's Air Defense Strategy

Taipei's current defense spending indicates that Taiwan's strategy for airpower in the event of an invasion is to potentially pursue what Robert Pape would call a *denial strategy* through operational and even strategic interdiction. Pape defines a *denial strategy* as one that "seeks to thwart the enemy's military strategy for taking or holding its territorial objectives."[14] A denial strategy through strategic interdiction involves attacking military production facilities to reduce what is available to the enemy. In contrast, operational interdiction focuses on impeding operational C2 and the tactical flow of supplies within a given theater.[15] Operational interdiction would rely heavily on Taiwan's ability to employ its air and missile resources to interdict PLA vessels as they move to resupply ground forces. One of the fundamental problems with Taiwan's ability to implement Pape's version of denial is that it requires air superiority, which Taiwan is unlikely to achieve by relying on exquisite air platforms.[16]

Recent spending indicates that Taiwan seeks to accomplish a denial strategy by using missiles to threaten the Chinese mainland and confronting landing forces with modern conventional equipment.[17] Regarding the air domain, Taiwan's purchases suggest that it will continue to invest in advanced air platforms to compete with the PLAAF for air superiority and enhance its ability to conduct operational interdiction. In 2019, Taiwan announced the purchase of an additional 66 F-16 fighters from the United States.[18] In addition to F-16 fighters, Taiwan's defense minister continues to express interest in acquiring the fifth-generation F-35.[19] For air defense, Taiwan appears to rely heavily on the Patriot surface-to-air system to help defend its air bases and enable the ROCAF to contest China for air superiority.[20] Taiwan's investment in capabilities to challenge control of the skies ignores the reality that most aircraft and stationary air defenses are vulnerable to a Chinese saturation attack. Deterring or defeating a Chinese amphibious invasion will require a shift in Taiwan's current airpower strategy from contesting the

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[14] Robert A. Pape, *Bombing to Win: Air Power and Coercion in War* (Ithaca, NY: Cornell University Press, 1996), 69, https://www.jstor.org/.

[15] Pape, *Bombing to Win*, 71–73.

[16] Pape, *Bombing to Win*, 58.

[17] Michael A. Hunzeker, "Taiwan's Defense Plans Are Going Off the Rails," *War on the Rocks*, 18 November 2021, https://warontherocks.com/.

[18] Hunzeker, "Taiwan's Defense Plans Are Going Off the Rails."

[19] Franz-Stefan Gady, "Defense Minister: Taiwan Is Seeking F-35 Stealth Fighter," *The Diplomat*, 15 May 2018, https://thediplomat.com/.

[20] "U.S. Approves $95 mln boost to Taiwan's air defense system," *Reuters*, 5 April 2022, https://www.reuters.com/.

PLAAF for air superiority to one that cedes initial control of the skies but gradually denies access with asymmetric capabilities.

A denial strategy is appropriate for Taiwan, but not as Pape defines it. This is due to the difficulty associated with achieving air superiority in a conflict with China. Instead, Taiwan needs to reorient its air strategy to gradual air denial, focused on degrading the PLA's combat power and denying it superiority during its amphibious landing. As explained by Maximilian Bremer and Kelly Grieco, Taiwan needs to realign its air strategy to fit the concept of sea denial described by Julian Corbett. [21] Applying Corbett's idea to the ROCAF, Taiwan will need to survive initial strikes to ensure that it maintains a level of air defense that can harass and dispute control of the air.[22]

Ukraine's air defense operations provide an apt example of how to accomplish Corbett's strategy of air denial. After a year of conflict in Ukraine, Russia remains unable to exert air superiority despite its numerical and qualitatively superior air force.[23] Stijn Mitzer confirms that Russia has lost approximately 283 aircraft in the conflict, with 192 destroyed.[24] Ukraine accomplished this by relying on its mobile air defense systems to constantly threaten Russian aircraft.[25] The ability to deny Russia air superiority is now assisting Ukraine in its counteroffensives by denying Russia the ability to conduct aerial reconnaissance over Ukrainian positions.[26]

Unlike current operations in Ukraine, it is difficult to execute "shoot and scoot" tactics with large air defense systems and retain airfield redundancy in Taiwan.[27] Terrain and urbanization challenges force Taiwan to use unmanned aerial vehicles (UAV) and SHORAD systems to conform to Corbett's principles of denial because of their mobility and potential to operate in Taiwan's restricted and urban terrain.

Due to the PLA's overwhelming superiority, Taiwan should initially cede control of the air domain to retain SHORAD capabilities and the ability to contest the PLA's air superiority during an amphibious landing when the PLAAF and PLA Army are most vulnerable. Air superiority is essential for the success of any amphibious operation. The success rate of modern amphibious landings without

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[21] Bremer and Grieco, "In Denial About Denial."

[22] Bremer and Grieco, "In Denial About Denial."

[23] Bremer and Grieco, "In Denial About Denial."

[24] Stijn Mitzer, "List of Aircraft Losses during the 2022 Russian Invasion of Ukraine," *Oryx*, 20 March 2022, https://www.oryxspioenkop.com/.

[25] Bremer and Grieco, "In Denial About Denial."

[26] Maximilian Bremer and Kelly Grieco, "Success Denied: Finding Ground Truth in the Air War over Ukraine," *Defense News*, 21 September 2022, https://www.defensenews.com/.

[27] Bremer and Grieco, "In Denial About Denial."

air superiority plummets to only 14 percent.[28] Taiwan should look to lessons from the North Atlantic Treaty Organization's (NATO) operations in Kosovo to preserve its air defense force. Instead of using their radars simultaneously, Yugoslavian integrated air defense systems (IADS) relied on ballistically fired surface-to-air missiles to force NATO aircraft to lower altitudes for man-portable air defense system (MANPADS) engagement. By keeping their radars off, the Yugoslavs preserved their force by relying on a challenging asset to locate because of its mobility. Additionally, Taiwan can leverage its restricted terrain to complicate the suppression of enemy air defense (SEAD) campaign and harden its communications systems as the Yugoslavs did against NATO.[29] If Taiwan can survive the initial brutality of China's long-range strike campaign, it can use its SHORAD and remaining long-range assets to deny the PLAAF air superiority and exploit the PLA's vital weakness, joint air-ground integration.[30] Therefore, Taiwan's strength lies not in its ability to compete for air superiority but rather in its ability to gradually deny air superiority and impose severe costs during one of the most complicated military operations, an amphibious landing.

Future Air Defense Investments

Achieving a strategy of gradual denial will require the ROCAF to cut its procurement of crewed aircraft and instead seek the robotization of its forces using UAVs. Recent conflicts, such as those in Nagorno-Karabakh and Ukraine, illustrate the utility of UAVs on the future battlefield. In Nagorno-Karabakh, the Azerbaijanis used cheap drones to force Armenian air defense systems to reveal themselves then employed armed or kamikaze drones to destroy the exposed air defense systems. With Armenian air defenses neutralized, the Azerbaijanis used UAVs to devastate Armenian ground forces and facilitate an advance into the disputed territory.[31] Essentially, Azerbaijan employed a low-cost option to substitute for a crewed air force, which enabled ground maneuver.

The Ukrainians operate military and civilian drones to increase the tactical leader's situational awareness and facilitate strikes against targets. Current assessments state that the Ukrainians used UAVs to strike artillery batteries, armor

[28] Steven A. Yeadon, "The Problems Facing United States Marine Corps Amphibious Assaults," *Journal of Advanced Military Studies* 11, no. 2 (Fall 2020), 150, https://www.usmcu.edu/.

[29] Thomas Withington, *Wild Weasel Fighter Attack: The Story of the Suppression of Enemy Air Defenses* (Barnsley, UK: Pen & Sword Aviation, 2008), 182–83.

[30] McPhilamy, "Air Supremacy."

[31] Robyn Dixon, "Azerbaijan's Drones Owned the Battlefield in Nagorno-Karabakh—and Showed Future of Warfare," *Washington Post*, 11 November 2020, https://www.washingtonpost.com/.

formations, and naval vessels, including the *Moskva*.[32] Taiwan must study these conflicts to identify which cheap military UAVs and commercial drones can perform the same functions as crewed aircraft for a fraction of the cost and without the risk of destruction at the onset of hostilities. Previous uses of UAVs in Nagorno-Karabakh and Ukraine demonstrate that the ROCAF can identify and strike enemy ground and amphibious forces without crewed aircraft.

China's insistence on destroying air base infrastructure during the initial phases of its campaign means that Taiwan should procure UAVs that can be mass produced and are capable of vertical takeoff and landing. There are several systems that Taiwan can look to procure, but most will likely come from the United States because of Taipei's unique international status. As such, Taiwan should look to acquire systems that the US Air Force is beginning to test, such as the XQ-58A Valkyrie, which is significantly cheaper than crewed platforms at USD 2 million per copy.[33] The US Air Force plans to potentially use these aircraft as part of its UAV wingman program because it is mass producible and expendable.[34] Given Taiwan's situation relative to China, the ROCAF can look to substitute crewed platforms with the Valkyrie. Relatively low costs mean that Taiwan can use its small defense budget of USD 19.41 billion to procure more systems.[35] Instead of spending USD 8 billion on 66 new F-16s, Taiwan could use the same money to purchase more than 4,000 Valkyries or a combination of various types of UAVs to focus on contesting airspace through the employment of mass as opposed to exquisite platforms.[36]

The ROCAF can use two additional capabilities—drone swarms and loitering kamikaze drones—to close the gap with the PLAAF by threatening landing forces. Drone swarms are currently only in a testing phase for militaries worldwide, but increased investment in the artificial intelligence that underlies drone swarms will pay dividends for Taiwan. According to Paul Scharre, defensive drone swarms could provide "an automatically responsive protective bubble around

[32] Elias Yousif, "Drone Warfare in Ukraine: Understanding the Landscape," *Conventional Arms* (blog), 30 June 2022, https://www.stimson.org/.

[33] T.X. Hammes, *An Affordable Defense of Asia* (Washington, DC: Atlantic Council, June 2020), 15, https://www.atlanticcouncil.org/.

[34] Valerie Insinna, "Air Force Pilots Try Out XQ-58A Valkyrie Drones ahead of Potential UAV Wingman Program," *Breaking Defense*, 10 November 2022, https://breakingdefense.com/.

[35] Reuters, "Taiwan Proposes Large Rise in Defense Spending amid Escalating China Tensions," *CNBC*, 25 August 2022, https://www.cnbc.com/.

[36] Phil Stewart, Idrees Ali, and Yimou Lee, "Exclusive: U.S. Seeks Way to Speed Delivery of New Fighter Jets to Taiwan," *Reuters*, 20 January 2022, https://www.reuters.com/.

units, to intercept potential threats."[37] Taiwan could employ these assets in the "air littoral" to disrupt PLAAF efforts to provide close air support (CAS) and act as a form of air defense. Once again, Bremer and Grieco note that the threat of collision could deny air superiority to countries operating expensive fifth-generation fighters, which China currently has allocated to its Eastern Theater Command.[38] In addition to swarm technology, Taiwan should seek to acquire numerous loitering drones from the United States, including the Switchblade. The United States provided Switchblade 300 drones to Ukraine, which used them to destroy lightly armored targets, including fuel trucks and personnel carriers. Reports indicate that the new Switchblade 600 can potentially destroy heavily armored targets.[39] Taiwan could use both swarming technology and loitering munitions to deny the PLAAF air superiority at the PLA's landing sites while also threatening troop and ship transports. Low-cost threats such as these provide Taiwan with a unique force multiplier that will prove more capable than the ROCAF's current crewed aircraft.

In addition to a roboticized air force, Taiwan must acquire additional SHORAD systems and stockpile munitions to attrit PLAAF aircraft forced to lower altitudes by the necessity to conduct CAS for landing forces. Determining the exact number of systems currently in Taiwan's arsenal is difficult, but it possesses three significant SHORAD assets: the Avenger, Sky Sword, and Sea Oryx.[40] SHORAD systems such as the Avenger and its Stinger missile continue to prove lethal on the battlefield, particularly by Ukrainian forces who continue to request additional supplies.[41] Before Ukraine, Afghan mujahadeen fighters used the Stinger to destroy up to 269 Soviet aircraft throughout their employment.[42] Investing in large quantities of these systems and stockpiling their munitions is critical for Taiwan to contest its airspace and attrit PLAAF aircraft, particularly since Taiwan does not share a land border from which the United States can resupply it. The mobility of these systems and the MANPADS variant of the Stinger is vital to presenting the PLA with more problems than it can hope to counter. As

[37] Paul Scharre, "How Swarming Will Change Warfare," *Bulletin of the Atomic Scientists,* 74, iss. 6 (2018), 387, https://thebulletin.org/.

[38] Maximilian K. Bremer and Kelly A. Greico, "The Air Littoral: Another Look," *Parameters* 51, no. 4 (2021), 71, https://press.armywarcollege.edu/.

[39] Stephen Losey, "Switchblade Kamikaze Drone Production to Ramp Up Following Ukraine Use," *Defense News*, 11 October 2022, https://www.defensenews.com/.

[40] "Taiwan," *Missile Defense Advocacy Alliance*, 18 July 2018, https://missiledefenseadvocacy.org/.

[41] Mike Stone, "U.S. Buys More Stingers after Missiles' Success in Ukraine," *Reuters*, 27 May 2022, https://www.reuters.com/.

[42] David B. Ottaway, "Stingers Were Key Weapon in Afghan War, Army Finds," *Washington Post*, 5 July 1989, https://www.washingtonpost.com/.

James Timbie and James Ellis note, short-range air defense is essential for increasing the level of risk China must assume when invading Taiwan. The cost imposed by these relatively cheap systems may deter China from launching an amphibious invasion.[43]

Some may argue that instead of a robust SHORAD capability, Taiwan should focus the bulk of its investment on long-range air defense (LRAD) systems to function as an antiaccess/area-denial (A2/AD) capability. Ukraine employed LRADs such as the S-300 to devastating effect against the Russian Air Force, forcing Russian forces to conduct stand-off strikes from Russian airspace or fly extremely low, leaving them vulnerable to MANPADS.[44] Yugoslavia had similar success in targeting NATO aircraft, as previously mentioned. Ultimately, LRADs will help attrit PLAAF ballistic missiles and aircraft during the initial assault but are unlikely to survive a saturation attack because they are relatively immobile. One of Taiwan's most mobile assets, the Patriot, takes a minimum of one hour to prepare for movement and another hour to emplace and prepare for operations.[45] In addition to mobility, Patriot batteries cost approximately USD 1 billion each, which is significant given Taiwan's small defense budget.[46] One potential solution to the immobility and exposure of LRADs is containerization. Major powers continue to demonstrate the ability to launch cruise missiles from containers, and experts believe that it is only a matter of time before air defense systems can launch from containers.[47] A European company, MBDA, demonstrated its ability to containerize a short-range system in 2019, enabling any ship with enough space for a container to act as an air defense asset.[48] Placing LRADs such as the Patriot into containers reduces the likelihood the PLA can identify and destroy Taiwan's assets during an initial strike.

Conclusion

Despite Taipei's rhetoric toward creating an asymmetric force, the evidence seems to indicate that Taiwan is preparing for the opposite, particularly regarding

[43] James Timbie and James O. Ellis Jr., "A Large Number of Small Things: A Porcupine Strategy for Taiwan," *Texas National Security Review* 5, iss. 1 (Winter 2021/2022), https://tnsr.org/.

[44] Bremer and Grieco, "In Denial About Denial."

[45] Department of the Army, FM 3-01: *U.S. Army Air and Missile Defense Operations* (Washington, DC: Headquarters, Department of the Army, 2020), 7–8, https://armypubs.army.mil/.

[46] Harry Halem and Eyck Freymann, "Ukraine Shows Why Taiwan Needs More Air Defense," *War on the Rocks*, 7 April 2022, https://warontherocks.com/.

[47] Hammes, "An Affordable Defense," 13.

[48] Joseph Trevithick, "This Containerized Missile Launcher Could Give Almost Any Ship Short-Range Air Defenses," *The Drive*, 22 February 2019, https://www.thedrive.com/.

the air domain. Current defense spending suggests that Taiwan will attempt to contest the PLAAF for command of the air by pitting its F-16 fighters against China's fourth- and fifth-generation aircraft. The PLA's ability to hold these aircraft and Taiwan's current air defenses at risk with long-range precision strikes dictates that Taipei must pursue a new strategy for the air domain in the event of an invasion. Deterring or defeating China will require Taiwan to adopt a strategy that creates enough redundancy in its air defense networks to absorb the PLA's initial strikes but retain the necessary capabilities to deny air superiority gradually and impose substantial costs on the PLAAF. A strategy of gradual denial will require the ROCAF to abandon its continued procurement of crewed platforms in favor of a roboticized air force supplemented by a robust SHORAD network. Through the application of mass, Taiwan can increase the PLA's operational cost to an unacceptable level and successfully retain its unique status. ✪

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