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Chinese drone TB-001 may have been involved in Ballistic Missile Impact

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Introduction: The Issue

The rhetoric and actions of China, which has been increasing its military presence around Taiwan, are causing strong alarm not only for surrounding countries but also for the international society.

On August 4, 2022, the Chinese People's Liberation Army (PLA) began large-scale joint military exercises around Taiwan, under the command and control of the Eastern Theater Command.¹ This military action, carried out in retaliation for the visit to Taiwan by U.S. Speaker of the House Nancy Pelosi, was positioned as “important military exercises” and was conducted on an unprecedented scale.² For this exercise, Chinese authorities established six restricted maritime areas and their airspace that appear to surround Taiwan. The fact that several ballistic missiles were actually fired into these restricted maritime areas and airspace served as a reminder to the international community of China's hardline approach.³

According to the Ministry of Defense of Japan, nine ballistic missiles fired by the PLA were launched from China's inland area, Zhejiang Province, and Fujian Province between 2:56 p.m. and 4:08 p.m. on August 4 (see Figure 1). Of these missiles, one fired from Zhejiang Province and four from Fujian Province made impact in Japan's exclusive economic zone (EEZ) south of Yonaguni Island (Yonaguni Town, Okinawa Prefecture).⁴ At a press conference on August 5, Chinese Foreign Ministry Spokesperson Hua Chunying (Assistant Minister of Foreign Affairs) was asked about the missiles making impact in Japan's EEZ. Her response, “China and Japan have not carried out maritime delimitation in relevant waters, so [Beijing] has no view of a ‘Japanese EEZ,’”⁵ highlights some of the unresolved issues between the two countries. Additionally, this was the first time that some of the ballistic missiles launched by the PLA crossed the skies of Taiwan.

China's military intimidation in response to U.S. and Taiwanese pro-independence forces is comparable in scale and intensity to the Third Taiwan Strait Crisis of 1995–96, according to some observers,⁶ and may eventually go down in

¹ “中国人民解放军将进行重要军事演训行动开组织实弹射击 [The Chinese People's Liberation Army to conduct important military exercises and training activities and organize live-fire drills],” 解放军报 [*PLA Daily*], August 3, 2022.

² “我军在台岛周边海空域成功举行实战化总合演训 [Our military succeeds in conducting realistic combat joint exercises in the sea and airspace around Taiwan Island],” 解放军报 [*PLA Daily*], August 5, 2022.

³ Minne Chan, Lawrence Chung, and Cyril Ip, “A day of firsts as massive Chinese military drills break decades-old tacit rules with Taiwan,” *South China Morning Post*, August 4, 2022, <https://amp-scmp.com.cdn.ampproject.org/c/s/amp.scmp.com/news/china/military/article/3187761/day-firsts-massive-chinese-military-drills-break-decades-old>, accessed on August 24, 2022.

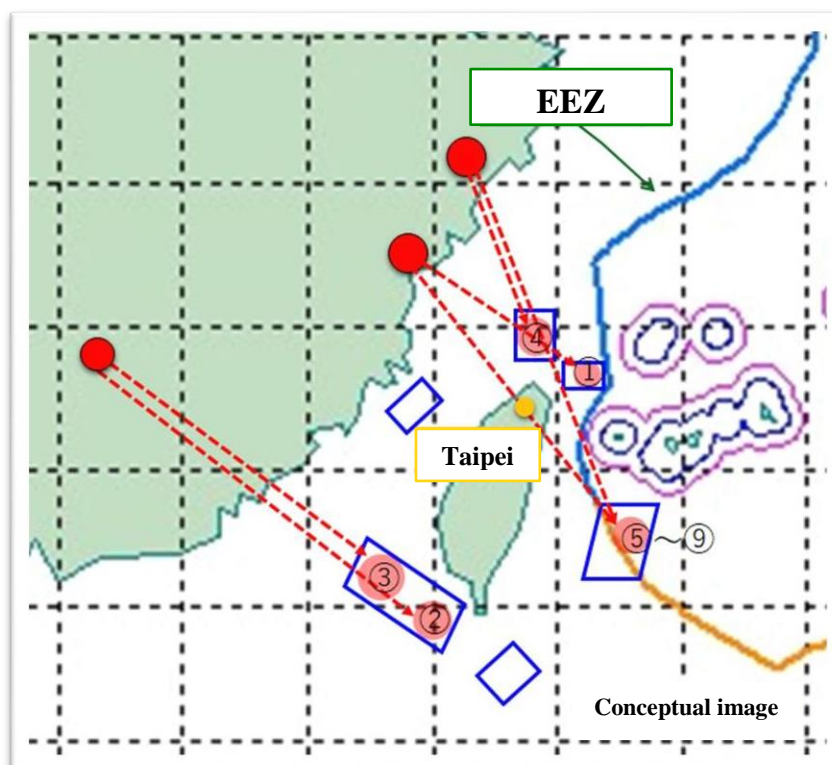
⁴ “Chugokugun ga ‘Taiwan fusa’ daikibo enshu kaishi: dando misairu 11-patsu hassha, 5-hatsu ga Nihon EEZ-nai ni rakka [The Chinese military begins large-scale ‘Taiwan blockade’ exercises: launches 11 ballistic missiles, 5 fall within Japan's EEZ],” *Yomiuri Shimbun*, August 4, 2022, <https://www.yomiuri.co.jp/world/20220804-OYT1T50208/>, accessed on September 12, 2022.

⁵ Mitsuzuka Shohei, “Enshu mokuteki ‘gaibu seiryoku haijo’ [Exercise purpose to ‘exclude external forces’],” *Sankei Shimbun*, August 6, 2022.

⁶ “Taiwan soto, chohatsu ni yokusei taio, misairu joku tsuka, jumin wa reisei: Chugoku gunji enshu futsukame [Taiwanese president reacts to provocations with restraint, missiles pass overhead, residents remain calm: day two of Chinese military exercises],” *Jiji Press*, August 5, 2022, <https://www.jiji.com/jc/article?k=2022080500158&g=int>, accessed on September 12, 2022.

history as the “Fourth Taiwan Strait Crisis.”

Figure 1 Chinese ballistic missile impacts in relation to the restricted maritime areas and airspace



Source: Ministry of Defense, “Chugoku dando misairu hassha ni tsuite [China’s ballistic missile launches],” Press Release, August 4, 2022, <https://www.mod.go.jp/j/press/news/2022/08/04d.html>, accessed on September 12, 2022.

At the same time, there is another significant event that deserves attention: three Chinese unmanned aerial vehicles (UAV) flew south of the Sakishima Islands in Okinawa Prefecture and off the northeast coast of Taiwan on the same day as the ballistic missile launches, August 4. From morning through night, a Chinese TB-001 reconnaissance and strike UAV and a Chinese BZK-005 reconnaissance UAV flew between Okinawa Island and Miyako Island to the Pacific Ocean, separately circled the skies over the Pacific Ocean south of the Sakishima Islands, and returned to the East China Sea on the same route.⁷ In addition, an aircraft, presumed to be an UAV, was also spotted flying in from the East China Sea and circling off the northeast coast of Taiwan.⁸ What did these UAV flights signify?

The TB-001 UAV has neared Japan around five times thus far. Every time, the Japan Air Self-Defense Force responded by scrambling, and the Joint Staff of the Ministry of Defense released a summary of activity. Nevertheless, Chinese authorities have not provided any responsible account of the repeated inexplicable flights by UAVs, and surrounding countries are struggling to deal with the situation.

The purpose of this paper is to analyze and draw inferences from various perspectives about the premises underlying such responses, i.e., the objective of the inexplicable flights by Chinese UAVs. As will be examined closely, the military action on the first day of the important military exercises since early August offers critical hints. In order to deal with the military actions of China, which repeatedly conducts inexplicable UAV flights and does not face up to its responsibilities, we must first decipher the true motives and intentions of its actions. However, it must be said that the news reports and discussions to date have not provided a sufficiently persuasive argument. What is required is a frame of mind that builds

⁷ “Chugoku mujinki Sakishima nanpo ni [Chinese drones spotted south of Sakishima Islands],” *Sankei Shimbun*, August 6, 2022.

⁸ Joint Staff, “Chugokuki no doko ni tsuite [Moves by Chinese aircraft],” *Joint Staff Press Release*, August 5, 2022, https://www.mod.go.jp/js/pdf/2022/p20220805_01.pdf, accessed on September 7, 2022.

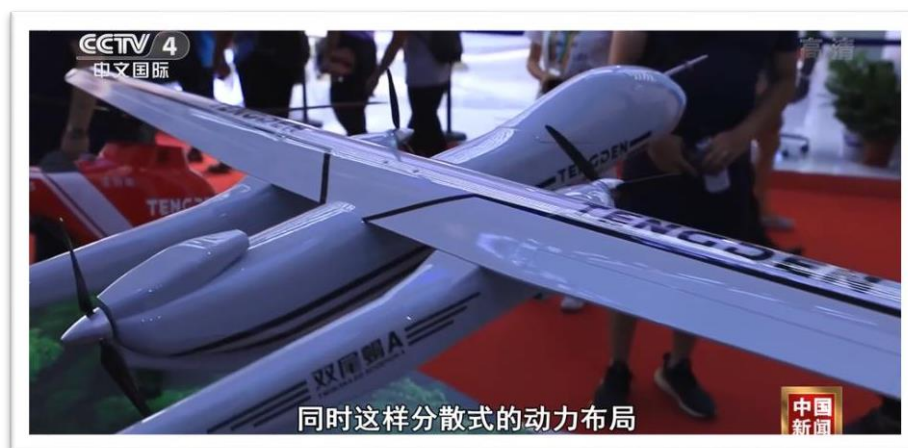
on expertise in China's military actions and practical experience in flight operations.

With the above goal, this article makes analyses from China's official announcements, news reports, actual flight paths, and other data, and contends that the TB-001 UAV may have been involved in the impacts of the ballistic missiles launched on the same day at around the same time.

Premise (1): What is the TB-001 UAV?

What kind of aircraft is the TB-001 UAV? According to the website of its manufacturer, Sichuan Tengden Sci-Tech Innovation Co. ("Tengden"), the TB-001 UAV was developed as a medium-altitude long-endurance (MALE) UAV.⁹ Fitted with three propeller engines, the TB-001 UAV is capable of long-range and long-duration flights. Accordingly, a variety of uses has been anticipated, such as transporting supplies and relaying communications (see Figure 2). As implied by its name in China, "Twin-Tailed Scorpion A (TW328-A)," the aircraft is designed with two fuselages to secure payload capacity. The fuselage has a total length of 10.5 meters, wingspan of 20 meters, and total height of 3.1 meters, enabling a maximum takeoff weight of 3,250 kilograms, maximum range of 7,200 kilometers, maximum flight time of 36 hours, maximum speed of 360 kilometers per hour, and service ceiling of 10,000 meters.¹⁰

Figure 2 A mock-up of the TB-001 UAV displayed at the 13th China International Aviation and Aerospace Exhibition



Source: CCTV, "关注第十三届中国航展 首款‘三发’无人机 造型独特功能多样 [Spotlight on the 13th China International Aviation and Aerospace Exhibition: the first 'three-engine' UAV with unique shape and various functions]," 中国新闻 [China News Service], October 3, 2021.

The TB-001 conducted its first successful flight in Chengdu in China's Sichuan Province in September 2017 and entered mass production following test flights of the mass production model in March 2019. According to Jane's almanac, the TW328 (TB-001 UAV) can carry sensors and communications equipment in the cargo bay of its central fuselage, and is designed to provide communications relay support from the sky even in rugged mountainous areas where radio propagation is difficult.¹¹

Tengden has not officially acknowledged military use of the TW328. Notwithstanding this, it has appeared in ground displays at air shows, such as CAEXPO 2017 hosted by China, and has been seen with an IR (infrared)/EO (electro-optical)

⁹ Tengden, "双尾蝎A [Twin-Tailed Scorpion A]," Sichuan Tengden Sci-Tech Innovation Co., <https://www.tengden.com/product/1.html>, accessed on September 7, 2022.

¹⁰ Ibid.

¹¹ "TW328/ TB001 Twin Tailed Scorpion," *Jane's All the World's Aircraft: Unmanned 2020-2021* (Coulsdon: Janes, 2020), p. 47.

camera pod in the center belly although details are unknown.¹² Moreover, the latest report by the U.S. Department of Defense affirms that, in addition to the armed TW328, Tengden displayed a dual-engine TW356 (transport type) with a large cargo pod suspended between two large engine nacelles.¹³ As for armament, the TW328 has two hardpoints under its wings, ensuring a total payload of 1,200 kilograms (see Figure 3).

Figure 3 An armed TB-001 UAV



Source: CCTV, “第 13 届中国航展 首款‘三发’无人机造型独特功能多样 [The 13th China International Aviation and Aerospace Exhibition showcases the first ‘three-engine’ UAV with unique shape and various functions],” 东方新闻 [East Day News], October 3, 2021.

The TW328 has been seen with air-to-surface missiles, such as the FT-8D, FT-9, and FT-10D, as well as the FT-7 glide bomb and China Aerospace Science and Industry Corporation’s (CASIC) C-702K anti-ship missile and CM-502KG precision missile for ground attack.¹⁴ It is clear that the PLA uses the TW328, albeit details are still unknown such as which military service and organization it belongs to.

Premise (2): Past Instances of the TB-001 UAV Approaching Japan

The TB-001 UAV has neared Japan around five times thus far. The first time was on August 24, 2021, about a year before Pelosi’s visit to Taiwan. At that time, a single TB-001 UAV entered Japan’s air defense identification zone (ADIZ) from the East China Sea near China but did not go south of 27 degrees north latitude.¹⁵ On the following day, August 25, the BZK-005 UAV flew southward between Okinawa Island and Miyako Island to the Pacific Ocean, along with a Y-9 PLA naval patrol aircraft.¹⁶ On the next day, August 26, the TB-001 UAV entered the ADIZ for the second time. (Similar

¹² Ibid.

¹³ U.S. Department of Defense, *Military and Security Developments Involving the People’s Republic of China 2021*, Office of the Secretary of Defense, 2021, p. 57.

¹⁴ *Jane’s All the World’s Aircraft: Unmanned 2020-2021*, p. 47.

¹⁵ Joint Staff, “Suitei chugokuki no higashishinakai ni okeru hiko ni tsuite [Flight by supposed Chinese aircraft over the East China Sea],” *Joint Staff Press Release*, August 25, 2021, https://www.mod.go.jp/js/pdf/2021/p20210825_02.pdf, accessed on September 7, 2022.

¹⁶ Joint Staff, “Chugokuki no higashishinakai oyobi taiheiyo ni okeru hiko ni tsuite [Flight by Chinese aircraft over the East China Sea and the Pacific Ocean],” *Joint Staff Press Release*, August 25, 2021, https://www.mod.go.jp/js/pdf/2021/p20210825_04.pdf, accessed on September 7, 2022.

to the BZK-005 on the previous day,) the TB-001 UAV flew between Okinawa Island and Miyako Island toward the Pacific Ocean in conjunction with the Y-9 PLA naval patrol aircraft and turned back, retracing almost the same route.¹⁷

The third entry into the ADIZ occurred on July 25, 2022, ten days before the “important military exercises” discussed in this article. A single TB-001 UAV entered Japan’s ADIZ from the East China Sea, flew southwestward between Okinawa Island and Miyako Island, and circled the skies off Taiwan’s eastern coast for several hours.¹⁸ *Global Times*, a newspaper under the Chinese Communist Party’s official newspaper, *People’s Daily*, states: after the TB-001 UAV completed its circling flight, it crossed the Bashi Channel and headed northward on the western side of Taiwan before returning toward Shanghai along the median line of the Taiwan Strait.¹⁹ If the *Global Times* article is correct, the TB-001 UAV, which flew above waters east of Taiwan by passing through the Miyako Strait, reconnoitered the Han Kuang 38 Taiwanese military exercise off the northeast coast of Taiwan and conducted a long flight, making a full circle clockwise around the main island of Taiwan, before returning to China.

The fourth entry took place on August 4, 2022, which is the focus of this article. (As described in more detail below,) on the first day of the important military exercises, three UAVs, including the TB-001, circled in the restricted maritime areas and airspace established around Taiwan.²⁰ The fifth entry occurred on August 30, 2022, when a single aircraft entered Japan’s ADIZ from the East China Sea, flew between Okinawa Island and Miyako Island heading toward the eastern side of Taiwan, and turned back, retracing almost the same route.²¹

Based on premises (1) and (2), it is clear that the TB-001 UAV is operated by the PLA. The TB-001 UAV was considered to belong to the PLA Navy, as it flew along with a PLA Navy patrol aircraft when it entered the ADIZ on August 26, 2021. In the August 4, 2022 instance, however, the service or organization which the TB-001 UAV belongs to is unknown, raising the possibility that it was associated with ballistic missile operations.

Analysis of the TB-001 UAV’s Flight Path on August 4, 2022 and Hypothesis

The flight by three UAVs on August 4, 2022 mentioned above has important implications for the discussion in this article. To keep the discussion from becoming overly broad, this article examines only the TB-001 UAV in-depth.

On the morning of August 4, the TB-001 UAV entered Japan’s ADIZ from the East China Sea and flew toward skies off Taiwan’s eastern coast through the Miyako Strait, skillfully ensuring it did not intrude into Japanese territorial airspace. As shown in Figure 4, the UAV then circled in the restricted maritime areas and airspace established by China. This TB-001 UAV retraced the same route back to the East China Sea. As the flight continued into the evening, it may be assumed that the UAV flew near the restricted maritime areas and airspace at around the same hours that impact was made in those areas by ballistic missiles launched by the PLA Rocket Force under the Eastern Theater Command (from about 1:00 p.m. to 4:00 p.m.).

Aside from the TB-001 UAV discussed in this article, the BZK-005 UAV and a flying object whose details could not be confirmed (presumably a UAV) also flew in the same manner.²² They too circled near the restricted maritime areas and

¹⁷ Joint Staff, “Chugokuki no higashishinakai oyobi taiheiyo ni okeru hiko ni tsuite [Flight by Chinese aircraft over the East China Sea and the Pacific Ocean],” *Joint Staff Press Release*, August 26, 2021, https://www.mod.go.jp/js/pdf/2021/p20210826_01.pdf, accessed on September 7, 2022.

¹⁸ Joint Staff, “Chugokuki no doko ni tsuite [Moves by Chinese aircraft],” *Joint Staff Press Release*, July 25, 2022, https://www.mod.go.jp/js/pdf/2022/p20220725_01.pdf, accessed August 12, 2022.

¹⁹ Liu Xuanzun, “Taiwan fails to report PLA drone’s 1st island-circulating flight, ‘reflects great vulnerability,’” *Global Times*, July 27, 2022, <https://www.globaltimes.cn/page/202207/1271535.shtml>, accessed on September 5, 2022.

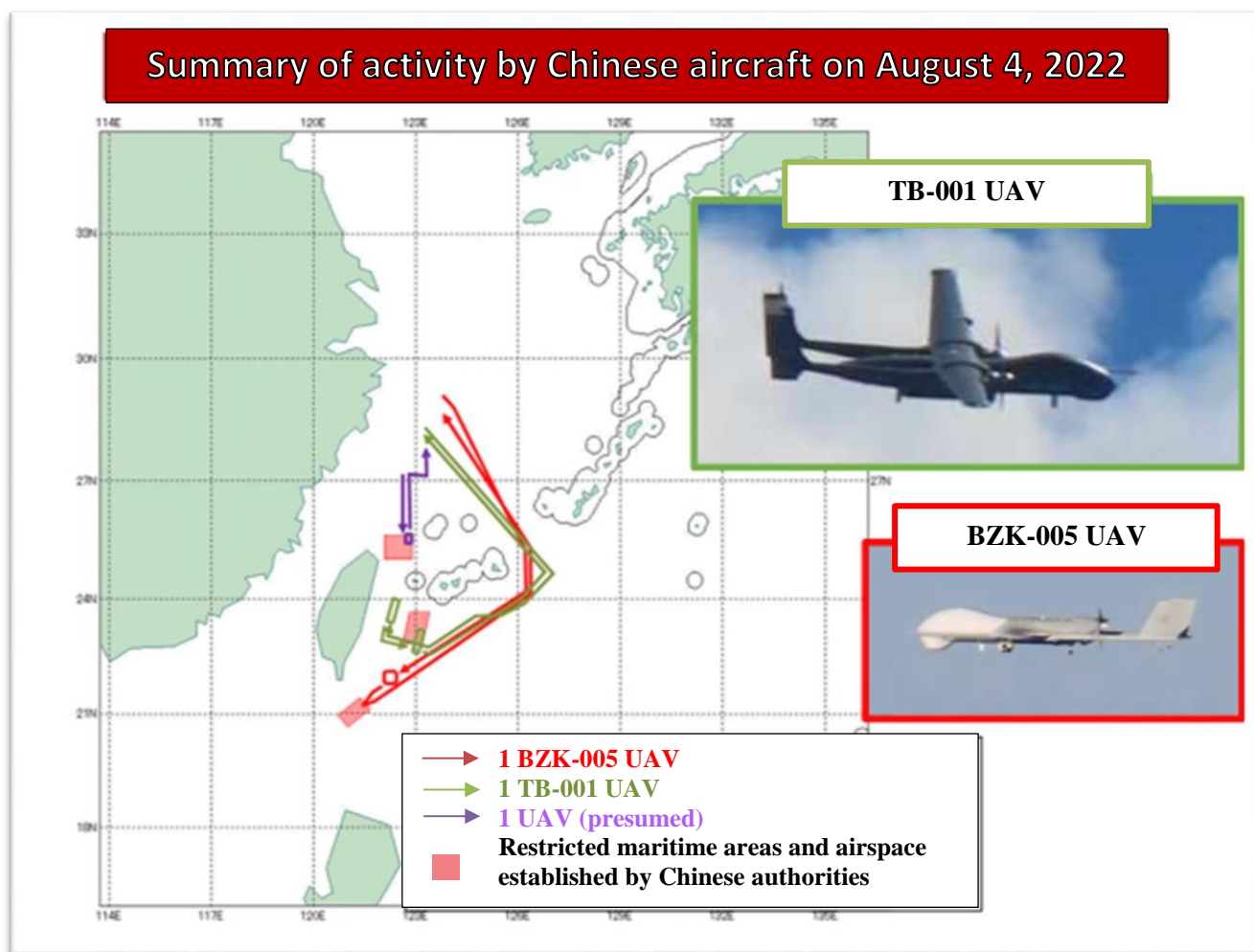
²⁰ Joint Staff, “Chugokuki no doko ni tsuite [Moves by Chinese aircraft],” *Joint Staff Press Release*, August 5, 2022, https://www.mod.go.jp/js/pdf/2022/p20220805_01.pdf, accessed on September 7, 2022.

²¹ Joint Staff, “Chugokuki no doko ni tsuite [Moves by Chinese aircraft],” *Joint Staff Press Release*, August 30, 2022, https://www.mod.go.jp/js/pdf/2022/p20220830_02.pdf, accessed on September 7, 2022.

²² “Chugoku mujinki Sakishima nanpo ni [Chinese drones spotted south of Sakishima Islands],” *Sankei Shimbun*, August 6, 2022.

airspace, as Figure 4 shows, indicating that these UAVs were engaged in similar activities. Looking at the flight paths, the question as to whether the UAVs belong to the PLA Navy may not be all that important. Rather, it may be wiser to understand that China utilizes UAVs flexibly according to operational needs, regardless of the service or organization to which they belong. Furthermore, if the TB-001 UAV is capable of photographing the strike target and transmitting its location in real time,²³ it would not be unnatural to assume that the UAV can transmit images of ballistic missile impacts in real time.

Figure 4: Summary of activity by Chinese aircraft on August 4, 2022



Source: Compiled by the author based on Joint Staff, “Chugokuki no doko ni tsuite [Moves by Chinese aircraft],” *Joint Staff Press Release*, August 5, 2022, https://www.mod.go.jp/js/pdf/2022/p20220805_01.pdf, accessed on August 12, 2022.

The above leads to the hypothesis that the PLA Eastern Theater Command used the UAVs to confirm missile impact. The points that could prove this hypothesis are discussed below.

²³ “Lessons from Ukraine / SDF lags China in drone development race,” *The Japan News*, August 30, 2022, <https://japannews.yomiuri.co.jp/politics/political-series/20220830-54818/>, accessed on September 7, 2022.

Verification (1): The Maritime Area and Airspace Restrictions Were Lifted on Day One of the Exercises

As stated at the outset, the military actions on the first day (August 4) of the “important military exercises” contain important clues to the question posed in this article: “What do the inexplicable flights by UAVs signify?”

At 1:00 p.m. (local time) on the same day, the PLA Eastern Theater Command launched precision fire strikes with long-range rocket artillery and a new type of ballistic missile [火箭炮和新型导弹精确火力打击].²⁴ According to a CCTV news flash shortly afterwards at 1:52 p.m., “Army units under the Eastern Theater Command conducted long-range live-fire rocket drills against specific areas in the eastern part of the Taiwan Strait²⁵ and achieved the desired results.”²⁶ At just after 4:00 p.m. on the same day, Senior Colonel Shi Yi, spokesperson for the Eastern Theater Command, released a press statement which said the following.

*The PLA Eastern Theater Command’s Rocket Force accurately hit all targets with multi-regional and multi-model conventional ballistic missiles, proving their precision strike and area denial capabilities. With this, the restrictions on the relevant maritime areas and airspace will be lifted [解除相关海空域管控].*²⁷

China’s statements demonstrate that the six restricted maritime areas and airspace announced by Chinese authorities limited operations of all ships and aircraft only on the first day of the military exercises, the day when ballistic missiles were launched. These areas were not meant to indicate the PLA’s areas of operations during the exercises on the second day and onwards. In retrospect, several media outlets of various countries reported as if China had continued the exercises from August 4 to 7 by “surrounding Taiwan.”²⁸ It should be kept in mind that restrictions on the six areas and airspace were lifted immediately after the ballistic missiles made impact and the areas were no longer on the map.

This suggests the following implications for the Chinese military actions on day one of the exercises (August 4). First, based on the PLA’s announcement that it “achieved the desired results by firing ballistic missiles,” it can be assumed that the Eastern Theater Command had confirmed the ballistic missile impacts by some means. Second, the fact that the restrictions on the maritime areas and airspace²⁹ were lifted immediately after the ballistic missiles’ impacts indicates that

²⁴ Although the DF-15B was reportedly launched as a new type of ballistic missile, the possibility of other missiles being launched cannot be denied based on CCTV news footage broadcast at a later date.

²⁵ Eastern Theater Command, “现场画面！东部战区陆军部队在台湾海峡实施远程火力实弹射击 [Images from the site! Eastern Theater Army units conduct long-range live-fire shooting in the Taiwan Strait],” Ministry of National Defense of the People’s Republic of China, August 4, 2022.

²⁶ CCTV, “东部战区陆军部队对台湾海峡东部特定区域实施远程火力实弹射击，取得预期效果 [Eastern Theater Army units conduct long-range live-fire shooting in specific areas in the eastern Taiwan Strait, achieve expected results],” 中视网 [China Central Television Online], August 4, 2022, 1:52 p.m., <https://military.cctv.com/2022/08/04/ARTIcBytWqTXVueYAtQ43Fci220804.shtml>, accessed on August 10, 2022.

²⁷ Eastern Theater Command, “东部战区导弹全部精准命中目标 [All of the Eastern Theater’s missiles hit their targets accurately],” 微博 [Weibo], August 4, 2022, <https://m.weibo.cn/detail/4798762298379265>, accessed on August 10, 2022.

²⁸ “Taiwan yuji wa Nihon yuji, genjitsu [‘Contingency in Taiwan is contingency for Japan’ becomes a reality],” *Sankei Shimbun*, August 6, 2022; “China begins live-fire military drills around Taiwan, a day after Pelosi visit,” *CNBC*, August 4, 2022, <https://www.cnbc.com/2022/08/04/china-begins-live-fire-military-drills-around-taiwan-a-day-after-pelosi-visit.html>, accessed on September 7, 2022; “China says military exercises around Taiwan complete,” *Financial Times*, August 10, 2022, <https://www.ft.com/content/357828f1-10f7-4f6a-9d03-8a167823ffdf>, accessed on September 7, 2022.

²⁹ Fujian Maritime Safety Administration, “FJ21/22 Military Exercises and Gun Firing,” 中华人民共和国海事局航行警告 [Navigation warning from the Maritime Safety Administration of the People’s Republic of China], August 3, 2022, promulgated 00:17, https://www.msa.gov.cn/msacnms_wap/pages/content.do?articleId=7D76D1E9-DA4B-4699-BA41-386D6D2E9076&channelId=7B084057-6038-4570-A0FB-44E9204C4B1D, accessed on August 10, 2022.

the areas were established exclusively for the firing of ballistic missiles. Accordingly, it is necessary to look for commonalities between the restricted maritime areas and airspace, ballistic missiles, and UAVs. Thirdly, with the Chinese media frequently reporting the launching of ballistic missiles that appear to be the DF-15B, the PLA's announcement of "precision fire strikes by a new type of ballistic missile" must be understood as signifying Chinese authorities' wish to call attention to the DF-15B capable of precision strikes.

Verification (2): The Possibility that the TB-001 UAV Transmitted Videos of the Ballistic Missiles' Impacts in Real Time

As discussed in the previous section, the Eastern Theater Command had confirmed ballistic missile impacts by some means. Thus, the maritime area and airspace restrictions were lifted immediately after the impacts.

There have been no official announcements from Chinese authorities as of yet that the UAVs transmitted real-time videos of the ballistic missile impacts. However, the media reported that UAVs relayed real-time videos of rockets accurately hitting maritime targets when the Eastern Theater Command's Army fired long-range rockets into the Taiwan Strait at around the same time [无人机实时回传的打击画面显示]. This is particularly noteworthy.³⁰

If the report is true, the Eastern Theater Command may have also known in real time, via UAVs, about the videos of ballistic missiles launched by its Rocket Force making impact on the planned target sites in the restricted maritime areas and airspace.

Even if it is technically impossible to relay images in real time, the ability to later confirm whether or not missiles hit their targets is of great interest for the headquarters in charge of command and control of military operations. This constitutes a critical activity also known as battle damage assessment (BDA). Knowing whether the target was destroyed by the missile strike as targeted is essential in determining whether or not further strikes are necessary.

In fact, the actual capabilities of the TB-001 UAV were not known until recently. Its capabilities came to light only because the 科技日报 [*Science and Technology Daily*] reported on the role of the Twin-Tailed Scorpion (TB-001 UAV) in disaster relief, in the wake of the magnitude 6.8 earthquake in Sichuan Province on September 5, 2022.³¹

According to this report, by six hours after the major earthquake, the first TB-001 UAV was over the affected area, transmitting images of the devastation while urgently establishing an aerial cell phone communication network. Twelve hours after the earthquake, a second TB-001 UAV equipped with an electro-optical reconnaissance pod [光电察吊舱] and airborne base station equipment flew above the affected area and reportedly continued to ensure emergency communication day and night. The PLA Western Theater Command was likely in charge in the Sichuan earthquake instance. It is noteworthy that real-time images of the affected areas across a vast region were transmitted to the disaster command and control center in Chengdu and helped in determining where the next rescue teams should be deployed.³² Based on the *Science and Technology Daily* report, the TB-001 UAV is deemed capable of at least serving as an airborne base station for building a communication network and transmitting images in real time to support decision-making. Therefore, the TB-001 UAV, which circled the eastern coast of Taiwan on August 4, is assumed to have transmitted real-time images of

³⁰ “我军在台岛周边海空域成功举行实战化总合演训 [Our military succeeds in conducting realistic combat joint exercises in the sea and airspace around Taiwan Island],” 解放军报 [*PLA Daily*], August 5, 2022.

³¹ 张强 [Zhang Qiang], “打通 ‘最后一公里’ 双尾蝎无人机驰援救灾一线 [Connecting the ‘last mile’: Twin-Tailed Scorpion UAV rushes to front line of disaster relief],” 科技日报 [*Science and Technology Daily*], September 7, 2022, <http://m.stdaily.com/index/kejixinwen/202209/4573fb190ba24490b88f823188171bba.shtml>, accessed on September 7, 2022.

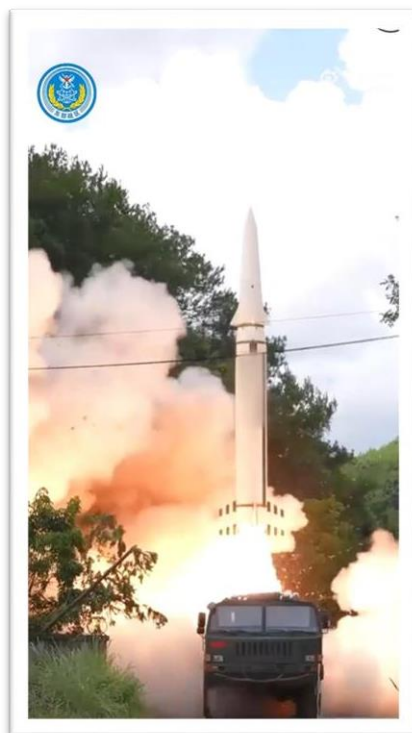
³² Developed by Tengden, a civilian company in Sichuan Province, the TB-001 (Twin-Tailed Scorpion) debuted in 2014 as a UAV to assist in aerial communications and extinguish forest fires in mountainous areas. In February 2022, the Sichuan Communications Administration launched the Large High-Altitude Full Network Emergency Communications UAV Platform project. In July, at an altitude of 4,238 meters above sea level, an airborne communication base station carried by the TB-001 UAV had just succeeded in network-wide emergency communications in a complex natural environment—the world's first high-altitude and signal inaccessible area. 科技日报 [*Science and Technology Daily*], September 7, 2022.

the impacts of ballistic missiles fired by the Rocket Force to the headquarters.

Verification (3): The Possibility that the TB-001 UAV Provided Terminal Guidance to the DF-15B

The section before last noted that “precision fire strikes by a new type of ballistic missile” signified an intention of Chinese authorities to call attention to the DF-15B, a ballistic missile capable of precision strikes. In fact, the Chinese media frequently broadcasts the launching of ballistic missiles that appear to be the DF-15B (see Figure 5).

Figure 5 Launching of a ballistic missile thought to be a DF-15B that was broadcast shortly afterwards



Source: Eastern Theater Command, “反制美台挑衅，东风快递员闻令而动 [Dongfeng delivery personnel take action upon receiving orders to counter U.S. and Taiwanese provocations],” 微博 [Weibo], August 4, 2022, https://weibo.com/tv/show/1034:4799052353831035?from=old_pc_videoshow, accessed on September 7, 2022.

What kind of a ballistic missile is the DF-15B? According to Jane’s almanac, the DF-15B is a short-range ballistic missile (SRBM) with a maximum range of 850 kilometers. It is a variant with improved accuracy of the DF-15 and began to be deployed to the (then) Second Artillery Force in 2006. Of particular note is the DF-15B’s external feature, having a warhead rear mounted with four control fins for terminal guidance. In order to have high accuracy, the DF-15B is equipped with an active seeker and a laser rangefinder to increase accuracy until the circular error probability (CEP)³³ reached 5 to 10 meters.³⁴

What, then, does the Rocket Force operating the DF-15B have to do with UAVs? Would the PLA Rocket Force, known for its nuclear missile units, even operate UAVs? These questions are answered in various foreign reports discussing the details of the Rocket Force and their relevance to UAVs.

According to *PLA Rocket Force Organization*, a report by the China Aerospace Studies Institute (CASI) of the U.S.

³³ CEP refers to the radius of a circle centered on the target, whose boundary is expected to include the impact of half of the missiles fired under identical conditions, and may be considered as the “hit rate” in the broad sense of the term.

³⁴ “Ballistic missiles: China,” *Jane’s Weapons: Strategic 2022-2023* (Coulson: Janes, 2022), pp. 12-14.

Air Force, the PLA Rocket Force's predecessor, the Second Artillery Force, made steady progress over the past two decades in diversifying its missile capabilities and expanding its size accordingly.

The PLA's Second Artillery Force decided to deploy not only nuclear but also conventional missiles from the 1980s and began to introduce the DF-15 SRBM in the early 1990s. In addition, the size of the Second Artillery Force steadily expanded with the diversification of capabilities, including deployment of the CJ-10 ground-based cruise missile and the DF-31, the first road-mobile intercontinental ballistic missile (ICBM), from the 2000s. In the 2010s, as many as 13 new brigades were added to the Second Artillery Force (renamed the Rocket Force in 2016), and the pace of growth of the Rocket Force accelerated, including the addition of the DF-21D anti-ship ballistic missile, the new DF-41 ICBM, the DF-26 (dual-capable) medium-range ballistic missile capable of carrying nuclear and conventional warheads, and the DF-17 hypersonic glide vehicle.³⁵ It is worth noting that between 2017 and late 2019, the size of the force increased by more than 33% in three years, from 29 to 39 missile brigades.³⁶

It has been unclear to what extent the "bases"³⁷ of theater commands and the Rocket Force exert operational control over conventional missile units. It has been considered, nonetheless, that joint operations with other army, navy, and air forces are becoming easier to implement following the military reforms initiated in 2016 by Chairman Xi Jinping of the Central Military Commission (CMC), which have made conventional missile units increasingly subordinate to theater commands.³⁸

As of 2022, the Rocket Force as a military service consists of the headquarters in Beijing and nine bases: Base 61 (operations/command: Huangshan); Base 62 (operations/command: Kunming); Base 63 (operations/command: Huaihua); Base 64 (operations/command: Lanzhou); Base 65 (operations/command: Shenyang); Base 66 (operations/command: Luoyang); Base 67 (nuclear warhead stockpile management/command: Baoji); Base 68 (missile engineering/command: Luoyang); and Base 69 (development and training/command: Yinchuan). Six of the bases that operate missiles are located throughout China as seen in Figure 6. As the figure reveals, Base 61 in charge of military operations against Taiwan has missile units scattered mainly in Fujian Province.³⁹

Based on these reports on the PLA Rocket Force, it can be presumed that the missile units which launched DF-15Bs in the large-scale military exercises were the missile units of the 613th Brigade (Shangrao, Jiangxi Province) and 616th Brigade (Ganzhou, Jiangxi Province), which are subordinate to Base 61 and are equipped with DF-15Bs. Furthermore, as the report states that Base 61 has a unit which operates UAVs to support operations,⁴⁰ it can be assumed that these missile brigades deployed maneuvers and launched ballistic missiles under the command and control of the Eastern Theater Command.

The possibility that the Rocket Force operated UAVs is also supported by other think tank studies. According to the Project 2049 study led by Ian Easton, the Second Artillery Force has employed UAV systems to assist in targeting conventional ballistic and cruise missiles since 2013. The report notes that UAV systems were critical, particularly for target acquisition and BDA in support of anti-ship ballistic missile operations. Additionally, Easton lists specific UAV

³⁵ Ma Xiu, *PLA Rocket Force Organization*, The China Aerospace Studies Institute, January 5, 2022, pp. 1-12, <https://www.airuniversity.af.edu/Portals/10/CASI/documents/Research/PLARF/2022-01-05%20PLARF%20Organization%20ExecSum.pdf>, accessed on September 7, 2022.

³⁶ Ma Xiu and P.W. Singer, *China's Missile Force Is Growing at an Unprecedented Rate*, Popular Science, February 25, 2020, <https://www.popsci.com/story/blog-eastern-arsenal/china-missile-force-growing>, accessed on September 7, 2022.

³⁷ "Base" here refers to an independent unit within the PLA's organizational structure, similar to regiment, brigade, or division. Each base is considered to have a number of outposts that accommodate several garrison-like units. Roderick Lee, *Integrating the PLA Rocket Force into Conventional Theater Operations*, Jamestown Foundation, August 14, 2020, <https://jamestown.org/program/integrating-the-pla-rocket-force-into-conventional-theater-operations/>, accessed on September 7, 2022.

³⁸ Ibid.

³⁹ Ma, pp. 4-8. Base 61 is headquartered in Huangshan, Anhui Province and covers parts of eastern and southeastern China. It is believed to command two MRBM brigades (DF-21A/B), four SRBM brigades (DF-11A, DF-15A/B/C), and one hypersonic MRBM brigade (DF-17).

⁴⁰ Ma, p. 8.

units as of 2013, including the 96605 Unit in Hui'an County, Fujian Province, the 96626 Unit in Jinhua, Zhejiang Province, the 52 Base (headquarters: Huangshan, Anhui Province) 96180 Unit in Xianyou, Fujian Province, and the 53 Base (headquarters: Kunming, Yunnan Province) 96212 Unit in Puning, Guangdong Province.⁴¹ Due to military reforms since 2016, slight changes have been made to unit names, as seen in the aforementioned CASI report. In any case, the Rocket Force has been operating UAVs for some time, and it is highly likely that the Eastern Theater Command used UAVs to confirm ballistic missile impacts during the important military exercises.

Figure 6 Locations of the PLA Rocket Force's missile operating bases



Source: Ma Xiu, *PLA Rocket Force Organization*, The China Aerospace Studies Institute, January 5, 2022, pp. 3-4, <https://www.airuniversity.af.edu/Portals/10/CASI/documents/Research/PLARF/2022-01-05%20PLARF%20Organization%20ExecSum.pdf>, accessed on September 7, 2022.

Jane's almanac states that not only the DF-26 but also the DF-15B is capable of precision strikes on ships. In other words, it notes that, when the DF-15B targets large ships, it must constantly receive updated target information as it flies, and to do so, must relay target information from over the horizon (OTH) radar, UAV, submarine, or satellite.⁴²

For the PLA planning an advance into Taiwan, the key to military operations is to develop scenarios for key military

⁴¹ Ian M. Easton and L.C. Russell Hsiao, *The Chinese People's Liberation Army's Unmanned Aerial Vehicle Project: Organizational Capacities and Operational Capabilities*, Project 2049, March 11, 2013, https://www.sldinfo.com/wp-content/uploads/2013/03/uav_easton_hsiao.pdf, accessed on September 7, 2022.

⁴² *Jane's Weapons: Strategic 2022-2023*, pp. 12-14.

points scattered across Taiwan and for the arrival of U.S. and other supporting forces and to consider how to strike them. At the same time, the high mountainous terrain across the main island of Taiwan may have presented an obstacle, making it impossible to accurately destroy targets with conventional ballistic missiles that make impact on parabolic trajectories. Moreover, there may have been communication concerns.

A 2000 PLA study is taken as an example. It stresses the importance of operational command under information conditions, particularly emphasizing that “after correctly assessing the battlefield situation, possible strike targets should be evaluated, and the focus and priorities of the attack should be determined.”⁴³ Therefore, the PLA, which has been required to strike with a high degree of precision, may have needed to improve the DF-15B to enable precision destruction. Furthermore, to enable terminal guidance, precision guidance using OTH radar and UAV communications may have been essential.

In any case, PLA equipment has undergone rapid modernization, and sensors of various military services have been integrated. According to an April 21, 2022 article in the PLA’s official newspaper, *PLA Daily*, Chinese strategists underscore that, in modern warfare, with increasingly sophisticated sensors being deployed on the battlefield due to the rapid development of sensing technology, it is necessary to optimize and integrate sensors that are dispersed in land, sea, and air spaces and throughout the frequency domain. Hence, it is interesting that the strategists advocate the importance of building combat systems that integrate UAVs to attack time-sensitive targets (打击时敏目标).⁴⁴

In light of the above discussion, it can be concluded that the TB-001 and other UAVs were involved in the ballistic missile impact between 1:00 p.m. and 4:00 p.m. on August 4. Furthermore, UAVs may have been used to provide terminal guidance for ballistic missiles in order to pursue the “precision fire” goal of the PLA Rocket Force.

Conclusion and Future Prospects

This article examined the possibility of the TB-001 UAV flight being involved in the impact of ballistic missiles at around the same time on the same day that missiles were launched from the PLA Eastern Theater. In a nutshell, the above discussion indicates that the hypothesis is correct: “the PLA Eastern Theater Command used UAVs to confirm missile impact.”

In retrospect, images of the launch of ballistic missiles thought to be the DF-15B were frequently broadcast by the Chinese media in connection with the important military exercises. This may have been an attempt by the PLA to call attention to the further enhancement of China’s A2/AD (anti-access/area denial) capabilities.

If the missiles were the DF-15Bs capable of precision strikes, it is highly likely that the TB-001 UAV made real-time updates to the target information received by the ballistic missiles in flight. Highly confidential electromagnetic intelligence can immediately clarify this point. However, as this article has done, it may be important to use open-source materials in accumulating circumstantial evidence and proving the hypothesis in terms of sounding an alarm to the international community.

Lastly, an additional point to note regarding the future is that one cannot be optimistic about the international security situation, given the current circumstances in which a vast number of UAVs are being manufactured in China and some of them are being exported. The PLA, until now, has pursued an operational concept of network-centric combat with information sharing. If unmanned technology (the TB-001 UAV is just one example) continues to evolve, China’s concept of “informatized local warfare” will evolve further and shift toward the concept of “intelligentized warfare” which integrates AI and involves UAVs attacking autonomously.

If China, which is still taking a hardline stance toward surrounding countries, is beginning to make significant use of more autonomous UAVs, it may be time for surrounding countries to review their defense strategies fundamentally.

⁴³ 崔永贵 [Cui Yonggui], 战役信息作战研究 [A study on campaign information operations] (Beijing: 国防大学出版社 [NDU Press], 2000), pp. 144-145.

⁴⁴ 张翠 [Zhang Cui], 张乃敏 [Zhang Naimin], and 朱建平 [Zhu Jianping], “如何提高打击时敏目标能力 [How to improve the ability to strike time-sensitive targets],” 解放军报 [PLA Daily], April 21, 2022.

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