



The Improvement of the PLA's Close Air Support Capability

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Introduction

In August 2020 the Chinese People's Liberation Army (PLA) indicated that some of its units had made technological and procedural advancements in its capability to provide close air support (CAS). The PLA has been working to develop the systems and procedures to conduct CAS safely and effectively for more than a decade. While these and other recent developments may indicate that the PLA has finally built the foundation of a complex of systems and procedures for safe and effective CAS, the PLA's capability to conduct CAS is far from mature.

The capability to provide CAS is indispensable for the PLA. CAS is one of two types of operations that the U.S. Air Force calls "counterland" operations, operations against an enemy's land forces.¹ CASⁱ is defined as actions by aircraft, both fixed- and rotary-wing, against enemy land forces that are in close proximity to, and may have already engaged, friendly forces.² The other type of counterland operation is air interdiction, which is an operation to "divert, disrupt, delay, or destroy" units of an enemy's land forces before they engage friendly forces.³ The primary distinction between these two types of operations is the proximity to friendly forces in which they are conducted.

CAS is important for what the U.S. military calls "forcible entry" operations, operations to seize and hold lodgments, such as a beachhead or an airfield, through which additional troops and materiel can be transported to the battlefield.⁴ Forcible entry operations are generally conducted by highly mobile forces, such as amphibious and airborne forces, that cannot transport weapons like artillery and tanks. CAS compensates for these forces' lack of heavy firepower. In order for the PLA to conquer Taiwan, it must seize lodgments on the island through amphibious, airborne, and/or air assaults; the ability of the PLA to hold those lodgments will be limited should the PLA's air forcesⁱⁱ be unable provide CAS. Therefore, developing the capability to provide CAS is crucial

ⁱ Unlike the other U.S. military services, the U.S. Army does not call such fire support by its own rotary-wing aircraft "close air support."

ⁱⁱ "Air forces" here refers to the aviation branches of the PLA Army, Navy, and Air Force.

for the PLA's overall capability to conquer Taiwan and thereby achieve China's principal national goal.

Past Efforts

The PLA seems to have become earnest about improving its capability to provide CAS when it developed new training instructions that were issued in 2009. Every several years the PLA issues a new Outline of Military Training and Evaluation (OMTE), which sets new goals and guidelines for training. After an OMTE is devised, it is tested and revised for a few months before it is issued. The content of the OMTEs is not publicized, but it seems that improving the PLA's capability to provide CAS was a part of the 2009 OMTE because during the 2009 OMTE's trial period in 2008, in accordance with the new OMTE, a PLA Army (PLAA) division included at least two personnel from the PLA Air Force (PLAAF) in its command team during an exercise: one to serve as a PLAAF "commander" and another to serve as a "guide."⁵

The PLA uses "guidance"ⁱⁱⁱ in the sense of leading a force's way to an objective or vectoring it to a target, but it also uses "guidance" to refer to the act of cueing a target for attack by supporting fire. In the U.S. military's CAS missions, the latter action is conducted by a terminal attack controller or a forward air controller, someone who communicates directly with pilots to direct CAS. Except in direct translations, the PLA refers to terminal attack or forward air controllers as "guides," and hence one may assume that the "guide" in the said PLA Army division was equivalent to a controller in the U.S. military, but this is not so. For one thing, the U.S. military embeds controllers in tactical levels of command down to those of the battalion and the company.^{iv}

During the PLAA division's exercise, as a regimental commander's unit approached the opposing force's position, he requested CAS through the PLAAF's "guide" in the divisional command post.⁶ Neither he nor the guide had visually acquired the target; members of one of the regiment's reconnaissance elements had done so.⁷ It is unclear who actually directed the CAS mission, but it is likely that it was directed by the PLAAF "commander," not the guide. This also contrasts with the degree of authority that the U.S. military's terminal attack or forward air controllers have. Traditionally, pilots in the PLA only took directions from their flight leader or their unit's commander. In other words, aviation units controlled their own aircraft, so requests for CAS would have to be relayed to the headquarters of the supporting aviation unit, from which the mission would be directed. Therefore, those requesting CAS could only communicate with the aircrews providing CAS through a link between their own higher headquarters and the

ⁱⁱⁱ "Guidance" in Chinese is 引导; "guide" is 引导员 or 引导人员.

^{iv} In another exercise in 2008, "surface command teams" and "surface liaisons" from the PLAAF were integrated into command posts at every level—even down to the company level—of a motorized infantry division of the PLAA as well as into the division's intelligence and fires centers. However, the source of this information focused on the fact of the integration, not what the integration achieved, so although it seems logical to assume that the "surface liaisons," at least, served as controllers, it is unclear whether they did so or not. 邹秋月 [Zou Qiuyue], 石斌欣 [Shi Binxin], and 安晋忠 [An Jinzhong], "解放军陆空联合演习空军指挥员不再当陪衬" [Air force commanders will never again serve as props in Liberation Army's army-air force joint exercises], 解放军报 [Liberation Army News], posted on 中国新闻网 [China News Agency Online], December 3, 2008, accessed October 8, 2020, <http://www.chinanews.com/gn/news/2008/12-03/1471882.shtml>.

supporting unit's headquarters. It is likely that the PLAA and PLAAF units in the exercise attempted to shorten the distance between the aircrews and the supported units by embedding PLAAF personnel who could translate the request for CAS into a briefing that the aircrews could act on (the guide) and someone who could command the aircrews (the commander).

Such an arrangement would only have been a slight improvement to the PLA's traditional method of conducting CAS. Neither method makes CAS impossible, but they do make it riskier and less flexible, and its riskiness and inflexibility increase as the communication between those who have visually acquired a target and the aircrews who provide CAS becomes more indirect. It can be difficult for aircrews, particularly those operating fixed-wing aircraft, to distinguish friendly and enemy forces and to ascertain the situation on the battlefield, a situation that could change between the time that an aircrew received a request for CAS and the time that the aircrew arrived over the battlefield. Therefore, the measure of the PLA's ability to provide CAS is not merely its capability to deliver munitions to a particular point—a capability that it already demonstrated during the exercise in 2008—but its capability to do so in a way that neutralizes the target with as little risk of fratricide as possible. Developing such a capability seems to have been the focus of the PLA's efforts in relation to CAS since 2008.

The PLA had made some progress towards this goal by 2012. That year a group army of the PLAA (a formation that is equivalent to a corps of the U.S. Army) conducted an exercise in which it embedded “fires coordinators”^v from the PLAAF and the PLAA's aviation branch in an armor battalion's command team.⁸ And, unlike in the past, the battalion was able to request CAS directly from PLAA attack helicopters that were in the air.⁹ More specifically, the PLAA's fires coordinator in the battalion's command vehicle requested CAS together with a staff officer from the aviation brigade whose helicopters were in the air, perhaps indicating the fires coordinator's lack of authority.¹⁰ However, a request to the PLAAF for CAS was relayed through, and—more important—the PLAAF's CAS mission was probably directed from, the headquarters of the battalion's parent brigade, where there was likely to be a PLAAF commander as in the past.¹¹ So, in this arrangement, although the PLAA's and the PLAAF's aviation units had “eyes” on the battlefield, as the commander of the armor brigade put it, communication between the PLAAF's fires coordinator and the aircrews of the PLAAF's aircraft providing CAS was still indirect and, therefore, still quite risky and inflexible.¹²

By 2015 the PLA was experimenting with substantially improved methods of providing CAS. In one demonstration exercise in 2015, an amphibious mechanized infantry regiment of the PLAA placed “target guides”^{vi} from the PLA Navy, the PLAAF, and the PLAA's aviation branch in “almost 90 percent” of its battalions and companies.¹³ These “target guides” seem to have communicated information about targets, such as the targets' coordinates and characteristics, directly to aircrews.¹⁴ During a major force-on-force exercise in the same year, the friendly and opposing forces had aircraft from the PLAA and the PLAAF stand by at multiple airfields and in aerial holding areas so that they could more quickly respond to requests for CAS.¹⁵ PLAAF “operations coordinators”—not “commanders”—were embedded in each side's headquarters, and “target guides” were embedded in each side's task force.¹⁶ In addition, although they did not

^v “Fires coordinator” in Chinese is 火力协调员.

^{vi} “Target guide” in Chinese is 目标引导员.

visually acquire targets themselves, the PLAAF's "surface target guides"^{vii} seem to have provided target coordinates and characteristics directly to aircrews.¹⁷ Given the amount of progress that was manifest in these exercises, it seemed that in 2015 the PLA was on the cusp of finalizing its systems and procedures for CAS, but experiments continued well after 2015.

Recent Efforts

In 2016 the PLA was reorganized into a more completely joint structure, and in the same year the PLA used a major force-on-force exercise to conduct more experiments in CAS. The new Southern Theater Command succeeded in establishing cross-service voice and data links, and it reportedly achieved "results" in "close air-to-ground fire support."¹⁸ Only one example of such was cited: a platoon leader used a handheld BeiDou^{viii} terminal to send the coordinates of a blockhouse to a PLAAF aircrew, presumably doing so directly and electronically.¹⁹

In 2017 the PLA reported that a soldier in a brigade of the PLAA's 75th Group Army, which is, incidentally, subordinate to the Southern Theater Command, had undergone training with the PLAAF and three months of "diligent study and difficult training" to become an "aerial fires guide."²⁰ During an exercise that year, the soldier, Private First Class Shi Jianhao, used an "air coordination" radio to communicate directly with the crews of PLAAF aircraft and he used a portable "command terminal" to communicate requests



Figure 1: Shi Jianhao uses a radio to request close air support from aircraft of the air force. He is accompanied by a captain.

for CAS to the crews of helicopters of the PLAA's aviation branch (see Figure 1).²¹ This example seemed to indicate three things: first, that the PLA had indeed finalized its systems and procedures for CAS; second, that the PLA's variously named "guides" were conducting terminal attack or forward air control and, therefore, had become the equivalent of such; and, third, that the PLAAF was training personnel from other services to serve as "aerial fires guides"^{ix} or controllers instead of embedding its own personnel in land units to do so. Again, in spite of the significant progress in the PLA's capability to conduct CAS that this example seemed to indicate, none of these conclusions proved to be entirely true.

In September 2020 the PLA reported that over 100 personnel of a combined-arms brigade of the PLAA's 74th Group Army, which is also subordinate to the Southern Theater Command, had undergone training with the PLAAF to become "target indicators."²² The unusually large

^{vii} "Surface target guide" in Chinese is 地面引导人员.

^{viii} BeiDou is China's satellite position, navigation, and timing system.

^{ix} "Aerial fires guide" in Chinese is 空中火力引导员.

number of personnel in the unit who have undergone this training likely indicates that “target indication” is not the same as terminal attack or forward air control because 100 personnel in the same brigade cannot all separately control aircraft providing CAS and—given the difficulty of directing CAS—because training an entire company to direct CAS would go far beyond the need to maintain redundant personnel. Indeed, during a joint amphibious assault exercise in September 2020 in which their unit participated, these “target indicators”^x seem to have only relayed target coordinates through a staff officer who called for CAS.²³ This may have been done in order to simplify the control of the large number of aircraft that fly over the area of operations during an amphibious assault, but it is still unlikely that such a large number of personnel in the same unit would be trained to direct CAS. Moreover, even assuming that “target indicators” are distinct from “guides,” then they should not require training with the PLAAF merely to learn how to find the coordinates of a target. Rather, while it is likely that the PLAAF has abandoned the practice of embedding its personnel in land units to cue targets in favor of training other services’ personnel to do so, it seems that the purpose of the training is not to train people to conduct terminal attack or forward air control. Therefore, the example of Shi Jianhao seems to have been exceptional, the product of yet another experiment, not the product of an unvarying training program that was associated with finalized systems and procedures for CAS.

In fact, the arrangements for CAS in an experimental exercise that was held sometime in the fall of 2020 seemed to have been no different from those that were made in the aforementioned exercise of 2008. During the exercise a training brigade of the PLAAF’s Xi’an Flight Academy provided CAS to a battalion of a combined-arms brigade that is subordinate to the PLAA’s 76th Group Army of the Western Theater Command.²⁴ The request for CAS, however, was relayed to the training brigade through a PLAA-PLAAF joint command post, and the brigade’s aircraft only took off after receiving the request.²⁵ Moreover, the pilots took directions from the commander of PLAAF’s participating units, who was at the joint command post.²⁶ If the PLA had finalized its systems and procedures for CAS by 2020, then it would have been unnecessary for these units to conduct yet another experiment in such, and it is unlikely that they would make arrangements for CAS that are backward in comparison with those of previous efforts. Therefore, as late as 2020, the PLA seems to be struggling still to develop the systems and procedures for conducting CAS safely and effectively—and that the efforts to do so are not being centrally coordinated.

Even so, other units seem to have made progress in developing the systems and procedures for CAS beyond what others had achieved before. In August 2020 the PLA reported that a higher echelon had approved the methods and the “detailed rules and regulations” for the coordination of fires from land and the air that some PLAA and PLAAF units had developed together over a period of three years.²⁷ The units were an unspecified aviation brigade under the Northern Theater Command (equivalent to a wing of the U.S. Air Force), the 78th Army Aviation Brigade, which is subordinate to the Northern Theater Command’s 78th Group Army, and the 1st Battalion of the 48th Combined-Arms Brigade, which is also subordinate to the 78th Group Army.²⁸ The 1st Battalion is one of the PLA’s few high-mobility combined-arms battalions.²⁹

Beginning in the summer of 2020, these units tested regulations, communication links, and a command and control structure for the coordination of air-land joint fires as well as a means of identifying friend and foe in the battlespace.³⁰ Several days before August 3, 2020, these units

^x “Target indicator” in Chinese is 目标指示员.

conducted an exercise in which a “surface guidance unit”^{xi} was able to communicate directly, by voice, with an “aerial support force,” and in which the same unit was able to share target data with helicopters over a “point-to-point” connection—all through a datalink that connected aircrews and individual soldiers carrying an unspecified piece of equipment.³¹ Given its juxtaposition with the army aviation brigade’s helicopters, the “aerial support force” was likely to have been composed of fixed-wing aircraft from the air force. Indeed, a PLA television news program presented video of the exercise that showed a JH-7 fighter-bomber dropping a bomb.³² Similar footage appeared throughout a report about the previous year’s iteration of the same exercise, but a fighter-bomber, of which the JH-7 is the PLA’s only type, was also employed in the 2018 iteration of the exercise, so it is likely that a JH-7 was employed in the 2020 iteration even if footage from 2019 had been recycled.³³

It is unclear whether the members of the “surface guidance unit” directed CAS during the exercise or not, but three things distinguish these units’ efforts from previous efforts by other units. First, the development of a single network through which to request and, at least theoretically—given the voice communications link—direct CAS is an improvement on the two pieces of equipment that the soldier in the 75th Group Army used in 2017. Second is the fact that these units tested the systems and procedures that they developed in the same scenario, i.e., under the same conditions, over a few years, a fact that indicates a degree of determination that previous efforts seem to have lacked. Third, the fact that the arrangement and procedures for CAS that these units have developed received a higher echelon’s approval may also indicate a degree of finality to them that previous efforts’ achievements lacked.

Conclusion

It is possible that the efforts of the Northern Theater Command’s units will form the foundation of a complex of finalized systems and procedures for CAS. Recent developments indicate that the PLA’s technology for CAS has improved in other respects. In September 2020 the PLA reported that soldiers of the 83rd Air Assault Brigade, which is subordinate to the Central Theater Command, used a laser designator to “lase” or designate a target against which a Z-10 attack helicopter conducted a simulated strike through the fog (see Figure 2); in “late autumn”



Figure 2: Soldiers of the 83rd Air Assault Brigade set up a laser designator.

2020 a member of a special operations unit of the PLAAF’s Airborne Corps also used a laser designator to lase a target, thereby guiding a new type of guided bomb dropped by a PLAAF aircraft to the target.³⁴ In August 2020 the PLA reported that a Z-19 reconnaissance helicopter of

^{xi} “Surface guidance unit” in Chinese is 地面引导单元.

the 83rd Air Assault Brigade “buddy lased” a target for a Z-10 that was being jammed; in November 2020 the PLA reported that the 71st Army Aviation Brigade, which is subordinate to the Southern Theater Command, had succeeded in using what appears to be an ASN-209 unmanned aerial vehicle to “buddy lase” targets at sea against which a Z-9 attack helicopter and a Z-19 fired missiles from beyond visual range.³⁵ These technologies will increase the PLA’s options for cueing targets for aircraft providing CAS, and they should also increase the accuracy of the PLA’s CAS strikes.

However, even if the PLA has the elements of a complex of systems and procedures for CAS, its capability for CAS is far from mature. Those systems and procedures must be spread throughout the PLA, and units throughout the force must train to conduct CAS. And even assuming that the Northern Theater Command has developed the systems and procedures for conducting CAS, the PLA must still overcome the problem of coordinating CAS at higher, joint echelons of command, such as the theater level, if it is to provide CAS during complex campaigns like an invasion of Taiwan. In addition to the problem of controlling large numbers of aircraft from multiple services in the same airspace, there is also the problem of allocating aircraft, particularly the fixed-wing aircraft of the PLAAF and the PLA Navy, for CAS among other, competing priorities such as the achievement of air superiority over the battlefield and the defense of China’s airspace. Similar problems have vexed the U.S. military in spite of its abundant experience in joint operations. It may seem ironic, but this is an obstacle that may prove more difficult for the PLA to overcome than that of developing the technologies and basic procedures for CAS. The PLA is making progress, but it still has a long way to go before it can be said to be capable of conducting CAS.

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Endnotes

¹ Department of the Air Force, *Annex 3-03 Counterland Operations*, February 5, 2019, 3, accessed October 7, 2020, <https://www.doctrine.af.mil/Doctrine-Annexes/Annex-3-03-Counterland-Ops/>.

² Ibid.

³ Ibid.

⁴ Joint Chiefs of Staff, *Joint Publication 3-18 Joint Forcible Entry Operations*, June 27, 2018, accessed October 7, 2020, https://www.jcs.mil/Portals/36/Documents/Doctrine/pubs/jp3_18ch1_pa.pdf?ver=2018-07-03-125841-997.

⁵ 刘逢安 [Liu Feng'an] and 武天敏 [Wu Tianmin], "新一代《军事训练与考核大纲》颁发" [New generation of military training and evaluation program issued], 解放军报 [Liberation Army News], posted on 中国新闻网 [China News Agency Online], July 25, 2008, accessed October 8, 2020, <http://www.chinanews.com/gn/news/2008/07-25/1324075.shtml>; 马仕府 [Ma Shifu] and 覃照平 [Tan Zhaoping], "空军指挥员走进陆军指挥所" [Air force commanders enter army command post], 解放军报 [Liberation Army News], posted on 新浪军事 [Sina Military], August 22, 2008, accessed October 8, 2020, <http://mil.news.sina.com.cn/2008-08-22/0607517649.html>.

⁶ 马仕府 [Ma Shifu] and 覃照平 [Tan Zhaoping], "空军指挥员走进陆军指挥所" [Air force commanders enter army command post].

⁷ Ibid.

⁸ 邵敏 [Shao Min], 戴强 [Dai Qiang], and 欧阳浩 [Ouyang Hao], "空军协调员走进陆军指挥车" [Air force coordinators sit in army command vehicle], 解放军报 [Liberation Army News], posted on 中国国防动员网 [China National Defense Mobilization Online], December 11, 2012, accessed October 8, 2020, http://www.gfdy.gov.cn/tech_m/2012-12/11/content_5135847.htm.

⁹ Ibid.

¹⁰ Ibid.

¹¹ Ibid.

¹² Ibid.

¹³ 罗守成 [Luo Shoucheng] and 姜博西 [Jiang Boxi], "营连战斗模块有了目标引导员" [Now battalion and company combat modules have target guides], 解放军报 [Liberation Army News], posted on 国防部网 [National Defense Ministry Online], July 6, 2015, accessed October 8, 2020, http://news.mod.gov.cn/pla/2015-07/06/content_4593107.htm; 罗守成 [Luo Shoucheng] and 姜博西 [Jiang Boxi], "联合作战目标引导: 进入战场末端跨军兵种时代" [Joint operations target guides: entering the era when battlefield terminals bestride services and branches], 中国军网 [China Military Online], July 8, 2015, accessed October 8, 2020, http://www.81.cn/syjd/2015-07/08/content_6576890.htm.

¹⁴ 罗守成 [Luo Shoucheng] and 姜博西 [Jiang Boxi], "营连战斗模块有了目标引导员" [Now battalion and company combat modules have target guides].

¹⁵ 郑泰平 [Zheng Taiping], 吴松 [Wu Song], and 李玉明 [Li Yuming], "陆空协同, 让对抗从平面走向立体" [Army-air force cooperation makes force-on-force battle go from uni- to multidimensional], 解放军报 [Liberation Army News], August 7, 2015, accessed October 6, 2020, http://www.81.cn/jmywyl/2015-08/07/content_6618566.htm.

¹⁶ Ibid.

¹⁷ Ibid.

¹⁸ 曾斌 [Zeng Bin] and 欧阳治民 [Ouyang Zhimin], "一场演习收获多重“改革红利”" [One exercise reaps multiple 'reform dividends'], 解放军报 [Liberation Army News], posted on 中国军网 [China Military Online], December 23, 2016, accessed October 9, 2020, http://www.81.cn/jwgz/2016-12/23/content_7420434_2.htm.

¹⁹ Ibid.

²⁰ 马飞 [Ma Fei], 杨元庆 [Yang Yuanqing], 张正举 [Zhang Zhengju], and 谢晓龙 [Xie Xiaolong], "一名陆军士兵的“联战”体验" [One army soldier's experience of 'joint warfare'], 中国军网 [China Military Online], October 12, 2017, accessed October 9, 2020, http://www.81.cn/lj/2017-10/12/content_7784587.htm.

²¹ Ibid.

²² 柳刚 [Liu Gang], 钱晓虎 [Qian Xiaohu], 段江山 [Duan Jiangshan], and 梅常伟 [Mei Changwei], "铁甲战车驰骋在强军路上" [Armored fighting vehicle gallops along path of strong armed forces], 解放军报 [Liberation Army News], September 26, 2020, accessed November 13, 2020, http://81.cn/jfjbmmap/content/2020-09/26/content_272286.htm; 杨晶 [Yang Jing], 苏鹤 [Su He], and 朱文强 [Zhu Wenqiang], "我们在战位报告 | 强军路上, 两栖精兵锐不可当!" [We report from our positions: on the path of strong armed forces elite amphibious troops cannot be held back], 中国军网 [China Military Online], September 21, 2020, accessed November 13, 2020, http://www.81.cn/bz/2020-09/21/content_9905423.htm.

²³ 杨晶 [Yang Jing], 苏鹤 [Su He], and 朱文强 [Zhu Wenqiang], "我们在战位报告 | 强军路上, 两栖精兵锐不可当!" [We report from our positions: on the path of strong armed forces elite amphibious troops cannot be held back].

²⁴ 吕流春 [Lü Liuchun], 秦建伟 [Qin Jianwei], 汪洋 [Wang Yang], and 潘健飞 [Pan Jianfei], "突破! 再突破! 陆空携手鏖战戈壁滩" [Break through! Break through! Break through again! The army and air force join hands to engage in a fierce battle in the Gobi desert], post to the WeChat account of the Chinese People's Liberation Army Air Force, October 13, 2020, accessed November 13, 2020; "陆空联合一体打击 检验多种作战样式" [Army-air force joint integrated strike tests multiple operational

styles], 曹磊 [Cao Lei], 段奇东 [Duan Qidong], 张旭东 [Zhang Xudong], 毛宇杭 [Mao Yuhang], 于首帅 [Yu Shoushuai], 王雲峤 [Wang Yunjiao], and 潘健飞 [Pan Jianfei], 军事报道 [Military Report], aired November 13, 2020, on CCTV-7, accessed November 17, 2020, <https://tv.cctv.com/2020/11/13/VIDEce3BOKYEnpCmftooKoSe201113.shtml>. The author thanks Roderick Lee for bringing these sources to his attention.

²⁵ 吕流春 [Lü Liuchun], 秦建伟 [Qin Jianwei], 汪洋 [Wang Yang], and 潘健飞 [Pan Jianfei], “突破！突破！再突破！陆空携手鏖战戈壁滩” [Break through! Break through! Break through again! The army and air force join hands to engage in a fierce battle in the Gobi desert]; “陆空联合一体打击 检验多种作战样式” [Army-air force joint integrated strike tests multiple operational styles], 曹磊 [Cao Lei], 段奇东 [Duan Qidong], 张旭东 [Zhang Xudong], 毛宇杭 [Mao Yuhang], 于首帅 [Yu Shoushuai], 王雲峤 [Wang Yunjiao], and 潘健飞 [Pan Jianfei].

²⁶ 吕流春 [Lü Liuchun], 秦建伟 [Qin Jianwei], 汪洋 [Wang Yang], and 潘健飞 [Pan Jianfei], “突破！突破！再突破！陆空携手鏖战戈壁滩” [Break through! Break through! Break through again! The army and air force join hands to engage in a fierce battle in the Gobi desert].

²⁷ 陶李 [Tao Li] and 牛辉 [Niu Hui], “三年优化空地协同实现“攥指成拳”” [Three years optimizing air-land cooperation results in realization of 'clenched fingers becoming a fist'], 解放军报 [Liberation Army News], August 4, 2020, accessed August 4, 2020, http://www.81.cn/jfjbmap/content/2020-08/04/content_267548.htm. Reposted at http://www.81.cn/jfjbmap/content/2020-08/04/content_267631.htm.

²⁸ 陶李 [Tao Li] and 牛辉 [Niu Hui], “三年优化空地协同实现“攥指成拳”” [Three years optimizing air-land cooperation results in realization of 'clenched fingers becoming a fist']; “多兵种空地联合，锻造新质战斗力” [Multiple branches join in the air and on land, forging a qualitatively new combat capability], 段然 [Duan Ran], 陶李 [Tao Li], 董远成 [Dong Yuancheng], 王平 [Wang Ping], 王天一 [Wang Tianyi], and 尹路 [Yin Lu], 军事报道 [Military Report], aired August 3, 2020, on CCTV-7, accessed August 4, 2020, http://www.js7tv.cn/video/202008_225423.html; Joshua Arostegui, “An Introduction to China’s High-Mobility Combined-Arms Battalion Concept,” *Infantry* 109, no. 3 (Fall 2020): 13. The author thanks Dennis Blasko for bringing this last source to his attention.

²⁹ Joshua Arostegui, “An Introduction to China’s High-Mobility Combined-Arms Battalion Concept,” 13.

³⁰ 陶李 [Tao Li] and 牛辉 [Niu Hui], “三年优化空地协同实现“攥指成拳”” [Three years optimizing air-land cooperation results in realization of 'clenched fingers becoming a fist'].

³¹ Ibid.

³² “多兵种空地联合，锻造新质战斗力” [Multiple branches join in the air and on land, forging a qualitatively new combat capability], 段然 [Duan Ran], 陶李 [Tao Li], 董远成 [Dong Yuancheng], 王平 [Wang Ping], 王天一 [Wang Tianyi], and 尹路 [Yin Lu].

³³ “陆军第 78 集团某旅新型合成营：锻造精锐机动作战力量” [A certain new type of combined-arms battalion of the 78th Group Army: forging an elite, mobile combat force], 曹际超 [Cao Jichao], 肇翀 [Zhao Chong], 王平 [Wang Ping], and 丁柏淞 [Ding Bosong], 军事报道 [Military Report], aired August 9, 2019, on CCTV-7, accessed October 7, 2020, http://www.js7tv.cn/video/201908_189650.html; 王达 [Wang Da], “一个新型合成营的战斗力有多强” [How strong is one new type of combined-arms battalion’s combat power], 中国青年报 [China Youth Daily], August 16, 2018, accessed October 8, 2020, http://zqb.cyol.com/html/2018-08/16/nw.D110000zgqnb_20180816_1-12.htm.

³⁴ “陆军第 83 集团军某空突旅：空地信息融合 快速精准打击” [A certain air assault brigade of the 83rd Group Army: air-land information fusion, rapid and precise strikes], 张雅璇 [Zhang Yaxuan], 俞博 [Yu Bo], 郭嘉洲 [Guo Jiazhou], 李文涛 [Li Wentao], 宋松远 [Song Songyuan], and 徐君强 [Xu Junqiang], 军事报道 [Military Report], aired September 23, 2020, on CCTV-7, accessed September 24, 2020, http://www.js7tv.cn/video/202009_230228.html; 谷浩东 [Gu Haodong] and 吴高明 [Wu Gaoming], “千里出击 空降兵指引“落地惊雷”” [Attack over a thousand li, paratroopers guide down sudden flash of lightning], 解放军报 [Liberation Army News], November 16, 2020, accessed November 17, 2020, http://www.81.cn/jfjbmap/content/2020-11/16/content_275930.htm.

³⁵ “空中突击 武直-10 垂直打击装甲目标” [Aerial assault: WZ-10 vertically strikes armored targets], 胡春峰 [Hu Chunfeng], 郭嘉洲 [Guo Jiazhou], 任帆 [Ren Fan], 赵领燃 [Zhao Lingran], and 任相睦 [Ren Xiangmu], 军事报道 [Military Report], aired August 6, 2020, on CCTV-7, accessed August 9, 2020, http://www.js7tv.cn/video/202008_225763.html; “空中 武装直升机满载弹药跨海突击” [In the air: attack helicopters fully loaded with ordnance cross the sea to attack], 仇凯 [Chou Kai], 向旭 [Xiang Xu], 谢嘉俊 [Xie Jiajun], 徐海东 [Xu Haidong], and 舒悦 [Shu Yue], 军事报道 [Military Report], aired November 6, 2020, on CCTV-7, accessed November 10, 2020, <https://tv.cctv.com/2020/11/06/VIDEsbxjdHjT4Hm0jVDgKVgH201106.shtml>; 高骏峰 [Gao Junfeng] and 向旭 [Xiang Xu], “雾海突袭 无人机制导“低空利箭”” [Surprise attack through fog over sea: unmanned aerial vehicle guides 'low-altitude sharp arrow'], 解放军报 [Liberation Army News], November 16, 2020, accessed November 17, 2020, http://www.81.cn/jfjbmap/content/2020-11/16/content_275931.htm; Li Wei, “Army aviation brigade uses drones to guide helicopter missile strike,” China Military Online, November 18, 2020, accessed November 19, 2020, http://english.chinamil.com.cn/view/2020-11/18/content_9938663.htm.