



China's use of drones in the Sino-Indian border dispute: a concrete example of civil-military integration

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China's use of drones in the Sino-Indian border dispute: a concrete example of civil-military integration

Introduction

In December 2022, the Indian and Chinese armed forces clashed again along the Sino-Indian Himalayan border, causing dozens of injured troops. The two neighbours are fighting over a border that is almost 3,500 kilometres long and, despite the signing of multiple agreements and the creation of coordination mechanisms, incidents are becoming more frequent. Tensions run high on a daily basis; in 2020, a clash resulted in the death of at least 20 Indian and 4 Chinese soldiers.

The Himalayan plateau lies at high altitude, with an average elevation of almost 4,000 metres. In recent years, in order to strengthen its military presence there, China has built a network of modern infrastructure in the two autonomous border regions of Tibet and Xinjiang. The country has also begun to make extensive use of UAVs for a variety of missions, and Chinese state media have begun to report widely on the subject. These UAVs are becoming



so important that, in 2021, a Chinese legislator — a former commander of a border regiment on the plateau — called for the increased and enhanced use of UAVs, which are essential to the operations of the Chinese military because they can, in his words, “*see what troops can’t see, hear what troops can’t hear, and go where troops can’t go*”¹.

China is the country with the greatest number of UAV development programmes². Yet, until now, there has been no English-language publication on Chinese UAVs deployed specifically on the borders, in particular the Sino-Indian border. This research note aims to fill this gap by drawing on Chinese sources, particularly in the Chinese language, be they state media articles, scientific publications, or social networks. This research work aims not only to identify the UAVs deployed and the manufacturers involved, but also to better understand the objectives

¹ LIU Xuanzun, “Chinese legislator urges enhanced UAV usage in border regions”, *Global Times*, 28 February 2021.

² The UAV Databook, “The Center for the Study of the UAV”, 2019.

and difficulties encountered by the Chinese authorities in using UAVs within the unique environmental constraints of the Himalayan plateau. Border defence is a specific focus for them due to the complex geographical conditions, poor road networks and problems in supporting military operations there. The use of UAVs therefore lends itself well to the Himalayan topo-graphy and, since the 2017 Doklam incident, the People's Liberation Army (PLA) has accelerated it on the border with India.

In this work, we have identified about forty different UAVs with diverse missions: mainly logistical transport, but also surveillance, artillery observation, mine clearance, and even search and rescue of injured personnel. These are mainly small and medium-sized multi-rotor UAVs, as well as small rotary wing designs³. The vast majority of the UAVs used are built by civilian companies, not military ones, including startups. While well-known manufacturers DJI and AllTech are involved, so are more confidential manufacturers, such as Ziyan, Tuohang and Tiantu, that nonetheless play a key role. These companies illustrate China's progress in civil-military integration, a national strategy pursued since 2015⁴.

1. Himalayan border dispute: the root cause of Sino-Indian tensions

With tensions continuing to run high on the border, Indian and Chinese armed forces clashed in December 2022 in Doklam, near Bhutan, resulting in dozens of injured troops⁵. The two neighbours are in disagreement over a 3,488-km border, the Line of Actual Control (LAC). There is no precise, let alone consensual, delineation of this border. Beijing is claiming nearly 75,000 square kilometres from India, almost the entire state of Arunachal Pradesh, while New Delhi is claiming Aksai Chin, a 37,000 square kilometre area occupied by China since the 1962 Sino-Indian war in Ladakh⁶. China has settled its land-based territorial disputes with most of its neighbours, such as Laos in 1991, Kazakhstan in 1999 and Russia in 2008, but the Sino-Indian dispute continues without any prospect of resolution⁷.

The two sides have taken steps to control and manage their territorial disputes, signing several agreements to ensure peace and stability in the border region in 1993, 1996, 2003, 2005, 2012 and 2013⁸. A working mechanism for consultation and coordination on border affairs was established in 2012, and the latest meeting, the 26th, took place on 22 February 2023 in Beijing. In parallel, a military consultation mechanism was established. Within this framework, the 17th meeting of corps commanders was held in December 2022. China often presents the situation as “*generally stable*” – in January 2023 the Chinese Vice Foreign Minister referred to

³ That is, UAVs weighing between 15 and 150 kg, a category defined in the State Council 2021 guidelines on the use of UAVs (无人驾驶航空器系统标准体系建设指南 (2021)).

⁴ BONDZ Antoine, “Un tournant pour l'intégration civilo-militaire en Chine”, *Recherches & Documents*, FRS, n° 7/2017, October 2017.

⁵ LANDRIN Sophie, “Dans l'Himalaya, l'Inde reste sous la menace croissante de la Chine”, *Le Monde*, 30 January 2023.

⁶ CURTIS Lisa, GROSSMAN Derek, “Trouble at the Roof of the World”, *Foreign Affairs*, 15 February 2023.

⁷ FRAVEL Taylor, *Strong Borders, Secure Nation*, Princeton University Press, 2008.

⁸ BONDZ Antoine, CAUSSAT Paul, RACINE Jean-Luc, “Inde – Chine, entre compétition et coopération”, *Diplomatie*, Grands Dossiers, n° 14, April-May 2013.

the transition from “*emergency response to normalized management and control*”⁹. Conversely, India, through its Foreign Minister, has pointed out that the situation is fragile, and that China is continuing efforts to change the *status quo* unilaterally¹⁰.

Over the past decade, there have been a number of clashes on different parts of the border: in April 2013 in Ladakh, in June 2017 in Doklam, and, most importantly, in 2020. While there had been no casualties since 1975, the June 2020 clash in Ladakh's Galwan Valley, following a major Chinese military build-up, left at least twenty people dead on the Indian side and four dead on the Chinese side. In February 2021, after nine rounds of talks, the two countries began to disengage. However, by September 2021, China and India were accusing each other of firing shots despite a 1996 agreement prohibiting the use of firearms near the border. The tensions continue and are of concern, to the point of being explicitly mentioned by France in its Indo-Pacific strategy¹¹.

Ambiguity in Indian policy and strategy circles about whether China is a partner or a rival has been replaced by “strategic clarity”. China's behaviour is now perceived as confrontational and Indian domestic public opinion on China has deteriorated considerably¹². India is increasing cooperation and coordination with the United States, including improvements in its capacity to manage and monitor the border¹³.

The official Chinese position is to blame its neighbour. In 2017 a long document was published seeking to clear China of any responsibility¹⁴. Concerning the deadly incident of 2020, a video was broadcast in early 2021 on Chinese social networks with the goal to influence Chinese public opinion by presenting “*the truth about the border clashes with India*”¹⁵. Media coverage is also very biased. In state media, the territorial dispute is exploited to highlight the responsibility of the United States, the irresponsibility of India and the “legitimate” nationalism of China.

On the first argument – about the responsibility of the United States –, many editorials refer to “*external forces*” that are allegedly pushing India into confrontation with China¹⁶. Washington is said to be strengthening military cooperation with India “*in order to encourage India to provoke China more aggressively*”¹⁷, and seeking to “*undermine economic integration*”

⁹ FMPRC, “Vice Foreign Minister Sun Weidong Meets with Indian Ambassador to China Pradeep Kumar Rawat”, 20 January 2023.

¹⁰ “China didn't observe agreements with India on border issue, tried to ‘unilaterally change’ LAC”, *Indian Express*, 3 January 2023; “The situation to my mind still remains very fragile”, Reuters, 18 March 2023.

¹¹ French Ministry for Europe and Foreign Affairs, “La stratégie de la France dans l'Indopacifique”, February 2022; BONDZ Antoine, “La France, une puissance d'initiatives en Indo-Pacifique”, *Notes de la FRS*, n° 37/2022, 15 November 2022.

¹² GOKHALE Vijay, “A Historical Evaluation of China's India Policy: Lessons for India-China Relations”, Carnegie Endowment for International Peace, December 2022.

¹³ “US shared intel with India to repel Chinese troops? White House says”, *Hindustan Times*, 21 March 2023.

¹⁴ FMPRC, “The Facts and China's Position Concerning the Indian Border Troops' Crossing of the China-India Boundary in the Sikkim Sector into the Chinese Territory”, 2017.

¹⁵ Twitter account of @CGTNOOfficial, 20 February 2021: shorturl.at/eyHM0.

¹⁶ Editorial, “Has India suffered a loss when border with China goes further towards stability?”, *Global Times*, 24 September 2022.

¹⁷ FEI Xue, “India-US drill near LAC exposes US' belligerence”, *Global Times*, 4 December 2022.

*and political unity and convergence between Eurasia and the South Asian subcontinent*¹⁸, or wanting to “*maintain its global hegemony*” by making India “*one of its proxies*”¹⁹.

A second argument is that India is irresponsible. According to Chinese state media, Indian media deliberately exaggerate the scale of the incidents²⁰ and, above all, refuse to negotiate with China by maintaining “*unrealistic illusions*”²¹. In particular, Indian nationalism is criticised for transforming the country into a “*patriotic superpower*” (爱国主义超级大国)²², a nationalism fostered by a political class seeking to accumulate political capital at the expense of China²³.

A third argument justifies and fuels nationalism in China. Following the deadly incident in June 2020, the four Chinese soldiers who died were posthumously decorated, including with the July 1 medal, the highest award given to Party members. The commander of the border regiment, who suffered a head injury in the incident, was awarded the “Heroic Chief of the Border Guards” title (卫国戍边英雄团长) and was even one of the Olympic torch bearers in Beijing in 2022. This glorification of Chinese soldiers in the media – particularly Chinese soldiers deployed on the Sino-Indian border – is unprecedented²⁴.

2. The importance of UAVs for Chinese border defence: underlying concepts

The Tibetan plateau gives an advantage to China, which is building a network of modern infrastructure, including airports, helipads, roads and railways in the two autonomous border regions of Tibet and Xinjiang in order to be able to rapidly move troops and support its military operations. The defence of the “Line of Actual Control” is a difficult and far-reaching military challenge for India.

¹⁸ LI Xiguang (李希光), “Constructing a new Himalaya narrative based on solidarity” (用团结打造环喜马拉雅新叙事), *Global Times*, 26 December 2022.

¹⁹ GUO Bingyun, “Will New Delhi make the right choice as Washington pushes it as a proxy for war?”, *Global Times*, 29 January 2023.

²⁰ WANG Shida (王世达), “Do not let the border question commandeer Sino-Indian relations” (别让边界问题绑架中印关系), *Global Times*, 15 December 2022.

²¹ Editorial, “India to lose out as Sino-Indian border takes another step towards stability?” (中印边境朝稳定再进一步, 印度吃亏了吗?), 23 September 2022.

²² Editorial, “India still sleepwalking on border question; we are waiting for it to wake up” (印度仍在边界问题上梦游, 我们等它醒来), 11 October 2021.

²³ “China, India should enhance cooperation rather than hinder their relations due to border disputes”, *Global Times*, 15 December 2022.

²⁴ “Chinese youngsters flood social media to mourn border heroes who died in clash with India with surging patriotism”, *Global Times*, 20 February 2021; “Belongings of Chinese martyrs who sacrificed their lives in Galwan Valley border clash exhibited for 1st time in Beijing”, *Global Times*, 4 July 2021; “Galwan Valley heroes nominated China’s ethical role models, become epitome of Chinese people’s growing patriotic sentiments”, *Global Times*, 5 November 2021; “Bridges along Xizang-Xinjiang highway named after Chinese heroes in Galwan Valley border clash”, *Global Times*, 4 November 2022.

SINO-INDIAN TERRITORIAL DISPUTE IN THE HIMALAYAS²⁵



Border defence receives special attention in Chinese official documents. One of the characteristics of border defence is the diversity of the actors involved. A 2004 publication by the Military Science Press explains that it involves “*the triad of People’s Liberation Army (PLA) border defence troops, public security forces and militia*” (解放军部队公安边防部队和民兵三结合)²⁶. In addition, there is a chapter dedicated to border defence in the 2020 edition of *The Science of Military Strategy*, a reference publication of the Academy of Military Sciences (AMS)²⁷. The aim of this publication is to improve understanding of the characteristics of contemporary warfare among military elites, AMS students and the National Defence University²⁸.

The chapter on border defence states that “*China is a large border country, the environment and internal security challenges are very complicated, and the tasks undertaken by the military are very complex*”. Border areas have their own specific characteristics, namely “*complex geographical conditions, poor road networks and combat support difficulties*”. In particular, in the

²⁵ Map adapted by the authors based on ZHANG Ketian, “Explaining Chinese Military Coercion in Sino-Indian Border Disputes”, *Journal of Contemporary China*, 2022 and FRAVEL Taylor, *op. cit.*

²⁶ LI Xing (李星), *Border defence study (边防学)*, Military Science Press, 2004.

²⁷ *The science of military strategy (战略学)*, National Defense University Press, 2020. A version translated into English by one of the U.S. Air Force research centres is available on the China Aerospace Studies Institute website (26 January 2022). On this publication, see also BONDZ Antoine, “Chapter 1: China” in BONDZ Antoine, BOQUERAT Gilles, GROS Philippe, RUFFIE Nathalie, “Stratégies de défense et enjeux capacitaires : les cas de la Chine, de l’Inde et du Brésil”, *Observatoire des conflits futurs*, FRS, January 2019.

²⁸ This publication does not contain the “Military Strategy Directives” (军事战略方针). Elements of operational doctrine, such as the “Rules of Combat” (作战条令), are classified documents and are not publicly available (YANG Zurong, “Un expert décrypte le rapport sur le développement de l’intégration civilo-militaire du XVIIIème Congrès” (专家解读十八大报告中关于军民融合式发展的重要论述), *PLA Daily*, 15 November 2012).

context of military operations on the borders, it is “*difficult to reliably guarantee the effectiveness of operations and communications on the ground*”.

The Sino-Indian border is described by Chinese researchers as a “*high-altitude mountainous area*” (高寒山地区), at an elevation exceeding 3,000m. The average altitude of the border is 4,000m, which means a very cold climate, with temperatures as low as -40°C , strong winds and rarefied air²⁹. It is also difficult for troops to protect themselves from the sun's rays and glaring snow³⁰. The terrain is extremely uneven, and troop mobility is severely limited by geography and climate. Until recently, due to the lack of roads, they could only patrol some of these remote areas on foot or on horseback. On this rugged terrain, 471 officers and soldiers have reportedly lost their lives on high mountain patrols since 1980³¹.

It is in this specific geographical and climatic context that the use of UAVs is justified, not only because they have “*become an indispensable force on the battlefield*”, but also because they allow “*the autonomy of support systems, intelligent command, the use of swarms and cloud organisation, with new support concepts, support models and support methods*”³². It is also stated that they facilitate “*search and rescue on the battlefield*”.

The importance of UAVs in border defence was highlighted by a deputy of the National People's Congress, a former commander of a border regiment³³. Since the 2017 Doklam incident, the PLA has reportedly accelerated the use of UAVs on the border with India to enhance “*combat capabilities in high-altitude areas to better safeguard national sovereignty and territorial integrity*”³⁴. These UAVs are presented as enabling the PLA's Tibet Military Command to facilitate “*equipment supplies, defence and management of the border, and armed surveillance and reconnaissance*”.

The use of UAVs lends itself relatively well to Himalayan topography. They require less space to take off, especially for VTOL quadrotors or UAVs catapult-launched from a truck. In addition, their ability to fly close to the ground makes them particularly stealthy, improving their ability to penetrate enemy lines. Over the past few years, the PLA has therefore deployed a significant number of UAVs in areas of tension in the Himalayan foothills, and particularly high levels of activity have been observed in areas where recent Sino-Indian incidents have taken place³⁵.

²⁹ HUANG Xiangxuan, WU Zilong, BI Daping, WANG Shuangyu (黄翔璇; 吴子龙; 毕大平; 王双宇), “Influence and countermeasures of the alpine and mountainous battlefield environment on UAV combat” (高寒山地战场环境对无人机作战的影响和对策), *Proceedings of the Tenth China Command and Control Conference*, 17 August 2022.

³⁰ “Domestic UAVs monitor border zones 24 hours a day” (无人机全天候监管边境地区 本文来自全球无人机网), *Global Drones Network*, 12 May 2015.

³¹ “UAV application for border surveillance” (无人机应用之边防监控), Nanjing UAV Pilot Training Centre, 9 November 2015.

³² *The science of military strategy* (战略学), *op. cit.*

³³ LIU Xuanzun, “Chinese legislator urges enhanced UAV usage in border regions”, *Global Times*, 28 February 2021.

³⁴ “PLA expands high-altitude arsenal to address border threat”, *Global Times*, 31 May 2020.

³⁵ RUSER Nathan, GREWAL Baani, “Zooming into the Tawang border skirmishes”, *ASPI*, 20 December 2022.

HEAVY AND OTHER UAVS AT MALAN AIRPORT IN XINJIANG IN 2019³⁶



Heavy UAVs have been observed at military bases further away from the border, notably the military airports of Shigatse in Tibet and Malan in Xinjiang³⁷. While the presence of these UAVs should not be underestimated, they are not the ones most used on the border by the PLA or the People's Armed Police (PAP). And the display of so many heavy UAVs at a given time at Malan airport looks more like a communication exercise than a demonstration of operational capabilities on the border.

3. A wide range of missions: strong points of Chinese UAVs at the border

According to Chinese publications, UAVs deployed on the border with India perform a variety of missions. These include support for logistical transport, border surveillance, combat damage assessment, artillery observation, sniper support, mine clearance, search and rescue, and communication support. Among the benefits clearly identified by the Chinese authors are automation, low cost, flexibility of use, permanence and, at a fundamental level, the ability to shape the image of the PLA in China and abroad.

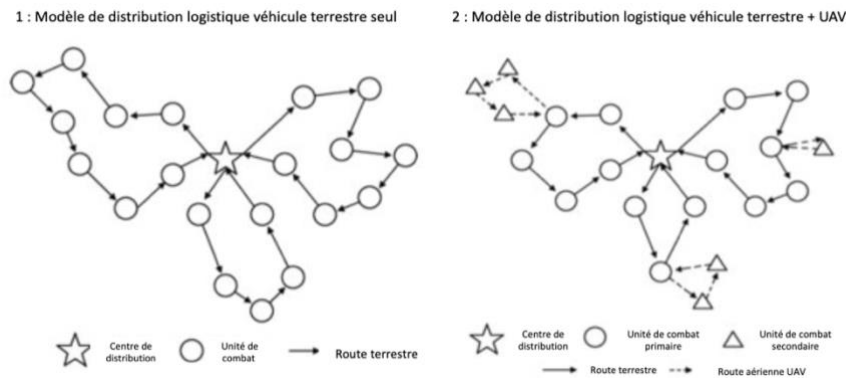
UAVs appear to be used primarily as a logistical transport tool, and there is frequent explicit involvement of the Logistics Department of the PLA Military Command in Tibet. Border outposts are located three to fourteen days' walk from maintenance and supply distribution centres, making land-based logistics links particularly vulnerable to disruption. They are often affected by landslides and heavy snowfalls³⁸. The Army Engineering University, for example, has presented a "road transport + UAV logistics distribution model" that allows for a better distribution of equipment within combat units.

³⁶ ROGOWAY Tyler, "Highly Impressive Lineup Of Chinese Air Combat Drone Types Caught By Satellite", *The Drive (The Warzone)*, 8 December 2019.

³⁷ "Soar Dragon UAVs Deploy to Yishuntun Airbase", *Bellingcat*, 23 March 2018.

³⁸ "PLA drones support Motuo frontline soldiers in Tibet for first time", *Global Times*, 4 October 2020.

COMPARISON OF LOGISTICS DISTRIBUTION MODELS WITH AND WITHOUT UAVS IN SUPPORT OF GROUND TRANSPORT³⁹



1. Distribution logistics model, land vehicle only. Distribution centre. Combat unit. Ground route.
2. Distribution logistics model, land vehicle + UAV. Distribution centre. Primary combat unit. Secondary combat unit. Ground route. UAV air route.

Moreover, one of the main problems facing PLA logistics planners is the “last mile”, which often cannot be achieved by road when Chinese soldiers are on mission⁴⁰. In this case, the use of swarms of UAVs enables rapid deliveries to be made autonomously – operators define a departure and arrival point from the ground station, and the flight can be monitored *via* the on-board camera. This also reduces the number of soldiers needed to handle logistics. According to one publication, it used to take 120 soldiers two to three days to transport supplies to the stations, and soldiers were eating mainly dehydrated vegetables and canned food; now UAVs can do the job⁴¹.

TRANSPORTING HOT FOOD TO A GROUP OF SOLDIERS ON BORDER PATROL⁴²



Most of the UAVs deployed on the plateau have a payload capacity of a few tens of kg, but this can rise to almost two tons for certain heavy UAVs, which, in addition, offer autonomy allowing logistical transport to the plateau from bases located several hundred kilometres away. This is the case, for example, with the AT-200 unmanned utility aircraft, inspired by New

³⁹ WANG Jinuo (王金岷), “Optimisation of vehicle + UAV delivery route based on improved ant-colony organization algorithm” (基于改进蚁群算法的车辆 + 无人机配送路径优化), *Journal of Armed Forces*, April 2022.

⁴⁰ “PLA Army conducts wartime drone supply-delivery drill in Tibet”, *Chinamil*, 9 November 2020.

⁴¹ “PLA drones support Motuo frontline soldiers in Tibet for first time”, *Global Times*, 4 October 2020.

⁴² “Drone swarm in Tibet military region to drop food and supplies to troops” (西藏军区无人机“蜂群”出动 空投单兵食品和物资), *Sina*, 10 September 2020.

Zealand's PAC 750. With a payload capacity of 1.5 ton and 10 m³, this civilian utility UAV can be used for military transport⁴³. At the 2018 Singapore Airshow, the UAV was shown as potentially linking Chengdu to Ngawa County on the Tibetan plateau at the Sino-Indian border⁴⁴.

**ILLUSTRATION
OF THE THEORETICAL USE OF THE AT-200
TRANSPORT UAV BETWEEN CHENGDU
AND THE TIBETAN PLATEAU⁴⁵**



Given the limited mobility of personnel and the often unfavourable cloud cover for satellite observation, UAVs also represent an effective border surveillance solution. They are used as patrol and observation tools by police forces operating on the plateaus⁴⁶, but also as communication relays in certain areas, mapping and meteorological tools, etc. One of the strong points are their flexibility of use and their low cost (a report by the Civil Security Bureau of China assesses the average price of a fixed-wing surveillance UAV at 150,000 yuan, or about 20,000 euros⁴⁷). Training is cheaper and much faster, and can even be outsourced to commercial companies⁴⁸.

It is noted that UAVs can also be used for damage assessment in combat when it is difficult for military personnel to reach the area⁴⁹. In this regard, a number of Indian media outlets have reported on numerous commercial VTOL UAVs that, following the deadly fighting in 2020, flew over the area where the clashes between the PLA and the Indian Army took place in the

⁴³ "Could drone that can deliver cargo to islets in South China Sea secure presence in disputed waters?", *South China Morning Post*, 28 October 2017.

⁴⁴ "Fantastic! Domestic AT200 and Xingying UAVs make Singapore Air Show debut" (给力! 国产 AT200、星影无人机亮相新加坡航展), 8 February 2018.

⁴⁵ "Drone swarm in Tibet military region to drop food and supplies to troops" (西藏军区无人机 "蜂群" 出动 空投单兵食品和物资), *op. cit.*

⁴⁶ Particularly since the Ministry of Public Security's 2016 "Notice on Strengthening Police Aviation Work" (关于进一步加强警用航空工作的意见). Seen in JIA Xiaoxuan, DOU Zengyu (贾小璇, 都增予), "Research into video image detection and collection of evidence by police drones in the plateau region" (高原地区警用无人机视频图像侦查取证探究), *Journal of Railway Police College*, 2020.

⁴⁷ The price can be broken down as follows: 10,000-30,000 yuan for the UAV body, about 20,000 yuan for avionics equipment, 50,000-100,000 yuan for the ground station and the flight control system (software). Seen in HUANG Zhaoqi, GUAN Wanlong (黄兆麒, 关万隆), "Research into the use of UAVs for border control" (无人机在边防警务领域的应用与发展), *Proceedings of the China Aviation Science and Technology Conference*, 2017.

⁴⁸ WANG Shuangyu, SUN Jiyao, CHEN Ming (王双宇, 孙纪尧, 陈明), "Discussion on the construction of a small system for prevention and control of drone fusion" (小型无人机融合防控体系构建刍议), *Building national defence*, October 2022.

⁴⁹ ZHAO Minjie of PLA Brigade 69250 (张明杰, 解放军 69250 部队), "Influence and countermeasures of the alpine and mountainous battlefield environment on the use of UAVs" (高寒山地战场环境对无人机系统运用的影响及对策), *Gansu Science and Technology*, Vol. 37, n° 20, 2021.

Galwan Valley⁵⁰. As for the ISR support function, there are reports of UAVs being used in sniper exercises, flying a few metres above the ground to give the sniper a better aim at a target.

The electromagnetic environment, which suggests a scarcity of available frequencies, also reduces artillery accuracy. Thus, UAVs are reportedly used for artillery observation operations⁵¹. For example, in 2022, at an altitude of 4,600 metres and in -20°C weather, a reconnaissance UAV took off from a vehicle and guided PHL-03 multi-launch rocket systems to accurately strike simulated targets representing mobile infrastructure involved in air defence⁵².

On a more anecdotal note, several PLA exercises have featured small UAVs in mine-clearing exercises, with the aircraft dragging a chain to detonate anti-personnel mines⁵³. Finally, some UAVs have been deployed on the plateau to conduct search and rescue operations for injured personnel, including casualty evacuation on stretchers.

Finally, it is important to note that media coverage of the use of UAVs offers important benefits in managing the image projected by the PLA in China and abroad. Firstly, these UAVs present the image of a modern, technological army. The use of UAVs, synonymous with innovation, is also effective in convincing young Chinese to join the army and, potentially, the PLA Military Command in Tibet. Secondly, UAVs allow for nationalistic demonstrations⁵⁴. The use of a DJI Mavic pro 2 UAV to raise the Chinese flag in the Galwan Valley in front of PLA troops is particularly telling⁵⁵.

FLAG RAISING CEREMONY IN THE GALWAN VALLEY USING A DJI MAVIC PRO 2 UAV⁵⁶



Thirdly, there are numerous videos of UAVs carrying self-warming rations to soldiers posted in forward positions. The message is one of relative comfort for Chinese troops on the border

⁵⁰ AROOR Shiv, "3 separate brawls, 'outsider' Chinese troops & more: Most detailed account of the brutal June 15 Galwan battle", *India Today*, 21 June 2020.

⁵¹ "Silent killer soaring above the Himalayas" (盘旋在喜马拉雅山上空的静默杀手), *Military technology*, 2020.

⁵² "PLA holds live-fire long-range rocket artillery drills in Xizang", *Global Times*, 18 December 2022.

⁵³ *Ibid.*

⁵⁴ More broadly, showcasing the use of these UAVs contributes to the techno-nationalism of the regime (BONDAZ Antoine, "Le techno-nationalisme chinois renforce la légitimité du regime", *La Recherche*, n° 557, March 2020).

⁵⁵ @louischeung_hk, "PLA garrison at #GalwanValley near the China-India border holds national flag-raising ceremonies. The Chinese national flag was raised by drone. #GalwanClash", Twitter, 2 October 2021.

⁵⁶ *Ibid.*

(e.g. deliveries by UAV for New Year celebrations), in contrast to the conditions experienced by Indian troops.

LUNAR NEW YEAR DELIVERY AT A BORDER OUTPOST USING AN AV-500 FROM THE CHINA HELICOPTER RESEARCH AND DEVELOPMENT INSTITUTE⁵⁷



4. An example of successful civil-military integration: the strong presence of civilian UAVs

No official list of UAVs deployed on the border is available. In Chinese sources, we have identified references to at least 40 models used on the Sino-Indian border (see Appendix 1). We observe that most of the deployed UAVs fall into the category of small and medium multi-rotor models (多旋翼无人机)⁵⁸ and small rotary wing designs (直升机)⁵⁹, although there are occasional references to heavy UAVs.

Commercial UAVs are the most common on the plateau, and they are perfectly integrated into the PLA's equipment. Some manufacturers are more present than others. We have chosen to focus our analysis on five of them, two well-known ones (DJI and AllTech), and three more confidential startups whose presence on site is decisive (Ziyan, Tuohang and Tiantu).

According to certain Chinese research groups, about 12 % of commercial UAVs produced in China are sold for surveillance and security (police and military) activities⁶⁰. The role of commercial companies is not limited to the production of commercial UAVs. They supply the PLA with counter-UAV equipment, communications systems, specific parts for military UAVs, and in some cases carry out training of military personnel as well as flying/maintaining equipment on military sites. Several training courses on the operation of this type of small

⁵⁷ ZHANG Hui, "PLA Tibet military command adopts drones for logistics support in drills amid China-India border clash", *Global Times*, 11 September 2020.

⁵⁸ That is, UAVs weighing between 15 and 150kg, a category defined in the State Council 2021 guidelines on the use of UAVs (无人驾驶航空器系统标准体系建设指南 (2021)), 2021.

⁵⁹ LIU Xuanzun, "Chinese legislator urges enhanced drone usage in border regions", *Global Times*, 28 February 2021.

⁶⁰ WEI Yong, YANG Tianhao (魏永、杨天昊), "In-depth report on military UAV industry: if you want to see over thousands of kilometres, move up to the next level" (军用无人机行业深度报告: 欲穷千里目, 更上一层楼), AVIC Securities Research Institute, date unknown.

commercial UAVs on the plateaus have indeed been set up by border defence regiments and the PAP⁶¹.

Although DJI (大疆) says the company “does not sell UAVs for military use”⁶², its products are ubiquitous in photos of PLA exercises: reconnaissance, transportation using the Matrice 600⁶³, fire support, etc. The Xinjiang PAP uses what looks like the DJI FPV (virtual reality headset) for “anti-terrorist” swarm flights⁶⁴. It is interesting to observe the use of DJI UAVs in the Ukrainian theatre of war for reconnaissance, surveillance and artillery observation operations (for the Mavic range)⁶⁵. The Matrice range of UAVs has been used by both sides for transportation and for dropping rudimentary grenades on enemy positions and equipment. DJI equipment is used for training military personnel: the PLA Border Defence University, based in Urumqi, uses DJI equipment (S1000+) in ISR UAV training⁶⁶. Note that DJI was added to the blacklist of Chinese military companies by the US Department of Defense in October 2022.

USE OF A DJI RECONNAISSANCE UAV BY THE ARMED FORCES ON PATROL ON THE SINO-INDIAN BORDER IN TIBET⁶⁷



Beyond the presence of its aircraft on the Sino-Indian and Sino-Nepalese borders, AllTech (科卫泰) stood out during the conflicts in the Galwan Valley. The head of the company praised on his Weibo account two employees of the company, sent as pilots, trainers and analysts, who were injured in the Sino-Indian clashes and who boasted of “flying UAVs” for “reconnaissance missions” in the area⁶⁸. Some videos feature the manufacturer’s UAVs used by the PLA on the

⁶¹ “Regiment in Xinjiang military region and South Xinjiang military region border defence regiment organize drone backbone training” (新疆军区某团、南疆军区某边防团组织无人机骨干培训), images from the Wechat account of the Western Military Theatre, 28 July 2021.

⁶² Official DJI website, “DJI Statement on Military Use Of UAVs”, 21 April 2022.

⁶³ “Chinese Army drops supplies using drone ‘swarm’, like a scene from a science fiction film” (中国军队在高原地区由无人机“蜂群”空投补给，场面过于科幻), CCTV Military footage, seen on Baijiahao, 11 September 2020.

⁶⁴ “Xinjiang armed police using UAV ‘swarm’ tactics to ‘catch’ violent terrorists” (无人机“蜂群”战术白菜化，新疆武警“抓”暴恐分子都用上了), CCTV Military footage, seen on Sohu, 30 August 2021.

⁶⁵ @SamBendett, “1/2 The Russian MOD showed a video of artillery units at the Western Military District using small drones for target adjustment and reconnaissance: ‘The drone’s firmware to create a secure communication channel was carried out on site in the field.’ Screenshot below (Twitter, 3 December 2022).

⁶⁶ WANG Xinjuan, “Military academy trains border defense drone pilots in Xinjiang” (军校为新疆培训边防无人机飞手), 81.cn, 18 January 2021.

⁶⁷ https://weibo.com/7711753752/Mralt4JdC?refer_flag=1001030103_

⁶⁸ “AllTech publicly congratulates two employees for heroism during outbreak of [Sino-Indian] conflict” (深圳科衛泰公開表彰兩員工於衝突爆發時表現英勇), hk01.com, 25 February 2021.

plateau for refuelling and transportation missions, including the KWT TMOP-300 and KWT-X6L-15⁶⁹. According to a CCTV video, AllTech refuelling UAVs were reportedly put into service in Mêdog County (墨脱县) at an outpost at 4,000m altitude⁷⁰. AllTech's equipment (KWT-X6L) is included in Defence University training courses on the use of surveillance and intelligence-gathering UAVs⁷¹.

Zhuhai Ziyan UAV (紫燕无人机/珠海紫燕无人飞行器) is one of China's leading startups offering dual-purpose UAVs suitable for high mountain operations. It was founded in 2014 by a former Air Force pilot⁷². Its CEO claims that the idea for the startup came about when he was rescued in an emergency in 2006 when he was stranded by snow in the Xinjiang highlands. The company's website explicitly mentions that it is specialised in the highlands and mountains (高原山地) and in border patrols (边境巡防). While Ziyan has signed several agreements with the Chinese police⁷³, the startup's UAVs are suitable for purely military applications. Numerous patents have been filed for bomb racks⁷⁴ or night targeting systems⁷⁵. The company has links with the military R&D community, as evidenced by a tender won by the company for the Academy of Military Sciences on battlefield target detection systems.

Ziyan's UAVs have been seen on several occasions on the plateaus in western China. A small helicopter, the Falcon 10 (隼-10), was operated by an army unit in Xinjiang during a high-altitude exercise. The UAV reached an altitude of 5,300 metres for a reconnaissance mission⁷⁶. "Pufferfish A-3" (河豚 "A-3) UAVs, capable of dropping up to six 60mm munitions, were reportedly integrated with a brigade in the Xinjiang military region, taking off from armoured vehicles to conduct target bombing exercises⁷⁷. According to the company, Ziyan's UAVs "*have been widely used for tactical land, sea and air strikes, theatre protection exercises and military equipment transportation*"⁷⁸. Finally, the company is active on export markets, presenting its UAVs at international trade shows and exporting Falcon-10s to Saudi Arabia, the United Arab Emirates, Pakistan, Turkey and Indonesia⁷⁹.

⁶⁹ Among others: "Medog outpost in Tibet uses UAVs to drop supplies" (西藏墨脱哨所使用无人机空投物资), *China Military*, 4 October 2020, or the "Border Inspection" section of AllTech's official website.

⁷⁰ *Ibid.*

⁷¹ "Qi Manguli, representative of the 20th National Congress of the Communist Party of China and female soldier of Xinjiang" (二十大代表、新疆女军人其曼古力给" 开朗"代言!), CGTN, November 2022.

⁷² "Little 'Ziyan' has produced so many famous drones" (小"紫燕"竟产出这么多"明星"无人机), *81.cn*, 22 June 2017.

⁷³ "Ziyan wins double first prize in national police UAV tactical exercise" (紫燕夺全国警用无人驾驶航空器战法演练双料一等奖), *Sohu*, 1st June 2017.

⁷⁴ Patent number CN210592443U.

⁷⁵ Patent number CN115163730A.

⁷⁶ "Falcon on reconnaissance mission on the plateau" (猎鹰高原侦察), Wechat from Ziyan UAV, 17 November 2022.

⁷⁷ @军迷 007 兄弟 on Toutiao, 23 July 2022.

⁷⁸ <https://www.ziyanuav.com/en>

⁷⁹ "China's Puffer A2 rotary wing UAV selling well in Middle East" (中国河豚 A2 无人直升机畅销中东 大户把展品都买下了), *Toutiao*, 29 December 2019.

USE OF THE ZIYAN A-3 PUFFERFISH UAV BY A UNIT IN XINJIANG IN A BOMBING EXERCISE⁸⁰



Founded in 2019 in an industrial cluster specialising in civil-military integration in Chengdu Science City⁸¹, Chongqing Tuohang Technology (重庆驼航科技) is developing unmanned helicopters for civil and military use, designed for logistics missions, including equipment transportation (up to one ton) and site surveillance. The company has explicit links with the military and the defence industry. It is an example of civil-military integration specialising in logistics, and it offers a solution to the difficulties inherent in highland areas. During a “precision medical drop” (医疗物资精准空投) exercise in 2020, the company worked with army brigades on the Tibetan plateau to deliver medical supplies with the Camel Hump 500 UAV at altitudes up to 4,700 metres⁸². As in the case of DJI and Alltech⁸³, it appears that civilian UAV engineers and pilots are well integrated into these exercises, with company employees on the flight team.

TUOHANG CAMEL HUMP 500 MEDICAL ASSISTANCE UAV USED IN EXERCISE ON THE TIBETAN PLATEAU TO DELIVER MEDICAL SUPPLIES⁸⁴



Tuohang represents a typical example of the Chinese-style UAV startup model, often founded by former defence industry engineers. Its engineering team includes alumni of Beihang

⁸⁰ https://weibo.com/7711753752/Mralt4JdC?refer_flag=1001030103_

⁸¹ “Jiangjin (Chongqing) opens a new chapter in integration development in Science City” (江津 开启融入西部 (重庆) 科学城发展新篇章), Chongqing Municipal Government, 1st April 2021.

⁸² “Great! Jiangjin has built unmanned helicopters!” (酷! 江津造无人直升机!), *Jiangjin Media*, 23 September 2020.

⁸³ “Chinese drone firm honours employees involved in Galwan conflict”, *Global Times*, 25 February 2021.

⁸⁴ https://weibo.com/7711753752/Mralt4JdC?refer_flag=1001030103_

University⁸⁵, former AVIC technicians and former Airbus China employees⁸⁶. The startup has strong links with academia and the defence industry, having worked with the Chengdu Aviation Institute and other players such as AVIC, particularly in the certification of UAVs, including military ones⁸⁷.

Beifang Tiantu UAV (北方天途航空技术) is a startup working on development and production of small VTOL UAVs and fixed-wing UAVs. The company exports its systems to Japan, India and the United States⁸⁸. It has links with the PLA. In 2015, it was authorised to supply equipment to the PLA by the General Department of Armaments and, in 2016, its aircraft were reportedly used in “*several units*” for border surveillance missions⁸⁹. Tiantu's platforms, including the small six-rotor M8FA helicopter, are reportedly being used on the Tibetan plateau for border surveillance missions and military logistics transport (up to 17kg of equipment).

In addition to its participation in national technology development plans (UAV plan of programmes 863 and 973), the company has links with the Beihang Key Laboratory for National Defence Technology for the development of military UAVs⁹⁰. According to CEO YANG Yi, Tiantu was developed through cooperation between companies and academia, including universities related to national defence, such as the Harbin Institute of Technology. Tiantu has signed agreements with CASC and created a joint venture with one of its subsidiaries, China Yuanwang Communications, to accelerate R&D on UAVs⁹¹.

This startup illustrates another aspect of civil-military integration, namely the training of military personnel in the use of UAVs. Tiantu is the largest private UAV pilot training entity in China and has opened several pilot training schools across the country, certified by the Aircraft Owners and Pilots Association of China (AOPA)⁹². These schools issue UAV pilot certificates for civilians and are involved in the training of some PLA and PAP units⁹³. These military training courses take place in Tiantu's schools, one of which, located in Xinjiang, is specialised in UAV pilot training for high mountain operations. Tiantu is also reported to have signed several training and UAV platform supply agreements with certain units of the PAP⁹⁴.

⁸⁵ Mainly from the Institute of Automation and the Institute of Unmanned Systems in Beihang.

⁸⁶ Recruitment notice on jobui.com.

⁸⁷ “L'Institut de technologie et de normes de navigabilité des drones de Chengdu a été officiellement créé à l'Académie de l'aviation de Chengdu” (成都无人机适航技术与标准研究所在成都航院正式成立), edu.cn, 31 August 2020.

⁸⁸ As stated on the company's official website.

⁸⁹ *Ibid.*

⁹⁰ Company presentation on youUAV.

⁹¹ *Ibid.*

⁹² *Ibid.*

⁹³ “Tiantu forme des professionnels des drones pour la police armée” (天途教育为武警行业输送无人机专业人才), YouUAV, 6 December 2018.

⁹⁴ Official website of the company.

5. The use of UAVs at the border: limitations and constraints

The high plateaus impose particular constraints on the use of UAVs along the border. The first obstacle lies in the high-altitude climate, which is very unforgiving. The police forces based on the plateau have complained about the very limited number of commercial UAVs that can be operated at high altitude: most of the models used lack thermal seals to protect against the cold and anti-vibration resistance to withstand the wind⁹⁵.

Some manufacturers offer solutions adapted to the climate (ultralight, waterproof UAVs equipped with algorithms to compensate for turbulence)⁹⁶, but these seem to be in the minority. Some officers formerly based on the plateau complained about the lack of resources allocated to heavy UAVs adapted to high altitude, as the "small" quadcopter models mainly present on the plateau were unable to withstand the elements and froze in place.

The rarefied air in the high mountains also poses a problem for the take-off of UAVs. This is because aerodynamic lift is reduced, so increased engine power and speed are needed to take off. This is why most fixed-wing UAVs can only take off from a truck-mounted catapult⁹⁷. The deep valleys at very high altitude restrict the line of sight, and thus the possibility of transmitting images and controlling the aircraft at long range.

In addition to the harsh climate, the PLA is also reportedly facing an upgrade of the counter-UAV defences of the Indian forces. Some Chinese researchers with links to the defence industry refer to the Samyukota electronic warfare system deployed on the border as a problem for the proper operation of Chinese UAVs in the area⁹⁸.

Finally, the Ministry of Public Security police forces based on the plateau report a lack of personnel capable of analysing the images and data transmitted by the UAVs. This lack of expertise within the PLA's border defence forces would go some way to explaining the presence of personnel sent by companies to fly and maintain the UAVs and to analyse UAV data⁹⁹.

⁹⁵ JIA Xiaoxuan, DOU Zengyu, *op. cit.*, 2020.

⁹⁶ See the TA-Q12 quadrotor UAV. Presentation on the official United Aircraft website (联合飞机), 5 August 2022.

⁹⁷ ZHANG Xudong, YIN Hang, WANG Jian, WANG Fan (张旭东; 尹航; 王剑; 王璠), "Research into plateau take-off modes for small and medium drones" (中小型无人机高原起飞方式研究), *Proceedings of the 2nd China Aviation Science and Technology Conference 2015*, 2015.

⁹⁸ WU Tanran, CHENG Ruosi, ZHAO Shuang, WANG Xueyu (武坦然, 程若思, 赵霜, 王学宇), "Analysis of Indian Army electronic warfare equipment and its use in mountain operations" (印军电子战装备及其山地作战使用特点分析), *Electronic countermeasures*, 2021.

⁹⁹ ZHAO Minjie, *op. cit.*

Conclusion

China's frequent use of UAVs on the Sino-Indian border for a variety of purposes has the potential to change the balance of power on the Himalayan plateau to India's detriment. While we have identified some 40 different UAVs, there may be more of them. It is therefore important to continue to investigate, and in particular to try to identify even more precisely the different units using these UAVs, and their characteristics.

Beyond that, particular attention should be paid to this concrete and successful example of civil-military integration – a national strategy since 2015 – in the field of UAVs. Indeed, the question arises, among others, of the role of industrial alliances, the mechanisms for financing this integration, the partnerships with universities and research institutes, and more broadly the institutional mechanism that fosters integration.






The direct involvement of civilian manufacturers – internationally known, like DJI, or more confidential, like Tuohang – must also raise questions about international cooperation with these players. Ensuring that French and European technologies do not contribute to the development of Chinese capabilities, both civil and indirectly military, is essential not only to protect French and European scientific and technological potential as best as possible¹⁰⁰, but also to avoid unwittingly participating in a shift in the balance of power between China and its neighbours, particularly India.

¹⁰⁰ BONDAZ Antoine, "Reality Check on China: Protecting Europe's Science and Technology Potential", 49 Security, September 2022.

Annexe 1 NON-EXHAUSTIVE LIST OF CHINESE UAVs DEPLOYED ON THE SINO-INDIAN BORDER

This list is based on various videos and images from PLA military exercises, manufacturers' statements, tenders and Chinese trade press articles. For some UAVs, it is not clear whether the vehicle is still in the field-testing phase before entering service or already operational. In many cases the exact area is not specified (most sources are vague about this, referring to the "plateau" or the "border").

It should be noted that all the heavy UAVs of the Chengdu Aircraft Design Institute, AVIC and Aerospace CH of CASC were only seen once, at the same time, by satellite image at the Malan base in Xinjiang, which leads one to suppose that it was a communication exercise rather than an actual deployment; the latter, therefore, remains to be demonstrated.

Manufacturer	Model	Description and/or location of deployment	Illustration
ALLTECH/ SHENZHEN KEWEITAI 科卫泰 	KWT X6L ¹⁰¹	6-rotor VTOL UAV for observation and border surveillance missions, cargo transport and refuelling	
	KWT- X6L Q ¹⁰²	Hydrogen-fuel variant of the X6L	
	KWT X6L-- 15 ¹⁰³	X6L variant for payloads up to 15 kg	
	KWT X6M ¹⁰⁴	Nyalam Border Inspection Post in Tibet	
	KWT TMOP -300 ¹⁰⁵	Cargo transport UAV (3-20kg payload), widely used on the plateau	

¹⁰¹ "Medog outpost in Tibet uses drones to drop supplies" (首次! 西藏墨脱哨所使用无人机空投物资), *81.cn*, 4 October 2020; AllTech official website.

¹⁰² "Keweitai UAV makes new contribution to transportation on the plateau!" (科卫泰无人机再立功, 征战高原运输!), Shenzhen UAV Industry Association, 3 November 2021.

¹⁰³ Official website of AllTech.

¹⁰⁴ "Development of multi-functional Chinese drones. Tibetan border defence drones on patrol on the Sino-Nepalese border" (中国无人机多用途发展 西藏边防无人机巡查中尼边境), *Sina*, 13 April 2017.

¹⁰⁵ *81.cn, op. cit*, 2020.

<p>DJI 大疆</p> 	<p>Mavic/Mavic Pro¹⁰⁶</p>	<p>Widely used for observation, patrol, sniper support, etc.</p>	
	<p>DJI FPV¹⁰⁷</p>	<p>FPV (First Person View) UAV in anti-terrorism exercises</p>	
	<p>Matrix 600¹⁰⁸</p>	<p>6-rotor VTOL cargo UAV, used by APL and PAP</p>	
	<p>1000+ Matrix¹⁰⁹</p>	<p>Eight-rotor VTOL UAV seen at Xinjiang PAP UAV training centres</p>	
<p>ZIYAN 紫燕无人飞行器</p> 	<p>Shanquan S2 山雀 S2¹¹⁰</p>	<p>Small rotary wing UAV used for observation and patrol</p>	
	<p>Falcon-10¹¹¹</p>	<p>Small rotary wing UAV used for reconnaissance missions</p>	
	<p>Blowfish A2¹¹²</p>	<p>Strategic support, equipment transport, logistical support, intelligence, reconnaissance on the plateau and tactical strike missions¹¹³</p>	

¹⁰⁶ Multiple sources available.

¹⁰⁷ « UAV 'swarm' tactics used by Xinjiang armed police to 'catch' violent terrorists » (无人机 "蜂群" 战术白菜化, 新疆武警"抓"暴恐分子都用上了), CCTV Military footage, seen on Sohu, 30 August 2021.

¹⁰⁸ *Ibid.*

¹⁰⁹ WANG Xinguan (2021), *op. cit.*

¹¹⁰ Manufacturer's website.

¹¹¹ @HenriKenmann, "Entraînement d'une unité de reconnaissance, de la région militaire du #Xinjiang, à 5 300 m d'altitude. Le #drone hélicoptère utilisé ici semble être le 'Falcon 10' (隼-10) conçu par Ziyan UAV: – MTOW 25 kg – Charges max 7 kg – Vmax 130 km/h – Autonomie 50 min". Twitter, 16 November 2022.

¹¹² LIU Xuanzun, "Private arms firms equip PLA with intelligent equipment for better border defence", *Global Times*, 2 November 2020.

¹¹³ HU Yuwei, ZHANG Yutong, "Unmanned helicopters fit for high-altitude combat aid China's Tibetan military command at the border with India", *Global Times*, 19 November 2020.

<p>HUMINGJIE 慧明捷科技</p> 	<p>HMJ- 00D6000P¹¹⁴</p>	<p>Used by the border protection regiments</p>	
	<p>Unspecified UAV image transmission system¹¹⁵</p>	<p>Used by the PAP in border areas</p>	
<p>HARWAR UAV 哈瓦无人机</p> 	<p>H Range- 16¹¹⁶</p>	<p>6-rotor VTOL transportation UAV, used for lifting loads (approx. 15 kg)</p>	
<p>TIANTU 天途</p> 	<p>M8FA¹¹⁷</p>	<p>8-rotor UAV, used by the PAP for border surveillance</p>	
<p>FACCON UAV 猎鹰</p> 	<p>LY- 34¹¹⁸</p>	<p>Fixed-wing surveillance UAV used by Xinjiang police</p>	
<p>JOUAV 纵横</p> 	<p>CW- 25¹¹⁹</p>	<p>Hybrid (battery and petrol) VTOL fixed-wing UAV with extended flight time</p>	
<p>X Control Systems 艾肯拓科技</p> 	<p>MK- 400¹²⁰</p>	<p>Small rotary wing UAV with two rotors, used for transportation, rescue and extraction of personnel in mountainous terrain</p>	
<p>Tuohang 驼航科技</p> 	<p>Camel Hump 600 重载¹²¹</p>	<p>Small rotary wing UAV with two rotors, used for "military support" and equipment transportation missions</p>	

¹¹⁴ 慧明捷西藏巡展连续报道:第一期:铁军进藏, *YouUAV*, 26 June 2019.

¹¹⁵ Official website of the manufacturer.

¹¹⁶ "Chinese Army drops supplies using drone 'swarm' in the plateau region, like a scene from a science fiction film" (中国军队在高原地区由无人机"蜂群"空投补给, 场面过于科幻), CCTV Military footage, seen on Baijiahao, 11 September 2020.

¹¹⁷ "Tiantu drones prove effective in defence of border with Tibet" (天途无人机效力西藏边防), official account of the manufacturer, reposted on Sohu on 31 December 2016.

¹¹⁸ Official website of the manufacturer.

¹¹⁹ LIU Xuanzun, "Private arms firms equip PLA with intelligent equipment for better border defense", *Global Times*, 2 November 2020.

¹²⁰ Manufacturer's video posted on Weibo on 16 November 2021.

¹²¹ Manufacturer's image published on Sohu on 26 November 2021.

<p>Xinghuan Aviations 重 庆星环航空科技</p> 	<p>Unmanned helicopter SLH- 1200P 无人直升 升机¹²²</p>	<p>Used by a PAP brigade to transport equipment to the Tibetan plateau</p>	
<p>ZTO EXPRESS 天域航通科技</p>	<p>HY100¹²³</p>	<p>Cargo UAV with a capacity of 1.9 t., used on an air transport route between Tiemenguan and Alar in Xinjiang</p>	
<p>ZHONGTIAN FEILONG INTELLIGENT TECHNOLOGY 中天飞龙智能科技</p> 	<p>Feilong-1¹²⁴</p>	<p>Exercises with heavy load take-offs and precision delivery of large objects</p>	
<p>CASIC/ FEIHONG 航天九院飞鸿</p>	<p>Heavy oil unmanned miniature helicopter¹²⁵</p>	<p>Small rotary wing UAV for transporting equipment (120kg up to 6,000m altitude)</p>	
<p>AVIC/ CHINA HELICOPTER RESEARCH AND DEVELOPMENT INSTITUTE 航空工业直升机所</p> 	<p>AR- 500C¹²⁶</p>	<p>Small rotary wing UAV used for observation and reconnaissance missions at the border</p>	
	<p>AR- 20¹²⁷</p>	<p>4-rotor VTOL surveillance UAV deployed at the border; new, hydrogen-fuel variant announced</p>	
	<p>AV500W Zhanlang 战狼¹²⁸</p>	<p>High-altitude unmanned helicopter capable of strike and bombing missions; can carry machine</p>	

¹²² “Armed Police carry out transportation and delivery of plateau drones” (武警部队实现高原无人机运输投送), CCTV Video posted at js7tv on 15 September 2019.

¹²³ @HenriKehmann. “ZTO Express a inauguré la première ligne de transport régionale sans pilote en Chine, avec le [#drone](#) cargo HY100, entre Tiemenguan et Alar en province du [#Xinjiang](#). HY100, d’une capacité maximum de 1,9t, a obtenu son certificat de navigabilité (CBN) en novembre 2020”, Twitter, 19 December 2021.

¹²⁴ HUANG Kristin, “China puts Feilong-1 endurance UAV through high-altitude paces”, *South China Morning Post*, 28 April 2021.

¹²⁵ Seen on China Aerospace (航空产业网), 29 June 2022.

¹²⁶ LIU Xuanzun, “China’s unmanned plateau helicopter completes high-altitude maiden flight”, *Global Times*, 29 September 2020.

¹²⁷ LIU Xuanzun, “China’s plateau-operable UAV makes 1st flight with hydrogen power, extends endurance”, *Global Times*, 20 March 2020.

¹²⁸ “Sino-Indian border dispute could be long-lasting, and cutting-edge Chinese equipment continues to appear on the plateau” (中印边境对峙或长期化, 中国先进装备不断现身高原), *Defense Weekly*, as seen on Sohu, 28 September 2020.

		gun (450kg weapons payload); firing test at 4,300 metres ¹²⁹	
	AV- 500 ¹³⁰	China Post carried mooncakes for the Mid-Autumn Festival to guards based in Mêdog, 2,500m above sea level	
NORTHWESTERN POLYTECHNICAL UNIVERSITY 西北工业大学	JWP- 01 ASN- 206 (e) ¹³¹	Fixed-wing reconnaissance and artillery observation UAV designed by Xi'an Aisheng Technology Group	
	JWP- 02 ASN- 207 (e) ¹³²	Fixed-wing reconnaissance UAV, deployed with Brigade 77611 in Tibet and designed by Xi'an ASN Technology (西安无人机研究)	
BEIHANG UNIVERSITY/ UNMANNED HELICOPTER RESEARCH INSTITUTE 北航北航直升机所	F- 500 无人直升机 ¹³³	Small rotary wing UAV with 2 rotors, used in high-altitude equipment transport missions (up to 150kg at 5,000m altitude)	
	BZK- 005C ¹³⁴	Jointly developed with Harbin Aircraft Industry, used for strike exercises on the plateau	
	SKY Hawk 天鹰无人机 ¹³⁵	Stealth reconnaissance UAV, observed at Malan base in Tibet	

¹²⁹ "China's unmanned helicopters pass high-plateau testing", *Global Times*, 23 November 2017.

¹³⁰ @HenriKehmann, "#Drone L'armée de terre chinoise continue à tester le ravitaillement de ses troupes frontalières au #Tibet par les hélicoptères. Au moins un AV-500 de China Post a transporté des gâteaux de lune, pour la fête de la mi-automne, aux gardes basés à Mêdog, à 2 500 m d'altitude", Twitter, 30 September 2020.

¹³¹ *Ibid.*

¹³² Report "Explore the first APL women's plateau flight class and watch the new drone seen in 'Eye of War God' display a 'sword to seal the throat'!" (探秘解放军首支高原女子飞行班 看新型无人机化身"战神之眼"上演"一剑封喉"!), CCTV, posted on Youtube, 1st April 2021.

¹³³ "F-500 | First plateau mission demonstration by Chinese heavylift unmanned helicopter" (F500 | 国内首次大载重无人直升机高原飞行任务演示), *Vane Aviation*, 26 February 2021.

¹³⁴ LIU Zhen, "China-India border dispute: drones prove their worth at high altitude", *South China Morning Post*, 20 July 2020.

¹³⁵ ROGOWAY Tyler, "Highly Impressive Lineup Of Chinese Air Combat UAV Types Caught By Satellite", *The Drive (The Warzone)*, 8 December 2019.

<p>AVIC/ CHENGDU AIRCRAFT DESIGN INSTITUTE 成都飞机设计研究所</p>  <p>中航工业成都飞机设计研究所 AVIC CHENGDU AIRCRAFT DESIGN & RESEARCH INSTITUTE</p>	<p>Tengden 001 腾顿 TB- 001</p>	<p>Heavy reconnaissance and strike UAV, observed at the Malan base; tested at an altitude of 4,238m and up to 6,600m for 5 hours a day¹³⁶</p>	
	<p>GJ 1 - Wing Loon I 翼龙-1¹³⁷</p>	<p>Used in a rescue exercise in the Hexi corridor in Gansu as a relay for satellite communications</p>	
	<p>GJ- ID 翼龙 I D-¹³⁸</p>	<p>Inaugural flight at a plateau airport with extended range (35 hours)</p>	
	<p>GJ 2 - Wing Loon 2 翼龙-2¹³⁹</p>	<p>Maiden flight in 2021 and cloud seeding operation¹⁴⁰</p>	
	<p>Wing Loon 10 Cloud Shadow 风影</p>	<p>HALE stealth UAV observed at the Malan base</p>	
	<p>GJ- 11 Sharp Sword 翼龙-11</p>	<p>Stealth UAV seen at Malan base</p>	
	<p>Divine Eagle 神鹰</p>	<p>Heavy UAV observed at Malan base</p>	
	<p>WZ- 7 Soar dragon</p>	<p>HALE reconnaissance UAV observed at Malan base and Shigatse base¹⁴¹</p>	

¹³⁶ @jesusfroman “On 12 May 2022, it was reported that a TB-001 UAV (Tengden Tech.) finished a 14 day test where it flew from Kangding Airport (Tibet Autonomous Region, China) at an altitude of 4238m and went up to 6600m for 5h daily. The test were done private, but still a message to India”, Twitter, 13 May 2022.





¹³⁷ LIU Xuanzun, “Xinjiang gets border patrol drones for better missions”, *Global Times*, 21 January 2020.

¹³⁸ “China’s Pterosaur I-D smart drone unveiled” (中国翼龙 -ID 智能无人机亮相), *TRT*, 26 December 2018.

¹³⁹ ROGOWAY Tyler, *op. cit.*

¹⁴⁰ “China uses large UAV for cloud seeding over Qinghai-Tibet Plateau”, *Xinhua*, 10 October 2022.

¹⁴¹ @VivekSi85847001, “Shigatse Airport, just located 20 Km above Tawang sector in Tibet. China Pres Xi Jinping visited this Base early this year too... 10x Flanker Jet 1x WZ-7 Soaring Dragon HALE UAV 2xCH 4 UCAV with Ground support system”, Twitter, 27 November 2022.

<p>CASC/ AEROSPACE CH 航天彩虹</p>  <p>彩虹无人机</p>	<p>Caihong 4 CH 4- 彩虹</p>	<p>Reconnaissance UAV, observed at the Malan base</p>	
	<p>CH-902</p>	<p>Small hand-launched reconnaissance UAV¹⁴²</p>	
	<p>CH-802</p>	<p>Small hand-launched reconnaissance UAV, larger than the CH-90¹⁴³</p>	

¹⁴²@anshu217: “#China #PLA #TMR #Tibet Military Region has equipped its various units with variety of drones particularly the Artillery brigade and Reconnaissance Battalions of Combined Arms Brigade”, Twitter, 13 April 2023.

¹⁴³ Ibid.