Understanding Chinese UAV Group-Style Operations

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OE Watch Commentary

Chinese unmanned aerial vehicle (UAV) "group-style operations" have now entered the battlefield training phase, according to the following excerpted article, published in *Jiefangjun Bao*, the official newspaper of the Central Military Commission. The article explains these UAV operations are considered "novel" and "practical" and have "great operational potential and application prospects." However, there is no conceptual description or definition of these types of operations. As a result, the authors have set out to develop a better understanding of the three primary categories of UAV group-style operations, namely UAV fleet, cluster, and swarm operations, in hope that a better understanding will give China an overall advantage in UAV operations.

In short, UAV fleet operations are the most basic group-style operations. Their style and methods of operation are most closely associated with the style of warfare that would fall under mechanized warfare. UAV cluster operations are most closely associated with informatized warfare in that they rely on network intercommunication systems and have system-of-systems operations capability. Finally, UAV swarm operations fall under intelligentized operations. As such, they are generally fully autonomous, self-taught, and highly adaptable. (See: "China: New Concepts in Unmanned Combat," *OE Watch*, October 2020). While UAV fleet and cluster operations are underway, UAV swarm operations are still on the horizon. The authors argue that it is important to have a firm understanding of the three types of group-style operations. The goal is to integrate the development of the three group-style operations, to stay on top of ongoing research of UAV fleet operations and UAV cluster operations, and ultimately to seize the initiative in UAV swarm technology and operational applications. (Refer to the following chart for more comparisons between the three group-style UAV operations).

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Source: Ding Zaiyong, Yang Xiaoling, and Hao Weichuan, "军事论坛 | 群式作战，演绎无人战场新图景 (Group-Style Operations Reveal a New Unmanned Battlefield Scene)," *Jiefangjun Bao* (official newspaper of the Central Military Commission), 20 May 2021. https://www.81.cn/ll/2021-05/20/content_10037378.htm

At present, the group-style operations of unmanned aerial vehicles (UAVs) have entered the phase of battlefield practice from conceptual research. This indicates that the development of new types of UAV combat modes is becoming increasingly mature. Group-style UAV operations are manifested, in general, as UAV fleet operations, UAV cluster operations, and UAV "swarm" operations. Since there is no systematic and authoritative concept description of the three in China and abroad, it is very easy to cause concept confusion, which is not conducive to the in-depth study of the group-style operations of UAVs. For this reason, it is necessary to distinguish and analyze the concepts of the three to understand them clearly, thereby deepening the understanding and grasp of the characteristics and laws of UAV operations.

Group-style UAV operations are a novel and practical operational mode and have great operational potential and application prospects. In particular, we should pay a great deal of attention to the UAV "swarm" operation, which is an operational mode that may disrupt traditions. Correct recognition of UAV fleet operations, UAV cluster operations, and UAV "swarm" operations is an important basis and necessary prerequisite for accelerating the integrated development of mechanization, informatization, and intelligentization of group-style UAV operations. In actual combat, we should not only pay attention to the application research of UAV fleet operations and UAV cluster operations but also should be ahead of the pack and conduct research on UAV "swarm" technology and operational application. Only by planning ahead can we seize the initiative well.

	UAV Fleet Ops	UAV Cluster Ops	UAV Swarm Ops
Combat Power Generation Mode	Mechanization	Informationization	Intelligentization
Level of Operations	Low	Medium	High
Precision	Low precision	Medium precision	High precise
Operational Attributes	Quantity and scale	Unification (joint)	Intelligence (disrupting traditions)
Similar to...	Manned aircraft fleet	Network interconnection	Biological simulation (i.e.: social insects).
Characteristics & Organization	Superimposition effect. Consist of 3+ UAVs organized into an operational group.	An aggregate of systems and individuals.	Self programming. Constantly improving. Intelligent warfare.
Advantages	Group construction is relatively simple. Conducive to centralized management. Highly efficient carrying out simple tasks.	High task coordination efficiency. Stronger operational flexibility. Stronger ability to execute distributed operational tasks. Relatively strong group expandability.	Highly efficient at task coordination. Strong operational flexibility. Strong capability in executing distributed operational tasks. Strong group expandability. Strong battlefield adaptability.
Disadvantages/ Weaknesses	Weak task coordination. Weak at executing distributed operational tasks. Limited expandability of groups. Weak battlefield adaptability.	Information level requirements are high. Airframes are complex. Weak anti-electronic jamming capability.	Requires a large number of UAVs. High requirements for biological simulation technology research (i.e.: social insects). Subject to a lot of influence brought by background C2.
Applications	Ideal for concentrated fire strikes.	Usually executes operational tasks based on operational effects (i.e.: systems of systems operations).	Usually executes asymmetric offset operational tasks.

Source: Chart made by author using information from the article