



Methods of Dealing with Attacks of Swarms of Unmanned Systems



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Bottom Line

Aerial drone swarms are here; maritime drone swarms are soon to follow

Drone swarms present significant, growing threats across the full scope of national security issues

Countering drone swarms requires test and evaluation, analytical assessments, war games, exercises, and everything in between



Outline

- Establish a Common Language
- Drone Swarms are Here and Proliferating Fast
- Drone Swarms and Warfare
- Drone Swarms in the Maritime Environment
- Strategic Issues
- Counter-Swarm
- What to do now?



Establish a Common Language

- Drone swarms are distinct from *drones en masse*
- Drones operate in the air, on land, at sea, or even in space
- Degree of autonomy is variable, but must increase at scale



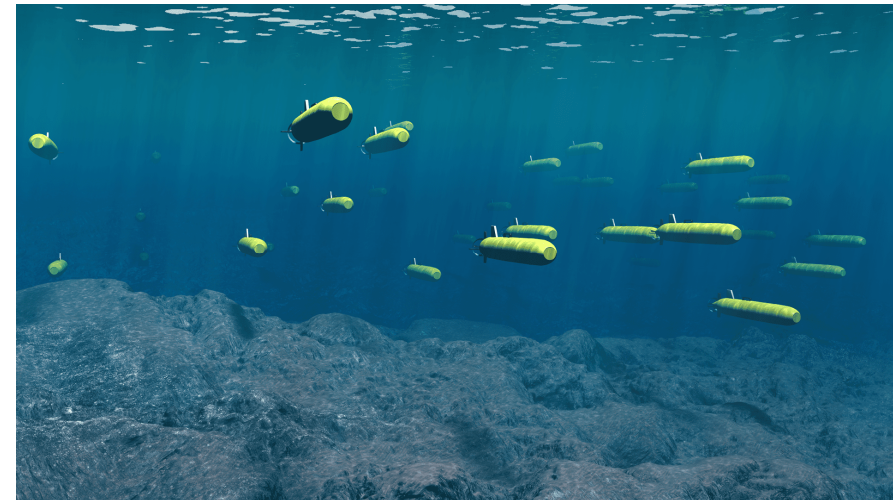
Drone Swarms are Here and Proliferating Fast

- In 2021 Israel became the first military to deploy a drone swarm in combat
- Wide range of actors developing swarms
 - In the past year, China, the Netherlands, the United Kingdom, Spain, and the United States militaries announced new swarm projects



Drone Swarms and Warfare

- Drone swarms create military value in three ways:
 - Mass
 - Wide-area distribution
 - Complexity
- Potential drone swarm missions are *extremely* broad
 - Suppression of enemy air defenses
 - Infantry and vehicle search and destroy
 - Anti-submarine warfare
 - Asymmetric weapon of terror



Drone Swarms in the Maritime Environment

- Drone roles:
 - Attacks on expensive platforms to disrupt or destroy
 - Aerial, undersea, or mixed swarms to search for targets
 - Drone swarms for countermine operations
- Drone swarms may vary greatly in what they look like, depending on mission:
 - Different types of payloads
 - Single- or multi-domain
 - Bespoke or modified craft



Strategic Issues

- Drone swarms are future weapons of mass destruction
 - Inherently scalable
 - AI-based targeting highly brittle
- Asymmetric threats
 - Terrorist use
 - Authoritarian regime repression
- Proliferation risks



Counter-Swarm

- Low-cost, rapid-fire, area of effect weapons likely ideal
 - But the devil is in the details
 - Virtually no open-source analysis has explored the issue to date
- Information warfare is critical
 - Swarms are flying, talking computers
 - Manipulating artificial intelligence and autonomy



What to do now?

- Need to understand what missions drone swarms are most effective for, and what composition of drone swarm work best
- Test, evaluation, modeling, and simulation of counter-drone systems is critical
 - Need to consider the specific technical parameters of maritime drones
- Assess progress and focus on drone swarm technology
 - Need to consider comparative progress of different types of drones and swarms
- Consider the full range of traditional WMD policies: international treaties, international norms, counter-proliferation



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The National Consortium for the Study of Terrorism and Responses to Terrorism (START) uses state-of-the-art theories, methods and data from the social and behavioral sciences to improve understanding of the origins, dynamics and social and psychological impacts of terrorism.

