# THE USE OF DRONES IN MOUNTAIN WARFARE

This session explored the **use of drones in mountain warfare**, addressing **strategic doctrines, operational constraints, and industrial innovations**. **Moderated by Antoine Level**, it brought together **experts from NATO's Mountain Warfare Centre of Excellence (MWCOE), the 7th BCA, and Drone Shield**.


The session highlighted the **strategic rise of drones in mountain warfare**, the **need to adapt doctrines and training**, and the **growing challenges related to counter-drone technologies**.

- Current State and Doctrine of Drones in Mountain Warfare, COL Leon Holc & LCL Dennis JAHN (MWCOE)

LCL Dennis JAHN recalled that the MWCOE organised a drone seminar in 2023, bringing together 100 participants from 16 nations and 12 private companies. The objective was to establish a clear vision of drone use in mountain combat. He stressed the importance of standardizing terminology in NATO doctrines and mentioned that the MWCOE is currently revising regulations to improve interoperability.

COL Leon HOLC highlighted the importance of drones for:

- Reconnaissance and surveillance of complex terrain;
- Targeting and objective acquisition;
- Logistics and rapid resupply for isolated troops;
- Environmental analysis to anticipate avalanche risks or restricted access zones.

- Operational Feedback on Drone Use in Mountain Environments, LCL Marc-Antoine (7e BCA)

LCL Marc-Antoine shared the 27th BIM's experience with small drones, highlighting:

- A growing need for drones in every combat group to improve tactical intelligence;
- Increased resistance to radio and GPS jamming is essential;
- The need for thermal cameras to detect enemy presence in snow or night conditions;
- Integration of artificial intelligence to enhance data analysis;
- Testing of simpler FPV drones, which can be repaired directly in the field.

He pointed out that mountainous terrain presents major challenges, including limited radio communication due to terrain features and cold temperatures affecting battery performance. Potential solutions include aerial relays to extend drone range and thermal storage systems to improve battery autonomy.

- Emerging Technologies and Counter-Drone Measures, Hans HOYER (DroneShield)

Hans HOYER highlighted the growing challenges posed by the proliferation of commercial and military drones. He explained that drone detection and neutralization rely on:

- Radiofrequency jamming systems and GPS signal disruption.
- Radars and acoustic sensors to identify and track autonomous drones.
- The increasing use of kinetic destruction ("hard kill") solutions, a trend reinforced by lessons learned from the conflict in Ukraine.

He also emphasized the rapid evolution of cheap, easily produced FPV drones, which are widely used in modern conflicts. These drones require adapted countermeasures, particularly faster and more intelligent interception systems.

The session concluded with a discussion on the future of drones in mountainous terrain, focusing on several key areas:

- **Standardisation of interfaces and control systems** to improve interoperability between allied forces and optimise drone operations;
- **Exploration of cargo drones**, particularly for transporting heavy loads and, in the future, conducting medical evacuation missions in difficult terrain;
- **Integration of ground robots to assist troops** in rugged areas and enhance logistics and operational capabilities.