

MOBILITY

This roundtable discussion explored the challenges and innovations related to motorized mobility in mountainous terrain, moderated by Yohan Briant, Director General of the Institute for Applied Geopolitical Studies. The discussions were structured around three main themes:

- **Specific challenges of motorized mobility** in mountain environments, including constraints related to altitude, cold, and rugged terrain.
- **Technological advancements and strategic approaches** to improve vehicle performance and adaptability.
- **Logistical and operational challenges**, focusing on mission optimization and troop safety.
- [LCL Grégoire \(EMAT\): Military Mobility in Mountainous Terrain](#)

Motorized mobility in mountain environments relies on specialized equipment adapted to demanding terrain. Several vehicle types are distinguished:

- **Light vehicles:** HT 270, quads, and snowmobiles, facilitating access to steep areas.
- **Armored vehicles:** VHM and future Jaguar, essential for controlling valleys.
- **Helicopters:** NH90 and Chinook, enabling airborne maneuvering and troop deployment.
- **Mobile artillery units:** CAESAR cannon and mortar systems mounted on tracked vehicles.

The main priority is to ensure mobility adapted to extreme conditions, balancing protection, autonomy, and off-road capability. Camouflage and interoperability remain key challenges.

- [The Role of Industry in Technological Innovation, Nicolas MALDERA \(Arquus\): Industrial Contributions to Military Mobility](#)

As an industrial leader, our role is to meet the operational needs of the armed forces while integrating technological and budgetary constraints. Our development priorities for mountain mobility include:

- **Engine adaptation:** Enhancing high-altitude performance and minimizing power loss.
- **Cold-start solutions:** Implementing preheating systems, electric resistances, and specialized fluids.
- **Weight and fuel consumption reduction:** Finding the optimal balance between armor protection, autonomy, and logistics.
- **Hybrid and autonomous vehicles:** Advancing the robotic mule program for mountain infantry.

These innovations are tested in real-world trials, in collaboration with international partners.

- [The German Approach and Multinational Challenges, LCL Andreas KUENZEL \(ACCDC, German Army\)](#)

In Germany, we focus on vehicles like the BVS10 (BAE Systems) and modular solutions for mountain troops. We also integrate autonomous platforms with strict requirements on:

- **Human-machine collaboration** to enhance operational effectiveness.
- **Camouflage capabilities** and low-visibility operations, minimizing light emissions.
- **NATO standardization** to ensure interoperability with allied forces.



International cooperation is essential to share costs and standardize capabilities, but it also requires balancing national requirements, which may sometimes diverge.

LOGISTICS IN EXTREME COLD ENVIRONMENTS

This roundtable addressed the **major challenges of logistics in cold environments**, with a particular focus on **military operations**. During the discussion, three key speakers shared their insights: **Captain Didier**, an **alpinist from the High Mountain Military Group**, **Colonel David ROYER**, **commander of the 7th RMAT and an expert in mountain and extreme cold maintenance**, and **Eric DESFARD**, representing the **industry sector**.

- [Thibault Fouillet \(IESD\): Opening Remarks](#)

Mr. FOUILLET opened the session by presenting the **Institute for Strategic and Defence Studies (IESD)**, a **centre of excellence recognised by the French Ministry of the Armed Forces**.

Today, the session focused on three main areas:

- **Operational challenges of logistics in extreme environments ;**
- **Technological innovation and equipment adaptation ;**
- **The role of industry and future development prospects**



- [CNE Didier \(GMHM\): The Challenges of Cold-Weather Operations](#)

Extreme cold imposes **severe physiological and material constraints**. At **minus 30°C**, exposure for just a few minutes **without adequate protection** can cause **irreversible frostbite** and even **jeopardise the mission**.

Autonomy in extreme cold environments relies on several key principles:

- **Anticipation and preparation:** specialised training, strict routines, and gradual adaptation to cold.
- **Equipment management:** layering thermal clothing, selecting high-performance materials, and maintaining gear.
- **The importance of a warm zone:** ensuring a **reconditioning space** to allow soldiers to sustain operations.

Our **Arctic mission experience** shows that **isolation and extreme conditions** require **precisely calibrated logistics** and **total autonomy for several weeks**.



- [COL David ROYER \(7^e RMAT\): Logistical Adaptation and Support Challenges](#)

Logistics in cold environments is a matter of both survival and operational performance. The support chain must be planned in advance to ensure:

- **Delivery of resources:** suitable fuel, specialised high-energy rations, and engine preheating.
- **Force mobility:** adapted vehicles, maintenance in extreme conditions, and reduced energy consumption.
- **The exponential impact of climatic constraints:** every drop in temperature **significantly increases logistical needs** and **extends implementation times**.
- Recent **operational feedback, particularly from Eastern Europe**, highlights that **effective logistics is essential** to maintaining **troop engagement capabilities** and **preventing attrition due to extreme conditions**.

- [Eric DESFARD \(Sciences\): The Role of Industry and Technological Innovation](#)

Industry plays a key role in adapting military equipment to extreme cold. Several innovations are currently under development:

- **Lithium-titanium-oxide batteries designed for cold environments:** reducing power loss in sub-zero temperatures.
- **Autonomous resupply systems:** gliders and logistics drones enabling precise delivery without exposing troops.
- **Enhanced thermal performance:** innovative textiles, portable heating systems, and optimised energy storage.

Cold-weather constraints require adjustments to logistics doctrine: **should priority be given to soldier autonomy or the resilience of support points? The answer depends on** the nature of engagements and tactical conditions.

