

Mountain Combat Operations in the Context of Contemporary Battlefield Requirements

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Abstract

The integration of new technologies into military operations has a significant impact on the entire process, resulting in specific features and shaping the character of warfare. The modern battlefield is characterized by the accuracy and long range of new weapon systems, the extensive use of multi-spectral sensors, the continuous improvement of the sensor-to-shooter relationship, and the development of unmanned capabilities. In this context, there is a question as to whether military operations executed in mountainous environments are still relevant in contemporary battlefield equations. These operations are typically spatially limited, static, and attritional, and are subject to transformation from a doctrinal and operational perspective in a paradigm shift in the maneuver-support-fire-protection relationship. This study aims to identify and describe key factors associated with the adaptation of mountain warfare forces and the operations they conduct through an interpretive analysis of land operations.

Keywords:

mountainous environment; tactical operations; doctrinal adaptation; tactical asymmetries.

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Mountainous areas occupy more than 25% of the world's land area, and approximately 20% of the world's population lives in these areas ([Allied Tactical Publication, ATP-3.2.1.3 2022](#), 2-4). Despite the current trend of population migration to urban areas, the mountain environment remains a place where people engage in various activities. Throughout history, there have been numerous instances where armed forces have been required to conduct military operations in mountainous areas. The mountain environment presents a number of challenges in terms of planning, preparation and the execution of tactical operations. Consequently, the mountainous terrain has often provided a position of advantage to one side, leading to actions by the opponent to nullify that advantage. Consequently, regardless of their strategic, operational or tactical value, mountain areas have become the scene of armed confrontations where the belligerents have had to make doctrinal and operational adaptations to meet the specific requirements imposed by the nature of this environment.

The mountainous terrain retains a high potential for the conduct of tactical operations in conventional or unconventional conflicts. This is evidenced by the relevance of operations in this type of environment as outlined in the NATO doctrine for land operations, which requires particular attention from military planners ([Allied Joint Publication, AJP-3.2 2022](#), A-24). In a subsidiary manner, the tactical manual for mountain operations emphasizes the necessity for Allied states to maintain a sufficient number of forces capable of operating in this environment ([Allied Tactical Publication, ATP-3.2.1.3 2022](#), 1-1). The current situation indicates that there are sources with the potential to generate armed confrontation in mountain environments. India and Pakistan continue to look at each other through the guns' prism for decades after the first war between the two countries broke out in 1947. Since then, several armed clashes have taken place between the two rivals in the Karakorum Mountains area for control of Kashmir, and *"from time to time along the border, guns are still being heard"* ([Marshall 2022](#), 183). The effective resistance of the mujahedeen guerrillas in the mountainous areas of Afghanistan is well known and despite the continuous adaptation of the Soviet 40th Army, it was eventually defeated ([Braithwaite 2015](#), 268). Ten years later, the scenario is being repeated to some extent and the Taliban insurgency is employing similar tactics to those in the Russian-Afghan conflict. In this case, too, the mountain environment played a role as a force multiplier, providing insurgents with both dispersal opportunities and safe locations for shelter and rebuilding fighting power. The 2020 Nagorno-Karabakh's war was conducted in its final phase, especially in the mountainous area of the region. Both attacker and defender sought to exploit the terrain's characteristics to their advantage, with a number of adjustments to force composition, tactics and combat procedures. Therefore, the field adaptation of the weapons and technologies was required in this case, too ([Jones, et al. 2022](#)).

¹ Approximately 30% of Romania's territory is comprised of mountainous areas, with the Carpathians representing one of the country's most prominent geographical features.

In light of the insights gained from military conflicts and also based on Romania's geographical considerations¹, the Romanian Armed Forces maintain their mountain capabilities while continuing efforts to develop them. In this context, the objective is to identify the needs for doctrinal and operational adaptation of the mountain forces according with the requirements of modern warfare. To this end, a number of objectives have been set to canalize the research effort. Consequently, an interpretative analysis of the phenomenology of ground operations will be conducted in order to identify the necessary adjustments to be made to the composition and organization of those forces. An investigation into the integration of mountain operations with land operations serves to elucidate the respective roles and necessity thereof. Furthermore, the requirements for equipping tactical formations will be determined.

The comparative analysis of Western Armies' tactical formations has enabled the acquisition of qualitative and quantitative assets related with the organizing and equipping Romanian similar forces. Finally, the theoretical milestones underlying the doctrinal adaptation of how to deploy forces for mountain hunters will be investigated. The identification and description of the impact of environmental characteristics and new technologies on the operational process, in a context marked by the multidimensionality of the battlefield, has enabled the drawing of relevant conclusions regarding the doctrinal adjustment of tactical operations executed in the mountain environment.

Integrating mountain operations into land operations

The complexity of land operations is the result of the interaction of several factors, which can be categorised as political, military, economic, social, informational and infrastructural. These factors are related to the temporal and spatial dimensions of the operational environment (PMESII-PTT). Under the impact of these variables, land operations fall under the general theme of operations, as defined by NATO doctrine for land operations. These operations can be distinguished by their purpose into defensive operations, offensive operations and stability operations. These tactical-level operations are the result of a tailored combination of several tactical actions, including offensive, defensive, intermediate and/or stability. The weight of the latter is determined by the nature of the tactical operation ([Allied Tactical Publication, ATP-3.2.1 2022, 1](#)). The relationship between the themes of operations, the type of tactical operations and the contribution of tactical actions to their materialisation is schematically represented in Fig. No. 1.

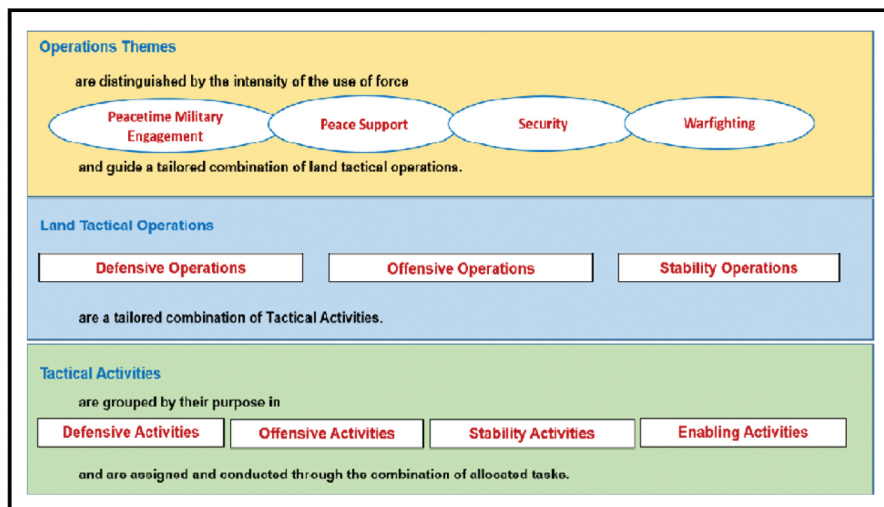


Figure No. 1 Operations themes and types of tactical activities
(Source: ***North Atlantic Treaty Organization, Allied Joint Publication, NATO Standard, *AJP-3.2, Allied Joint Doctrine for Land Operations*, Edition B Version 1, NATO Standardization Office (NSO), 2022, p. 56)

It is evident that the land component of the armed forces plays an indispensable role in a conflict situation, whether the context is combat operations or major crisis operations. The attributes of land forces –complexity, human presence, versatility, and persistence (Jordan, et al. 2016, 86) generated them with a unique status that transcends the specific theme of the operation. Tactical operations conducted in mountainous terrain align with the fundamental tenets of land operations, facilitating the attainment of desired outcomes. These operations may be standalone or be integrated into a larger tactical land operation conducted by the higher echelon. The composition of forces for a tactical operation in mountainous terrain may also be part of a larger ground force or, contingent on the circumstances, operate independently. A schematic representation of the integration of these operations is depicted in Fig. No. 2.

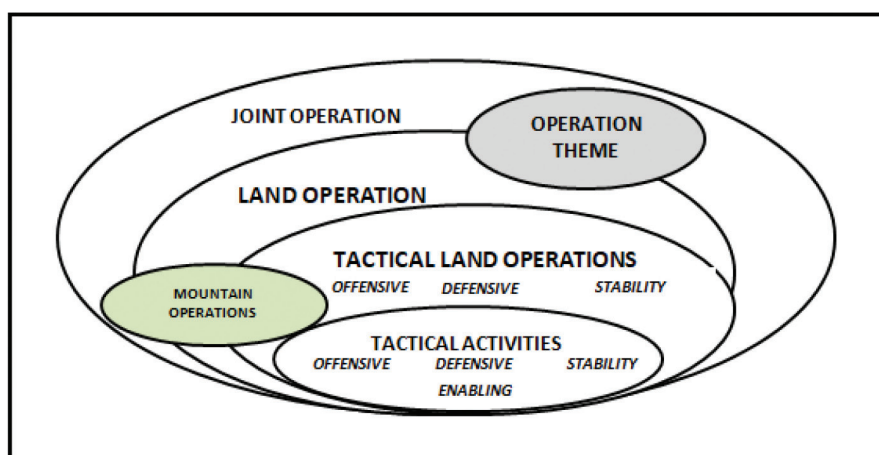


Figure No. 2 The integration of mountain operations into land operations

The specificity of the mountain environment and its influence on the conduct of operations

The mountain environment is a geographical area characterised by a highly fragmented terrain, large differences in altitude, specific weather conditions and poor or non-existent infrastructure. These areas are characterised by steep slopes, wide temperature variations and increased weather effects. Under the influence of these factors, tactical operations are designed in such a way so as to exploit the environment's advantages while reducing its disadvantages and inherent risks.

This type of environment necessitates the creation of military capabilities adapted to the requirements of the confrontation environment as well as the adjustment of tactics, techniques, and operating procedures. The rugged terrain and the electromagnetic wave shielding obstruct the command and control system, thereby hindering force coordination. In this respect, operations in mountain environments should be decentralised, both offensive or defensive operations usually taking the form of a series of clashes and fragmented battles. Intelligence plays an important role taking in consideration the vulnerabilities created by the environment's features. However, the use of ISR means of any kind is limited by the conditions of the environment. The lack of communication, the rugged and predominantly covered with vegetation terrain meant that the mounted forces' operations should to be combined with those of the dismounted ones. Tactical formations need to be equipped with all-terrain vehicles in order to increase their mobility in this type of terrain, as well as appropriate weapons systems to allow firing on ground and air targets. The equipment and armament of forces operating on foot must be designed to achieve an acceptable result in relation to their mass and performance. The maneuver of mounted forces is limited to existing communication paths, therefore maneuver operations are based on the actions of dismounted troops or airborne and forward detachments. From this perspective, the forces will be equipped with light infantry weapon systems to enable their rapid deployment. The availability of fire support is severely constrained by the highly fragmented nature of the terrain. Consequently, the most appropriate means of providing fire support are mortars. The mobility of self-propelled artillery is constrained by the necessity to utilize existing communications. Additionally, the substantial dimensions of the aforementioned platforms impose constraints on their utilisation of the road network. Furthermore, the existing coverings can reduce the effectiveness of ground effect munitions used to engage static targets as well as to neutralize enemy personnel. In this context, the use of fuse or airburst munitions is recommended. Conversely, the compartmentalization of terrain can impede the efficacy of smart munitions by constraining the ability to direct the projectile to the target. Anti-tank missile systems are effective in the engagement of armored vehicles operating in valleys. However, the fragmentation of the terrain and its extensive coverage limit the range of these systems. The existence of large blind areas impeding the targets' acquisition and fire control generate a necessity for the integration of ISR capabilities into combat support formations. The mountainous terrain, by reducing

the efficiency of electromagnetic wave propagation, increases the risk of losing contact with unmanned aerial vehicles (UAVs). Although terrain can facilitate UAS infiltration, adverse weather conditions, particularly high-intensity winds, fog, freezing rain and lightning strikes, severely restrict the time windows in which they can be used (Allied Tactical Publication, ATP-3.2.1.3 2022, 2-12). Finally, it should be noted that UAS class II require special runways for take-off and landing, as mountainous terrain significantly limits the possibility of their construction. Terrain-related difficulties in spotting and engaging targets necessitate the control of the high ground to prevent the helicopters' operations including reconnaissance, attack or insertions as well as UAS actions. MANPAD systems are effective in mountainous environments, provided that they are deployed on dominant terrain. However, the terrain itself limits their use because the presence of dense forest reduces the possibility of observation, while the mountainous terrain itself creates extensive "blind zones" that favour the infiltration of enemy helicopter formations ([Department of the Army, ATP 3-90.97 2016, 6-12](#)).

In light of the aforementioned modern battlefield's realities, analyzed from the perspective of the characteristics of the mountain environment, it becomes evident that *a balance of tactical operations* is required and it should take into account, especially the mobility and forces' protection, firepower and the additional environmental risks. In consideration of the operational process's requirements, limitations, and advantages offered by the mountain environment, a number of principles must be taken when planning and executing this kind of operations. These include *height control, decentralization of operations and exercise of mission command, achievement of surprise, the use of reserve, and leadership*. It is similarly important to note that the environment specificity imposes a particular character on operations, and therefore expertise in the field is necessary to integrate all combat functions.

Organisation, composition and forces' equipping

The modern multidimensional battlefield and new technologies embedded into new weapons systems, combat platforms and military equipment impose an adaptation of tactics and combat procedures in mountain environments. Consequently, the force's organisation and composition must also be adapted. In terms of the environment implications on the conduct of tactical operations it is evident that a force must be built in order to have sufficient mobility without drastically affecting its striking power and survivability. It is of the utmost importance to achieve a balance between maneuver and fire in mountain operations. This is assessed separately according to the level of terrain in which the operation is taking place². In this context, in terms of the composition of military forces, the following benchmarks are of particular importance:

² The mountainous terrain is categorised into three distinct levels. Level I encompasses the valley bottoms situated along communication lines. Level II encompasses the slopes and secondary ridges on either side of the valleys. Level III encompasses the dominant peaks and ridges.

- ISR capabilities and cavalry to provide both the information needed to plan and execute operations and to create the conditions for taking the initiative;
- combat engineer elements to increase the mobility of maneuver forces while performing counter-mobility missions;
- maneuver formations capable of operating in an integrated manner at all levels of the terrain, combining mounted and dismounted operations with airborne and airmobile operations;
- fire support capabilities capable of decentralised operation and sufficiently mobile to accompany maneuver elements;
- mobile logistic detachments that facilitate the execution of decentralised logistic support.

In terms of force organisation and composition, given the size of the operational area and the requirements for intelligence, force mobility and manoeuvre execution, I believe that the following units should be integrated into a mountain brigade formation:

- 1 reconnaissance battalion ((or regiment);
- 3 to 4 maneuver formations (battalion or regiment level);
- 1 mountain airborne company (up to 1 battalion);
- 1 artillery battalion (up to 1 regiment);
- 1 combat engineer battalion;
- 1 MANPAD company;
- combat support and combat service support elements;
- 1 combat service support battalion;
- 1 subject matter expert/SME cell.

This basic organisational formula is also motivated by an analysis and comparison of the existing mountain brigade formation in some member countries of the North Atlantic Alliance. In the following lines, therefore, the organisation of the Alpine Brigades of the armed forces of Germany, Italy and France will be outlined. It should be noted that the data has been collected from open sources and that there may be differences in the organisation of two similar structures within the armed forces of the same state.

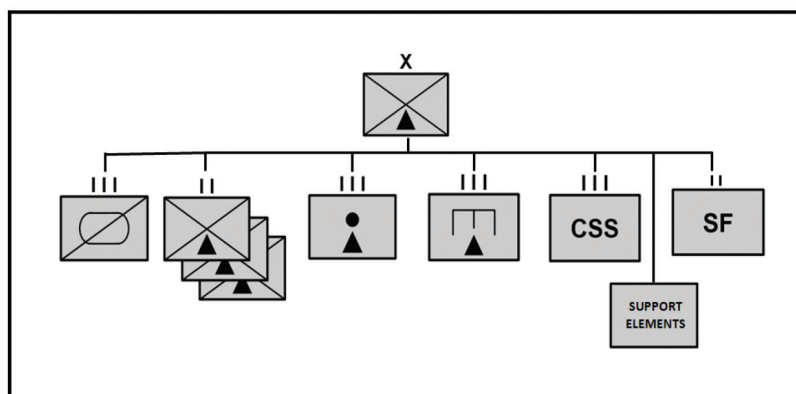


Figure No. 3 Deutsch 23rd Mountain Brigade

(Source: <https://www.bundeswehr.de/de/organisation/heer/organisation/division-schnelle-kraefte/gebirgsjaegerbrigade-23>)

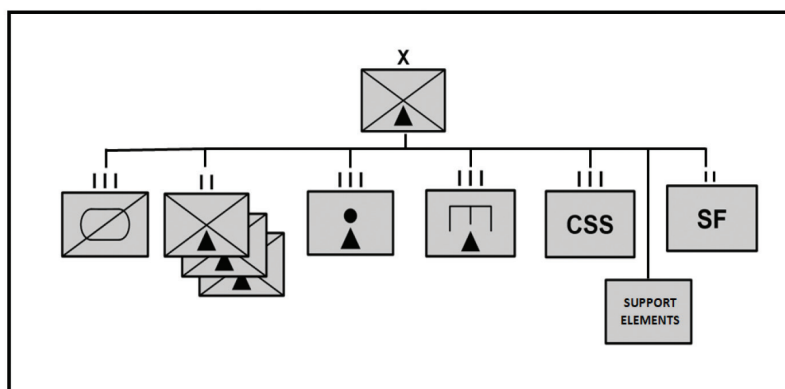


Figure No. 4 French 27 Mountain Brigade

(Source: <https://www.defense.gouv.fr/terre/nos-unites/nos-brigades/27e-brigade-infanterie-montagne>)

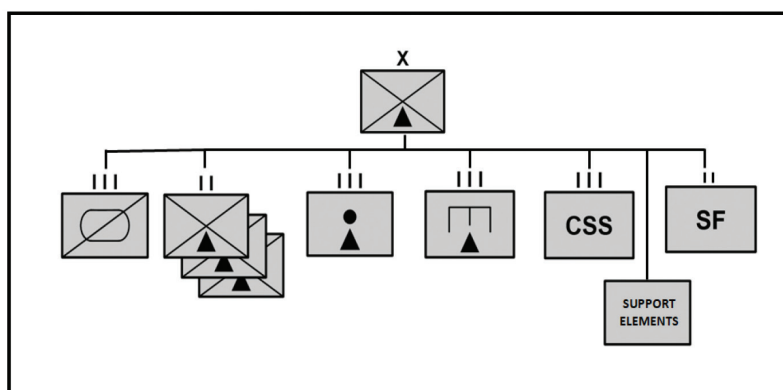


Figure No. 5 Italian „Taurinense” Mountain Brigade

(Source: <https://www.esercito.difesa.it/en/organization/the-chief-of-general-staff-of-the-army/comfoter/alpine-troops-command/taurinense-alpine-brigade>)

The analysis of the mountain brigade formations described above has identified key milestones in the delivery of weapon systems, combat platforms and equipment to mountain forces:

- the maneuver forces' endowment with combat platforms must provide an optimal mix of armoured, light armoured and unarmoured platforms; as far as armoured platforms are concerned, the use of tracked variants brings additional mobility, as they have a greater cross-country capacity in terrain covered with ice and snow, but modern medium-armoured wheeled variants are also effective in this type of terrain; lightly armoured and unarmoured ATVs are useful for specialised and reconnaissance detachments, enabling them to carry out screening and infiltration missions into enemy's rear;
- high trajectory artillery systems are most effective in mountainous environments, so it is necessary to equip mountain infantry with them down to the lowest tactical level; if at the level of the mountain battalion the main element of fire support is howitzers, at the level of the brigade, within the artillery battalion (or regiment), 155 mm self-propelled or towed howitzer can also be chosen; the integration of anti-tank weapon systems within the artillery battalion is not a priority, as the fight against armour is

decentralised and carried out by the brigade's battalions;

- given the limited mobility and versatility of recoilless gun anti-tank systems, we recommend replacing them with anti-tank guided missile/ATGM systems with *fire-and-forget*, *top-attack* and *flying top-attack* capabilities; given the difficulty of the terrain and the predominant use of dismounted forces, man-portable variants are the most appropriate; these capabilities to engage enemy armour will be formed into integrated sub-units at company and battalion level;

- the most appropriate means for aerial force protection are MANPADs; their high mobility, simplicity and effectiveness on target make them ideal for use in this environment;

- attack and surveillance drones can be useful during the conduct of military operations in mountainous environments, but due to weather conditions and communication system malfunctions, the effects of these capabilities are limited;

- the organisation and equipping of logistic modules must be carried out in such a way as to ensure the support of forces in all types of terrain (level I, II and III); thus, at brigade level, storage and transport sub-units must have vehicles (trucks) capable of operating in level I and II terrain, and at battalion level, these logistic structures must have transport capabilities capable of operating in level III high mountain areas (transport trackers, UTVs).

Doctrinal adaptation of tactical combat operations

In light of the specific characteristics of operations in mountainous environments and the requisite configuration, organisation and equipping of military forces, we will further examine the doctrinal implications of the shaping factors of the modern battlefield. These include the integration of advanced technologies into new weapon systems, the extension of the range and improvement of the accuracy of these systems, multispectral sensors, the fragmentation of operations and the extension of the phenomenon of “fragmented battles” specific to non-contiguous and non-linear areas of operations, as well as the use of unmanned and autonomous systems.

With regard to the defence operation, two possible approaches to its effective organisation can be identified:

- a. A solid, linear and continuous defence, concentrating all combat power on the enemy's main directions of penetration.
- b. An elastic defence, allowing the gradual absorption of the enemy's offensive effort.

In order for this strategy to be viable, it must be ensured that there are sufficient forces and resources available to guarantee a strong initial alignment on the battlefield, as well as reserves to execute counterattacks to close any gaps that may be created. The efficacy of this defensive strategy is evidenced by the lessons learned

from military conflicts, particularly those involving the integration of deep and contact strike systems. One of the most notable instances of the utilisation of this defensive form is the Battle of Monte Cassini during the Second World War. Here, German forces established the so-called Winter Line, with the central axis situated near Cassini, with the objective of impeding the Allied advance towards Rome. It is important to note, however, that due to the reduced number of forces available, this type of defence was challenging to implement in order to cover a large front. In addition to the aforementioned considerations, the enhanced capabilities of intelligence gathering will disadvantage those who find themselves in a position of disadvantage. Such individuals will be subject to accurate enemy fire.

The second scenario entails the organisation of mobile detachments with the objective of continuously harassing enemy forces through the implementation of swift hit-and-run attacks and ambushes on maneuver elements, as well as combat and logistical support elements. It is imperative that these detachments are equipped with the most up-to-date mobile combat platforms and portable weapon systems (RAD, MANPAD) if they are to be successful. It is of the utmost importance to control the dominant heights, and if they are lost, efforts must be made to prevent their occupation by the enemy by striking them with long-range weapons. It may also be necessary to maintain control of important objectives or key terrain. An extensive multispectral sensor system, providing coverage of the operation's area will provide timely information on enemy actions. Reconnaissance elements, should be deployed to complement the screening system, in order to coordinate the strike systems and the mobile detachments' operations. In this context, the most appropriate tactics and techniques of operation are ambushes, raids, Motti tactics, blocking communication lines, and actions designed to counter infiltrating elements.

The implementation of offensive operations in mountainous terrain is significantly constrained by environmental limitations. It is of the utmost importance to seize and control heights when undertaking offensive actions in the mountain environment. It is imperative that the valleys and the main axes of advance are secured before any movement is made along the slopes. The main forces advancing on communications will be preceded by forward detachments comprising anti-tank teams whose mission is to repel possible armoured counter-attacks. In order to maintain control over the dominant ground and other key terrain, the deployment of air defense capabilities becomes a priority. Given the difficulty of the terrain, MANPAD systems are the most appropriate solution. A key role in offensive operations in mountainous and forested terrain is played by turning movement detachments. The turning movement is conducted in order to shape the battle space, also aims to unbalance the enemy by creating a threat in his rear area. Regardless of the value of this detachment, its mission and mode of infiltration, the configuration and armament systems are crucial in order to generate effects designed to unbalance the enemy's defences. Concurrently, the deployment of extended-range strike systems, including unmanned aerial systems (UAS), can facilitate the extension of the mission of these detachments in terms of both

space and time. In the context of an offensive operation, the most appropriate tactics and techniques are as follows: turning movement, raids, air assault, and limited attacks. In light of the aforementioned considerations, it can be posited that the following implications are generated at the level of operations carried out in the mountain environment:

- the allocation of an area of operations, as in the urban environment, does not depend directly on the range of the weapons systems;
- the planning of tactical operations, whether offensive or defensive, must take into account the fact that mutual support and higher echelon's support is limited. Consequently, execution should be decentralised, which generates the need to organise the force in agreement with the combined-arms principle down to the lowest level;
- the employed TTPs must generate tactical asymmetries that undermine the enemy's operations cohesion. Consequently, the operation design must take into account the integration of all doctrinal frameworks – operational, geographical and tactical framework;
- the force's organisation must take into account the need to identify capabilities that can operate, at least separately, at all levels of mountain terrain;
- the allocation of weapons systems in support of small tactical units must be based on their mission type and on their degree of the independence;
- it is imperative that operations be conducted in a manner that will unbalance the enemy, thereby affecting his cohesion and comprehension. This is necessary for success, both in offensive and defensive operations. The creation of multiple operational dilemmas for the enemy will prevent him from implementing his plan and deplete his resources;
- the utilisation of extended-range and high-accuracy striking systems must consider the exploitation of limited windows of opportunity and the achievement of significant effects for the decisive operation.
- furthermore, the exercise of mission command, a crucial aspect of mountain operations, is enhanced by high-performance equipment and weapon systems.

Conclusions

The extended range and improved accuracy of new weapon systems, coupled with the rapid and continuous development of ISR assets, are significantly shaping the modern battlefield. This framework for future conflicts will drastically limit the possibility of large-scale combat operations in mountainous areas. It is unlikely that impetuous penetrations with armoured formations, such as those executed by the German Army in the Ardennes Mountains, will occur, nor will the organisation of cohesive defensive lines similar to those organised by the Germans in the Monte Cassini area in World War II. However, the analysis indicates that tactical operations conducted in the mountain environment retain their relevance today, particularly due to the ability of the terrain to channel the actions of maneuver forces. The opening

or closing of mountain passes can have significant consequences for the operations' design, whether offensive or defensive. While these approaches present operational difficulties, they facilitate the supply of forces, help to achieve or prevent surprise, and cause the enemy to redeploy forces to counter potential threats. Consequently, these operations have a shaping role in the execution of the joint operation.

The research's findings indicate that the success of executing tactical operations in mountainous terrain depends on the ability to outpace the enemy in the decision-making cycle. This is achieved by outperforming them in terms of intelligence acquisition, speed of maneuver, accuracy of fires, and an improved *sensor-to-shooter* relationship. It is of the utmost importance to satisfy operational requirements in terms of achieving a balance between force mobility, fire execution capabilities and the protection of force components. Increased survivability of the force is a key factor in achieving success on the battlefield. In this regard, reduction of the multispectral footprint is of paramount importance. Finally, commanders must be aware of the high risk of action due to terrain and weather effects. It is also important to consider the impact of sudden changes in weather conditions when using maneuver elements and fire support. It is of paramount importance that commanders and staffs maintain a constant focus on the need to enhance the expertise of specialized mountain combat cells. In this regard, the experience of "alpine" troops, lessons learned, staff studies and field reconnaissance offer a significant advantage.

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