



PERSPECTIVES

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[Missile Warfare: A Realistic Assessment](#)

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EXECUTIVE SUMMARY: The threat to Israel of missile warfare is somewhat exaggerated and public discourse on this issue should reflect realistic assessments. At this stage, missile attacks would be able to inflict only limited physical damage on Israel. Moreover, future military campaigns are unlikely to be limited to missile attacks – thus, the argument “land and type of terrain are unimportant in the missile age” is a dangerous fallacy.

Recent discussions around a preemptive strike on Iran have included the possible repercussions of such a move, namely missile attacks on Israel. The threat of ballistic missile warfare is perceived as a paradigm shift capable of radically altering modern warfare. Those who believe that Middle East battlefields of the future will primarily consist of missile attacks upon Israeli cities therefore argue that Israel must prepare itself for such a situation. Furthermore, since a missile war relegates ground forces to near irrelevance, they claim, geographical and topographical factors will become of lesser importance.

Yet no war in which missiles were employed – from the Iran-Iraq War to the Second Lebanon War – has ever been won without the additional use of maneuvering ground forces. In other words, the use of missiles has never been a deciding factor in any armed conflict.

This is no coincidence, since missiles have limitations that prevent them from becoming a decisive weapon. Their main limitation is inaccuracy, as most are only capable of landing hundreds of meters off-target. This makes the chance of a precise and direct hit very low.¹ Another significant limitation regards the physics of the explosion itself. The blast caused by the warhead steeply drops

as the distance from the blast center increases. Thus, the actual damage indicates a much more limited threat than what superficially seems to be the case. For example, an air-launched bomb weighing one ton will destroy a building if it hits it directly, while at only 45 meters off-target it will cause medium damage and at 60 meters off-target the damage will most likely be very limited.

There are hundreds of missiles in the Middle East. Syria, for example, has a particularly large array of surface-to-surface missiles with ranges of a few hundred kilometers, most of which are low-accuracy. Considering that longer range missiles cost considerably more, the number of 1,500 km-range missiles (capable of covering the distance between Iran and Israel) is likely to be much smaller than the number of 300 km-range missiles. Furthermore, launch and logistics capacities are complicated by the fact that most ballistic missiles used in the Middle East are liquid fueled, which ultimately decreases the launch rate. Clearly then, the simultaneous launching of hundreds of ballistic missiles is simply unrealistic.

On a countrywide – or even citywide scale – the expected damages and casualties of such missile attacks are low. A bird's-eye view of any town will show that due to public areas and numerous spaces between buildings, only a fraction of any area is in fact occupied by buildings. It is therefore likely that an attack by dozens of missiles will only cause a small number of direct hits and result in a relatively small number of casualties.

Nonetheless, the psychological impact of such an attack would be quite significant. And of course, a direct hit to a site or facility containing hazardous materials would drastically challenge this calculus. Such a scenario, in which potential damage is extremely high, warrants a separate discussion.

The largest missile battle that has taken place to date was during World War II, specifically from 1944 to 1945, after Germany completed its development of the V-2 ballistic missile, with a warhead of 980 kg and a range of 320 km. Most missiles were fired on Antwerp (approximately 1,660 missiles) and London (approximately 1,400 missiles). Although this huge number of missiles – 3,060 altogether – caused thousands of deaths, it did not prevent the Allies from reaching Berlin.

Considering the current technological capabilities and limitations of the missiles possessed by Israel's enemies, it seems likely that the current state of missile warfare will remain unchanged for quite some time. Any efforts to alter this will meet constraints, particularly economic considerations, policies pertaining to the sale of missiles, and organizational and logistical hindrances.

For example, Syria's current stockpile mainly consists of the older, liquid fueled Scud-C and D missiles. Even if Syria is able to acquire more advanced missiles in the future, it would be incapable of replacing its entire missile arsenal in a short time and would still be limited in firepower to a mix of advanced and old technologies.

Next Generation Ballistic Missiles

The Russian SS-26 is an innovative ballistic missile that represents a dramatic change of capacity for such weapons. It is capable of homing and maneuvering even during the final stage of its flight path. While Russia and the US currently possess this type of missile, no Middle East Arab country has yet been able to obtain such a weapon.

Operational since 2006, the SS-26 maintains an almost pinpoint precision of 5-7 meters at its 280 km range. The export version is not equipped with a homing warhead and therefore has a reduced accuracy of 30-70 meters. The arrival of high-accuracy ballistic missiles to the Middle East theater will change the situation, as such missiles pose a threat to military facilities, such as airfields and army depots, as well as to strategic civilian facilities. High-accuracy tactical ballistic missiles can significantly impact the battlefield on the ground by hitting communications nodes, headquarters, bridges, and so on.

The best response to next-generation ballistic missiles will most likely be a combination of deterrence, active defense and passive protection. Deterrence is central to any missile war. Israel must make it perfectly clear that anyone attacking it with ballistic missiles will be exposing its own vital infrastructure to great peril. One Israeli F-16 aircraft can carry nine tons of highly-accurate bombs (nine times the payload of a Scud missile). This means that the efficiency of one bombardment mission carried out by a single fighter armed precision guided munitions is several times more destructive than in the past. The defensive means available are missile-to-missile interceptors, systems designed to jam and disrupt attacking missiles' homing systems, and improved passive protection of critical facilities and domestic residences.

Conclusion

The threat attributed by the general public to missile warfare is somewhat exaggerated. The menace of ballistic missiles should be presented to the public in a realistic manner. The belief that territory and type of terrain are unimportant in the age of missiles is a dangerous fallacy. We do not know how future war will look. While missiles fired at Israel's cities are just one

possible scenario, the use of ballistic missiles has never been a deciding factor in any armed conflict.

Haim Rosenberg is the former head of long-term planning at Rafael Advanced Defense Systems Ltd. This article is part of a monograph on "The Future Battlefield: Technology's Impact on Topographical Factors" that will soon be published by the BESA Center.

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¹ Precision is measured by CEP (circular error probability), which is the probability of 50 percent of the attacking projectile landing within a given radius. For example, a CEP of 200 meters means that half of the attacking missiles are likely to land within a radius of 200 meters from the target.