Missile proliferation in the Middle East: a regional perspective

Mohamed Kadry Said

Two conflicting trends have shaped the security environment of the Middle East in the last ten years. The first trend has been characterized by the region's pursuit of peace and stability through determined movement towards conflict resolution, enhanced trust and tension control. The second trend has been a product of deeply rooted threat perceptions among the countries of the region, which has led to continuing plans for arms modernization, acquisition and defence preparations. Perhaps in no field is this trend more evident than in missile proliferation.

The Gulf War of 1991 was a turning point in the security environment of the Middle East. The intense political and military energy focused during the war was high enough to reveal the multitude of social and security risks in the area. The Arab-Israeli conflict, though important, seemed no longer to be the dominant confrontation in the region. The proliferation of weapons of mass destruction (WMD) and ballistic missiles appeared considerable. The war also tested the fragile stability of the region and the urgent need to deal with its flash points.

The Gulf War was a real demonstration of a 'missile war'. It showed fundamental changes in the art of fighting and the dominant role of air and missile power. Between 17 January and 26 February 1991, Iraq fired some ninety modified Scud ballistic missiles at targets in Israel and Saudi Arabia. The United States and the United Kingdom launched a total of 288 Tomahawk cruise missiles at targets in Iraq. Of these, 276 were launched from surface ships and twelve from submarines in the Persian Gulf, the Red Sea and the Eastern Mediterranean. In the opening hours of the war, the heavy strategic bombers of the United States Air Force delivered a further thirty-five conventional air-launched cruise missiles.[1]

This missile demonstration was not the first in the Gulf. It was preceded by the 1980–1988 Iran-Iraq War. The two countries fired more than 600 Scuds and modified Scuds at each other's cities.[2] The heaviest of these exchanges, the so called 'War of the Cities', took place between February and April 1988, during which Iraq fired a total of 189 modified Scuds at Iranian cities. The psychological effect of the Iraqi missile attacks was a major factor in Iran's acceptance of the cease-fire. The new 'missile factor' in the region was also behind Saudi Arabia's purchase from China of a number of CSS-2 ballistic missiles. The Iran-Iraq War marked an important transition in the role of ballistic missiles in the Middle East — from acquisition for deterrence to actual use in the battlefield for deep fire projection. It also showed how these weapons could strike fear and uncertainty among civilians and place extreme political pressure on governments.

Maj. Gen. (ret.) Dr Mohamed Kadry Said is Head of the Military Studies Unit and Technology Advisor at the Al Ahram Center for Political and Strategic Studies (Cairo), Professor of Missile Flight Mechanics at the Military Technical College (Cairo), and member of the committee for strategic planning in the Egyptian Council for Space Research, Science and Technology.

Another massive use of missile power was performed in the Balkans during the NATO air campaign. The crisis generated security concerns not only throughout Europe but also in the southern Mediterranean and the Middle East. The countries of the South feared that similar actions could take place against them (as against Libya in June 1981, January 1983 and in March 1986; Sudan and Afghanistan in August 1998; and for the past decade against Iraq). The 1991 Gulf War and the Kosovo air campaign convinced many developing countries that the United States possesses capabilities for which they have no response. The further proliferation of these capabilities and technologies to its allies in Europe and to Israel has strengthened this perception of imbalance, and will be considered in any future balance of power calculations or arms control negotiations.

Ballistic missiles and WMD proliferation in the Middle East offer the means for the countries of the region to pursue asymmetric strategies in confrontation with greater powers. There is also an economic incentive to acquiring ballistic missiles because they are often less expensive than acquiring and sustaining large conventional forces. The new defence strategies of NATO, Europe and its close allies, added to their monopoly of modern attack systems, make the issue of proliferation a shared risk not only flowing from South to North but also from North to South.

Defense against ballistic missiles is a growing issue in South-South, South-North security relations. During the Gulf War, the Patriot air-defence missile system was introduced for the first time to the Middle East. The system is now deployed in Israel, Kuwait and Saudi Arabia. New defence systems have been developed and are ready to be fielded. The offense-defense missile race has already started in the Middle East. From the North-South dimension, missile proliferation in the Middle East and North Africa can affect Europe's security and constrains NATO's freedom of action in the Mediterranean. Building regional defence architectures against missiles in Europe and in the Middle East continues to be a controversial issue.

The aim of this paper is to show the high magnitude of risks and dangers the Middle East region would face if the peace efforts failed to reach their goals. The paper portrays the growing trends in the acquisition of both offensive and defensive missile systems. This includes ballistic missiles, cruise missiles and other unmanned vehicles used for land attack missions. The paper also touches upon the new trends in missile acquisition, the dynamics of technology transfer, and the impact of defence co-operation programmes on the proliferation of missile technologies.

The genesis and rise of missile proliferation in the Middle East

Missile and WMD proliferation in the Middle East were initially generated late in the 1950s as a response to the Suez Crisis and Israel's plans to build an independent nuclear and missile arsenal. In late 1956, France and Britain had agreed with Israel to launch a war against Egypt to provide the two European nations with the pretext to attack Egypt and occupy the Suez Canal zone. In the same period of time, France agreed to provide Israel with a twenty-four megawatt reactor and a chemical processing plant in Dimona, which became the backbone of the Israeli project for nuclear armament. Intelligence communities and experts estimate the Israeli stockpile as consisting of 100–200 nuclear devices including warheads for its mobile Jericho-1 and Jericho-2 ballistic missiles as well as bombs for aircraft and other tactical applications. The first Israeli ballistic missile, Jericho-1, was also French-designed, developed and deployed during the 1960s.

By the mid-1960s, Israel's strategic alliance with France had gradually deteriorated until it was finally dissolved by President de Gaulle on the eve of the June 1967 Arab-Israeli War. By contrast, American Presidents Kennedy and Johnson started to demonstrate increased sensitivity to Israel's defence requirements. Since then, the growing American-Israeli strategic co-operation has been

forged in a series of agreements for technology transfer and joint development defence projects like the Lavi combat aircraft, the remotely piloted vehicles series, and the Arrow anti-tactical ballistic missile system.[3] Israel also bought several MGM-52 Lance short-range ballistic missiles from the United States in the 1970s. The same missile was supplied to Iran by the United States in 1974.

Israel's supremacy in the Middle East has considerably decreased with time due to missile technology proliferation in the region. It is now relatively easy for any government seeking to initiate a missile programme to acquire the needed technology from states such as North Korea, Russia, China, India and Pakistan. By doing so, the countries can avoid much of the basic research by simply buying the expertise and technology. The acquisition of basic Scud technology — the system favoured by most of the Arab states — from North Korea or Russia eliminates the need for continuous testing since most components have already been tested by others.

The reasons behind missile proliferation in the Middle East are numerous and diverse. Unresolved conflicts, regional competition between rival states, and the unrestrained supply of missile technology from external powers are significant factors. There are also other reasons that make states of the Middle East seek missile weaponry, such as evolution in the art of war, the desire to threaten the projection options of those outside the region, as compensation for weaknesses in conventional assets, beside the motivations of national prestige and deterrence.

The threat perceived by some Arab and non-Arab countries due to the Israeli conventional and non-conventional build-up was behind the initiation of counter-programmes. The scope of such programmes is generally limited in size and capabilities compared to already deployed Israeli systems. The Arab and Islamic countries are actually subjected to severe measures by the international regimes prohibiting missile and advanced technology proliferation on selective bases. Facing difficulties for financing their conventional arms procurements, some of these countries have chosen to acquire various kinds of WMD to compensate for the unfavourable conventional weapons balance and deter outside intervention.

In the following sections, the current status of ballistic missile capabilities and development programmes in Middle Eastern states is reviewed. The data is derived from several sources and summarized in Table 1.[4]

Israel

The first Israeli ballistic missile, Jericho-1, is a near copy of the two-stage, solid-fuelled, French MD-620 missile. The missile has a 500km range and can carry a 500kg payload. It is now deployed on mobile launchers with possible nuclear warhead storage nearby. The Jericho-2 was first tested in 1986 and has a range in excess of 1,500km, enough to cover the Arab world and Iran. The missile was indigenously developed and produced with some help from France. A 1989 report suggested that the South African 'Arniston' ballistic missile programme was similar to Jericho-2, and that a test launch in the same year from near Cape Town signified a joint project between the two countries. Israel launched a Jericho-2 missile across the Mediterranean that landed about 400km north of Benghazi, Libya. The missile flew over 1,300km, making experts think that its maximum range may reach 1,500km.

A Jericho-3 development programme for a missile with a range of 4,800km was reported in 1994. After proving its ability to produce a two-stage missile and place a surveillance satellite into space orbit by using a Shavit launcher, Israel has practically crossed the technical threshold for developing an intercontinental ballistic missile.

EGYPT

The Egyptian response to the Israeli missile and nuclear activities early in the 1960s was a counter development programme with the assistance of German scientists. By 1965, two configurations were tested: Al Kahir and Al Zafir. The programme was cancelled in 1967. Early in the 1970s Egypt imported Frog-7 unguided rockets and Scud-B ballistic missiles from the former Soviet Union. Reports suggest that in the mid-1980s Egypt participated with Iraq and Argentina in the development of a two-stage ballistic missile system. It is believed that Egypt terminated this programme in 1989.[5]

Table 1. Ballistic missile capabilities in the Middle East

Country	System name	Status	Range (km)	Payload (kg)	Origin	Remarks
Israel	Jericho-1	O	500	500	I/France	
	Jericho-2	O	1,500	1,000	I/France	
	Jericho-2+	D	2,500	1,000	I	
	Jericho-3	D	4,500	1,000	I	
	Lance (MGM-52)	O	130	450	US	Possibly withdrawn from service
	Shavit (SLV)	O	4,500	150–250	I	
Iran	Scud-B	O	300	985	I/North Korea	
	Scud-C	O	500	500	I/North Korea	
	Shehab-3	O	1,300–1,500	700	I/North Korea	Emergency operational capability
	Shehab-4	D	2,000	1,000	I/Russia	
Syria	Scud-B	O	300	985	I/North Korea	
	Scud-C	O	500	500	I/North Korea	
	SS-21	O	70–120	480	Russia	
	M-11?	O	280	500	I/China	
	M-9?	O?	600–800	500	I/China	
Iraq	Scud-B	O	300	985	I/North Korea	A few dozen missiles remain after the Gulf War
	Al Hussein	O	600	500	I/North Korea	
	Ababil-100	D	150	300	I	
	Al Samoud	D	140	300	I	
	Ababil-50	D	50	95	I	
Egypt	Scud-B	O	300	985	Russia	
Libya	Scud-B	O	300	985	Russia	
	Al Fatih?	D	1,000	500	?	
Saudi Arabia	CSS-2	O	2,600	2,150	China	

Key: D = in development, O = operational, I = indigenous

Iraq

Iraq imported Scud-B missiles from the former Soviet Union in the mid-1980s and used some of them in its war with Iran. The Al Hussein programme was based on the Scud-B design with a reduced warhead and increased liquid propellant to obtain a range of 600km. Around 190 Al Husseins were fired against Iran in 1988. Some eighty to ninety missiles were fired against Saudi Arabia and Israel during the Gulf War. A 2,000km-range missile was developed and tested in 1989, described by Iraq as a satellite launch vehicle. The missile was called 'Al Aabed' and used a cluster of five rocket motors as a first stage.

Since 1991 Iraq has been prohibited from developing or testing ballistic missiles with ranges exceeding 150km. Some reports indicate that 250 technicians are working on the Ababil-100 short-range ballistic missile at the Al Mamoun factory 40km south-west of Baghdad.[6] The Ababil-100 has a range in compliance with UN Security Council resolutions. Iraq may still retain the technology it acquired before the war, and the fact that the resolutions allow Iraq to continue producing and testing short-range missiles means that it can easily continue its missile development activities when circumstances permit.

Syria

Syria imported Scud-B missiles from the former Soviet Union in the early 1980s, followed by some SS-21 missiles with a 70–120km range. Scud-B and Scud-C variants were imported from North Korea in the early 1990s with ranges of 300km and 500km respectively. It is believed that in 1993 a production facility was established in Syria for both missile types. It is also reported that a production facility has been set up to produce both Chinese M-11 and M-9 missiles with ranges of 280km and 600–800km respectively.

Iran

Iran started its missile development activities by developing solid-propellant, unguided rockets in the late 1970s with the Nazeat, which had ranges from 90 to 150km. In the mid-1980s Iran imported Scud-B ballistic missiles from the former Soviet Union and North Korea. These missiles were used during the War of the Cities in 1988. The Scud-B and Scud-C variants (probably provided by North Korea) have been assembled in Iran since 1987 and 1991 respectively. The Shehab-3 system has been in development since 1992 and was first tested in July 1998. It is similar to the North Korean Nodong-1 and has a range between 1,300 and 1,500km.

According to American and Israeli intelligence sources, Iran's next ballistic missile, the Shehab-4, is largely derived from the 1950s Soviet SS-4 'Sandel' medium-range (2,000km range) ballistic missile.[7] The Shehab-4 was probably tested successfully on 21 September 2000. According to Admiral Shamkhani, Defense Minister of Iran, the test was the first of a new variant of the missile called 'Shehab-3D', which he said was a space launch vehicle.[8] Iran's defence minister announced in February 2000 that 'Shehab-3 will remain Iran's latest and last military missile'.[9]

Saudi Arabia

As a response to the Iran-Iraq War, Saudi Arabia secretly bought from China a limited number of the CSS-2 ballistic missile at an estimated cost of $3–3.5 billion. The missile has a maximum range of around 2,400km and carries a high-explosive warhead of up to 2,150kg. Riyadh pledged it would never arm the CSS-2 missiles with nuclear or chemical warheads.

Libya

Libya imported Scud-C missiles from the former Soviet Union in the late 1980s. A Scud-C variant is believed to have been imported from North Korea in the early 1990s. Some reports suggest that Libya has been developing the 'Al Fatih' ballistic missile since the early 1980s. It is believed that the programme is proceeding slowly, with the aim of producing liquid- or solid-propellant missiles with a range of around 750km.[10] In response to the American attack on Libya in March-April 1986, Libya launched two Scud-B missiles at an American Navy base on the Italian island of Lampedusa, which put the Italian armed forces on alert. Libya is still a target of Western accusations of initiating ballistic missile development projects with the help of China and North Korea. Libya's plans are very much affected by the international sanctions imposed in April 1992.

Libya is still a target of Western accusations of initiating ballistic missile development projects with the help of China and North Korea.

United Arab Emirates and Yemen

Both the United Arab Emirates and Yemen are reported to have purchased some Scud-B missiles in the early 1990s. Yemen may also have acquired from the former Soviet Union some SS-21 short-range ballistic missiles. A small number of Scud-B missiles were used in Yemen during the war of 1994.

Revolution in military affairs and missile proliferation

One of the important factors driving the proliferation of missile systems and unmanned vehicles is the fundamental change in military strategies and doctrines of war. Early in the 1980s, the United States initiated new forms of 'conventional deterrence' based on concepts such as 'extending the battlefield', 'the deep attack' and 'distance warfare'. These ideas were soon translated to a long list of new weapon systems, including long-range attack missiles, precision guided ammunitions supported by ground and space target detection and surveillance. Most of these weapon systems became available to the American allies in Europe and their technological building blocks soon came into the hands of Israel through technology transfer programmes. Ironically, these advanced systems — originally developed to defend Europe against a Soviet conventional attack — were used for the first time in the Middle East theatre during the Gulf War.

Late in the 1990s, military thinking was again effected by an even deeper transformation known as the revolution in military affairs (RMA). RMA would introduce fundamental changes in weapons

technology, in military doctrine and in military organization.[11] This new paradigm is basically dominated by precision deep strike weapons networked with ground and space sensors. An example of how these concepts are to be translated into reality in the United States is the idea of a monstrous 'arsenal ship' envisaged by the United States Navy as a low-manned, remotely tasked vessel with up to 500 vertical launch cells. The missile culture associated with the temptation of deep fire projection against economically-valued assets is now spreading after its 'live demonstration' in the Gulf and in the Balkans. One of the important characteristics of the new military organization in terms of arms control options is the difficulty of isolating any of its interconnected elements. Space assets coupled with sensor and information technology are performance multipliers for ballistic and cruise missile systems.

As a result of the Gulf War, most Middle Eastern countries became engaged in military modernization and defence technological readiness programmes. New weapons, such as modern attack submarines and theatre anti-ballistic missile systems, have been introduced for the first time. Israel's nuclear arsenal and its expanding space-based surveillance system have a profound impact not only on the strategic balance between Israel and the surrounding Arab countries, but also between Israel and other countries in the Mediterranean. Israel has a sophisticated nuclear military capability, and some reports indicate an active chemical weapons programme and biological warfare activities reportedly conducted at the Biological Research Institute in Ness Ziona.[12]

Israel started launching its Ofek series of high resolution satellites in 19 September 1988. In 1997 a joint venture satellite company (ImageSat International) was established as a consortium of leading satellite, sensor and information management companies, which include Israel Aircraft Industries, Electro Optics Industries and Core Software Technology, to build an eight-satellite constellation based on Ofek technology. The ground resolution of each satellite will be around 1.5 meters, which means the ability to identify military valued objects.[13] The first satellite of the series 'Eros-1' was launched successfully on 5 December 2000.[14] The space lobby in Israel's defence establishment is supporting the project 'Star-460' for the development of a powerful space launch vehicle that could give Israel a significant share of the expanding global satellite industry; the vehicle could also have a military role.[15]

Egypt, Saudi Arabia and Algeria are now 'thinking space' for peaceful applications. They focus on small and micro satellites to gain experience and transfer foreign technology. The Council for Space Research, Science and Technology was first established in Egypt in 1998. The Space Research Institute in Saudi Arabia was established in 1983. The Saudi institute launched two micro satellites (10kg each) onboard a Russian launcher on 25 September 2000.[16]

Defense against ballistic missiles

Defense against ballistic missiles is an increasingly important issue in the Middle East and in South-North security relations in general. From the perspective of NATO and the United States, missile proliferation in the Middle East and North Africa can affect Europe's security and constrain it freedom in the Mediterranean. The potential exposure of European population centres to retaliation could complicate the prospects for American and NATO access to southern Europe.[17] Initiating a regional anti-missile defence project in Europe might also raise security concerns among the southern Mediterranean countries if they feel that their modest response capabilities are eroding.

Initiating a regional anti-missile defence project in Europe might also raise security concerns among the southern Mediterranean countries if they feel that their modest response capabilities are eroding.

Area missile defence projects

American concern regarding the threat of ballistic missiles has run high over the last two years compared to the calm and easy-going approach of the European Union and Middle Eastern countries.[18] The Clinton Administration proposed to the Gulf Cooperation Council and Egypt to join the United States in developing an area defence system against ballistic missiles. Similar defence architectures are also proposed for Europe. So far, the Gulf States and Egypt have shown little enthusiasm for such a project because of financial constraints. A feasibility study has indicated that in the cases of the Gulf and Europe, the number of anti-ballistic missile batteries needed are considerably reduced if the batteries are interconnected into one regional system rather than working autonomously.[19]

National projects

As previously mentioned, the Patriot air-defence missile system is now deployed in Israel, Kuwait and Saudi Arabia. Israel has made ballistic missile defence a national priority. In the framework of the 'HOMA' [the Wall] project, Israel is aiming to deploy a nation-wide missile defence network consisting of its Arrow-2 system combined with the Patriot PAC-3 and the future point-target, short-range, rapid-firing defence guns.[20] Interoperability with the United States between the Arrow and the Patriot includes communication between the two systems and sharing early warning information.

Israel is the first country in the world to use new physical concepts to destroy attacking missiles. The American-Israeli High-Energy Laser (THEL) anti-missile system succeeded to destroy a two-rocket salvo on 28 August 2000 at the White Sand Missile Range in New Mexico. The target rockets were flying a 16km-range trajectory and were moving at 330 meters per second when the laser beam destroyed them.[21]

The transfer of advanced defence technologies could be used easily for offensive systems. The massive deployment of defence systems against ballistic missiles could oblige other countries in the region to further enhance their offensive capabilities in order to 'saturate' their adversaries' capabilities. The potential use by Israel of the high energy laser technology for intercepting missiles in their boost phase will be seen by its neighbours as destabilizing and highly provocative.

Proliferation of cruise missiles

The missile proliferation threat has traditionally been seen predominantly in terms of ballistic missiles. But ballistic missiles are far from representing the totality of the missile threat. Modern cruise missiles carry a similar size warhead as a ballistic missile over a similar range, but deliver it with far greater accuracy and at a fraction of a ballistic missile's cost. Moreover, the means to develop advanced cruise missiles can increasingly be obtained in the open market. Cruise missiles can carry and deliver biological or chemical agents in a more controllable manner than ballistic missiles. They are small, with low signatures at launch and during flight, fly at low levels, and can hide in terrain by exploiting masking and ground clutter. One cannot derive cruise missile's launch and impact sites simply by measuring their trajectory.[22]

Modern cruise missiles carry a similar size warhead as a ballistic missile over a similar range, but deliver it with far greater accuracy and at a fraction of a ballistic missile's cost.

Cruise missiles were used extensively in the Kosovo campaign. Six ships and three submarines from two United States Navy battle groups and one British submarine (HMS Splendid) launched 218 missiles against military and infrastructure targets in Yugoslavia. The conventional air-launched cruise missiles with conventional fragmentation warheads were delivered by B-52 strategic bombers from forward bases in England.[23]

The key suppliers of cruise missiles to both the developed and developing world have been France, Italy, the former USSR, the United Kingdom, the United States and China. No sales to the developing world from these exporting states are known to include land-attack systems. Most sales have been of relatively short-range anti-ship cruise missiles. Sales of such systems are not susceptible to export control restrictions as outlined in the 1987 Missile Technology Control Regime (MTCR) because they do not exceed 300km in range. However, anti-ship systems can easily be transformed into land-attack systems. China reverse-engineered the Russian SS-N-2 'Styx' to develop its Silkworm and Taiwan used the Israeli Gabriel-1 to develop the Hsiung-Feng I.

A significant number of non-Western countries (i.e. outside Europe, the United States and Russia) possess or produce indigenous cruise missiles and unmanned aerial vehicle. Most of these systems are used for anti-ship operations, but some of them are developed to perform long-range land-attack missions. Examples from the Middle East include the Israeli Popeye (100km) and Delilah (400–500km), the Iranian Kilter (50km) and Kyle (90km), and the Iraqi Kitchen (400km) and Kelt (400km).

A significant number of non-Western countries (i.e. outside Europe, the United States and Russia) possess or produce indigenous cruise missiles and unmanned aerial vehicle. Most of these systems are used for anti-ship operations, but some of them are developed to perform long-range land-attack missions.

Early in January 2000, Israel asked the United States for a supply of cruise missiles. The 'wish list' delivered by Amos Yaron, the director-general of the Israeli Defense Ministry, included the Tomahawk cruise missile, which can be launched from submarines, and therefore less vulnerable to pre-emptive strikes. Israel claims that it needs a long-range missile to compensate for its withdrawal from the Golan Heights in case of a peace agreement with Syria. No Middle Eastern state currently possesses a weapon system like Tomahawk. Providing Israel with Tomahawk would violate the MTCR and would create political complications.[24]

Threat of sea-launched ballistic missiles

The idea of using the sea to launch ballistic and cruise missiles has been limited to a small club of developed countries, but recently has started to attract the attention of some regional powers like Israel, India and China. The Rumsfeld Commission to 'Assess the Ballistic Missile Threat to the United States' concluded that the American intelligence community needs to pay more attention to launch configurations that were feasible but not employed by the United States and Russia.[25] The launch of ballistic missiles from surface ships was cited as a specific example. Although the United States and the former Soviet Union have preferred using submarines,[26] launching ballistic missiles from surface ships is still an attractive idea since it gives the country autonomy from foreign bases and lower risks in technical terms.

The primary attraction of surface-ship basing, when efficiently camouflaged, would be its ability to extend a nation's missile capability to intercontinental ranges using relatively simple technology. Most of the world's cities and military bases are within 1,500km of the ocean, putting much of the globe within range of such systems. This option represents a level of attainable ballistic missile technology for developing countries.[27]

Israel has recently obtained three modern submarines built in Germany. Some reports suggest that the submarines have four large (25.5 inch diameter) torpedo tubes that could be used to launch long-range nuclear capable cruise missiles.[28] According to some reports the submarines may be capable of carrying nuclear-armed Popeye Turbo cruise missiles to offer Israel a second strike capability. Under a system of rotation, two of the vessels would remain at sea: one in the Red Sea and Persian Gulf, the other in the Mediterranean. A third would remain on standby.

In May 2000, Israel is reported to have secretly carried out its first launches from two submarines of cruise missiles capable of carrying nuclear warheads. The missiles, launched near Sri Lanka in the Indian Ocean, are said to have hit a target at a range of 1,500km.[29]

Converted surface-to-air missiles (SAMs) are also another potent alternative to ballistic missiles. The republics of the former Soviet Union are retiring a large number of the S-200 surface-to-air missile system, which are suitable for conversion. This missile is already in use in North Korea, Syria and Iran. The use of SAMs as ballistic missiles is not new. China has sold versions of its locally manufactured SAM as the M-7 ballistic missile. It is in use in Iran under the name of 'Tamdar'.[30]

Missile technology transfer

While much attention has focused on the prospect of missile and WMD proliferation, little notice has been given to technology transfer programmes and the scientific and technical community that supports them. Critical technologies are transformed through joint development programmes. Western technologies proliferate to Israel and from Israel to other countries to gain extra technological or economic benefits. The same pattern exists with other countries receiving support from China, North Korea or Russia.

Concerns about Soviet weapons scientists seeking opportunities elsewhere began in 1991. For example, the Ukrainian Southern Machine Building Plant, which built the SS-18 intercontinental ballistic missiles, lost 5,000 personnel between 1991 and 1996. While many of the emigrating scientists went to Western Europe and the United States, others have gone to Israel, China, Iran, Iraq and North Korea.

Today, Israel is enjoying transfer of sensitive technologies from the two superpowers of the Cold War era. It has worked to bring key scientists out of the former Soviet Union to participate in several weapons and space technology programmes.[31] At the same time, Israel also succeeded to enhance its strategic ties with the United States and to remove many stumbling blocks facing this relation. In March 2000, Israel and the United States signed an energy co-operation accord that gives Israeli scientists limited access to United States Department of Energy laboratories. The accord will increase co-operation between the two countries in twenty-five 'civilian' nuclear and non-nuclear areas, including halting the leakage of WMD technologies and know-how from the countries of the former Soviet Union. The two sides also pledged to co-operate in the detection of underground nuclear tests, which are prohibited under the Comprehensive Test-Ban Treaty.[32]

The outer circle

A discussion on missile proliferation in the Middle East would not be complete without addressing relevant developments in the 'outer circle', basically India, Pakistan and Turkey. The multiple nuclear tests of both India and Pakistan in May 1998 coupled with their advanced missile and space

programmes have resounded in the nearby Gulf countries and elsewhere in the Middle East. India had already tested the Agni and Agni-2 ballistic missile systems, with ranges of 1,500 and 2,000km respectively. Pakistan is testing the Ghauri ballistic missile system, with ranges of 1,300–2,000km. The Gulf is a sensitive confrontation area not far from the Indian and Pakistani nuclear and missile threats. A large number of Egyptians, Pakistanis and Indians work in the Gulf States. For strategic and economic reasons, India considers the security of the Gulf important for its national security.

In March 1999, India sent its aircraft carrier INS Viraat to the Gulf for the first time as part of its continuing 'military diplomacy' to increase New Delhi's influence in the region. The Indian Navy held its first naval exercises with Kuwait and Iran and conducted one-day manoeuvres with the navies of Saudi Arabia and Oman as part of its strategic thrust in the area.[33] India also has growing technology transfer co-operation programmes with Israel. Turkey, a NATO member exposed to ballistic missile risks from its Middle Eastern neighbours, is striving to acquire missile defence systems from Israel or the United States.

Conclusions

The Middle East's experience with ballistic missiles is unique compared to other regions in the world. Missiles in the Middle East are not only acquired for deterrence or as a weapon of last resort, but are actually used in the battlefield. Most of the important wars in the Middle East since 1970 had included missile exchanges with ranges far beyond the front line. Important capitals and large cities in the area, like Baghdad, Riyadh, Tel Aviv, Tehran and Khartoum, remember the fear and uncertainty caused by ballistic missile strikes. The nature of the problem in the Middle East is not limited to confining missile proliferation in its material sense, but to fighting the proliferation of a 'missile culture' and the temptation to use such lethal weapons against population centres and the civilian infrastructure.

The nature of the problem in the Middle East is not limited to confining missile proliferation in its material sense, but to fighting the proliferation of a 'missile culture' and the temptation to use such lethal weapons against population centres and the civilian infrastructure.

For historical reasons the Middle East has failed to build security structures or dialogue forums to handle global changes in military technology and its impact on regional security. The absence of rules and constraints has led to further searching for new missile capabilities and basing options to guarantee security. The rapid spread of information, know-how and technology will soon put these weapons in the hands of more countries as well as enhance their lethal capabilities.

The growing proliferation of missiles in the Middle East increases the potential for long-range missile exchange in any future regional war. This has produced a major shift in military thinking and gives threat perceptions generated by missile acquisition new strategic dimensions. The dangers of a miscalculation leading to conflict with nuclear, biological or chemical warheads will increase.

The problem of ballistic missiles and WMD in the Middle East broadly defined should be considered in the two security contexts of South-South and North-South relations. It should be also seen from its future perspective, not only in its present status. Although missiles may not decide a war today, in the future, sophisticated missiles will be far more accurate and could be directed against strategic targets. Less accurate and cheaper types will continue to be used against population centres.

Any potential security regime hoping to address the missile proliferation dilemma must examine the larger framework of eliminating all types of WMD, and freeing the Middle East from their disastrous

consequences. This should cover all types of missile delivery systems, ground- and sea-based. The regime should not limit its obligations to the countries of the Middle East, but should be extended to other external powers sharing in its security responsibilities. Negotiated control or cuts in the numbers of missiles deployed regionally does not seem to be a feasible option in the near future. This is only possible after improving the security environment and establishing a framework for regional conflict resolution. It is important that the countries of the North show a desire to co-operate to stem missile acquisition and technology proliferation. As far as the countries of the region are concerned, confidence-building measures might be devised — at least at the beginning — to include pre-notification of launches, range limitations, capping of stocks and transparency measures.

Notes

1. See United States Department of Defense, 1992, *Conduct of the Persian Gulf Conflict: Final Report to Congress*, April.
2. A.H. Cordesman, 1999, The Military Balance in the Middle East: an Executive Summary, *IGCC Policy Paper # 49*, March, p. 109.
3. S. Feldman, 1996, *The Future of US-Israel Strategic Cooperation*, The Washington Institute for Near East Policy, p. 12–14.
4. E. Blanche and D. Lennox, 1999, Shifting Balance: Ballistic Missile Forces, *Jane's Defense Weekly*, vol. 31, no. 10, 10 March, p. 59–69. See also A.H. Cordesman, op. cit.; and L. Scheinman, 1999, NBC and Missile Proliferation Issues in the Middle East, in: B.R. Schneider (ed.), *Middle East Security Issues: In the Shadow of Weapons of Mass Destruction Proliferation*, USAF Counterproliferation Center, AU Press.
5. Blanche and Lennox, op. cit., p. 60.
6. Germany locates Iraqi missile factory, *Jane's Defense Weekly*, 30 August 2000, p. 8.
7. D. Lennox, 1998, Iran Ballistic Missile Projects: Uncovering The Evidence, *Jane's Intelligence Review*, June, p. 24–27.
8. A. Koch, 2000, Iran Claims Ballistic Test Success, *Jane's Defense Weekly*, 27 September, p. 4.
9. S. Rodan, 2000, Iran Now Able To Deploy Shehab-3, *Jane's Defense Weekly*, 22 March, p. 15.
10. See A.H. Cordesman, op. cit., p. 90.
11. T. Donnelly, 2000, Revolution in Military Affairs, *Jane's Defense Weekly*, 7 June.
12. B.R. Schneider (ed.), op. cit., p. 25.
13. B. Sweetman, 1997, Spy Satellites: The Next Leap Forward-Exploiting Commercial Satellites Technology, *International Defense Review*, vol. 30, 1 January, p. 26.
14. G. Ackerman, 2000, ImageSat Launches High-Resolution Imaging Satellite, *Jerusalem Post*, 6 December.
15. E. Blanche, 1999, Israel Plans World's Largest Launch Vehicle, *Jane's Missiles and Rockets*, vol. 3, no. 4, 1 April.
16. S. Shaban, 2000, An Arabic and Islamic Space Revolution, *National Guard Magazine* [in Arabic], no. 222, December.
17. I.O. Lesser, 2000, *NATO Looks South: New Challenges And New Strategies In The Mediterranean*, RAND, p. 24.
18. E. Fox and S. Orman, 1999, Will Europe Invest in Missile Defense?, *The Journal of Social, Political and Economic Studies*, vol. 24, no. 1, Spring.
19. J.L. Dyer, 1993, Features Of Cover Battalions For Wide Area Defense Of Populations, in: *Theater Missile Defense: Systems and Issues*, AIAA, p. 180.
20. *The 1999–2000 World Defense Almanac*, Military Technology, vol. XXIV, issue 1, 2000, p. 230–36.
21. D.C. Isby, 2000, THEL Kills A Two-Rocket Salvo, *Jane's Missiles and Rockets*, vol. 4, no. 10, 1 October.
22. A. Truesdell, 1997, Cruise Missiles: The Discriminating Weapons of Choice, *Jane's Intelligence Review*, 2 February, p. 87.
23. Report to Congress, 2000, *Kosovo/Operation Allied Forces: After Action Report*, 31 January.
24. Ed Blanche, 2000, Israel Asks US For Cruise Missiles, *Jane's Missiles and Rockets*, vol. 4, no. 2, 1 February.
25. Executive Summary, 1998, *Report of the Commission to Assess the Ballistic Missile Threat to the United States*, July.
26. The Soviet Navy explored the idea of surface-launched ballistic missiles in the early 1960s with the project 'Scorpion', and then returned to the ground silos option. The Scorpion project was cancelled in 1965.
27. S.J. Zaloga, 1998, Sea Scorpion: A Poor Man's ICBM?, *Jane's Intelligence Review*, November, p. 5–7.
28. M. Sieff, 1998, Israel Buying 3 Submarines To Carry Nuclear Missiles, *The Washington Times*, 1 July.
29. U. Mahnaimi and M. Campell, 2000, Israel Makes Nuclear Waves With Submarine Missiles Test, *London Sunday Times*, 18 June.
30. S.J. Zaloga, 1999, Back-door BMs: The Proliferation Threat Posed By Converted SAMs, *Jane's Intelligence Review*, April, p. 51.

31. A. Koch, Weapons Technology Transfers: A Growing Threat?, *Jane's Defense Weekly*, 22 December, p. 23.
32. Israel Granted Access To US DOE Nuclear Projects, *Jane's Defense Weekly*, 1 March 2000.
33. Rahulbedi, 1999, India Despatches Aircraft Carrier To The Gulf, *Jane's Defense Weekly*, 10 March.