Layered Defense, Layered Attack: The Missile Race in the Middle East

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The 1956 and 1967 Arab-Israeli Wars were characterized by Israeli air superiority, relying primarily on advanced aircraft and competent air attack operational concepts. In the 1967 War, most of the Egyptian air force was destroyed on the ground by a blitzkrieg Israeli air attack in the early morning of June 5, 1967. Egyptian air defense, relying mainly on anti-aircraft artillery, failed to intercept Israel's advanced aircraft. The disastrous results of the war forced Egypt to revolutionize its armed forces and, in particular, its air defense. In less than six years—from 1967 to 1973—a layered anti-aircraft missile defense force was deployed, comprising a new array of systems ranging from shoulder-launched short-range infrared homing missiles to medium- and long-range radar-command-guided missile systems (SAM-2, SAM-3, SAM-6, SAM-7). The size of the Egyptian anti-aircraft missile force in 1973 had increased fourfold compared to its size during the 1967 War.

The Egyptian air defense missile formations succeeded before the start of operations in 1973 in acting as a "firewall" against any potential Israeli pre-emptive air attack. In the critical initial hours of operations, they provided valuable protection for Egyptian troops in their surprise attack across the Suez Canal and the "Bar Lev" line fortifications. Although the number of the Israeli strike aircraft and their ammunition payload increased from 266 aircraft and 250 tons/sortie in 1967 to 540 aircraft and 1820 tons/sortie in 1973, approximately one-third of Israeli aircraft were shot down in the early days of the war.[1] It was clear that air defense operations on the Egyptian side had been closely interwoven with other air and ground missions, within the framework of the joint land-air battle.

The 1973 War demonstrated the first performance of a missile-based layered-defense against enemy air power. There were also other missile "firsts" before and during the war, including the destruction of the Israeli destroyer *Eilat* by a P-15 (Styx) guided missile on October 21, 1967, and the huge losses inflicted on Israeli tank formations by the Egyptian anti-tank guided missiles. On the Syrian front, Israel also successfully used its Gabriel anti-ship missile against Syrian missile boats.[2] Indeed, most of the "big pieces" of the conventional arsenal, such as aircraft, tanks, and destroyers, were severely challenged by the performance of "missile power" in 1973 War. Another impor-

tant result was the introduction in the Middle East of "anti-aircraft missile defense" concepts, practices, technologies, tactics, and countermeasures. These concepts have been further developed and enhanced as the nature of the threat has changed from aircraft to offensive missiles.

FROM LAYERED DEFENSE TO LAYERED ATTACK

In the early 1980s, a conceptual and technological response to the layered air defense architecture based on missile systems evolved with the introduction of "stealth" and "distance-warfare" concepts. New unmanned, high-precision, long-range attack systems were developed, and combined to form an integrated layered-attack force that could counter advanced defenses. Elements of these ideas were gradually adopted in the Middle East and first appeared in a rudimentary form during the 1980-1988 Iran-Iraq War. During that conflict, the two countries fired more than 600 Scud and modified Scud short-range ballistic missiles at each other's cities.[3] The heaviest of these exchanges, the so-called "War of Cities," took place between February and April 1988, causing more than 8,000 casualties.

The psychological effect of the Iraqi missile attacks was a major factor in Iran's eventual acceptance of a cease-fire. The "missile factor" in the Iran-Iraq war was also the spur to the Saudi Arabian purchase from China of approximately 30 Dong Feng-3 (CSS-2) intermediate-range ballistic missiles (IRBMs) in 1988.[4] In addition, the 1980-1988 Iran-Iraq War marked an important transition in the Middle East from missile acquisition for "deterrence" to missile "use" for deep strikes. The war also showed how much these weapons could produce profound fear and uncertainty among civilians and place extreme political pressure on governments.

Layered-attack architecture was further fine-tuned during the 1991 Gulf War. Between January 17 and February 26, 1991, Iraq fired roughly 90 modified Scuds at targets in Israel and Saudi Arabia. The Gulf War also marked the rise of the Tomahawk Land Attack Cruise Missiles (TLAMs) and a variety of precision-guided munitions. A total of 288 TLAMs were officially reported as having been launched by the United States and United Kingdom during the Gulf War. Of these, 276 were launched from surface ships in the Persian Gulf and the Red Sea, and 12 were launched from submarines in the Red Sea and Eastern Mediterranean. In the opening hours of the war, U.S. Air Force strategic bombers also delivered a further 35 Conventionally Armed Air-Launched Cruise Missiles (CALCM).[5]

Cruise and ballistic missiles represent the most distant tier in the layered-attack architecture, which is composed of three layers: (1) long-range ground-, ship-, and submarine-launched missile systems; (2) medium-range, stand-off air-launched precision-guided munitions (PGMs); and (3) short-range air-launched direct attack guided and unguided munitions.

The Gulf War also marked the first deployment of anti-ballistic missile systems in the Middle East and the rise of anti-missile defense issues in both their regional and trans-regional dimensions.

The impressive performance of the Tomahawk in the Gulf War made it the weapon of choice for the United States in the Middle East. Enjoying freedom of action and freedom to experiment, the United States used the Tomahawk in a variety of missions, ranging from air defense suppression, to fighting terrorism, to "hunting" individuals in their fortified hideouts. In ensuing actions after Desert Storm, the United States launched 45 Tomahawks against Iraq on January 17, 1993; 23 more on June 26, 1993; 31 on September 3-4, 1996; and 330 during Operation "Desert Fox" in December 1998.

To illustrate the utility of cruise missiles in "operations short of war," on August 27, 1998, the U.S. Navy fired 79 Tomahawk cruise missiles against training camps in Afghanistan and a pharmaceutical plant in Sudan in retaliation for terrorist attacks on the U.S. embassies in Tanzania and Kenya.[6] It was interesting to note how the United States used its distant or higher-tier (Tomahawk) missiles against Osama Bin-Laden in a "one-person-target operation." It was the extreme, limiting case of an "operation short of war" against the lowest, or the "zero tier," of the post-Cold War threats (i.e., terrorism).[7] In its war against the Palestinians, Israel has recently further enhanced such "personalization" of war operations by deliberately assassinating "named persons" using high-precision guided missiles launched from various platforms.

Finally, the Kosovo War (from March 24 to June 11, 1999) was a stark demonstration of modern layered-attack missile operations. The NATO campaign against Yugoslavia produced worried reactions among some Middle Eastern countries, which feared that they, like Libya, Sudan, Afghanistan, and Iraq, might be targets of a future U.S. missile attack. Both the Gulf War and the Kosovo

air campaign convinced Middle Eastern countries that the United States possesses capabilities for which they have no response—capabilities that could be easily shared with some U.S. allies in Europe (such as the United Kingdom) and in the Middle East (such as Israel). Early in January 2000, Israel sought to obtain cruise missiles from the United States. The Israeli "wish list" included the Tomahawk cruise missile, a system that could be launched from submarines and that might offer Israel a capability to compensate for its possible withdrawal from the Golan Heights in the context of a future peace agreement with Syria.[8]

According to emerging Israeli security doctrine, air power can no longer serve as the sole conventional deterrent force but must be incorporated into a broader, multidimensional combination of assets. The prime targets for Israel's "layered-attack" deterrence will become enemy missile launch facilities, missile depots, and critical infrastructure elements. Attacking these facilities will become the main challenge to Israel's technologies and operational tactics. With its new Dolphin-class submarine fleet, the Israeli Navy could become an important part of Israel's layered-attack strategic deterrence. Extending capabilities to outer space would add an additional dimension to Israeli power. As these capabilities evolve, the arms race in the Middle East is becoming one between effective, accurate missile delivery assets and effective countermeasures, both offensive and defensive.[9]

The threat perceived by the Arab and Islamic countries from the Israeli conventional and non-conventional buildup was a major factor leading to the initiation of counter programs, although growing missile threats posed by Iran, Iraq, and Libya have also stimulated defensive concerns in various capitals. The scope of the Arab and Islamic counter programs is generally limited in size and capabilities compared to the already deployed offensive capabilities of Israel. The Arab and Islamic countries are subject to severe measures by the international regimes prohibiting missile and advanced technology proliferation on selective bases. Facing difficulties for financing their conventional arms procurements, and lacking powerful allies, some of these states are seeking to acquire various WMD to compensate for the unfavorable balance they often face from other regional antagonists possessing or seeking these capabilities. Their future missile development programs focus on enhancing range, payload, accuracy, survivability, and immunity to countermeasures. Table 1 summarizes the current status of ballistic missile capabilities and development programs in the Middle East, with data derived from several sources.[10]

ENHANCING LAYERED DEFENSE AGAINST THE MISSILE THREAT

An important lesson of the Iran-Iraq War was that missiles had become a means of power projection in the Middle East, and some of these missiles might well carry chemical, biological, or even nuclear warheads. This lesson was further emphasized during the Gulf War in 1991. The countries of the Middle East became more aware that if they were to survive in the uncertain regional environment, they would have to provide protection for themselves and "think missile defense."

Swept up by the events of the Gulf War, Saudi Arabia and Israel deployed a limited number of Patriot (PAC-2) anti-missile batteries, without the need to consider some of the basic questions associated with missile defenses. After that conflict, however, regional states began to confront these issues, including the assessment of the offensive missile threat, the costs of missile defenses, the ability of the offensive side to introduce countermeasures against defenses, and other military/technical requirements. Within the geographical context of the Middle East, the term theater missile defense (TMD) sometimes also applies to national "homeland" missile defense (NMD) against intermediate- or shorter-range ballistic missiles. The threat could be conventional, chemical, biological, or nuclear.

The Patriot system is now deployed in Israel, Kuwait, and Saudi Arabia. The "after mission" assessment of the U.S. Patriot system performance both in Saudi Arabia and Israel after the Gulf War indicated that the system performed with limited military effectiveness. Even with hope for future improvements, in the Middle East the issue of missile defense has been considered as an activity that is neither easy nor cheap.

The United States has treated the threat of ballistic missiles a high-profile issue over the last five years, in contrast to the calmer and more relaxed attitude of the European Union and Middle Eastern countries (except Israel).[11] The Clinton administration had proposed to the Gulf Cooperation Council (GCC)[12] and Egypt that they join the United States in developing an area-defense system against ballistic missiles. Similar defense architectures have also been proposed for Europe and Southeast Asia. So far, the Gulf States and Egypt have shown little enthusiasm for such a project because of the considerable costs

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	France/I	
	Jericho-2	O	1500	1000	France/I	
	Jericho-2+	D	2500	1000	I	
	Jericho-3	D	4500	1000	I	
	Lance (MGM-52)	O	130	450	US	Possibly withdrawn from service
	Shavit(SLV)	O	4500	150-250	I	
Iran	Scud-B	O	300	985	I/N. Korea	
	Scud-C	O	500	500	I/N. Korea	
	Shehab-3	O	1300-1500	700	I/N. Korea	Emergency operational capability
	Shehab-4	D	2000	1000	I/Russia	
Syria	Scud-B	O	300	985	I/N. Korea	
	Scud-C	O	500	500	I/N. 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/N. Korea	Only a small number of missiles remain after the Gulf War
	Al-Hussein	O	600	500	I/N. Korea	Only a small number of missiles remain after the Gulf War
	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	1000	500	?	
Saudi Arabia	CSS-2	O	2600	2150	China	

Key: D=development; O=operational; I=Indigenous.

it would entail at a time when these countries are facing financial strains. Moreover, the Arab countries, realizing how much Israel and the United States are strategically "networked," have an additional concern. They fear that the networking that would be required for a joint missile defense system with the United States might include Israel in the future.

At the Second Middle East Air Force Symposium held in Dubai on May 7-8, 2002, a proposed missile shield to defend the GCC's northern and eastern frontiers was presented by the head of the United Arab Emirates Air Force to chiefs and senior officers from Britain, Egypt, France, Jordan, the United States, and the six GCC states. Experts at the symposium said that only two existing systems met the requirements: Raytheon's Patriot missile and Russian S-300 and S-400 missiles.[13]

Economic pressures to limit arms purchases have convinced the Arab countries, however, that their first response to regional threats should be seeking political solutions for their disputes with their neighbors. Saudi Arabia, for example, signed a limited security pact with Iran in April 2001 to cooperate in preventing drug trafficking and cross-border terrorism. Engaging Iran is a key to reducing tension in the Gulf region and in the Middle East as a whole. Iranian relations with its neighboring Arab states, which deteriorated after the conservative Islamic regime took power in 1979, have been blossoming in the last two years, including enhanced ties with Egypt.

The Arab states are also addressing issues that have long roiled relations among them. On March 21, 2001, for example, Saudi Arabia and Qatar signed an agreement ending a 35-year border dispute. A few days earlier, Qatar settled a 60-year-old dispute with Bahrain. In March 2000, the United Arab Emirates and Oman fixed their common border. Saudi Arabia settled a sea-border dispute with Kuwait and also reached agreement with Yemen to define their border of nearly 850 miles, which has seen frequent military clashes.[14]

Israel, however, is making a strong commitment to missile defenses. The basic concept of the present Israeli anti-missile defense is the national HOMA (The Wall) project, which envisages a layered active defense, based on three elements:[15]

- **Endo-atmospheric interception, or close to the target defense**, using an improved HAWK missile belt intended to intercept incoming enemy missiles at altitudes lower than 10,000 meters. This can be augmented by rapid-firing electromagnetic multi-guns defending vital targets. These systems are to be added to the existing Patriot (PAC-2) systems, which can intercept missiles as far as 10 km from the ground target. The improved PAC-3 will operate at a similar range. Also in this category is the tactical high-energy laser, or Nautilus project, now undergoing tests in the United States and Israel.
- **Exo-atmospheric interception, or mid-trajectory intercept,** which includes the Arrow-2 anti-ballistic missile system. The Arrow system can detect incoming missiles launched from 500 km and can intercept them at 90-100 km from Israeli targets. It is capable of battle-managing as many as 14 separate intercepts simultaneously. In October 2000, Israel declared the first of three planned Arrow batteries operational. In 2001, the Arrow units participated in a large joint air defense exercise with U.S. military forces, aimed at honing the ability of U.S. and Israeli air defense and missile defense units to operate in a coordinated manner.[16] Enhanced integration between U.S. and Israeli ballistic missile defense goes through an electronic interface known as the Arrow Link 16 upgrade (ALUC). This system will allow the Israeli Arrow and U.S. Patriot to communicate with each other, permitting the sharing and distribution of tactical information acquired by each missile system.
- **Launch, boost, or ascent phase intercept**, which aims at destroying the missile early in its trajectory, before its booster burns out and before its entry into a ballistic trajectory orbit. The concept employs airborne laser systems or high-speed airborne air-to-air projectiles.

Missile defense projects in Israel are tightly linked to developments in the fields of nuclear and space technologies. In the nuclear domain, reports indicate that Israel maintains a large supply of tritium, a heavy isotope of hydrogen, which is critical for Israel's nuclear weapons, including boosted fission weapons and neutron bombs. This allows scientists to produce lightweight warheads for missiles, which is important if future nuclear strategy calls for a conflict against a distant enemy, where warhead weight would be critical in maximizing missile range and warhead yield. Tritium is also essential for neutron bombs, which would be the nuclear weapons of choice against

massed armor formations along Israeli borders. A similar type of warhead can be used in a ballistic missile defense system, where the nuclear-tipped anti-ballistic missile would explode near the incoming nuclear missile, producing an electromagnetic pulse that would destroy the enemy warhead electronics.[17]

Israeli space capabilities and technologies are equally important, in view of the growing dependence of layered defense and layered attack on space-based assets for reconnaissance, communication, and missile guidance. Israel started launching its Ofec series of spy satellites in September 1988. Most recently, it launched the Ofec-5 reconnaissance satellite on May 28, 2002.[18] In 1997, a joint venture Israeli-U.S. Satellite Company (ImageSat International) was established to build a satellite constellation of eight small "Eros" satellites based on the Ofec technology. The ground resolution of each satellite will be approximately 1.5 meters, providing the ability to identify objects of military interest.[19] The first satellite of the series, "Eros-1," was launched successfully in December 2000.[20]

Egypt, Saudi Arabia, and Algeria are now "thinking space" for peaceful applications. They are examining small and micro satellites with the aim of acquiring technology and advancing economic development. The Council of 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 (10 kg each) on board a Russian launcher in September 2000.[21] In July 2000, the GCC commissioned a military committee to weigh options for buying satellites for communication or imagery. In October 2000, they chose to study the imagery satellite further and approved spending up to $500 million to buy one.[22]

Today, Israel is enjoying transfer of sensitive technologies from the two superpowers of the Cold War era. It has reportedly worked to bring key scientists out of the former Soviet Union to participate in several weapons and space technology programs.[23] On the other hand, it also succeeded in enhancing its strategic ties with the United States and in removing many red lines restricting technology transfers within this relationship. In March 2000, Israel and the United States signed an energy cooperation accord that gives Israeli scientists greater access to U.S. Department of Energy laboratories, although only for nonsensitive research. The accord will increase cooperation between the two countries in 25 "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 cooperate in the detection of underground nuclear tests, which are prohibited under the Comprehensive Test Ban Treaty (CTBT).[24]

Other countries in the Middle East are trying to overcome Western limitations imposed on transfers of critical military technologies. They are adopting a strategy of "technological readiness" that minimizes time to system development and deployment. Enhancing capabilities of existing systems and investing in defensive countermeasures are important aspects of their strategy. The massive deployment of defense systems against ballistic missiles will oblige other countries in the region to further enhance their offensive capabilities in order to "saturate" their adversaries.

EXTRA-REGIONAL INTERACTIONS: THE OUTER CIRCLE

A discussion of missile proliferation and missile defense in the Middle East would not be complete without addressing relevant interactions with the Middle East's outer circle in both its eastern and north-south directions.

Interactions with Eastern Neighbors

Middle Eastern interactions to the east are predominantly with India and Pakistan. The multiple nuclear tests of both these countries in May 1998, coupled with their advanced missile and space programs, have echoed in the nearby Gulf countries and far into the Middle East. India has already tested the Agni and Agni-2 ballistic missile systems with ranges of 1,500 and 2,000 km, respectively. Pakistan is also testing the Ghauri ballistic missile system with ranges up to 1,300-2,000 km. The Gulf, a region sensitive to confrontation, is 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, Egypt considers the security of the Gulf important for its own national security. Although Indo-Pakistani tensions are not likely, in themselves, to spur conflict in the Gulf region, the example of a growing missile arms race in South Asia serves to legitimize the enhancement of potentially destabilizing missile capabilities in neighboring areas.

Underscoring the strategic connectedness of South Asia and the Persian Gulf, in March 1999, India sent for the first time its aircraft carrier *INS Viraat* to the Gulf 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 maneuvers with the navies of Saudi Arabia and Oman as part of its strategic thrust in the area.[25] India also has growing technology transfer cooperation programs with Israel. In the other direction, Pakistan could also be tempted to provide medium-range solid-fuelled Ghauri missiles to Saudi Arabia to replace its aging Dong Feng-3 ballistic missiles.[26]

North-South Interactions

One of the important results of the wars in the Gulf and in the Balkans has been that they forced NATO to recognize the urgent need to modernize European military forces in the areas of precision strike, mobility, and command, control, and communications. The United States proposed in 1998 the implementation of the "Defense Capabilities Initiative" (DCI), later adopted by NATO in 1999. The DCI aims to upgrade the key military systems and capabilities of the European allies and make them interoperable with the U.S. systems.[27] Added to power projection modernization projects, the new NATO Strategic Concept approved at the Washington Summit in April 1999 emphasizes "multidimensional" risks emanating from beyond the traditional NATO area of action. The new NATO Strategic Concept reflects a geographic shift to address a more diverse set of risks, many of which are located in or emanating from the south. The expanded definition of NATO interests and scope for action raises questions about how far the geographic mandate of NATO extends.[28]

As a consequence of such changes in north-south relations, defense against ballistic missiles has become a rising issue. From the NATO and U.S. perspective, missile proliferation in the Middle East and North Africa can affect European security and constrains NATO and U.S. freedom of action in the Mediterranean. The potential exposure of European population centers to retaliation could complicate the prospects for U.S. and NATO access to southern Europe.[29] Turkey, a NATO member, already exposed to ballistic missile threats from its Middle Eastern neighbors, is striving to acquire missile defense systems from Israel or the United States. Initiating a regional anti-missile defense project in Europe, however, might also raise security concerns among the southern Mediterranean countries if they feel that their modest response capabilities are being undermined.

During the last ten years, U.S. defense institutions have undertaken numerous cost and effectiveness simulation studies for anti-ballistic missile defense area deployment, not only for its allies in Europe but also for the Gulf area and other regions of the world. Figures 1 through 3 show the results of a simulation study on how to accomplish population defense against the ballistic missile threat in Europe and in the Gulf area. The study has indicated in the two cases that the required number of anti-ballistic missile batteries is considerably reduced if the batteries are interconnected into one regional system rather than working individually.[30]

THE SEARCH FOR STABILITY

Two conflicting approaches have shaped the security environment of the Middle East during the last ten years. The first approach has been characterized by the region's pursuit of peace and stability through determined efforts aimed at conflict resolution, trust enhancement, and the reduction of tensions. The second opposing stream was the product of deep-rooted threat perceptions among the countries of the region, which have led them to generate plans for arms modernization, acquisition, and war preparations. For the moment, it appears that the latter approach remains dominant in the region today. Nonetheless, several important initial steps have been undertaken to im-

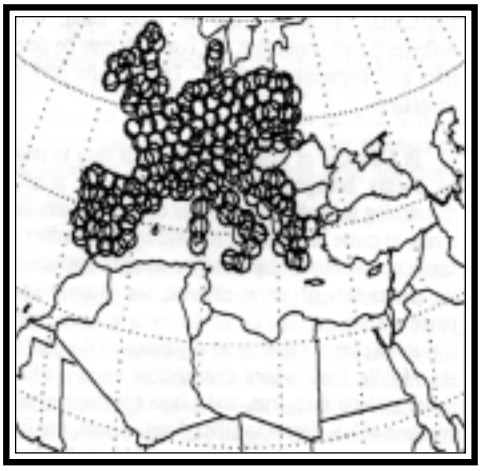

Figure 1. Coverage of Europe against a North African Missile Threat (from Libya) Using 100 Autonomous Batteries

Figure 2. Coverage of Europe against a North African Missile Threat (from Libya) with only Nine Interconnected Batteries

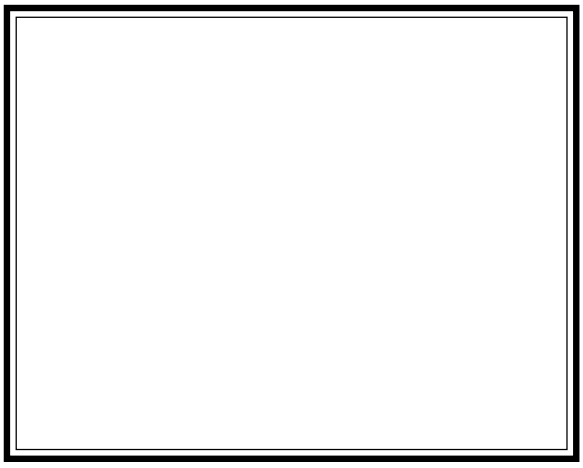

Figure 3. Coverage of Saudi Arabia and Gulf States with Interconnected Space-Based Sensors and Interceptor Batteries

prove the regional security environment through dialogue and conflict resolution.

One of the first efforts in the Middle East to deal with regional security matters was the Arms Control and Regional Security Talks (ACRS). Their aim was to bring together Israel, its immediate Arab neighbors, and the wider circle of Arab states in the Gulf and North Africa to discuss issues of mutual interest. After its inaugural meeting in Moscow in January 1992, the participants have met in seven rounds for talks in five separate working groups to discuss water resources, environmental issues, refugees, arms control and regional security, and economic and regional development. Although the parties have failed to put their signatures on a "Declaration of Principles on Arms Control and Regional Security in the Middle East," the existence of the ACRS working group in itself represented an important first step in developing a new common strategic culture in the area.[31]

Supplementary efforts by "Track 2" mechanisms sponsored by academic organizations have recognized the complexity of the Middle East security environment and have suggested some preliminary confidence-building measures (CBMs) in the area of ballistic missile acquisition and development to include—at least as initial steps—pre-notification of launches, range limitations, the capping of stocks, and transparency measures.[32]

National positions with regard to international multilateral conventions and treaties have reflected the asymmetries shaping the security environment in the Middle East. Those which "have" nuclear capability (only Israel) refuse to sign the Treaty on the Non-Proliferation of Nuclear Weapons (NPT), and others which "have not" and may be pursuing countervailing chemical capabilities are inclined not to sign Chemical Weapons Convention (CWC). Indeed, some regional states that have no intention of pursuing WMD are refusing to sign the chemical weapons ban until Israel has accepted parallel restrictions on its nuclear capability. All Arab states are parties to the NPT. The Iranian record of adhering to the international regimes controlling the proliferation of WMD is also good, compared to Israel, as illustrated in Table 2.

The Egyptian position is based on a plan proposed by President Mubarak that calls for ridding the Middle East of all WMD. Egypt worked hard to establish a Nuclear Weapon Free Zone (NWFZ) in Africa, which was finally signed in Cairo on April 12, 1996. The African zone includes all Arab countries in North Africa.[34]

Despite these efforts, recent developments indicate that the offensive-defensive missile race is accelerating in the region. The past 18 months have seen Libya, Syria, and Iran seeking to acquire longer-range missile systems, with Iran's continuing tests of the 1,300-km range Shahab III a particularly disturbing development. In the meantime,

Table 2. Adherence of Middle Eastern Countries to Multilateral WMD Nonproliferation Agreements

Country	NPT	CTBT	CWC	BTWC
Israel	Not signed	Signed 9/25/96	Signed 1/13/93	Not signed
Iran	Ratified 2/20/1970	Signed 9/24/96	Ratified 11/3/97	Ratified 8/22/73
Egypt	Ratified 2/26/1981	Signed 10/14/96	Not signed	Signed 4/10/72
Syria	Ratified 9/24/89	Not signed	Not signed	Signed 4/14/72
Algeria	Ratified 1/12/1995	Signed 10/15/96	Ratified 8/14/95	Not signed
Libya	Ratified 5/26/75	Not signed	Not signed	Ratified 1/19/69
Iraq	Ratified 10/29/69	Not signed	Not signed	Ratified 4/18/91

Israel is extensively using precision-guided missiles against the Palestinians; has now deployed three batteries of its Arrow ballistic missile defense system; is progressing on the development of laser-based defensive systems; and is exploring the possible use of unmanned aerial combat vehicles for intercepting missiles soon after launch. Also contributing to regional concerns are growing cruise missile capabilities in many states.

It remains to be seen whether the search for stability in the region through non-military means will ultimately bear fruit, especially given the recent intensification of tensions in the Middle East and, in particular, the impact of the Palestinian-Israeli conflict. A number of states remain strongly committed to this approach, however, and hope that it will regain momentum in the future. For the moment, however, it appears that terrorism, war-fighting, and weapons proliferation have endangered the core vision of the Middle East, as envisioned by its member states, of a region of peace, stability, and cooperation.

[1] General (retired) Mostafa Khairy, "Planning and Mission Execution of Air Defense Forces," in *October War Strategic Symposium: After 25 Years* (in Arabic), (Cairo: Egyptian Ministry of Defense, 1998), p. 130.

[2] See Jewish Virtual Library, "The Battle of Latakia,"<http://www.us-israel.org/jsource/History/latakia.html>.

[3] Anthony H. Cordesman, "The Military Balance in the Middle East: An Executive Summary," IGCC Policy Papers No. 49, University of California, San Diego, March 1999, p. 109.

[4] Mohan Malik, "China Plays 'the Proliferation Card'," *Jane's Intelligence Review*, July 2000, p. 35.

[5] See U.S. Department of Defense, "Conduct of the Persian Gulf Conflict: Final Report to Congress," Washington, DC, April 1992.

[6] Steve Zaloga, "The Cruise Missile Threat: Exaggeration or Premature?," *Jane's Intelligence Review* 12, April 2000, p. 48.

[7] Mohamed Kadry Said, "Tomahawk: A Weapon Against Terrorism" (in Arabic), *Al Ahram*, August 29, 1998.

[8] Ed. Blandy, "Israel Asks U.S. for Cruise Missiles," *Jane's Missiles and Rockets* 4, February 1, 2000.

[9] David Eshel, "Israel's Nuclear Deterrent Faces First Public Scrutiny," *Jane's Intelligence Review* 12, July 2000, pp. 14-15.

[10] Mohamed Kadry Said, "Missile Proliferation in the Middle East: A Regional Perspective," *Disarmament Forum*, Issue 2, 2001.

[11] E. Fox and S. Orman, "Will Europe Invest in Missile Defense?," *Journal of Social, Political and Economic Studies* 24, Spring 1999.

[12] The GCC comprises Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, and the United Arab Emirates.

[13] Riad Kahwaji, "UAE Proposes Missile Shield for Persian Gulf," *Defense News*, May 13-19, 2002, p. 6.

[14] Gobal Ratnam, "Gulf States Turn from Arms: Jobs, Debts, Infrastructure Take Renewed Importance," *Defense News*, May 28-June 3, 2001, pp. 1, 4.

[15] David Eshel, "Examining Israel's BMD Options," *Jane's Intelligence Review*, September 2000, pp. 21-24.

[16] Barbara Opal-Tome, "Israel Air Force Makes the Arrow its Own," *Defense News*, May 28-June 3, 2001, p. 31.

[17] Harold Hough, "Israel Reviews its Nuclear Deterrent," *Jane's Intelligence Review* 10, November 1998, p. 12.

[18] *Al-Hayat*, May 30, 2002, p. 5.

[19] Bill Sweetman, "Spy Satellites: The Next Leap Forward—Exploiting Commercial Satellite Technology," *International Defense Review* 30, January 1, 1997, p. 26.

[20] Gwen Ackerman, "ImageSat Launches High-Resolution Imaging Satellite," *Jerusalem Post*, December 6, 2000.

[21] *Asharq Al-Awsat*, September 2, 2000.
[22] Warren Feerster and Gobal Ratnam, "GCC Mulls Spy Satellite: Six Aligned Gulf States Seek Independent Image Source," *Defense News*, December 10-16, 2001, p. 1.
[23] Andrew Koch, "Weapons Technology Transfers: A Growing Threat?," *Jane's Defense Weekly*, December 22, 2001, p. 23.
[24] "Israel Granted Access to U.S. DoE Nuclear Projects," *Jane's Defense Weekly*, March 1, 2000.
[25] Rahulbedi, "India Despatches Aircraft Carrier to the Gulf," *Jane's Defense Weekly*, March 10, 1999.
[26] Malik, "China Plays 'The Proliferation Card'," p. 35.
[27] James W. Canan, "The Lessons of Kosovo," *Aerospace America Magazine*, June 2001, p. 25.
[28] Ian O. Lesser, Jerrold D. Green, F. Stephen Larrable, and Michele Zanini, "The Future of NATO's Mediterranean Initiative: Evolution and Next Steps," RAND Europe 2000, Santa Monica, CA, p. 21.
[29] Ian O. Lesser, "NATO Looks South: New Challenges and New Strategies in the Mediterranean," RAND Europe 2000, Santa Monica, CA, p. 24.
[30] John L. Dyer, "Features of Cover Battalions for Wide Area Defense of Populations," in *Theater Missile Defense: Systems and Issues* (AIAA, 1993), p. 180.
[31] Joel Peters, "Pathways to Peace: The Multilateral Arab-Israeli Peace Process," The Royal Institute of International Affairs, London, United Kingdom, 1996.
[32] Peter Jones, "Towards a Regional Security Regime for the Middle East," Stockholm International Peace Research Institute (SIPRI), Stockholm, Sweden, December 1998, p. 33.
[33]Derived from "Middle East Security Issues: In the Shadow of Weapons of Mass Destruction Proliferation," U.S. Air Force Counterproliferation Center, December 1999.
[34] Abdel Monem Said, "In the Shadow of the Israeli Nuclear Bombs: Egyptian Threat Perceptions," *Brown Journal of World Affairs* (Summer/Fall 1996), p. 156.