

Israel's Response to Regional Missile and Rocket Threats

Uzi Rubin

- Threat rationale: Hybrid Warfare.
- The missile threat on Israel's homeland: Scope and implications.
- Overview of Israel's missile defense programs.

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Iran's Radical Alignment



Hamas/Islamic Jihad in Gaza



The New Military Paradigm of Hybrid Warfare

Credit: Brigadier General Itai Brun, IDF General Staff



"We have devised a new type of warfare that is unlike anything the world has ever seen, a kind of warfare that is somewhere between regular war and guerilla"

Hassan Naserallah, 2008

- The underlying assumption is that Western societies are inherently weak, morally corrupt and fearful of casualties therefore frail (the "Cobweb" doctrine).
- In contrast, the practitioners of Hybrid Warfare are strong, morally upright, heroic and fearless – they "embrace death".
- Hybrid Warfare is designed to exploit the perceived societal asymmetry for destroying the antagonist's *society* rather than his *armed forces*.



Main Features of Hybrid Warfare

- Intimidation by highly visible demonstrations and verbal threats of destructive missile attacks on the adversary's homeland.
- Attrition of the adversary's society by protracted missile and rocket attacks against the defender's population centers.
- Survivable deployment of ballistic weapons by concealment, dispersion and embedding within the aggressor's own population centers
- Leveraging Western values to delegitimize the defender once his counter operations cause collateral casualties within the aggressors' human shield populations.
- Provoking the defender to hurl massive ground and air assaults on the aggressor's pre prepared defense in depth to maximize his casualties.
- Dominating the cognitive battlefield by proclaiming each engagement as a "Victory" and never conceding defeat.



Implementation of Hybrid Warfare doctrine

- The military forces of the Radical Alignment are being organized and equipped for static Wars of Attrition rather than mobile Wars of Maneuver.
- Accordingly, classic weapons of mobile warfare - tanks, combat aircraft, large surface naval vessels - are de emphasized.
- Instead, the emphasis is put on standoff weapons and precision guided munitions - Ballistic and cruise missiles, anti tank, anti aircraft and anti ship missiles.



"I believe we are entering a new era, the era of the Firepower Wars... The new dimension of ballistic firepower is creating a new reality"

Brigadier General Yossi Baidatz, Designated Commander of the IDF War College, in a speech to the INSS , November 17 2011



Syrian Air Force Combat Aircraft Obsolete or Approaching Obsolescence



MIG - 29



SU -24



MIG - 23



SU - 22

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Iran Air Force Combat Aircraft



F – 14 Tomcat



MIG - 29



F4 Phantom



SU -24

Iran Missile Programs

Shahab 3 Variants



Shahab 3
Range 1300 Km
Warhead: Explosive



Shahab 3 ER
Range: 2000 Km
Warhead: Cluster, Thermobaric?



"Ghader 1"
Range 2000 Km
Warhead ?

Iran Missile Programs

The “ Ashura”/“Sejil” Two Stage Solid Propellant Ballistic Missile

- First tested November 2007. several more tests followed in 2008 and 2011.
- Declared range: “More than 2000 Km” (Calculated range: 2450 – 2600 Km.)
- Solid propellant rocket motors and staging capability are two key technologies for ballistic missiles of global ranges.



Iran Missile Programs

Iran missiles going into hardened silos



Iran Missile Programs

Iran missiles going into hardened silos



Silo diameter can accommodate larger missiles

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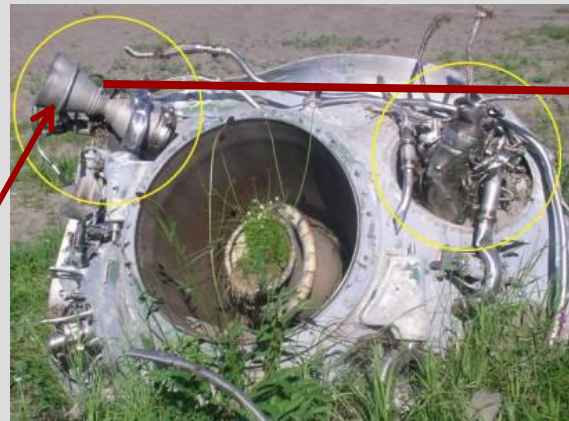
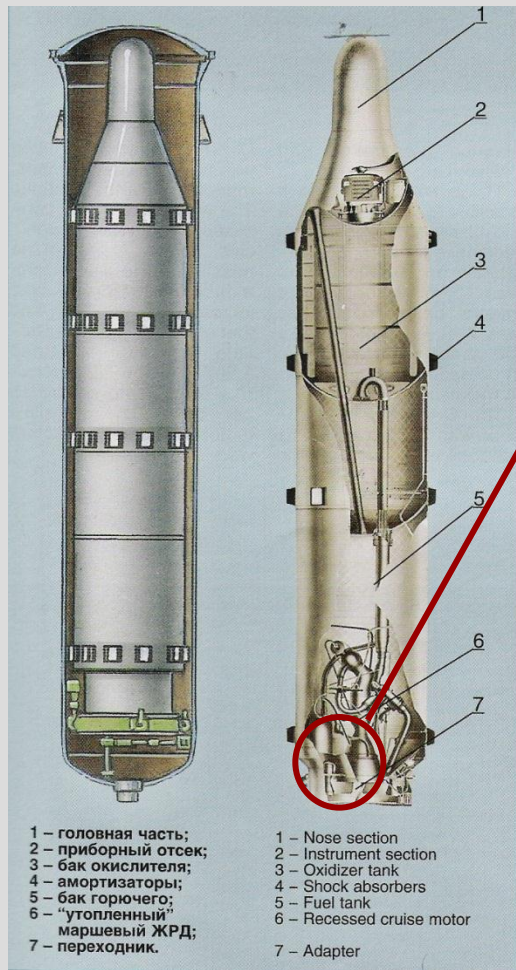
Iran Missile Programs

Is the 3500 Km. BM 25 in Iran ?



Iran Missile Programs

BM 25 Components in Iran



**Junked SSN6/R27 SLBM
In Russia**



**Gimbaled steering rocket motor
Displayed in Teheran, Feb 3 2010**

SSN6/R27 SLBM Drawing (Russian Arms Encyclopedia)

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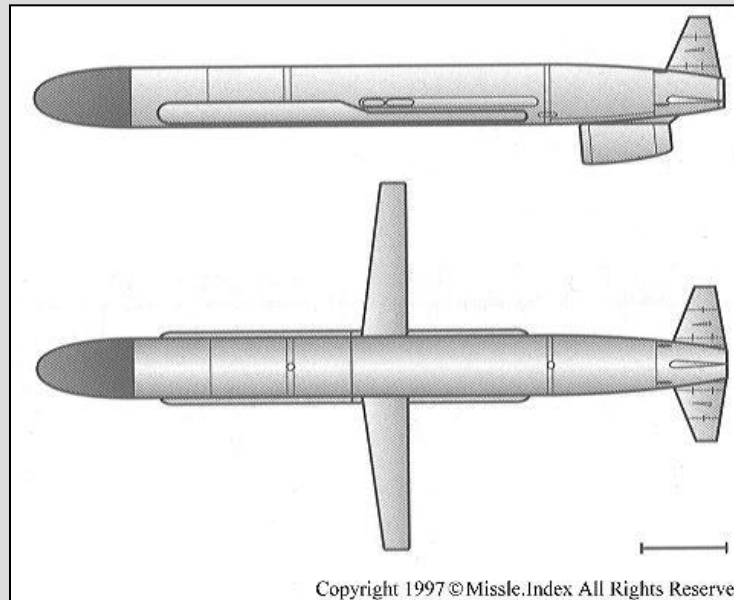


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Iran Missile Programs

Long Range Ground Launched Cruise Missile



"Iran is extending the range of the KH 55 beyond 2500 Km"

Yair Shamir, than Chairman of IAI, May 5 2010,

http://www.worldtribune.com/worldtribune/WTARC/2010/me_iran0382_05_06.asp



Iran Missile Programs

The 600 mm Family of Heavy Rockets



Zilzal 2
Range C. 250 Km.
Unguided



Fatah 110 3d Generation
Range 300 Km
Boost and midcourse guidance



Fatah 110 anti ship version
"Khalij Fars"
Range: C. 200 Km.
Terminal Guidance

Israel Response to Regional Missile and Rocket Threats

Kalij Farse ASBM Keep Away Zone



Brief History of Syria's Missile Forces

- **The Soviet equipped Syrian Air Force and Ground Based Air Defense Forces were heavily defeated by the US equipped Israel Air Force in the 1982 Lebanon War**
- **Concurrently, Saddam Hussein Soviet equipped air force was barely holding out against the US equipped and trained Iranian Air Force in the Iran – Iraq war.**
- **Hafez Assad (Bashar's Father) rightly concluded that his air power would remain inferior as long as Soviet air combat technology lagged behind the West.**
- **Two fundamental policy decision were made:**
 - **To switch from Air Power to Missile Power.**
 - **To established WMD based deterrence against Israel.**

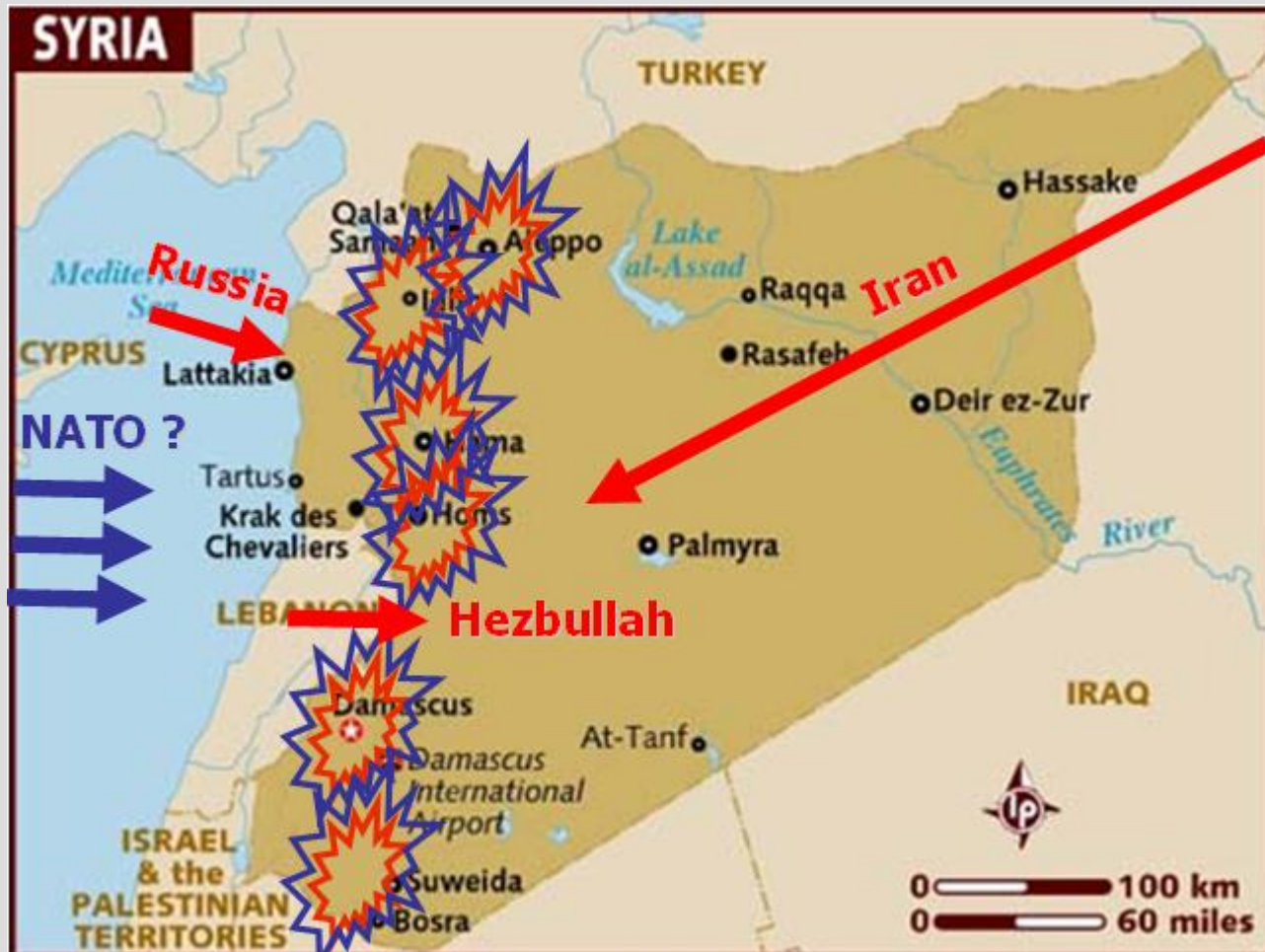


Brief History of Syria's Missile Forces

- **Large quantities of ballistic missiles were acquired from the Soviet Union, subsequently from North Korea and lately from Iran.**
- **A missile industry was established, including R&D facilities with trained manpower.**
- **A chemical warfare industry was established, operational chemical warheads were deployed on ballistic missiles.**
- **A military nuclear program was initiated, but suffered a setback when the North Korean supplied nuclear reactor was destroyed in 2007.**
- **A policy of opacity was strictly practiced. Syria never conceded having ballistic missiles or WMD – until recently.**



The Syrian Civil War



Syria's Missiles Unveiled

- To discourage outside intervention, the Syrian regime conducted televised exercises of its anti ship, air defense and ground to ground missiles in December 2011 and again in July 2012.



SA -6



C 802



SCUD B or C

- 7 types of ground to ground weapons were displayed: Four unguided rocket systems and 3 guided missile systems.
- All were anticipated, but never seen before in Syrian service.

Syria's Ground to Ground Missiles

Unguided Rocket Systems



Syria's Ground to Ground Missiles

Unguided Rocket Systems



Frog 7

Syria's Ground to Ground Missiles

Unguided Rocket Systems



Syria: "Maysalun"



Iran: "Zilzal 2"

Syria's Ground to Ground Missiles

Unguided Rocket Systems



Syria's Ground to Ground Missiles

Unguided Rocket Systems



Syria's Ground to Ground Missiles Ballistic Missiles



Syrian "Tishrin"



Iran "Fatah 110"

Syria's Ground to Ground Missiles Ballistic Missiles



SS21/KN02

Syria's Ground to Ground Missiles Ballistic Missiles

SCUD C/"Joulan 2"



Syria Missile Programs

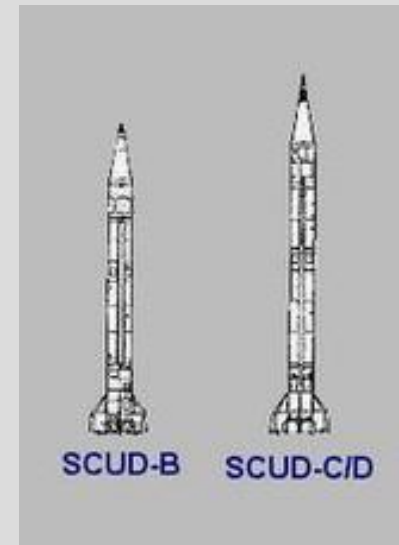
SCUD Variants



SCUD B
Range: 300 Km
Warheads: Explosive, Chemical



SCUD C
Range: C. 600 Km.
Warheads: Explosive, Chemical



SCUD D
Range: C. 700 Km.
Warheads: Explosive, Chemical
Cluster – Runway demolition
Antipersonnel, Fuel/Air,

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Threat to Israel



Synchronized Launchings



Syria: Synchronized launch of 2 Joulan -2's



Iran: Synchronized launch of 2 Shahab 2's

Synchronized Launchings



Syria: Synchronized launching of 302 mm rockets



Iran: Synchronized launch of 5 Zilzal 2

Mimicking Civilian Transports

Syrian 220 and 302 mm MLRS



Iranian Fajer 5 MLRS



Iranian Fajer 3 MLRS



Syrian Missiles Through Insurgent Eyes – June 10 2012



Syrian Missiles Through Insurgent Eyes – June 6 2012



Syria Rattles its Missiles – December 3 2011

First Ever Officially Released Footage of Syrian Anti Ship Missiles



C802



Silkworm



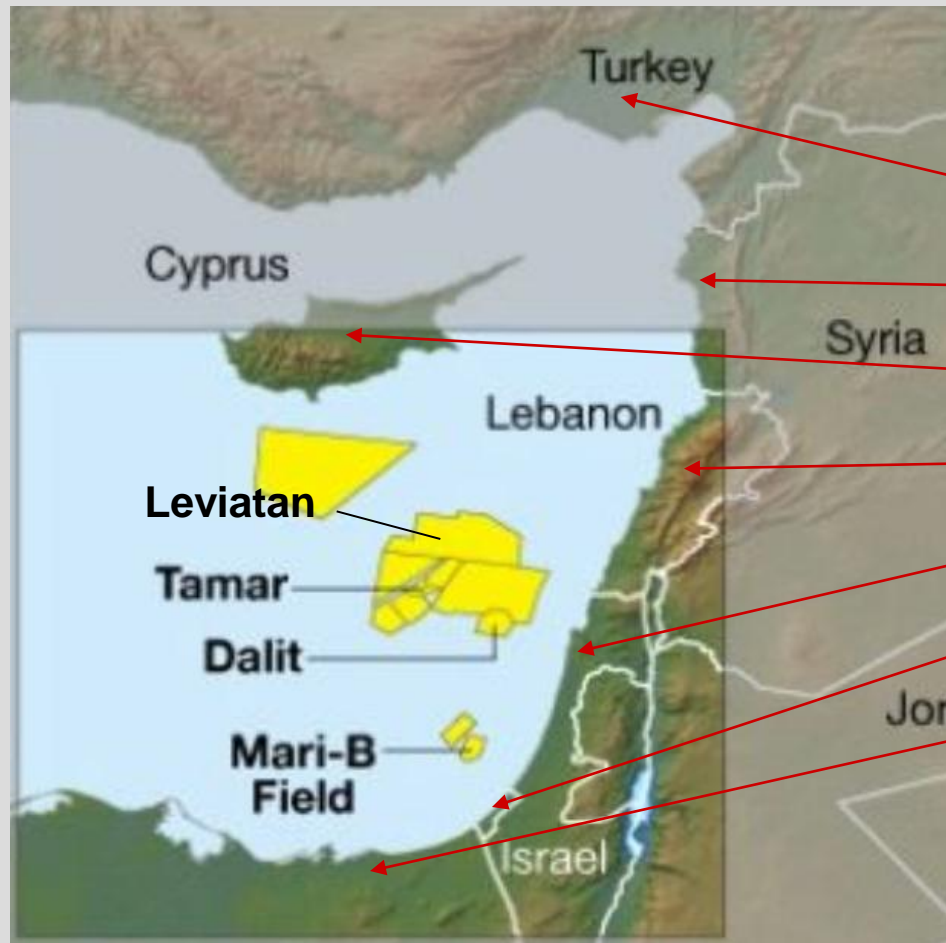
Yakhont

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Syrian Yakhont ASM Keep Away Zone



Eastern Mediterranean Resource Zone



Countries Entitled to Offshore Resource Exploitation :

-Turkey

-Syria

-Cyprus

-Lebanon

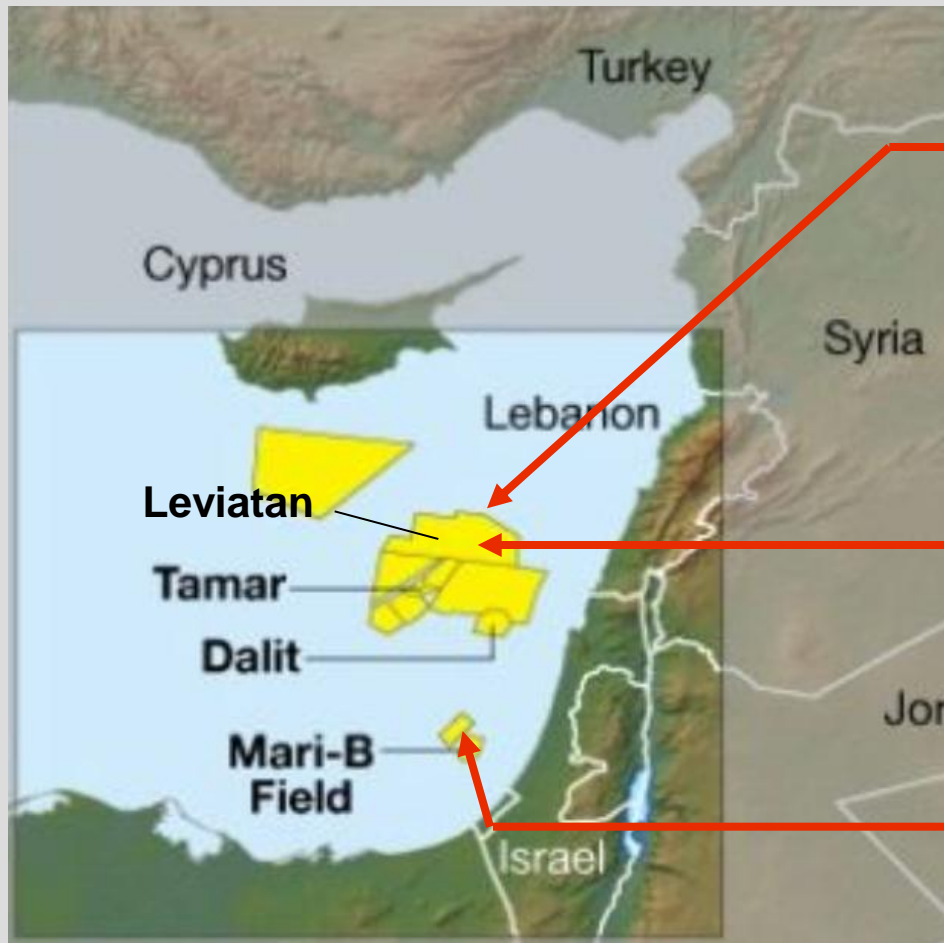
-Israel

-Palestinian Authority

-Egypt

Israel Response to Regional Missile and Rocket Threats

Eastern Mediterranean Resource Zone



Syria:
Yakhont



Hizbullah:
C- 802



Hamas:
C-704

BARAK 8 Sea based air/missile defense system *By IAI and Rafael*



Israel Response to Regional Missile and Rocket Threats

Lebanon/Hizbullah Heavy Missiles and Rockets



SCUD B
Range: 300 Km



Fatah 110 guided rocket
Range: C. 250 - 300 Km.

Lebanon/Hizbullah Medium Rockets



Fajer 3
Range C. 45 Km.

"220 mm"
Range C. 70 Km.



Russian "Uragan"



Fajer 5
Range C.75 Km

"302 mm"
Range: C. 110 Km



China WS-1

Lebanon/Hizbullah Light Rockets



Military issue mobile launcher 122mm



Military issue mobile launcher, Fajer 3 (?)



Improvised mobile launcher, 107mm (?)



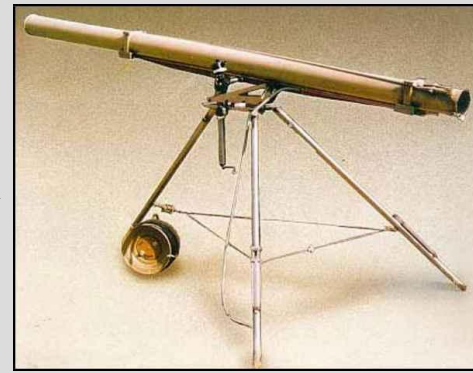
Static Launcher, 122mm

Israel Response to Regional Missile and Rocket Threats

Gaza: Hamas/Islamic Jihad Rockets



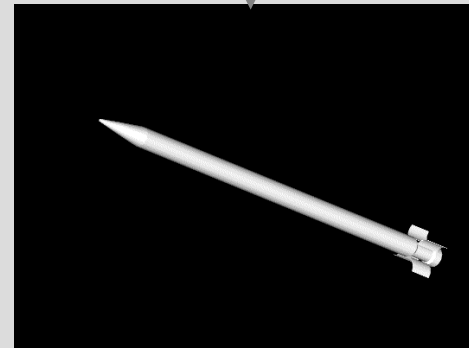
"Kassam" home made rockets
Ranges: 4 – 12 Km



Grad 122 mm artillery rocket
Range: 20 Km



Fajer 5 rocket (?)
Range: 75 Km



Grad ER 122 mm artillery rocket
Range: 43 Km

Israel Response to Regional Missile and Rocket Threats

Potential Range of Jihad Rocket Fired at Israel October 26th 2011



Islamic Jihad Rocket Team Preparing to Fire a Long Range Rocket October 29th 2011

Credit: IDF Spokesperson



A New Reality

- The members of the Radical Alignment are developing, acquiring, deploying and stockpiling rapidly growing arsenals of ballistic weapons, both guided and unguided.
- The current trends in the growing missile threats are:
 - Exponential growth in quantity.
 - Increased range, lethality and precision.
- This hostile capability can now reach anywhere within Israel, cripple key national assets, interfere with military operations and cause a severe casualties in all population centers.

"In 2006 the threat on Israel's center comprised of a few hundred missiles. Nowadays we are talking about many thousands. Quantity has turned into quality".

Brigadier General Yossi Baidatz, Designate Commander of the IDF War College, in a speech to the INSS, November 17 2011



Rethinking Israel's Military Doctrine

- Israel's legacy military doctrine did not factor in the revolutionary, game changing implications of the rocket and missiles threats on the country's heartland.
- Missile defense programs started in Israel in the late 1980's, but it was the shock of the 2006 Lebanon War that instigated a formal modification. To the three enshrined pillars of *deterrence, preemption and offensive*, a fourth pillar of *defense* was added – much to the discontent of IDF traditionalists.
- Four major active defense programs are being pursued, as well as integration of the missile defense array to the US deployable missile defense assets.
- The priorities of the missile defense shield should be:
 1. Preservation of the IDF capacity to mobilize and carry out offensive actions.
 2. Preservation of key national installation and infrastructures (Airports, seaports, power grid etc).
 3. Mitigation of casualties and damage among civilian populations.



Israel Response to Regional Missile and Rocket Threats

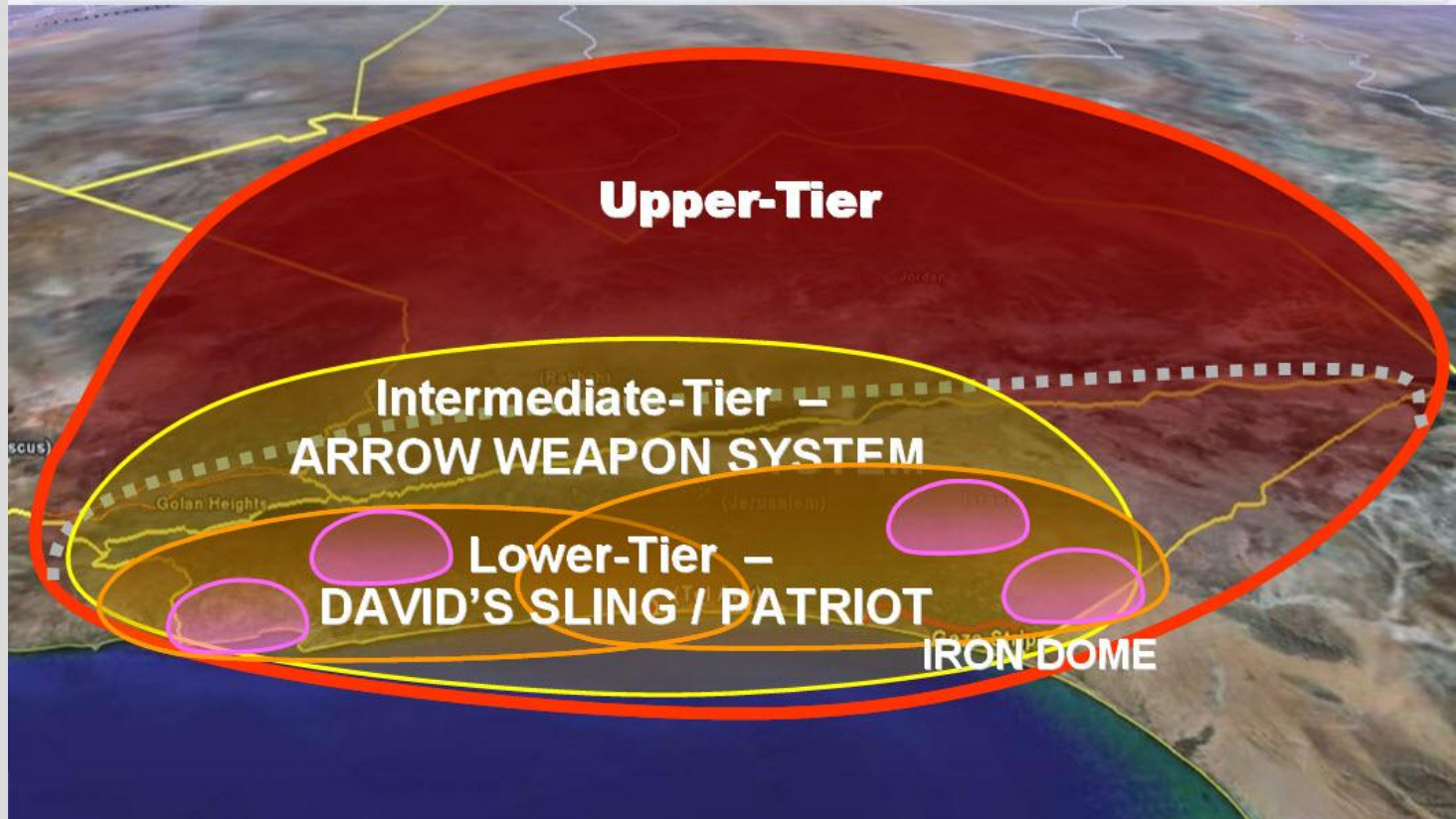


Israel
Missile
Defense
Organization

Unclassified



Israeli Multi-Layer BMD Concept



4 out of 25

Arrow 2 Intermediate Tier Capability Optimized against medium and long range TBM

Status: Operational, spiral development of Block 4 completed



Arrow 2 Interceptor
US industrial partner: Boeing



Green Pine EW/FC L Band radar

Arrow 3 Upper Tier Capability Optimized against evolved, long range TBM

Status: In development



Arrow 3 Interceptor
US industrial partner: Boeing



Super Green Pine L Band EW/FC Radar
Status: Operational



Augmented Early Warning Capability

Optimized against evolved, long range TBM



TPY- 2 X Band EW Radar

Status: Deployed

US Asset



Airborne EO sensor

Status: In development



David Sling Lower Tier Capability

Optimized against heavy and medium rockets and cruise missiles

Status: In development



Stunner Interceptor Missile



ELM 2084 Multi Mission Radar



Mobile Launcher

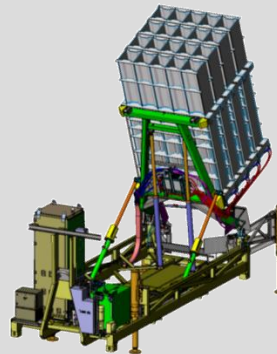
Stunner interceptor
US industrial partner: Raytheon

Iron Dome Localized Defense Capability Optimized against medium and light rockets

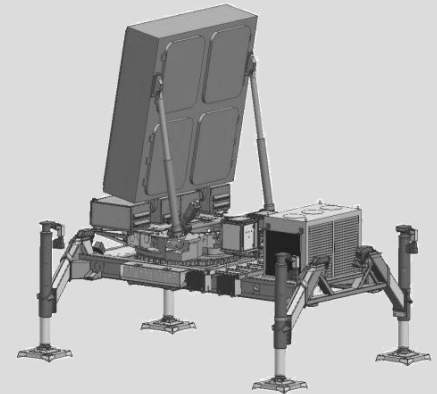
Status: Operational, combat proven



interceptor



Launcher



FC Radar



Israel Response to Regional Missile and Rocket Threats

Interoperability and Cost Targets



Arrow 2

Cost: 1



Arrow 3

Cost target ~0.75



David Sling

Cost target ~0.1



Iron Dome

Cost target ~0.01

Interoperable with Patriot, THAAD and AEGIS

The Rocket Campaign Against Southern Israel: The Arena



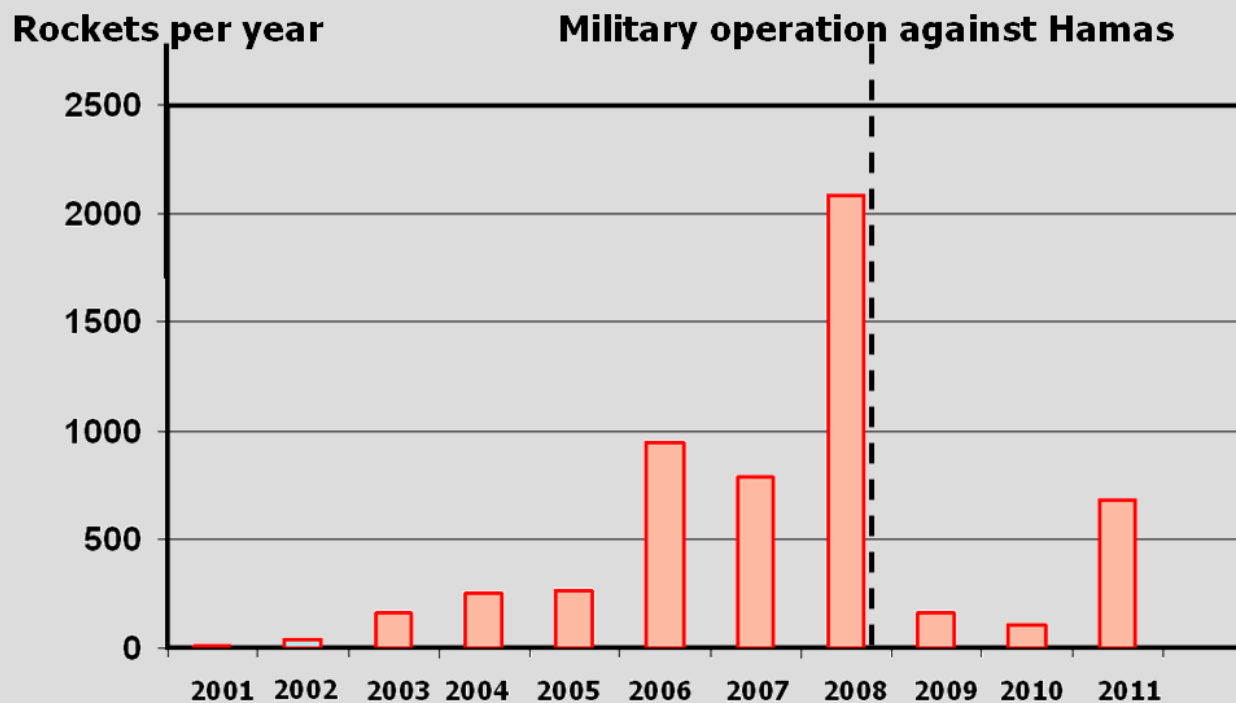
The Rocket Campaign Against Southern Israel 2001 – 2012 And On

Evolution

- **From 2001 to 2006 – mainly short range harassment of border communities**
- **2006 – first major city attacked (Ashkelon)**
- **2009 – range increased to 43 Km, two major more major cities come within range.**
- **Unpredictable, sporadic fire, "Bursts".**
- **No centralized command, attacks come from different armed groups in Gaza, sometimes from individuals seeking revenge or profit.**



The Rocket Campaign Against Southern Israel 2001 - 2011



Iron Dome Short Range Missile Defense In Action 2011- 2012

- The system was rushed into operation in late March 2011.
- It subsequently saw action in April, August and October 2011 as well as March and June 2012.
- The system successfully discriminated between non threatening and threatening targets, scoring 75% - 85% kill rates against the latter.
- Losses and damages were dramatically reduced. About 500 rockets that hit Israeli territory caused 1 fatality within a defended area.



Ashdod , March 2012



Impact within Israel

- The “wow” factor: Missile defense really works!
- Significant morale boost to the involved civilian population, expressions of gratitude to the Israel Air Defense Command troops.
- An elevated – and exaggerated - sense of security in the defended communities.
- Reversal of attitude by treasury and economists: “Whatever the cost of a single interceptor, it is certainly less than the value of the apartments it saves from destruction in Ashdod” (Alon Ben David, military correspondent of Chan. 10)
- Reversal of attitude by ranking Generals: “Active defense is a game changer, because it brings to an end the situation where our cities have been held hostages to any terrorist with a rocket” (Maj. General res. Dan Harel, former deputy chief of staff).
- Fierce competition between city mayors for protection by Iron Dome.



Impact on the Adversaries

- **In the declarative dimension: Initially, no official reference to Iron Dome. From March 2012 and on: Accusation that Israel is using Gaza as a battle lab for testing Iron Dome.**
- **In the cognitive dimension: Sense of dejection in Gaza, criticism of local leadership by public opinion.**
- **In the policy dimension: No discernable tendency to cease or reduce the rocket fire.**
- **In the operational dimension: Prompt attempts to break through the defensive shield by saturation.**
- **In the wider adversarial zone: Strong impression of Israeli technical prowess (Iran: "Our missile will defeat Iron Dome").**

Future Plans

- As of June 2012, four batteries were available to defend the 650000 residents of Southern Israel's major cities.
- Two additional batteries are scheduled for commissioning by early 2013.
- Thanks to the generosity of the US, the production of more Iron Dome batteries and interceptors is now proceeding ahead.
- An improved version of the interceptor has been cleared for operations.



Visit of US SECDEF to Iron Dome August 2nd 2012

In Conclusion

- **The successful defense of Israel's southern cities against rocket attacks proved:**
 - **That "you can hit a bullet with a bullet".**
 - **That it can be done with current technologies, allowing future technologies to mature in a timely fashion.**
 - **That cities need not be hostage to every rocket wielding terrorist.**



Israel Missile Shield



Defending the Nation

