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Iran's Present Day Military Capabilities and Military Aspirations in the Middle East

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September 25, 2013

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Key References

US and Iranian Strategic Competition: The Conventional and Asymmetric Dimensions – Examines Iran's Military forces in detail, and the balance of forces in the Gulf Region.
http://csis.org/files/publication/120221_Iran_Gulf_MilBal_ConvAsym.pdf

US and Iranian Strategic Competition: The Missile and Nuclear Dimensions – Examines Iran's Missile and Nuclear forces.
http://csis.org/files/publication/120222_Iran_Gulf_Mil_Bal_II_WMD.pdf

US and Iranian Strategic Competition: Sanctions, Energy, Arms Control, and Regime Change - Examines the impact of sanctions on the Iranian regime, Iran's energy sector, and the prospects for regime change in Tehran.
http://csis.org/files/publication/130625_iransanctions.pdf

US and Iranian Strategic Competition in the Gulf States and Yemen - Examines the competition between the US, and Iran and how it affects Yemen, Saudi Arabia, Bahrain, Kuwait, the UAE, Oman and Qatar.
https://csis.org/files/publication/120718_Iraq_US_Withdrawal_Search_SecStab.pdf

Other reports: **http://csis.org/program/us-and-iranian-strategic-competition**

The Conditions that Shape Current Capabilities and Aspirations:

An Uncertain Mix of Positives and Negatives Uncertain

Assessing the Full Range of Competition

Non-Military Competition

- *Ideology, religion, and political systems*
- *"Terrorism" and violent extremism vs. "counterterrorism"*
- *Energy, sanctions, and global economic impacts*
- *Arms control, arms exports, and arms imports*
- *International diplomacy*

Military Competition

- *Weapons of mass destruction*
- *Conventional forces*
- *Asymmetric and irregular warfare*
- *Proxy use of state and non-state actors*
- *Threat and intimidation*

Nations and Sub-Regions of Competition

- *Gulf Cooperation Council countries*
- *Yemen*
- *Iraq*
- *Jordan*
- *Syria-Lebanon*
- *Israel*
- *Gaza and West Bank*
- *Morocco*
- *Pakistan*
- *Turkey*
- *Afghanistan*
- *Central Asia*
- *Europe*
- *Russia*
- *China*
- *Japan and East Asia*
- *Venezuela, Cuba, Ecuador, and Bolivia*
- *Brazil and Argentina*
- *Sudan*
- *Nigeria*
- *Smaller Sub-Saharan African states*

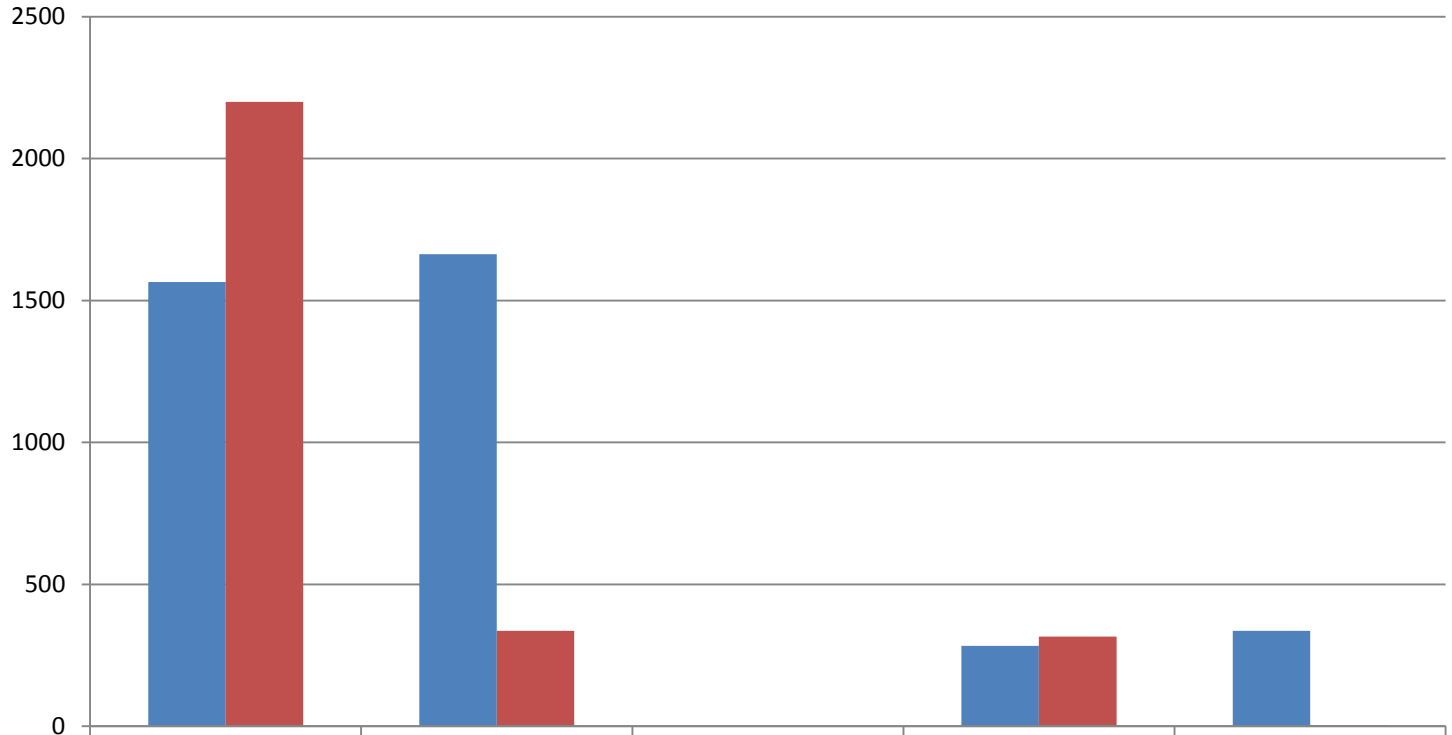
Rhetoric vs. Reality

- **Reinforcement of supreme Leader and political rhetoric vs. often solid military assessments and study of western and outside positions.**
- **Statements can defeat all attacks versus focus on defense in depth**
- **Capability to "close the Gulf" vs. steadily upgrading asymmetric capabilities and real world limits.**
- **Nuclear denial vs. nuclear efforts; exaggeration of missile capabilities.**
- **Claims of modernization versus real world limits and failures.**
- **Real but exaggerated progress in Asymmetric warfare.**
- **Exaggerated claims to military production and technology versus limited reality**
- **Claimed focus on US and Israel versus focus on Israel and GCC**
- **Denial/Understatement of links to non-state actors: Hamas, Hizbollah, Iraqi militias, Afghan Northern Alliance**

Key Positives

- **The US is Iran's "Secret Ally:" Invasion of Iraq and aftermath; Messing up Syria from the start, Uncertain & slipping nuclear "redline," faltering effort in Afghanistan, loss of allied confidence, in Egypt.**
- **Success in Lebanon, growing Syrian dependence, ties to Iraqi Shi'ites, presence in Western Afghanistan and role with Hazaras.**
- **Lack of progress and coherence in GCC forces.**
- **Instability of Yemen and Shi'ite populations in Bahrain, Saudi Arabia, other GCC states, Yemen.**
- **Asymmetric warfare progress, reposturing, Al Quds, cyber, etc.**
- **Missile and nuclear progress.**
- **Real progress in modernization, adaptation, selective imports.**
- **Integration of regular and revolutionary forces.**
- **Restructuring of Basij, internal security forces.**

US Destruction of Iraq's Major Forces - I



	Main Battle Tanks: 2003	Main Battle Tanks: 2012		Combat Aircraft: 2003	Combat Aircraft: 2012
Iran	1565	1663		283	336
Iraq	2200	336		316	3

Source: Adapted from IISS, **The Military Balance 2013**, various editions and Jane's Sentinel series.

US Destruction of Iraq's Major Forces - II

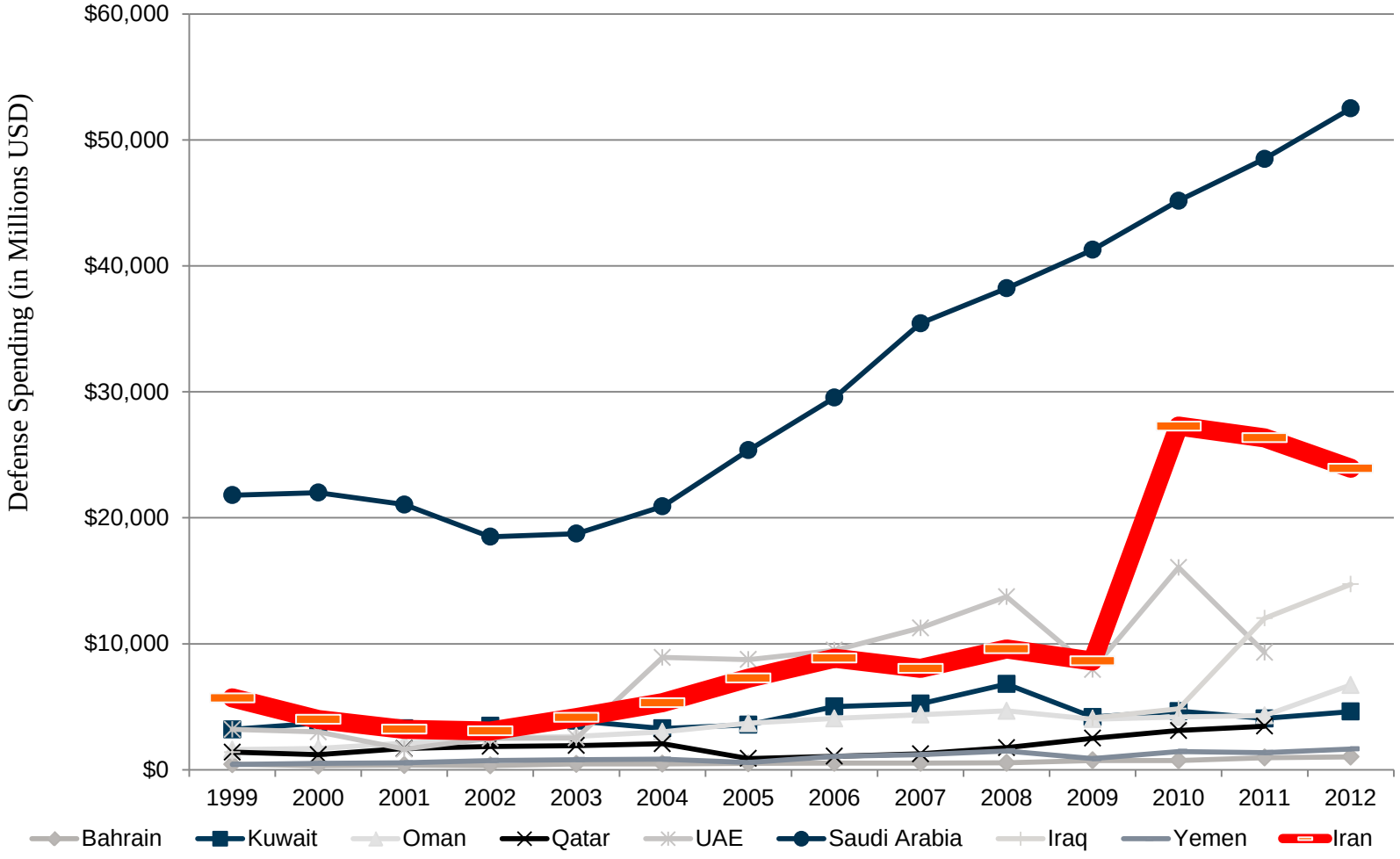
Category	2003			2013		
	Iraq	Iran	Force Ratio	Iraq	Iran	Force Ratio
Active Manpower	424,000	513,000	4:5	271,400	523,000	1:2
Reserve Manpower	650,000	350,000	19:10	NA	350,000	NA
Main Battle Tanks	2,200	1,565	7:5	336+	1663	1:5
AIFVs	1,300	815	8:5	193	725	1:3.8
APCs	2,400	590	4:1	1,455	640	2.3:1
Towed Artillery	1,900	2,085	9:10	138+	2,030	1:14.7
Self-Propelled Artillery	150	310	1:2	48+	292	1:6
Multiple Rocket Launchers	200	889	1:5	?	1,476	NA
Combat Aircraft	316	283	11:10	3	336	1:112
Attack Helicopters	100	85	6:5	0	50	NA
Major SAM Launchers	225	205	11:10	0	234	NA

Source: Adapted from IISS, **The Military Balance 2013**, various editions and Jane's Sentinel series.

Key Negatives

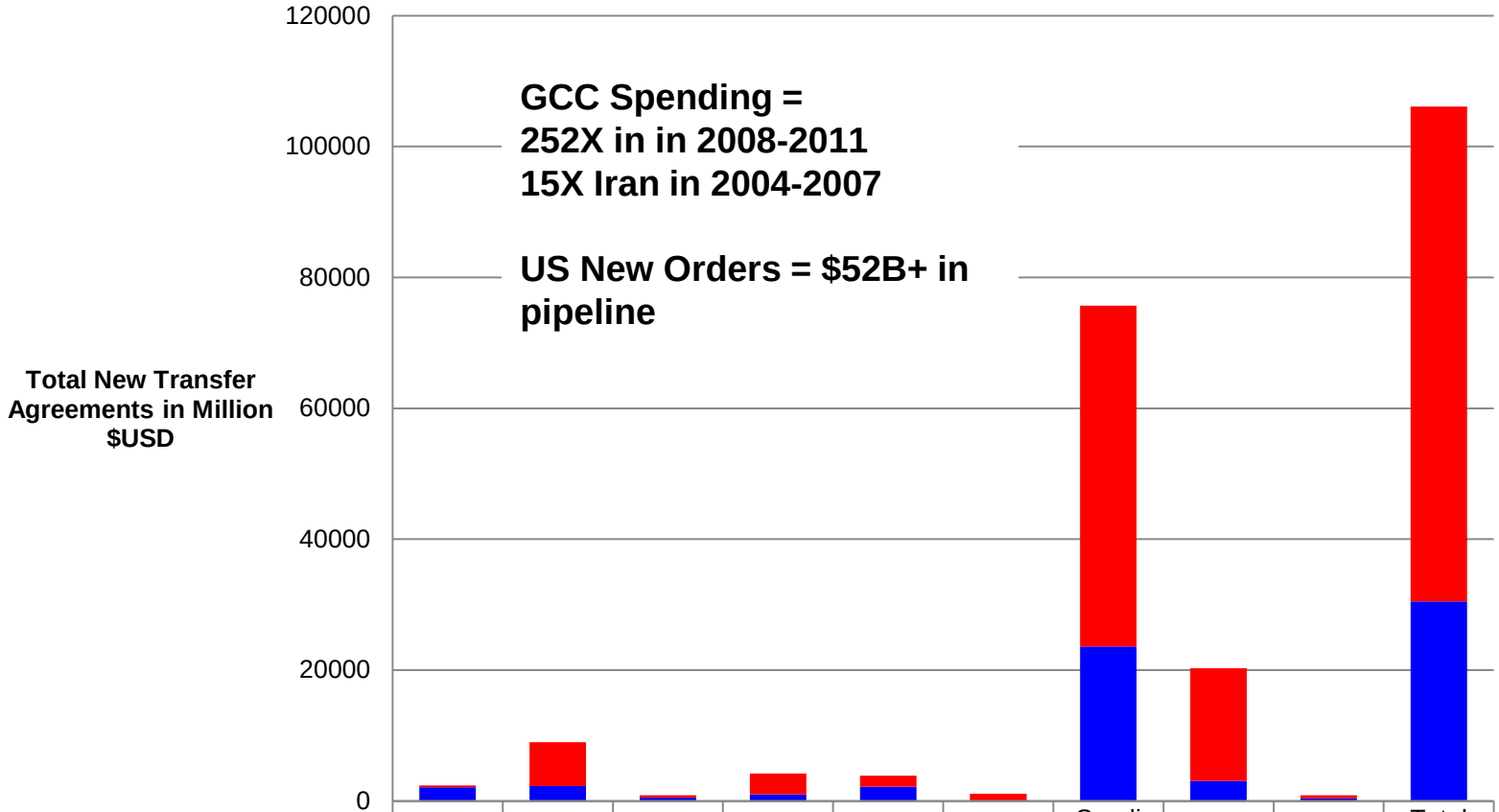
- **Unstable Lebanon, Iraq, Afghanistan, Uncertain Hamas.**
- **US-led progress, C4I/ISAR, and training progress in GCC forces; Broad Arab treatment of Iran as threat.**
- **Rising Sunni versus Shi'ite tensions; limits to Shi'ite acceptance of Supreme Leader, any form of Iranian control or proxy role.**
- **High level of effectiveness in limits to arms, technology, and production imports.**
- **Lack of Power projection assets, maneuver capability, sustained air capability, and geography of Gulf**
- **Sanctions/delays in nuclear program, impact on military spending, stability.**
- **Lack of nuclear and other WMD weapons, long-rang precision strike capability. Israeli, Pakistani, US nuclear/missile forces in being; US conventional long-range strike capability.**
- **Instability of Yemen and Shi'ite populations in Bahrain, Saudi Arabia, other GCC states, Yemen.**
- **Limits to asymmetric warfare progress, reposturing, Al Quds, cyber, etc.**

The Military Spending Gap – Less US, UK, France



Source: Adapted from the IISS, Military Balance, 1999-2013

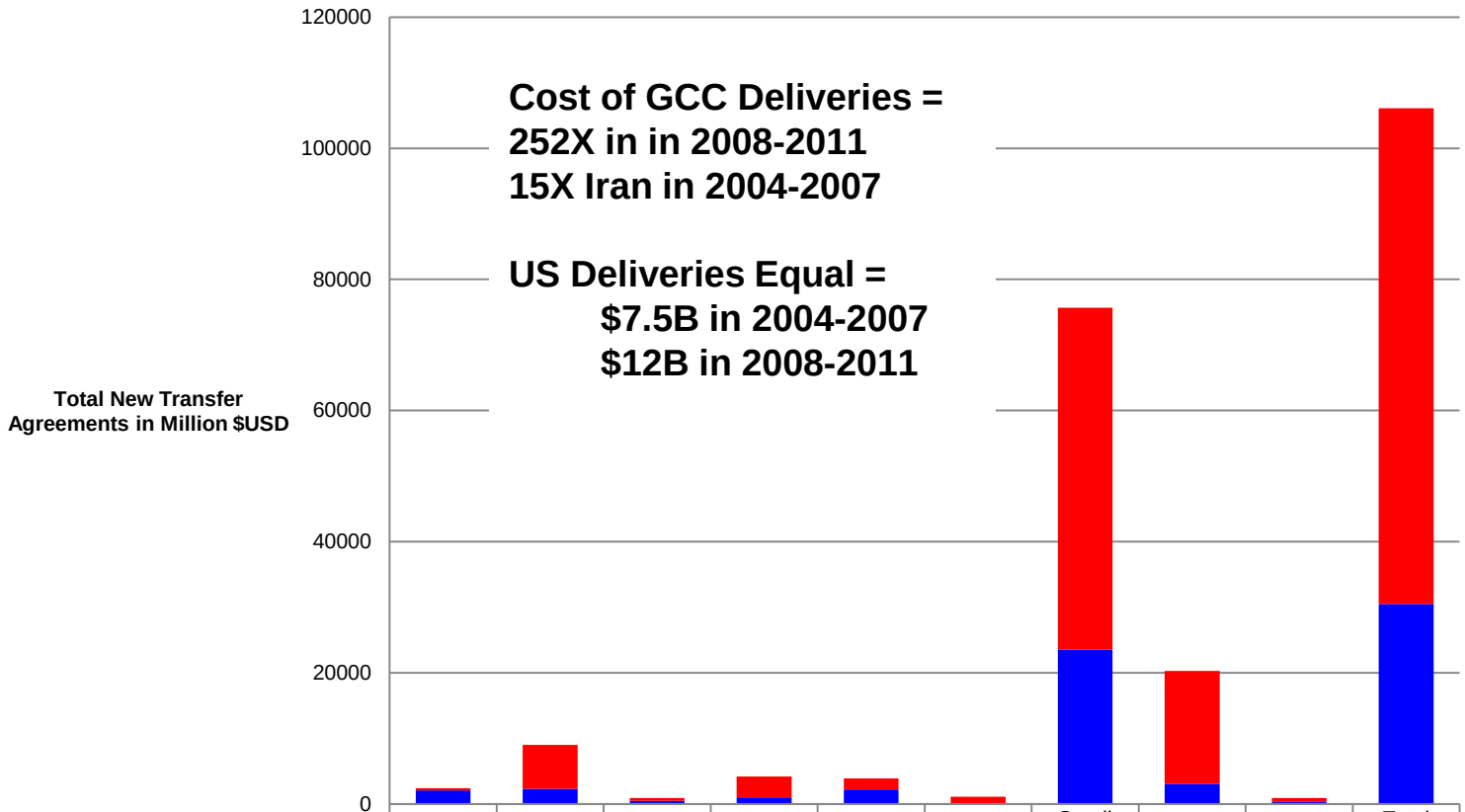
The New Arms Order Transfer Gap: Iran vs. GCC



	Iran	Iraq	Bahrain	Kuwait	Oman	Qatar	Saudi Arabia	UAE	Yemen	Total GCC
2008-2011	300	6700	400	3200	1700	1000	52100	17200	500	75600
2004-2007	2100	2300	500	1000	2200	100	23600	3100	400	30500

Source: Richard F. Grimmett and Paul K. Kerr, *Conventional Arms Transfers to Developing Nations, 2004-2011*, Congressional Research Service, August 24, 2012. p. 58 ,59. "0" represents any value below $50 million.

The Arms Delivery Gap – Iran vs. GCC



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Reliance on Aging/ Mediocre Systems – Land

MBT 1,663+: 150 M60A1;
100 *Chieftain* Mk3/Mk5; 540 T-54/T-55/Type-59/*Safir*-74; 168 M47/M48 **(480 T-72Z? 75+ T-62? 150 Zulqifar?)**
LT TK 80+: 80 *Scorpion*;
RECCE 35 EE-9 *Cascavel*
AIFV 610: 210 BMP-1; 400 BMP-2 with 9K111
APC (T) 340+: 200 M113; BMT-2 *Cobra*
APC (W) 300+: 300 BTR-50/BTR-60; *Rakhsh*
SP 292+: **155mm** 150+: 150 M109;; **175mm** 22 M107; **203mm** 30 M110
TOWED 2,030+; **105mm** 150: 130 M101A1;; **155mm** 205: 120 GHN-45; 70 M114; 15 Type-88 WAC-21; **203mm** 20 M115
AIRCRAFT • 10 Cessna 185; 2 F-27 *Friendship*; 4 *Turbo Commander* 690 **PAX** 1 *Falcon* 20
ATK 50 AH-1J *Cobra*
TPT 173: **Heavy** 20 CH-47C *Chinook*; **Medium** 25 Mi-171; **Light** 128: 68 Bell 205A (AB-205A); 10 Bell 206 *Jet Ranger (*AB-206); 50 Bell 214
MANPAD 9K36 *Strela*-3 (SA-14 *Gremlin*); 9K32 *Strela*-2 (SA-7 *Grail*)‡*;* **SP** 180: **23mm** 100 ZSU-23-4; **57mm** 80 ZSU-57-2

New Tanks?
OAVs?
Attack Copters?
SP Arty
SHORADS?

Reliance on Aging/Mediocre Systems – Air

FTR 184+: 20 F-5B *Freedom Fighter*; 55+ F-5E *Tiger* II/F-5F *Tiger* II; 24 F-7M *Airguard*; 43 F-14 *Tomcat*; 36 MiG-29A/U/UB *Fulcrum*; up to 6 *Azarakhsh* reported
FGA 111: 65 F-4D/E *Phantom* II; 10 *Mirage* F-1E; 30 Su-24MK *Fencer* D; up to 6 *Saegheh* reported
ATK 13: 7 Su-25K *Frogfoot*; 3 Su-25T *Frogfoot*; 3 Su-25UBK *Frogfoot*
ASW 5 P-3MP *Orion*
ISR: 6+ RF-4E *Phantom II**
TKR/TPT B-707; ε2 B-747
TPT 117: **Medium** ε19 C-130E/H *Hercules*; **Light** 10 F-27 *Friendship*; 1 L-1329 *Jetstar*; 10 PC-6B *Turbo Porter*; 8 TB-21 *Trinidad*; 4 TB-200 *Tobago*; 3 *Turbo Commander* 680; 14 Y-7; 9 Y-12; **PAX** 11: 2 B-707; 1 B-747; 4 B-747F; 1 *Falcon* 20; 3 *Falcon* 50
HELICOPTERS
MRH 32: 30 Bell 214C (AB-214C); 2 Bell 412
TPT 4+: **Heavy** 2+ CH-47 *Chinook*; **Light** 2+: 2 Bell 206A *Jet Ranger* (AB-206A);

New Fighters ? ISR? Tankers ? UCAVs? S-300/S-400?

Reliance on Aging/Mediocre Systems – Air Defense

Air Defense Force

SAM 529+:
250 FM-80 (*Crotale*); 30 *Rapier*; 15 *Tigercat*;
150+ MIM-23B I-HAWK/*Shahin*; 45 S-75 *Dvina* (SA-2 *Guideline)*; 10 S-200 *Angara* (SA-5 *Gammon);* 29 9K331 *Tor*-M1 (SA-15 *Gauntlet)* (reported)
MANPAD FIM-92A *Stinger*; 9K32 *Strela*-2 (SA-7 *Grail*)‡

S-300/S-400?

Army

SP 10+: HQ-7 (reported); 10 *Pantsyr* S-1E (SA-22 *Greyhound*)
MANPAD 9K36 *Strela*-3 (SA-14 *Gremlin*); 9K32 *Strela*-2 (SA-7 *Grail*)‡*; Misaq 1* (QW-1 *Vanguard*); *Misaq 2* (QW-11); *Igla-S* (SA-24 *Grinch* - reported); HN-54

Reliance on Aging/Mediocre Systems – Naval

FSGM 1 *Jamaran* (UK Vosper Mk 5 – 1 more under construction at Bandar-e Abbas, expected ISD 2013)with 2 twin lnchr with CSS-N-4 *Sardine* AShM, 2 lnchr with SM-1 SAM, 2 triple 324mm ASTT, 1 76mm gun, 1hel landing platform
FSG 4
3 *Alvand* (UK Vosper Mk 5) with 2 twin lnchr with CSS-N-4 *Sardine* AShM, 2 triple 324mm ASTT, 1 114mm gun
1 *Bayandor* (US PF-103) with 2 twin lnchr with C-802 AShM, 2 triple 324mm ASTT, 2 76mm gun
FS 1 *Bayandor* (US PF-103) with 2 76mm gun
PCFG 13 *Kaman* (FRA *Combattante II*) with 1–2 twin lcnhr with CSS-N-4 *Sardine* AShM
MSI 2 *Riazi* (US *Cape*)
LSM 3 *Farsi* (ROK) (capacity 9 tanks; 140 troops)
LST 4 *Hengam* each with up to 1 hel (capacity 9 tanks; 225 troops)
LSL 6 *Fouque*

Upgrades?

Does it matter?

ASMs?

SSMs?

Air/UAVs?

"Power Projection" Limits

- **Army not structure for sustained maneuver outside Iran.**
- **Limited land/air and air/sea capabilities.**
- **Ethnic and/or sectarian limits on occupation and influence.**
- **Iraq, Syria, Hezbollah, Hammas, Hazara not proxies**
- **Land movement must sweep through Iraq to "Kuwaiti hinge" or Ar Ar in Saudi Arabia.**
- **Very limited amphibious forced entry capability with no credible air cover.**
- **"Closing the Gulf" triggers major war Iran must lose, shuts on trade to Iran.**
- **Al Quds, arms transfer, volunteers, and training either need strong host country partner or are spoiler functions.**
- **"Spoiler function" more irritant than way of achieving goals.**
- **Proliferation breed proliferation, missile breed missiles and missile defenses.**
- **Intimidation leads to added reliance on US.**

The Broader Patterns in Iranian Activity

Iranian Actors	Related States/ Non-State Actors	Target/Operating Country
Revolutionary Guards	Iran	Iraq
Al Qaeda force	Syria	Israel
Vevak/other intelligence	Hezbollah	Egypt
Arms transfers	Hamas	Kuwait
Military and security advisors	Mahdi Army	Bahrain
Clerics, pilgrims, shrines	Yemeni Shi'ites	Syria
Commercial training	Bahraini Shi'ites	Yemen
Finance/investment	Saudi Shi'ites	Lebanon
Investment/training companies		Afghanistan
Education: scholarships, teachers		Venezuela
Cultural exchanges		
Athletic visits		

Naval Threats

- **Low intensity naval war of attrition, random acts of mining, raids, etc.**
- **Iranian effort to "close the Gulf."**
- **Iranian permissive amphibious/ferry operation.**
- **Variation on 1987-1988 "Tanker War"**
- **Raids on offshore and critical shore facilities.**
- **"Deep strike" with air or submarines in Gulf of Oman or Indian Ocean.**
- **Attacks on US and allied (ally) facilities**

But:

- ***Very weak air-sea capabilities, vulnerable escalation ladder.***
- ***High risk of US and allied intervention.***
- ***Limited threat power projection and sustainability.***
- ***Unclear strategic goal.***

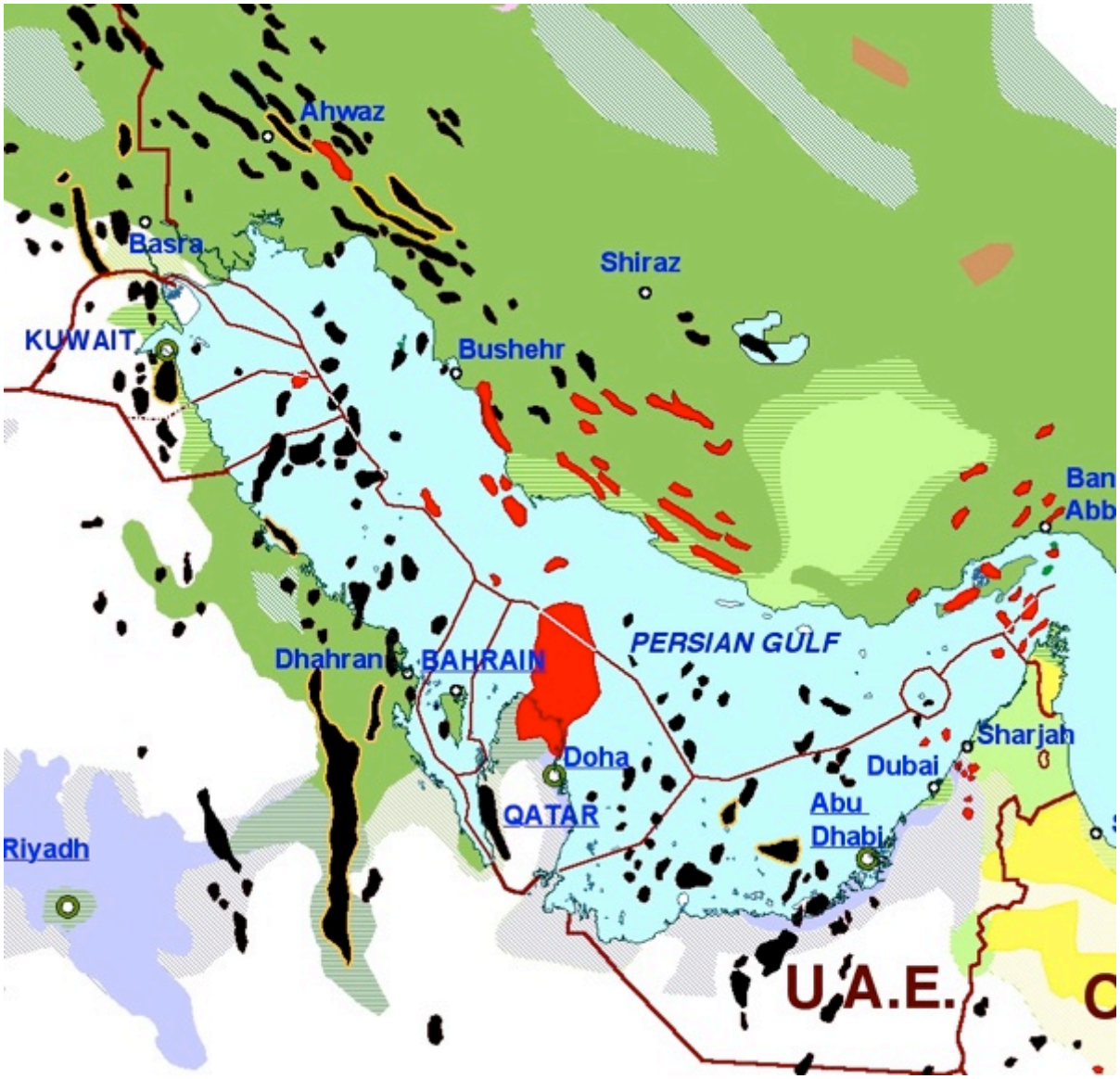
Air/Missile/UCAV Threats

- **Precision air strikes on critical facilities: Raid or mass attack.**
- **Terror missile strikes on area targets; some chance of smart, more accurate kills.**
- **Variation on 1983-1986 air confrontation tatics, "Fahd line"**
- **Strikes on offshore facilities.**
- **Strikes again tankers or naval targets.**
- **Attacks on US-allied facilities**
- **Use of UAVs as possible delivery systems (conventional or Unconventional munitions)**

But:

- ***Weak capability, high vulnerability to counterstrikes, poor escalation ladder***
- ***High risk of US and allied intervention.***
- ***Limited threat power projection and sustainability.***
- ***Unclear strategic goal.***

Vulnerability of Gulf Oil Fields



Primary Oil and Gas Deposits in the Middle East and the Shia Majority Areas.

- A Major Oil field
- A Super-Giant Oil field
- A Major Gas field

Islam:

- Shiism (to include Alevis/Alawis)
- Sunnism (Hanafi, Shafi'i, Maliki)
- Hunbli
- Ibadism
- Christianity
- Judaism
- Other

- Mixed population areas
- Sparsely populated areas
- Uninhabited areas

Source: M. Izady, 2006 http://gulf2000.columbia.edu/maps.shtml

Iranian Gulf Military Installations

Bandar-e Khomeini (30° 25'41.42"N, 49° 4'50.18"E)

Bandar-e Mahshahr (30° 29'43.62"N, 49° 12'23.91"E)

Khorramshahr (30° 26'2.71"N, 48° 11'34.25"E)

Khark Island (29° 14'48.01"N, 50° 19'48.88"E)

Bandar-e Bushehr (28° 58'2.58"N, 50° 51'50.74"E)

Asalouyeh (27° 27'21.08"N, 52° 38'15.55"E

Bandar-e Abbas (Naval base: 27° 8'35.79"N, 56° 12'45.61"E; IRGCN missile boat base: 27° 8'30.91"N, 56° 12'5.58"E; IRGCN torpedo & MLRS boat base: 27° 8'21.13"N, 56° 11'53.28"E; Hovercraft base and nearby naval air strip: 27° 9'15.68"N, 56° 9'49.97"E)

Jask (25° 40'40.90"N, 57° 51'4.54"E)

Bostanu (27° 2'58.22"N, 55° 59'3.22"E)

Chabahar

IRGCN base. It is the farthest east of all of Iran's military port facilities.

Qeshm (26° 43'10.09"N, 55° 58'30.94"E)

Sirri Island (25° 53'40.20"N, 54° 33'7.82"E)

Abu Musa (25° 52'22.32"N, 55° 0'38.62"E)

Occupied by Iran but claimed by the UAE. Suspected to house a small number of IRGCN forces. Also known to house HAWK SAMs and HY-2 "Silkworm" anti-ship missiles.

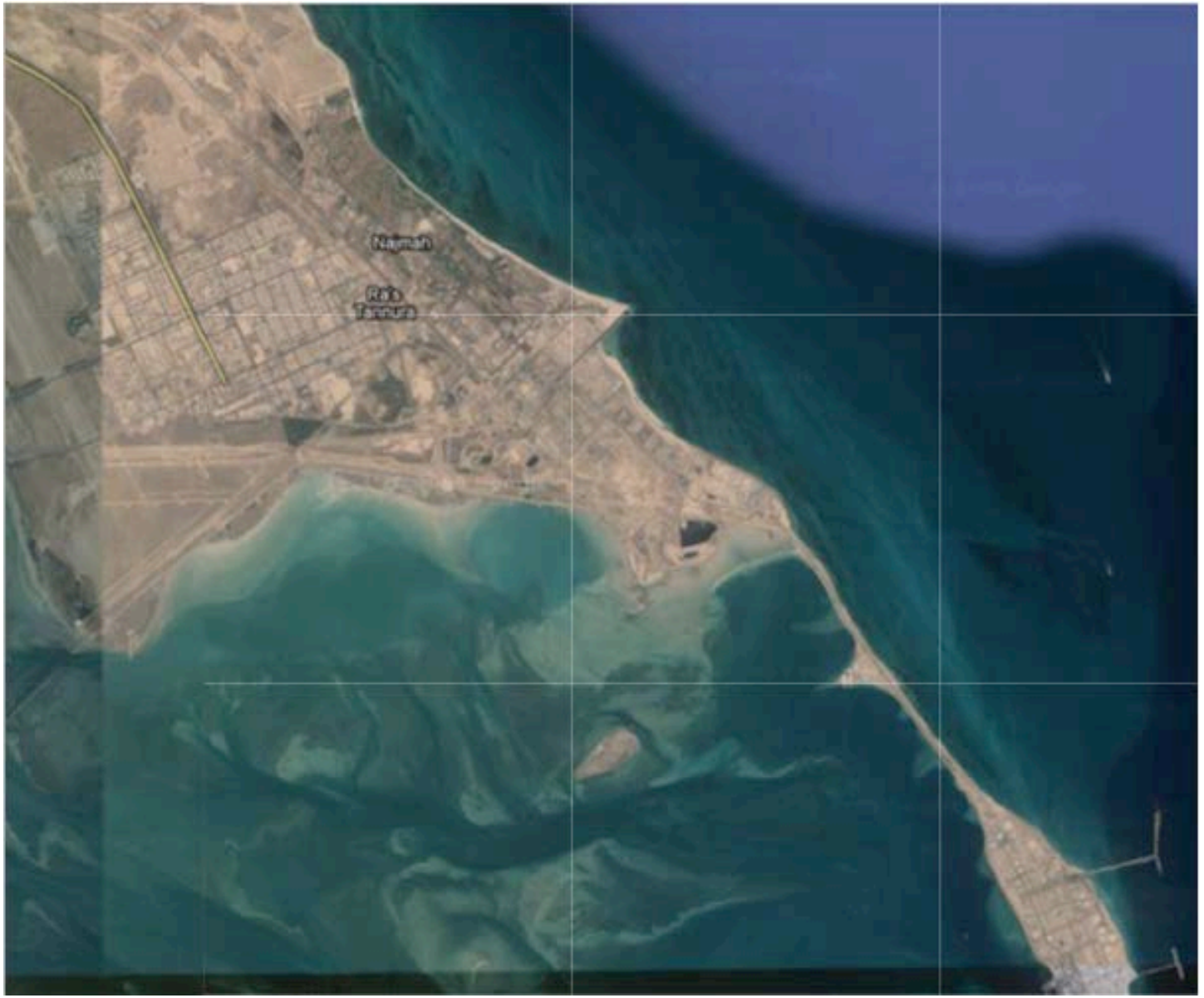
Greater Tunb and Lesser Tunb (GT: 26° 15'54.33"N , 55° 19'27.75"E; LT: 26° 14'26.08"N, 55° 9'21.18"E)

Occupied by Iran but claimed by the UAE. Home to heavily fortified airstrips and AA guns.

Source: Adapted by Anthony H. Cordesman from IISS, The Military Balance, various editions, Jane's Sentinel series, and material provided by US and Saudi experts..

The "Kuwaiti Hinge"

Ras Tanura



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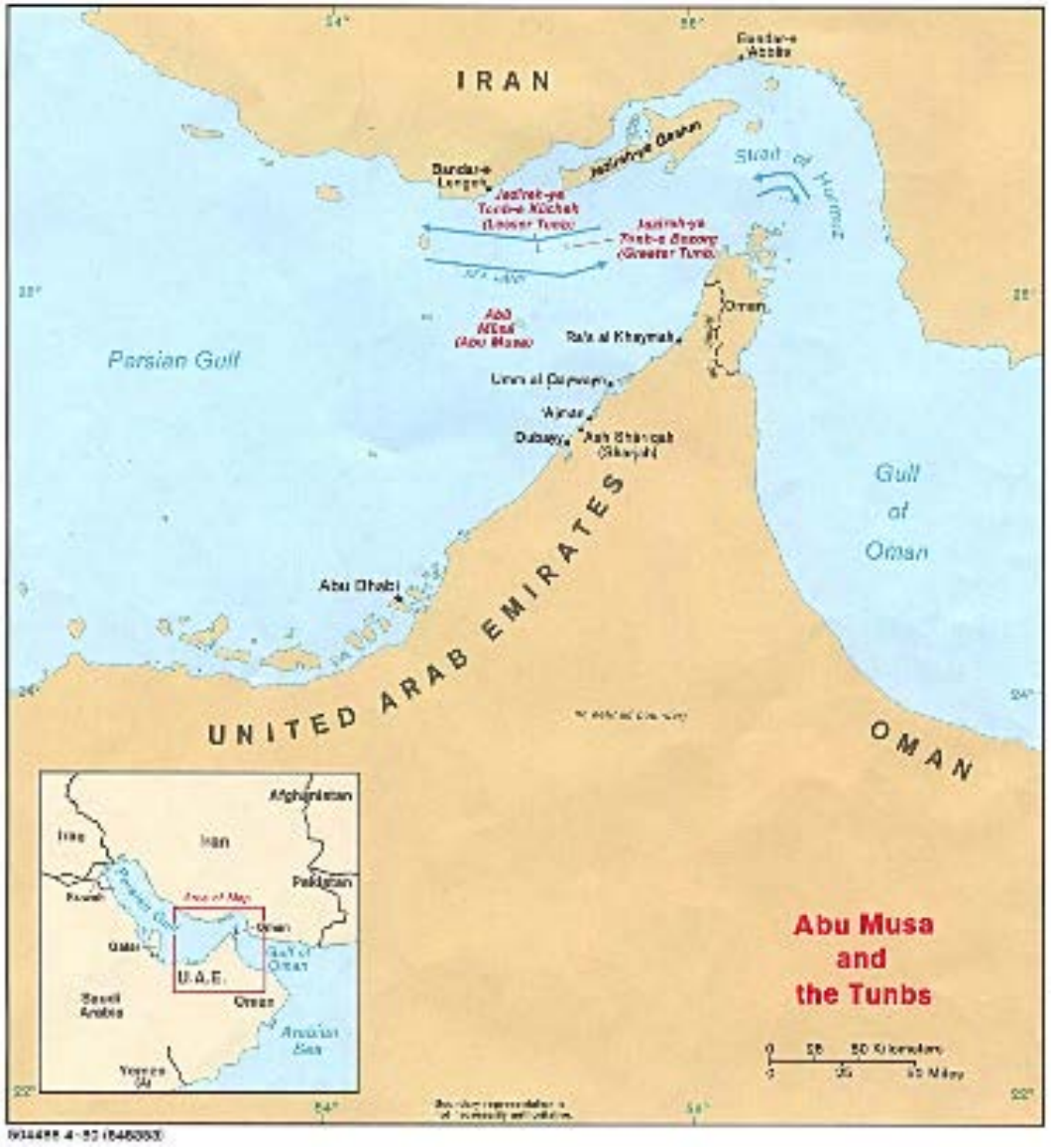
Source: Google maps

Hormuz: Breaking the Bottle at the Neck



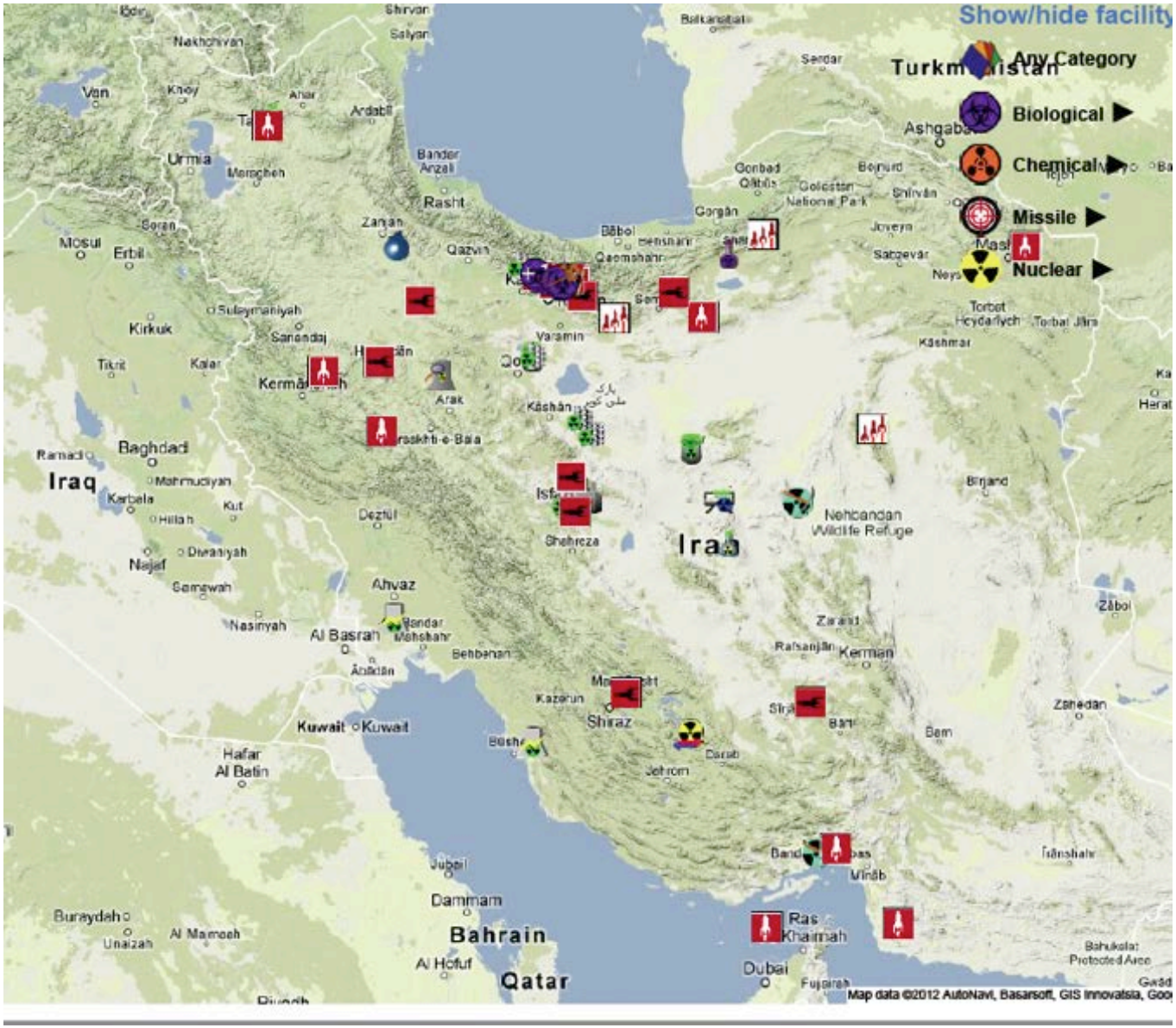
- **Air-sea-missile balance counts, not naval balance**
- **280 km long, 50 km wide at narrowest point.**
- **Traffic lane 9.6 km wide, including two 3.2 km wide traffic lanes, one inbound and one outbound, separated by a 3.2 km wide separation median**
- **Antiship missiles now have ranges up to 150 km.**
- **Smart mines, guided/smart torpedoes,**
- **Floating mines, small boat raids, harassment.**
- **Covert as well as overt sensors.**

Source: http://www.lib.utexas.edu/maps/middle_east_and_asia/hormuz_80.jpg; DOE/EIA, World Oil Transit Chokepoints, February 2011,

Abu Musa

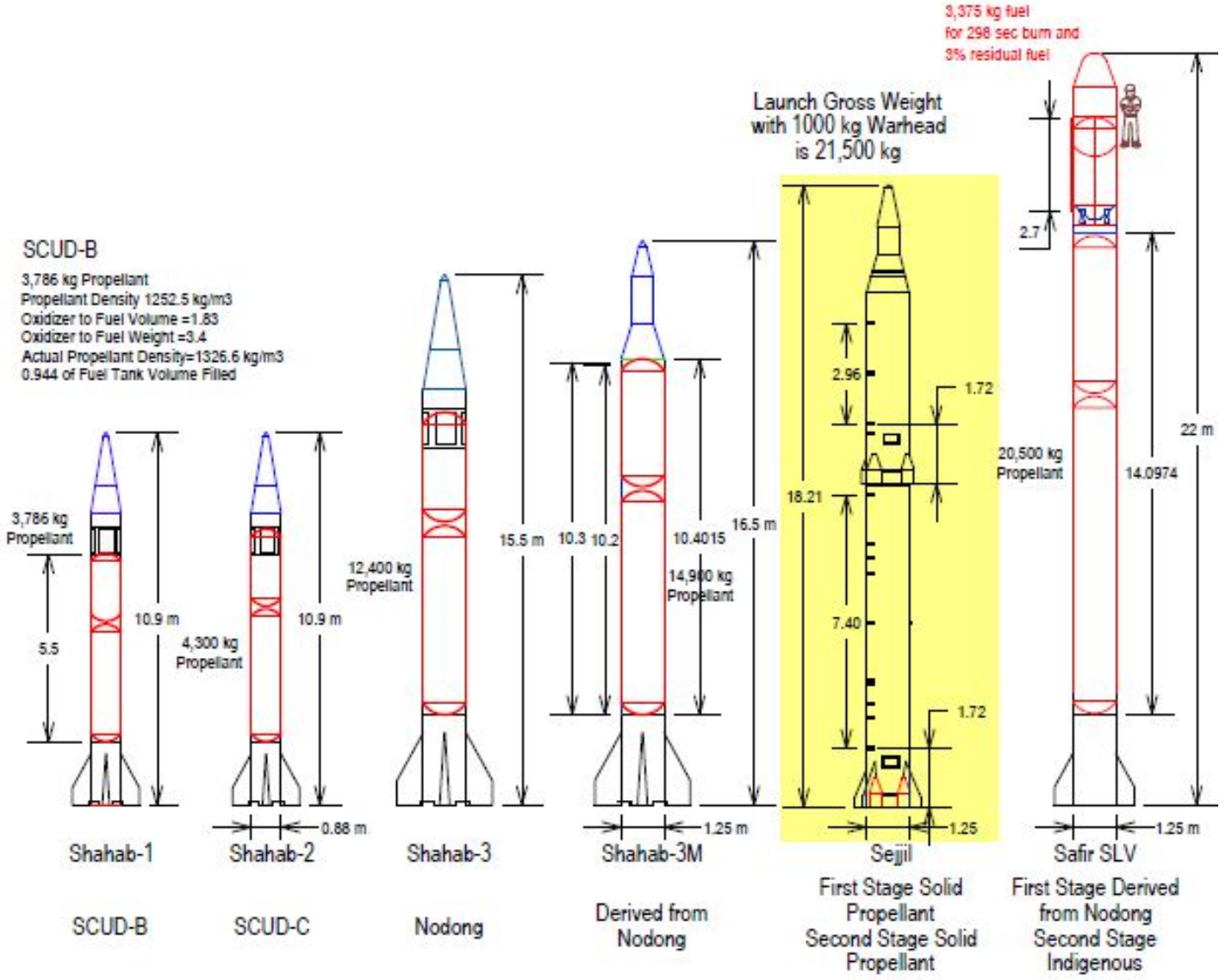
Source: Google maps

Iran: Major Open Source Missile and WMD Facilities



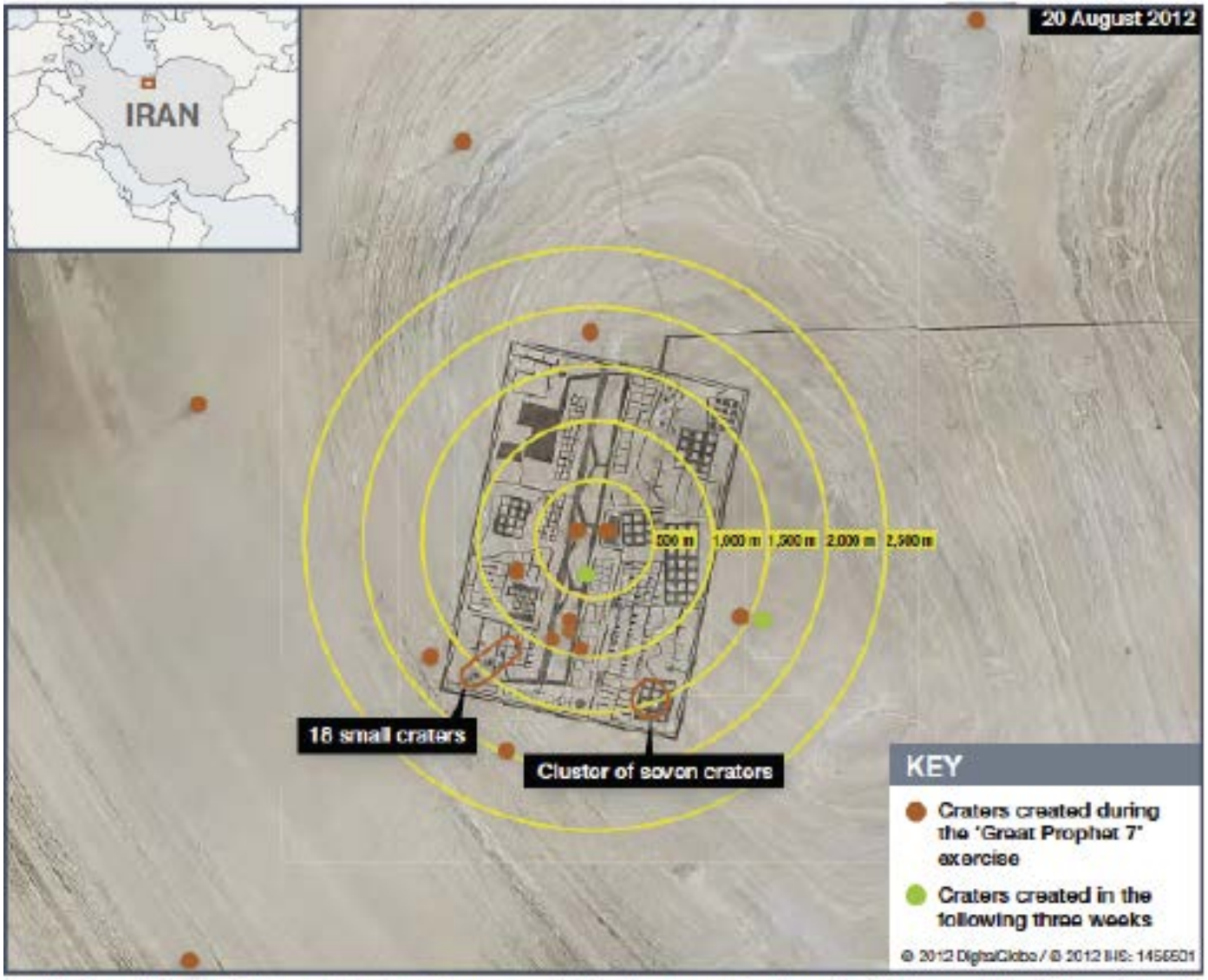
Source: NTI, http://www.nti.org/gmap/?country=iran&layers, September 2012

Iran's Longer-Range Missiles



(Reference: Theodre Postol, "A Technical Assessment of Iran's Ballistic Missile Program" May 6, 2009. Technical Addendum to the Joint Threat Assessment on Iran's Nuclear And Missile Potential.)

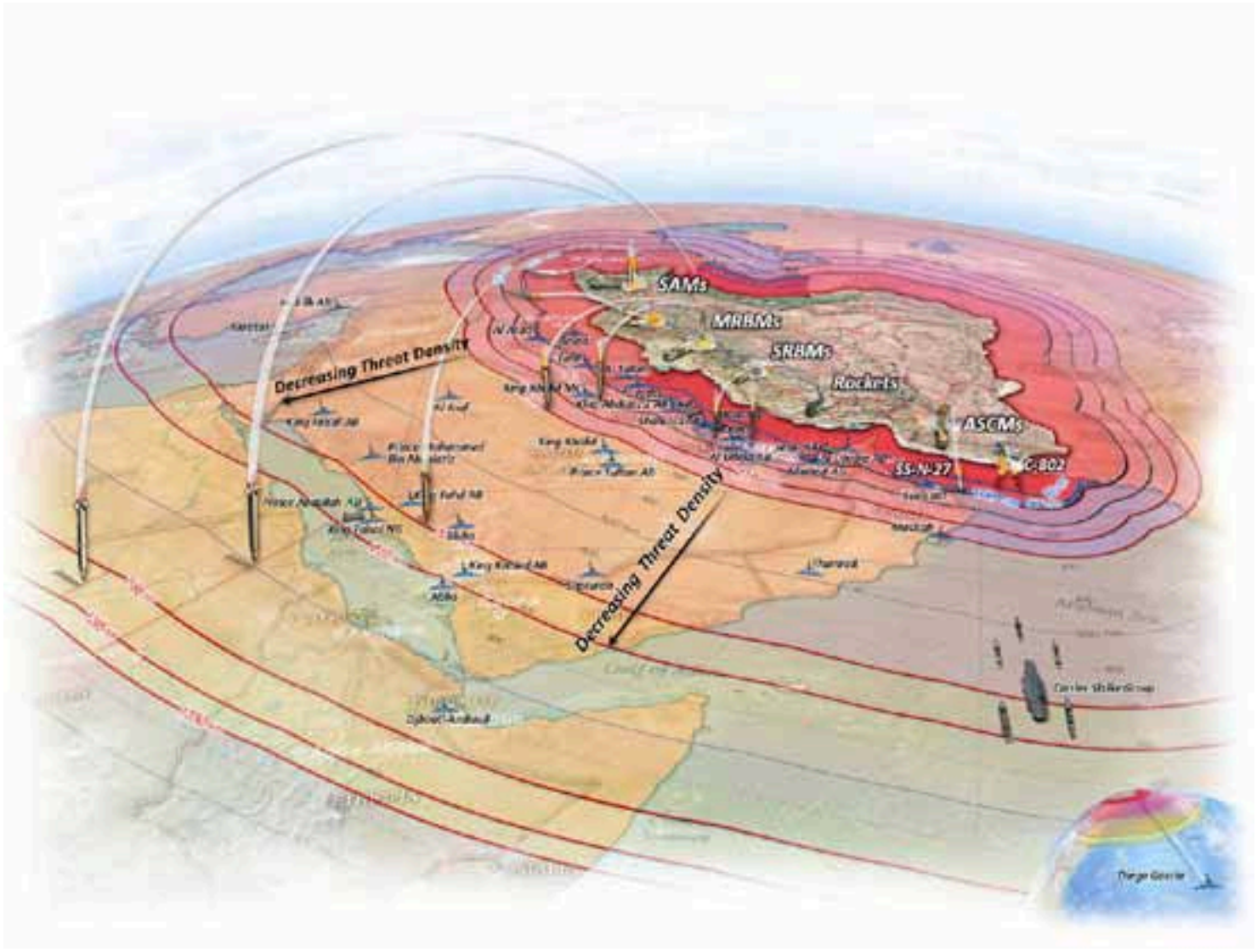
Missile Accuracy, Reliability, and Targeting



Iran's 'Great Prophet 7' exercise in July was explicitly designed to show that it is capable of targeting US bases in the region. A range of Iranian ballistic missiles and rockets were fired from different locations at a model air base that had been constructed in the desert 90 km southeast of the Semnan Space Centre. This DigitalGlobe satellite imagery shows the accuracy achieved during the exercise.

Source: Digital Globe And "2012 Annual Defense, Report," *Jane's Defence Weekly*, ,12 December 2012, p., 47

Missile Attack Range and Density

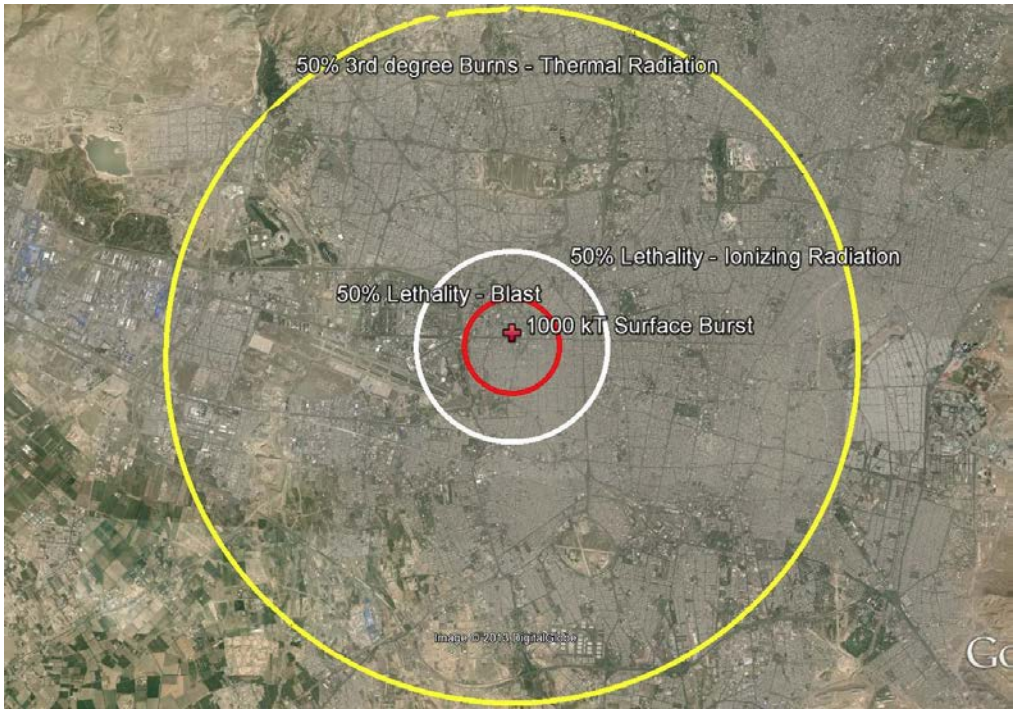


Source: Adapted from Mark Gunzinger and Christopher Dougherty, *Outside-In Operating from Range to Defeat Iran's Anti-Access and Area-Denial Threats*, CBSA, Washington DC, 2011..

A Gulf Missile War

Nuclear Capability and Risk

Tehran: 1 Megaton



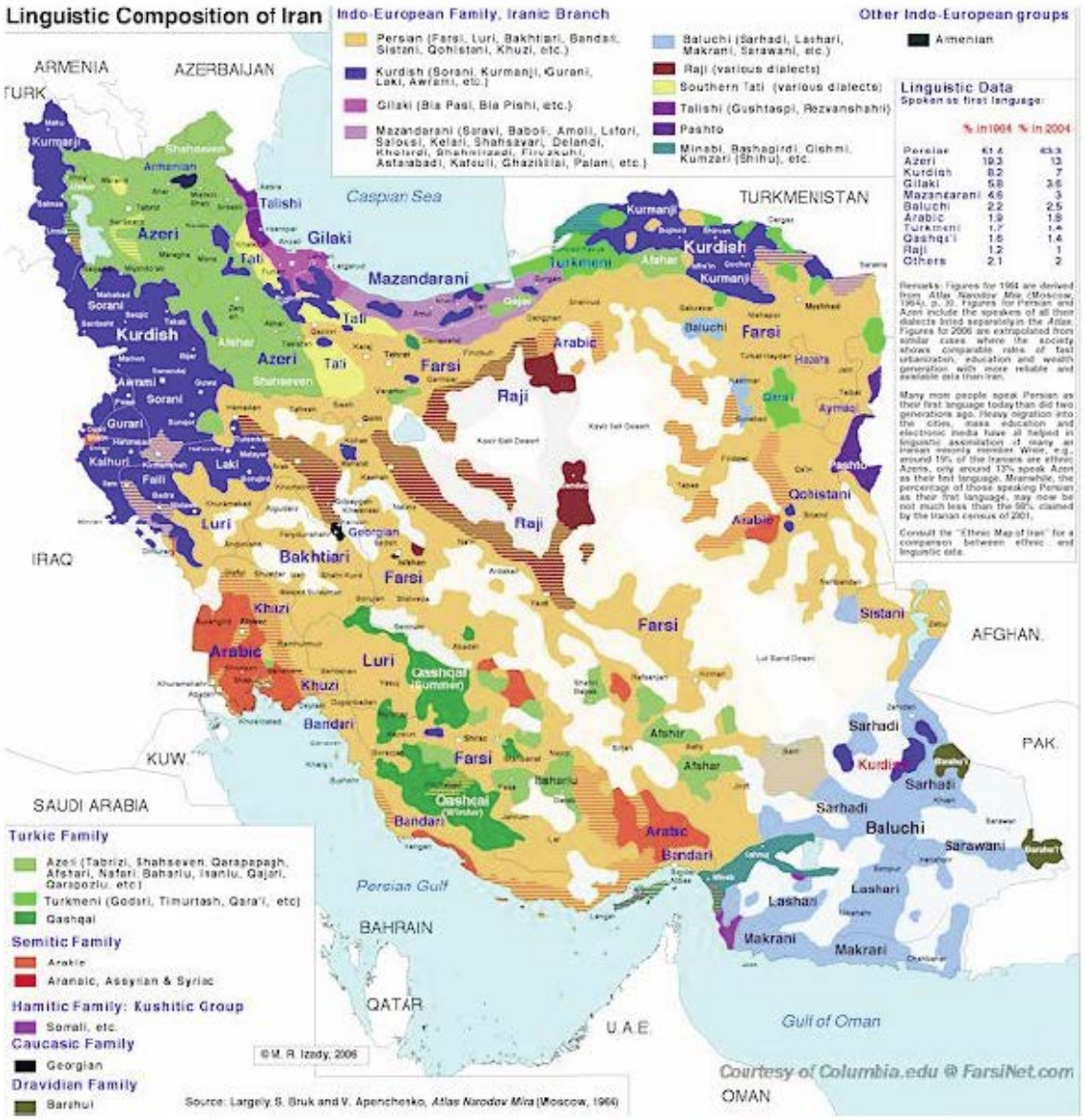
Population: 8.3 million urban,14 million wider area
Urban: 730 km^2 (280 sq mi)
Wider Area: 1,274 km^2 (492 sq mi)

Tel Aviv: 20 Kilotons

Population: 410,000+
Area: 52 km^2 (20 sq mi)

Maps based on estimates by dr. Abdullah Toukan

Iran's Ethnic Vulnerability to Nuclear Strikes



Source: Farsi – Persian Language, Farsi - Persian Language, http://www.farsinet.com/farsi/.

Key Potential Pivots

- **Iran deploys functional nuclear forces.**
- **US or Israeli preventive strikes.**
- **Missiles with terminal guidance, extreme accuracy. (w/ or w/o ,missile defenses.**
- **Serious (Shi'ite) unrest in Saudi Arabia and Bahrain.**
- **US tensions with GCC states (and Egypt/Jordan). Excessive US force cuts, spending crisis**
- **Iran access to most modern Russian and Chinese arms: advanced fighters, S-300/S-400 etc.**
- **Major clash in Gulf**
- **Assad victory or defeat in civil war; clear polarization of Iraq.**
- **Serious Iranian political upheavals, power struggle.**
- **Hostile Iranian involvement in post-2015**
- **Real Iran-Iraq-Syria-Hezbollah axis.**
- **New Arab-Israel Conflict.**

BACK UP SLIDES

The Challenge of Asymmetric Warfare:

Intimidation, Deterrence, and Warfighting

Most Likely Iranian Threats Are Not Formal Conflicts

- **Direct and indirect threats of using force. (I.e. Iranian efforts at proliferation)**
- **Use of irregular forces and asymmetric attacks.**
- **Proxy conflicts using terrorist or extremist movements or exploiting internal sectarian, ethnic, tribal, dynastic, regional tensions.**
- **Arms transfers, training in host country, use of covert elements like Quds force.**
- **Harassment and attrition through low level attacks, clashes, incidents.**
- **Limited, demonstrative attacks to increase risk, intimidation.**
- **Strike at critical node or infrastructure.**

Iran: Threat or "Competitor"

Non-Military Competition

- *Ideology, religion, and political systems*
- *"Terrorism" and violent extremism vs. "counterterrorism"*
- *Energy, sanctions, and global economic impacts*
- *Arms control, arms exports, and arms imports*
- *International diplomacy*

Military Competition

- *Weapons of mass destruction*
- *Conventional forces*
- *Asymmetric and irregular warfare*
- *Proxy use of state and non-state actors*
- *Threat and intimidation*

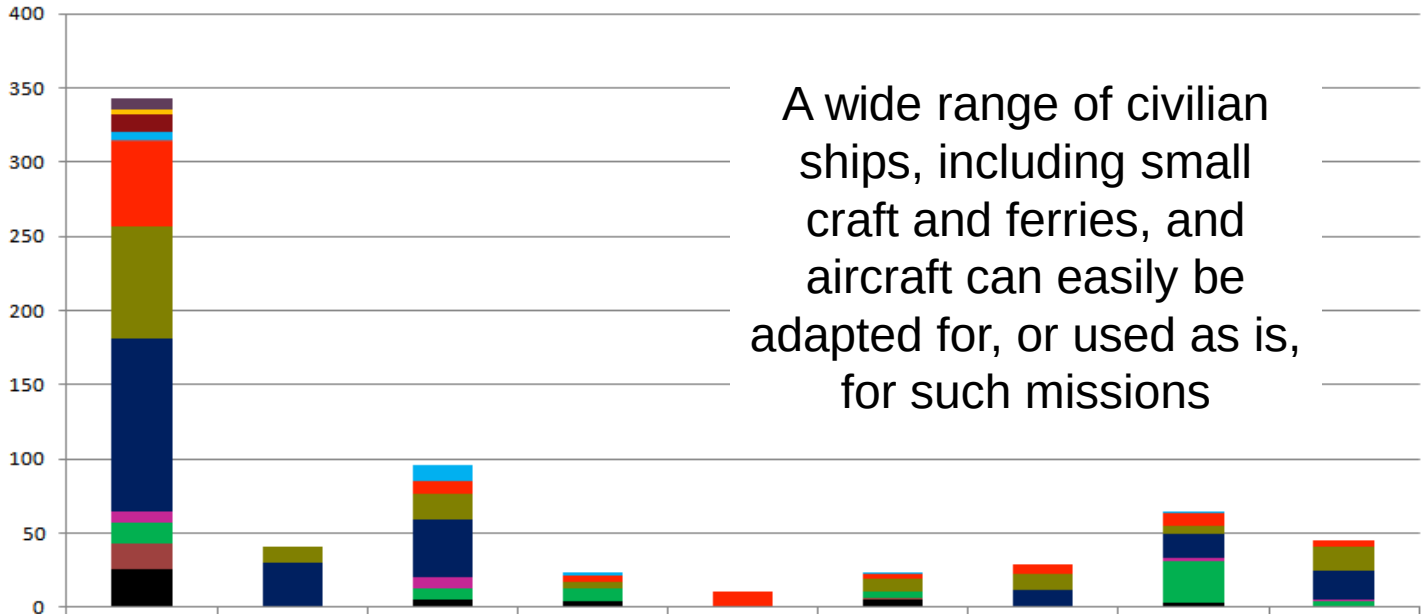
Nations and Sub-Regions of Competition

- *Gulf Cooperation Council countries*
- *Yemen*
- *Iraq*
- *Jordan*
- *Syria*
- *Lebanon*
- *Israel*
- *Gaza and West Bank*
- *Pakistan*
- *Turkey*
- *Afghanistan*
- *Central Asia*
- *Europe*
- *Russia*
- *China*
- *Japan and Asia*
- *Venezuela, Cuba, Brazil*

The Broader Patterns in Iranian Activity

Iranian Actors	Related States/ Non-State Actors	Target/Operating Country
Revolutionary Guards	Iran	Iraq
Al Qaeda force	Syria	Israel
Vevak/other intelligence	Hezbollah	Egypt
Arms transfers	Hamas	Kuwait
Military and security advisors	Mahdi Army	Bahrain
Clerics, pilgrims, shrines	Yemeni Shi'ites	Syria
Commercial training	Bahraini Shi'ites	Yemen
Finance/investment	Saudi Shi'ites	Lebanon
Investment/training companies		Afghanistan
Education: scholarships, teachers		Venezuela
Cultural exchanges		
Athletic visits		

Key Iranian and Gulf Ships for Asymmetric Warfare

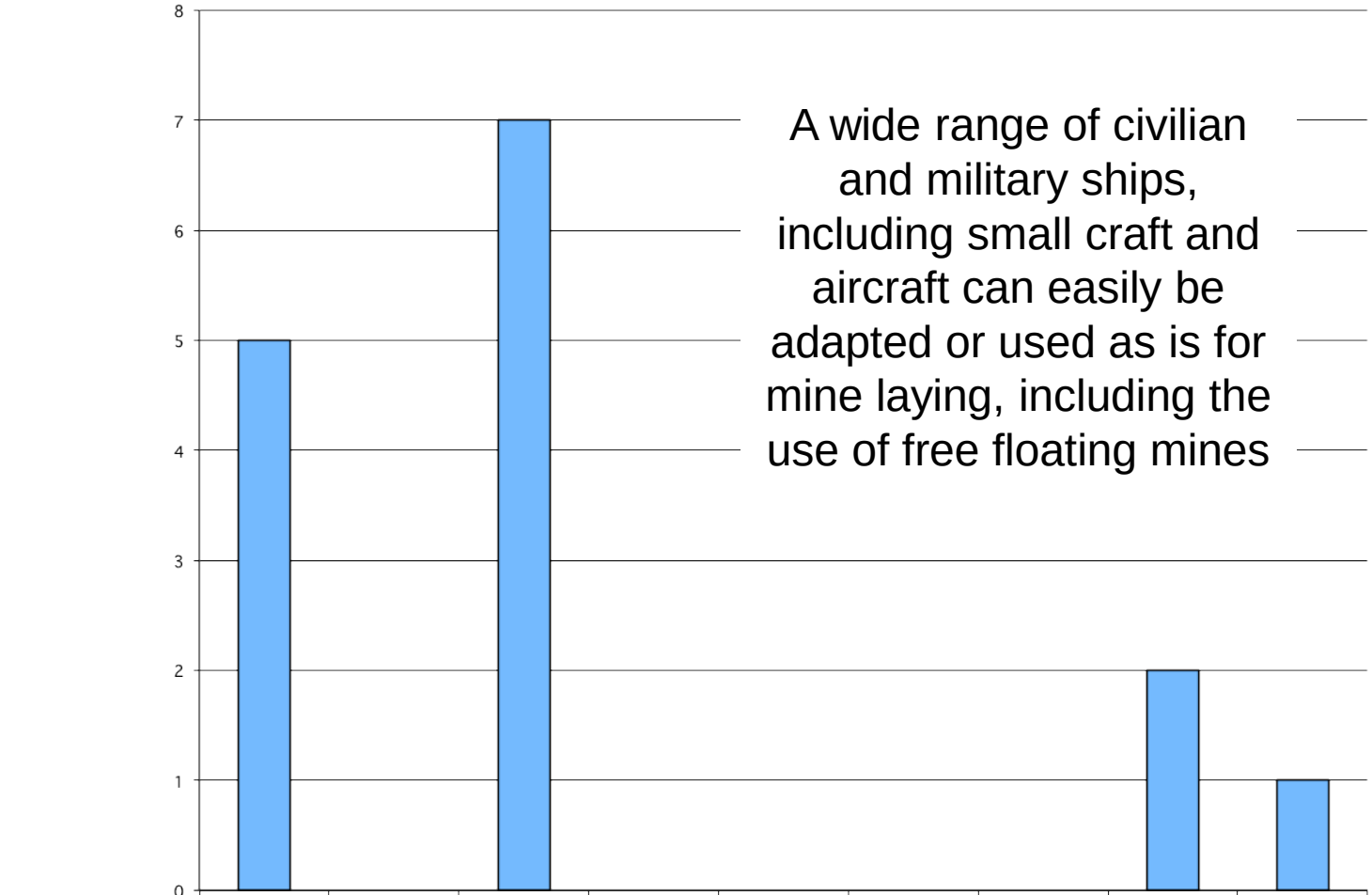


A wide range of civilian ships, including small craft and ferries, and aircraft can easily be adapted for, or used as is, for such missions

	Iran	Iraq	Saudi	Bahrain	Kuwait	Oman	Qatar	UAE	Yemen
SDVs	8								
Submarines	3								
Midget Submarines	12								
Major Missile Combat	5		11	3		2		2	
Major Other Combat	1								
Missile Patrol	57		9	4	10	3	7	8	4
Other Patrol	76	11	17	4		8	10	6	16
Armed Boats	117	30	39				11	16	20
Mine	7		7					2	1
Landing Craft	14		8	9		5		28	3
Amphibious Ships	17					1	1		1
Support	26		5	4	1	5		3	

Source: Adapted by Anthony H. Cordesman from IISS, The Military Balance, various editions; Jane's Sentinel series; Saudi experts

Iranian Mine Warfare Ships

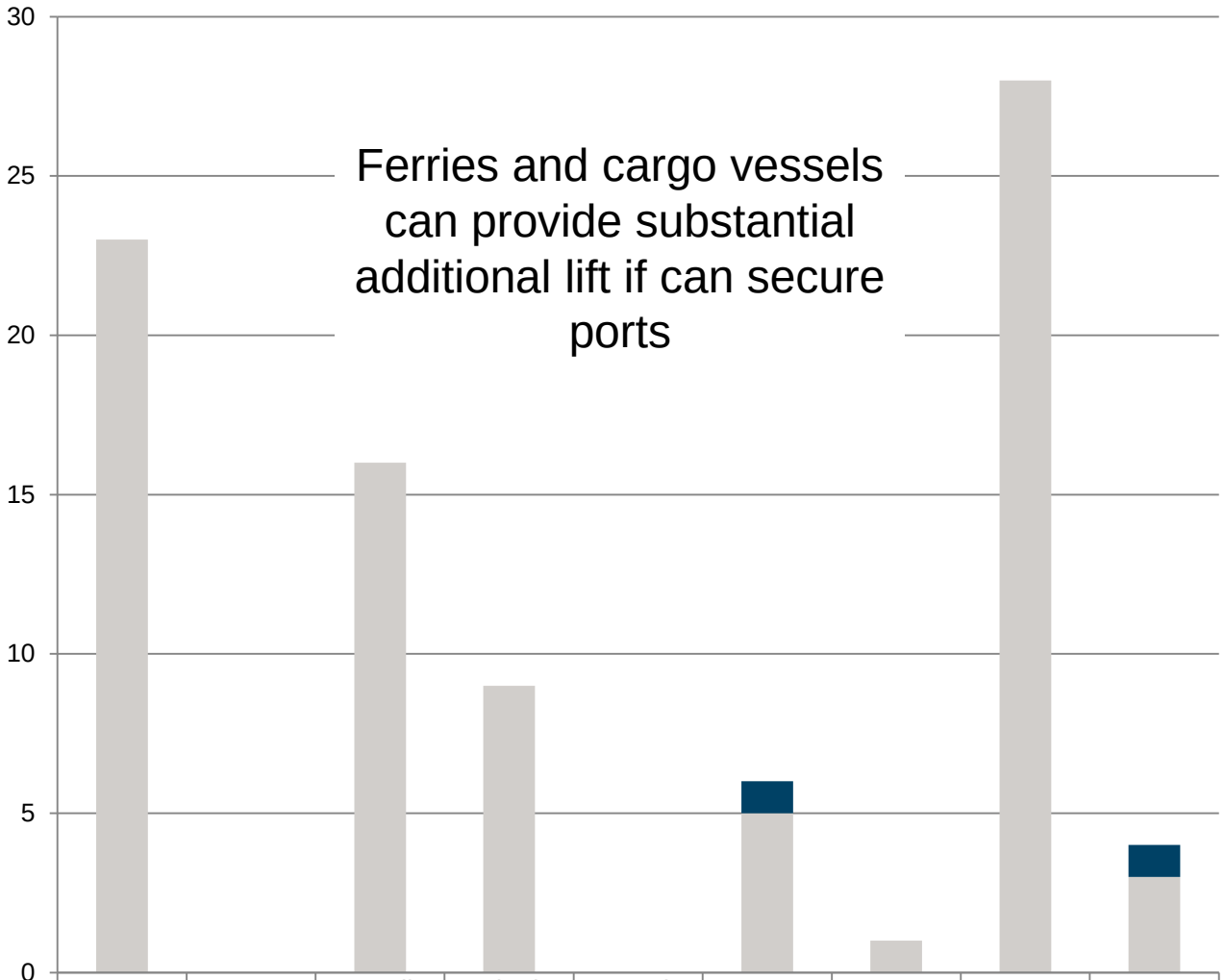


A wide range of civilian and military ships, including small craft and aircraft can easily be adapted or used as is for mine laying, including the use of free floating mines

	Iran	Iraq	Saudi	Bahrain	Kuwait	Oman	Qatar	UAE	Yemen
Mine Layers	0	0	0	0	0	0	0	0	0
Mine Countermeasure	5	0	7	0	0	0	0	2	1

Source: Adapted by Anthony H. Cordesman from IISS, The Military Balance, various editions; Jane's Sentinel series; Saudi experts

Amphibious Ships & Landing Craft



	Iran	Iraq	Saudi	Bahrain	Kuwait	Oman	Qatar	UAE	Yemen
Amphibious Ships						1			1
Landing Craft	23		16	9		5	1	28	3

Source: Adapted by Anthony H. Cordesman from IISS, The Military Balance, various editions, Jane's Sentinel series, and material provided by US and Saudi experts..

The Conventional and Asymmetric Threat in the Gulf

Naval Threats

- **Iranian effort to "close the Gulf."**
- **Iranian permissive amphibious/ferry operation.**
- **Variation on 1987-1988 "Tanker War"**
- **Raids on offshore and critical shore facilities.**
- **"Deep strike" with air or submarines in Gulf of Oman or Indian Ocean.**
- **Attacks on US facilities**

But:

- ***Low near-term probability.***
- ***High risk of US and allied intervention.***
- ***Limited threat power projection and sustainability.***
- ***Unclear strategic goal.***

Iran's Strategic Depth

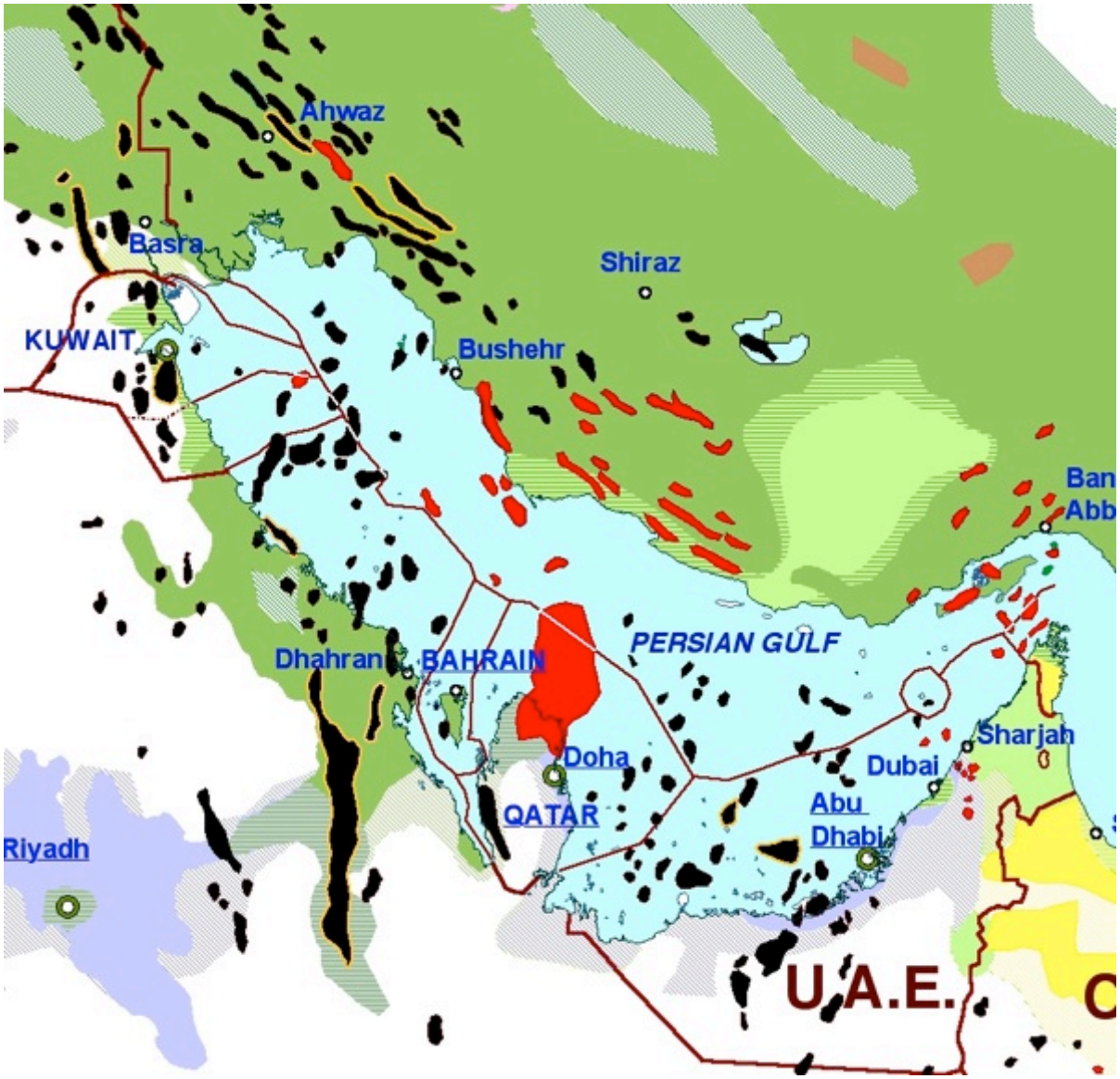
Most Alternative Routes Have Little or No Surplus Capacity or Are Not Operating

EIA: http://www.eia.doe.gov/cabs/World_Oil_Transit_Chokepoints/images/Oil%20and%20Gas%20Infrastructue%20Persian%20Gulf%20%28large%29.gif

The Entire Gulf: Breaking the Bottle at Any Point

Source: EIA, Country Briefs, World Oil Transit Chokepoints, January 2008

Vulnerability of Gulf Oil Fields



Primary Oil and Gas Deposits in the Middle East and the Shia Majority Areas.

- A Major Oil field
- A Super-Giant Oil field
- A Major Gas field

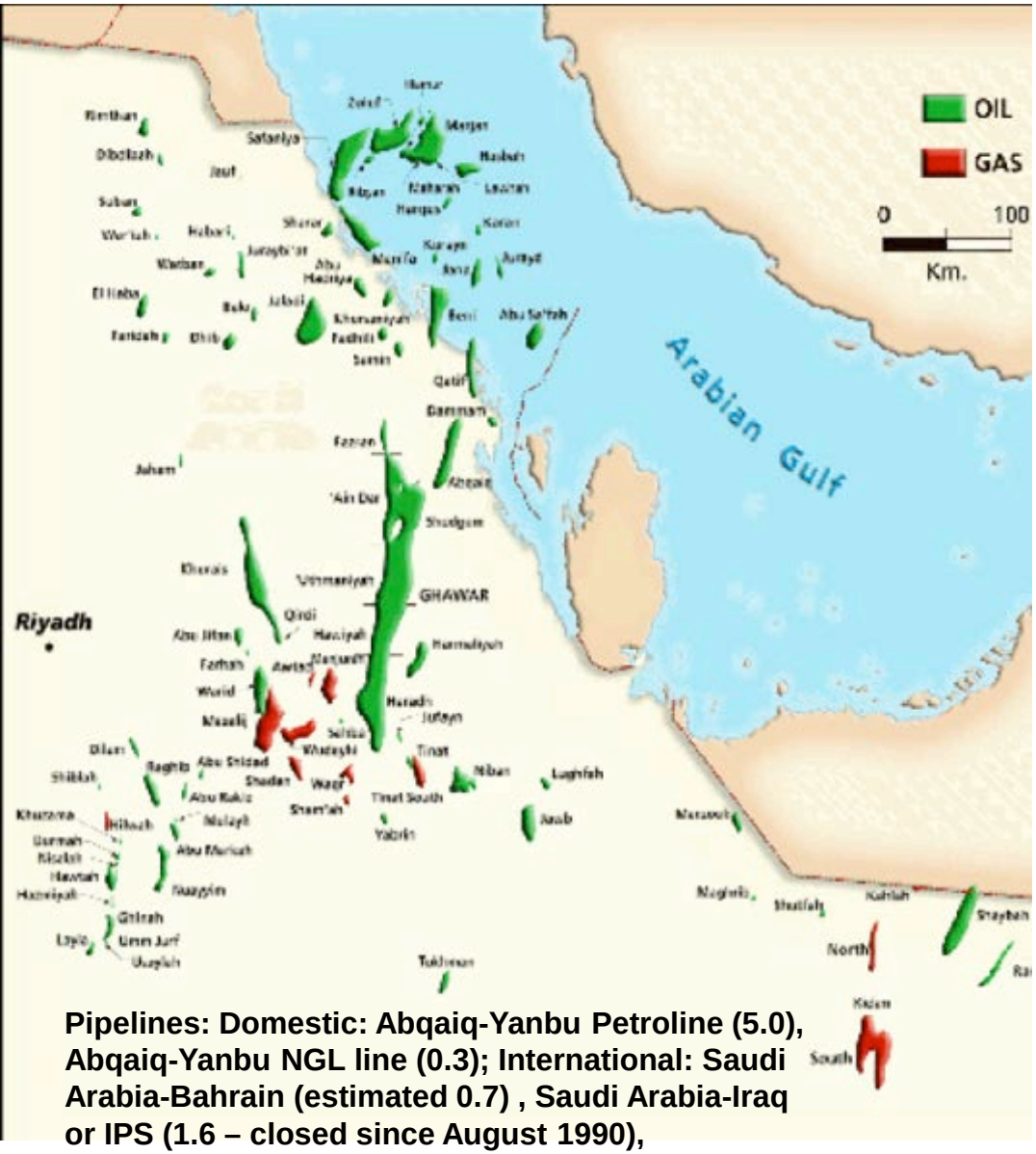
Islam:

- Shiism (to include Alevis/Alawis)
- Sunnism (Hanafi, Shafi'i, Maliki)
- Hunbli
- Ibadism
- Christianity
- Judaism
- Other

- Mixed population areas
- Sparsely populated areas
- Uninhabited areas

Source: M. Izady, 2006 http://gulf2000.columbia.edu/maps.shtml

Saudi Arabian Oil Exports



Pipelines: Domestic: Abqaiq-Yanbu Petroline (5.0), Abqaiq-Yanbu NGL line (0.3); International: Saudi Arabia-Bahrain (estimated 0.7) , Saudi Arabia-Iraq or IPS (1.6 – closed since August 1990), TransArabia Tapline (0.5 – closed since 1984)

260 billion barrels of proven oil reserves (plus 2.5 billion barrels in the Saudi-Kuwaiti shared "Neutral" Zone), amounting to around one-fifth of proven, conventional world oil reserves.

•Although Saudi Arabia has around 100 major oil and gas fields (and more than 1,500 wells), over half of its oil reserves are contained in only eight fields, including the giant 1,260-square mile Ghawar field (the world's largest oil field, with estimated remaining reserves of 70 billion barrels). The Ghawar field alone has more proven oil reserves than all but six other countries.

Saudi Arabia maintains the world's largest crude oil production capacity, estimated by U.S. Energy Information Administration (EIA) at over 12 million bbl./d at end-2010. Over 2 million bbl./d of capacity was added in 2009 with the addition of increments at Khurais, AFK (Abu Hadriya, Fadhili and Khursaniyah), Shaybah, and Nu'ayyim. For 2010, the EIA estimates that Saudi Arabia produced on average 10.2 million bbl./d of total oil

Saudi Arabia has three primary oil export terminals:

• The Ras Tanura complex has approximately 6 million bbl./d capacity, and the world's largest offshore oil loading facility. It includes the 2.5-million bbl./d port at Ras Tanura. More than 75 percent of exports are loaded at the Ras Tanura Facility.

• The 3 to 3.6-million bbl./d Ras al-Ju'aymah facility on the Persian Gulf.

• The Yanbu'terminal on the Red Sea, from which most of the remaining 25 percent is exported, has loading capacity of approximately 4.5 million bbl./d crude and 2 million bbl./d for NGL and products. The facility is reportedly not used to full capacity.

These and a dozen other smaller terminals throughout the country, appear capable of exporting up to 14-15 million bbl./d of crude and refined products, 3-4 million bbl./d higher than Saudi Arabia's current crude oil production capacity.

EIA, Country Briefs, "Saudi Arabia," 1/2011

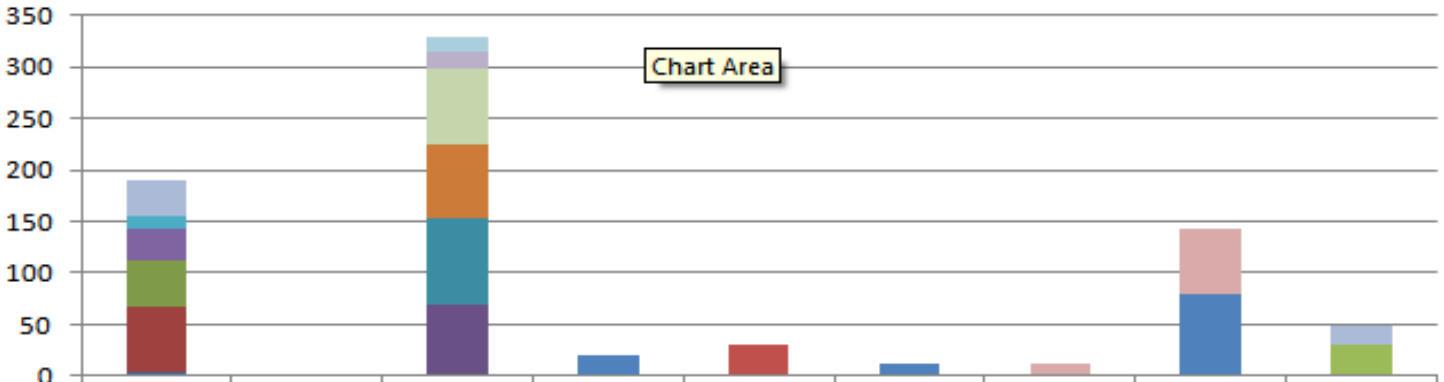
Air/Missile/UCAV Threats

- **Precision air strikes on critical facilities: Raid or mass attack.**
- **Terror missile strikes on area targets; some chance of smart, more accurate kills.**
- **Variation on 1983-1986 air confrontation tatics, "Fahd line"**
- **Strikes on offshore facilities.**
- **Strikes again tankers or naval targets.**
- **Attacks on US-allied facilities**
- **Use of UAVs as possible delivery systems (conventional or Unconventional munitions)**

But:

- ***Weak capability, high vulnerability to counterstrikes, poor escalation ladder***
- ***High risk of US and allied intervention.***
- ***Limited threat power projection and sustainability.***
- ***Unclear strategic goal.***

Comparative High Quality Fighter/Attack Aircraft in 2012



	Iran	Iraq	Saudi	Bahrain	Kuwait	Oman	Qatar	UAE	Yemen
Typhoon-2			16						
Tornado ADV			15						
Tornado IDS			75						
Mirage 2000							12	62	
MiG-29	35								18
MiG-25									
Su-25	13								
Su-24	30								
Su-20/22									30
F-18					31				
F-16				21		12		80	
F-15S			70						
F-15C/D			84						
F-15S			70						
F-14	44								
F-4D/E	65								
Saegheh	3								

Source: Adapted from the IISS, **Military Balance, 2012**; and the Jane's Sentinel series

Range of Iran's Air Power

Mission Profile:
Hi-Lo-Hi

F-4E (Bushehr):
(4) MK83 1000lb Bombs
(1) 600 Gallon Fuel Tank
10 Minutes loiter time
Range = 400 nmi

SU-24 (Shiraz):
(4) 500 kg/1000 lb Bombs
(1) 400 gallon tank
10 minutes loiter time
Range = 590 nmi

SU-25 (Shiraz):
(4) 500kg/1000lb Bombs
(1) 400 gallon tank
(2) 10 minutes loiter time
Range = 600 nmi

Gulf Land-Based Air Defenses In 2012

Country	Major SAM	Light SAM	AA Guns
Bahrain	8 I Hawk MIM-23B 60	R BS-70 18 FIM-92A Stinger 15 7 Crotale	27 guns Oerlikon 35 mm 12 L/70 40 mm
Iran	16/150 I Hawk 3/10 SA-5 45 SA-2 Guideline	SA-7/14/16, HQ-7 29 SA-15 S o me QW-1 Misaq 29 TOR-M1 Some HN-5 5/30 Rapier 10 Pantsyr (SA-22) Some FM-80 (Ch Crotale) 15 Tigercat Some FIM-92A Stinge r	1,700 Guns ZSU-23-4 23mm ZPU-2/4 23mm ZU-23 23mm M-1939 37mm S-60 57mm ZSU-57-2
Iraq			
Kuwait	5 / 24 I Hawk Phase III 12 5/40 Patriot PAC-2 12	Aspide S t a rburst Aspide Stinger	12 Oerlikon 35mm
Oman mm	None	Blowpipe 8 Mistral 2 SP 12 Panstsyr S1E 34 SA-7 6 Blindfire S713 Martello 20 Javelin 40 Rapier	26 guns 4 ZU-23-2 23 mm 10 GDF-005 Skyguard 35 12 L-60 40 mm
Qatar	None	10 Blowpipe 12 FIM-92A Stinger 9 Roland II 24 Mistral 20 SA-7	?
Saudi Arabia (NG)	16/128 I Hawk 4-6/16-24 Patriot 2 17/73 Shahine Mobile 16/96 PAC-2 launchers 17 ANA/FPS-117 radar 73/68 Crotale/Shahine	40 Crotale 5 00 Stinger (ARMY) 92 5 00 Mistral (ADF) 5 00 FIM-43 Redeye 500 R e deye (ADF) 7 3 -141 Shahine static	1,220 guns M-163 Vulcan 20 mm 30 M-167 Vulcan 20 mm 8 50 AMX-30SA 30 mm 128 GDF Oerlikon 35mm 1 50 L-70 40 mm (in store) 130 M-2 90 mm (NG)
UAE	2/6/36 I Hawk	20+ Blowpipe 20 Mistral Some Rapier Some Crotale Some RB-70 Some Javelin Some SA-18	62 guns 42 M-3VDA 20 mm SP 20 GCF-BM2 30 mm
Yemen	S o me SA-2, 3 Some SA-6 SP	Some 800 SA-7 Some SA-9 SP Some SA-13 SP Some SA-14	530 guns 20 M-163 Vulcan SP 20mm 50 ZSU-23-4 SP 23 mm 100 ZSU-23-2 23 mm 150 M-1939 37 mm 50 M-167 20mm 120 S-60 57 mm 40 M-1939 KS-12 85 mm

Source: Adapted by Anthony H. Cordesman from IISS, The Military Balance, Periscope, JCSS, Middle East Military Balance, Jane's Sentinel and Jane's Defense Weekly. Some data adjusted or estimated by the author.

IRGC Naval Forces

The IRGC has a naval branch consists of approximately 20,000 men, including marine units of around 5,000 men.

The IRGC is now reported to operate all mobile land-based anti-ship missile batteries and has an array of missile boats; torpedo boats; catamaran patrol boats with rocket launchers; motor boats with heavy machine guns; mines as well as Yono (Qadir)-class midget submarines; and a number of swimmer delivery vehicles.

The IRGC naval forces have at least 40 light patrol boats, 10 Houdong guided missile patrol boats armed with C-802 anti-ship missiles.

The IRGC controls Iran's coastal defense forces, including naval guns and an HY-2 Seersucker land-based anti-ship missile unit deployed in five to seven sites along the Gulf coast.

The IRGC has numerous staging areas in such places and has organized its Basij militia among the local inhabitants to undertake support operations.

IRGC put in charge of defending Iran's Gulf coast in September 2008 and is operational in the Gulf and the Gulf of Oman, and could potentially operate elsewhere if given suitable sealift or facilities.

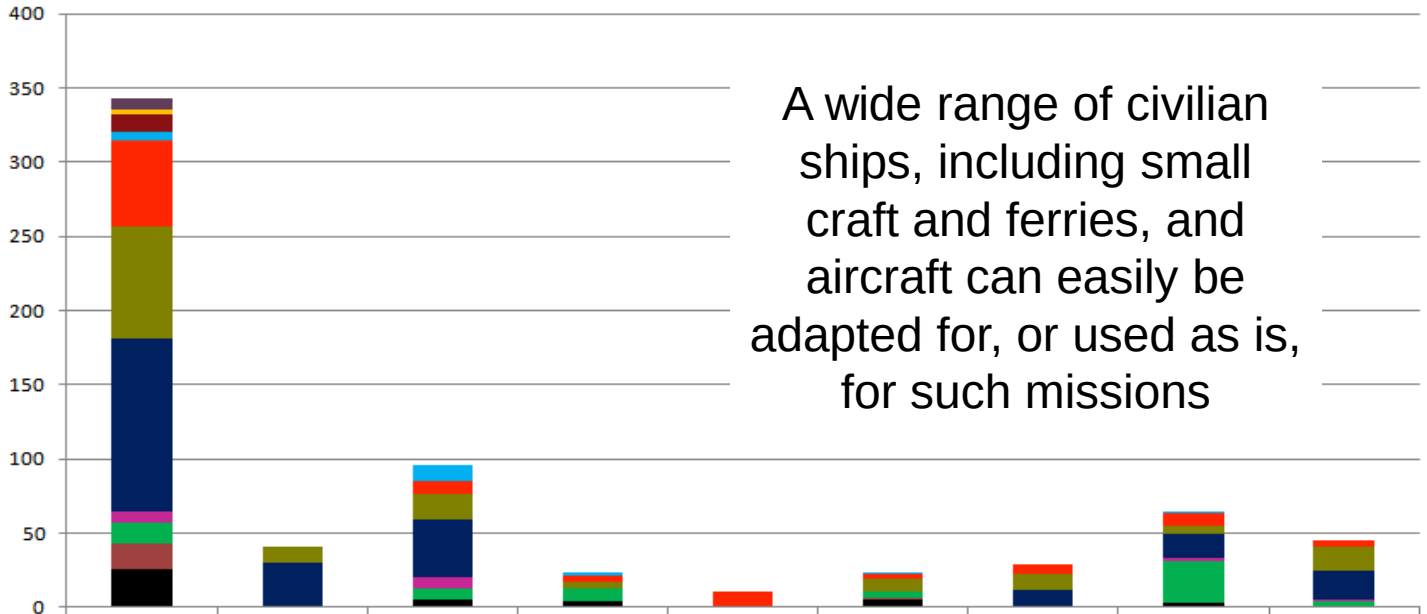
Can deliver conventional weapons, bombs, mines, and CBRN weapons into ports and oil and desalination facilities.
Force consists of six elements: surface vessels, midget and unconventional submarines, missiles and rockets, naval mines, aviation, and military industries.

Large numbers of anti-ship missiles on various types of launch platforms.

Small fast-attack craft, heavily armed with rockets or anti-ship missiles.

Source: Adapted from IISS, The Military Balance 2011, various editions and Jane's Sentinel series

Key Iranian and Gulf Ships for Asymmetric Warfare



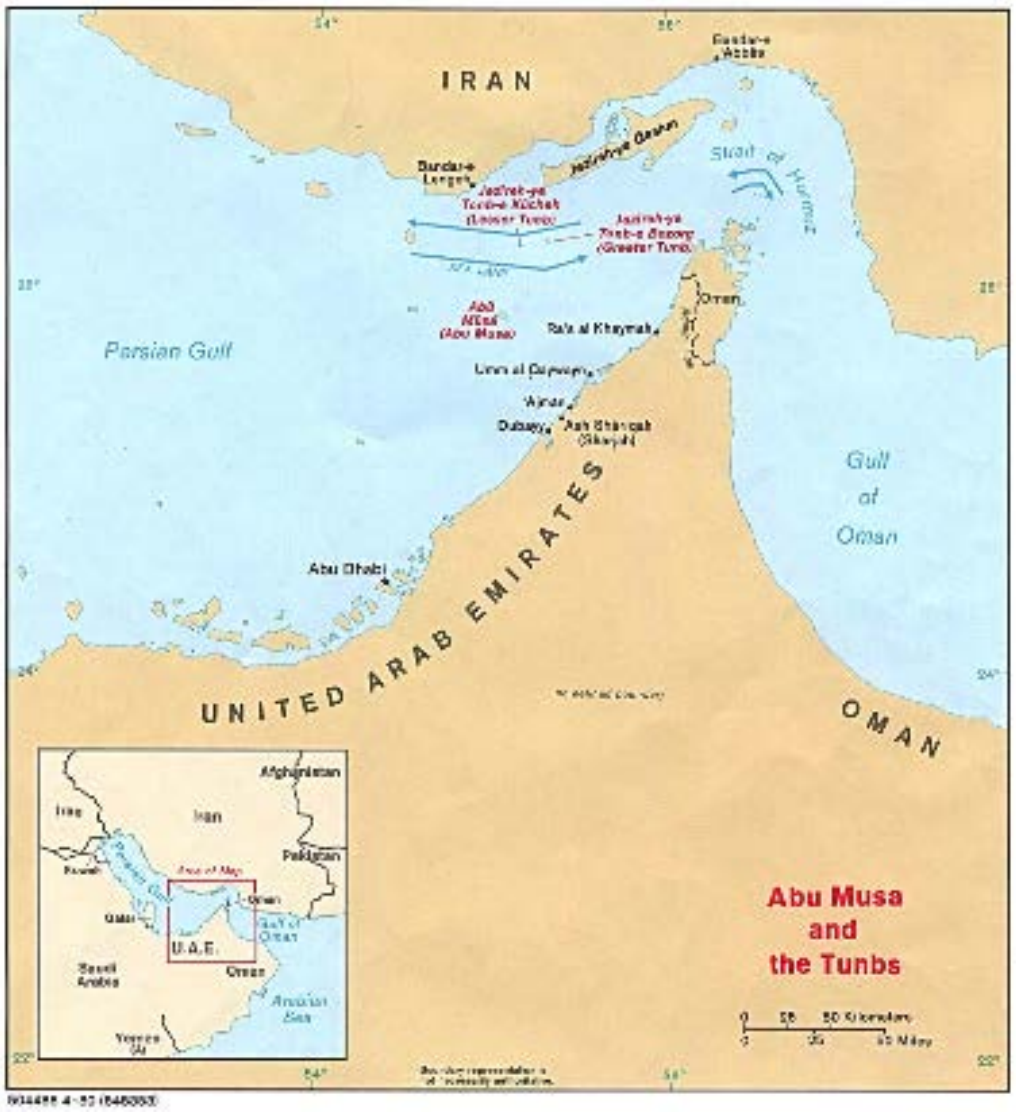
A wide range of civilian ships, including small craft and ferries, and aircraft can easily be adapted for, or used as is, for such missions

	Iran	Iraq	Saudi	Bahrain	Kuwait	Oman	Qatar	UAE	Yemen
SDVs	8								
Submarines	3								
Midget Submarines	12								
Major Missile Combat	5		11	3		2		2	
Major Other Combat	1								
Missile Patrol	57		9	4	10	3	7	8	4
Other Patrol	76	11	17	4		8	10	6	16
Armed Boats	117	30	39				11	16	20
Mine	7		7					2	1
Landing Craft	14		8	9		5		28	3
Amphibious Ships	17					1	1		1
Support	26		5	4	1	5		3	

Source: Adapted by Anthony H. Cordesman from IISS, The Military Balance, various editions; Jane's Sentinel series; Saudi experts

Map of Arabian Sea

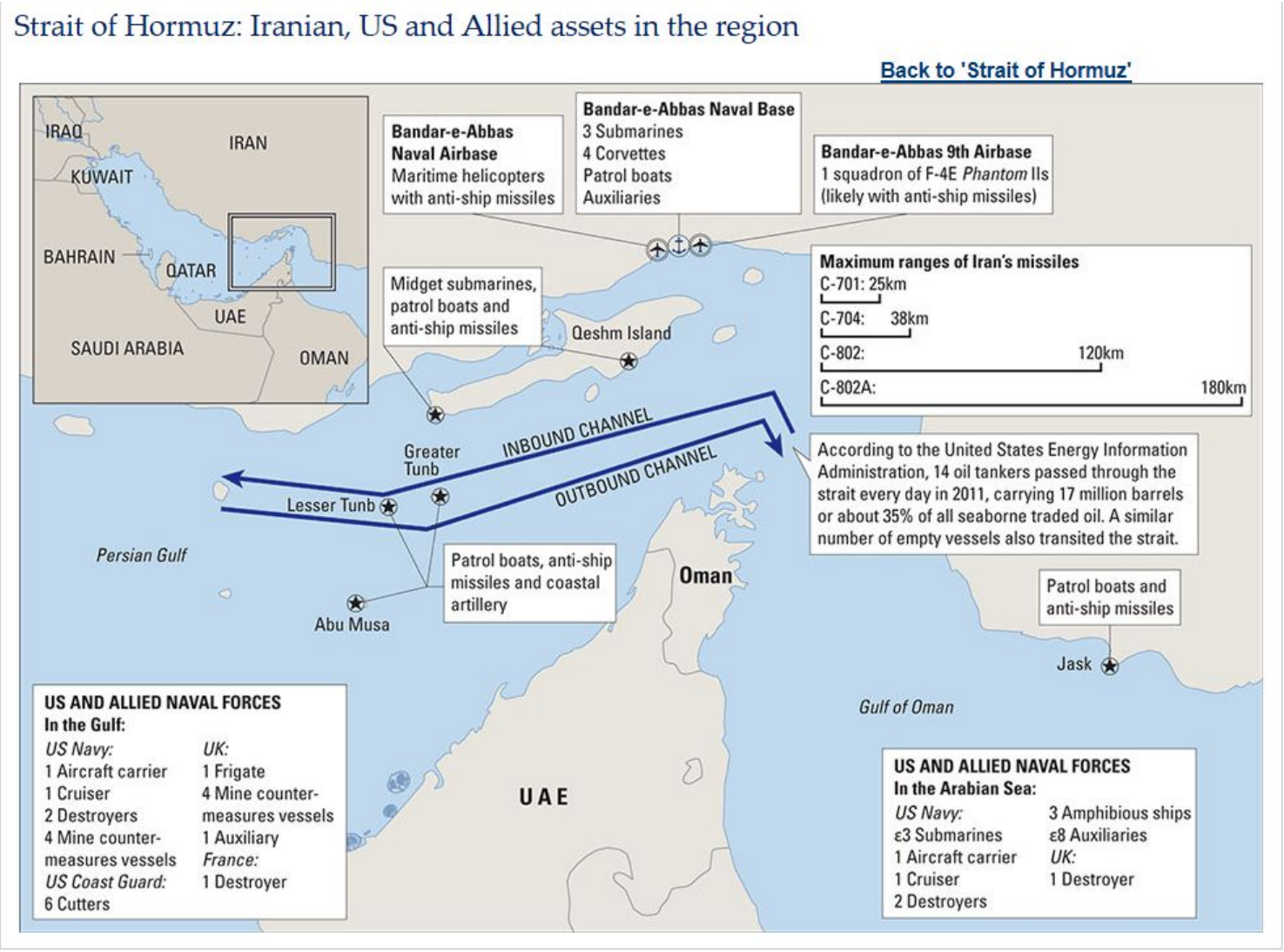
Hormuz: Breaking the Bottle at the Neck

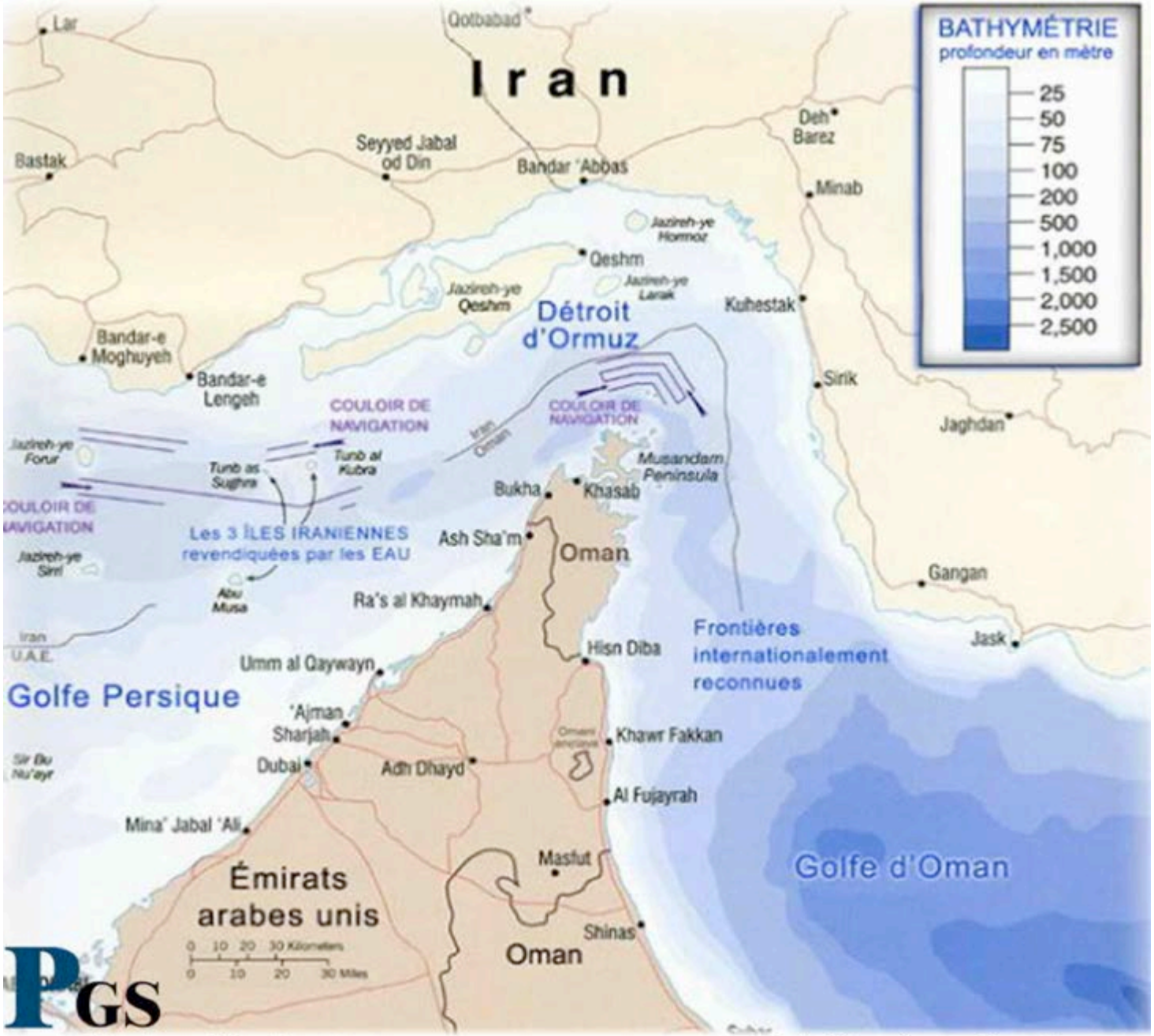


- 280 km long, 50 km wide at narrowest point.
- Traffic lane 9.6 km wide, including two 3.2 km wide traffic lanes, one inbound and one outbound, separated by a 3.2 km wide separation median
- Antiship missiles now have ranges up to 150 km.
- Smart mines, guided/smart torpedoes,
- Floating mines, small boat raids, harassment.
- Covert as well as overt sensors.

Source: http://www.lib.utexas.edu/maps/middle_east_and_asia/hormuz_80.jpg; DOE/EIA, World Oil Transit Chokepoints, February 2011,

One Estimate of Naval Balance Less Air and Mine Warfare





EIA Estimate in 9/2012:

Hormuz is the world's most important oil chokepoint

Its daily oil flow of almost 17 million barrels in 2011, up from between 15.5-16.0 million bbl./d in 2009-2010.

Flows through the Strait in 2011 were roughly 35 percent of all seaborne traded oil,

Or almost 20 percent of oil traded worldwide.

Abu Musa

Source: Google maps

660

Iranian Oil Facilities

Kharg Island, the site of the vast majority of Iran's exports, has a crude storage capacity of 20.2 million barrels of oil and a loading capacity of 5 million bbl./d.

Lavan Island is the second-largest terminal with capacity to store 5 million barrels and loading capacity of 200,000 bbl./d.

Other important terminals include Kish Island, Abadan, Bandar Mahshar, and Neka (which helps facilitate imports from the Caspian region).

Iran has an expansive domestic oil network including more than 10 pipelines that run between 63 and 630 miles in length.

Iran has invested in its import capacity at the Caspian port to handle increased product shipments from Russia and Azerbaijan, and enable crude swaps with Turkmenistan and Kazakhstan.

In the case of crude swaps, the oil from the Caspian is consumed domestically in Iran, and an equivalent amount of oil is produced for export through the Persian Gulf with a Swiss-trading arm of NIOC for a swap fee.

According to FGE, Khatam Al-Anbia Construction Headquarters (KACH), the construction company controlled by Iran's Islamic Revolutionary Guard Corps (IRGC), was awarded a new contract by NIOC worth $1.3 billion to build two oil pipelines.

The new oil pipelines will total 684 miles and will deliver crude oil from the Khuzestan Province to the Tehran oil refinery.

In addition, KACH is constructing three other pipelines that will deliver crude oil and petroleum products. These include the Nayeen-Kashan, Rafsanjan-Mashhad, and Bandar Abbas-Rafsanjan pipelines.

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EIA, Country Briefs, "Iran," 2/2012

Key Targets that Illustrate Iran's Vulnerability

- **Critical dependence on refineries with high cost, long lead facilities and on imports of product.**
- **Minimal power grid that can be crippled or destroyed selectively on a regional or national basis.**
- **Gas production and distribution facilities needed by Iran's domestic economy.**
- **Key bridges, tunnels, overpasses and mountain routes for road and rail traffic.**
- **Gulf tanker loading facilities, oil storage and and tanker terminals – for mining or direct attack.**
- **Key military production facilities**
- **Command and control centers.**
- **Communications grids.**
- **Airfield and air bases.**
- **IRGC land, air, and naval facilities.**
- **Coastal naval bases and port facilities.**

Military Threats and the Conventional Balance

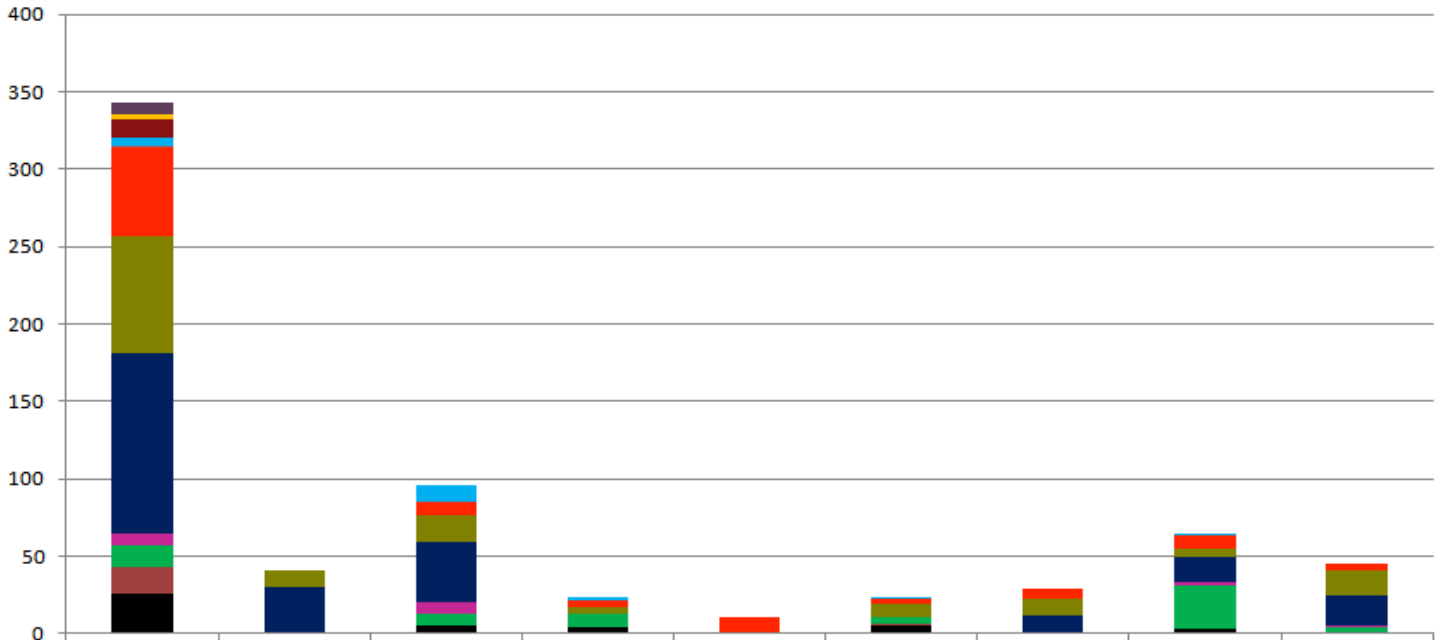
Naval Threats

- **Low intensity naval war of attrition, random acts of mining, raids, etc.**
- **Iranian effort to "close the Gulf."**
- **Iranian permissive amphibious/ferry operation.**
- **Variation on 1987-1988 "Tanker War"**
- **Raids on offshore and critical shore facilities.**
- **"Deep strike" with air or submarines in Gulf of Oman or Indian Ocean.**
- **Attacks on US and allied (ally) facilities**

But:

- ***Very weak air-sea capabilities, vulnerable escalation ladder.***
- ***High risk of US and allied intervention.***
- ***Limited threat power projection and sustainability.***
- ***Unclear strategic goal.***

Comparative Gulf Naval Combat Ships: 2011



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Armed Boats	117	30	39				11	16	20
Mine	7		7					2	1
Landing Craft	14		8	9		5		28	3
Amphibious Ships	17					1	1		1
Support	26		5	4	1	5		3	

Source: Adapted from the IISS, **Military Balance, 2011**; and the Jane's Sentinel series.

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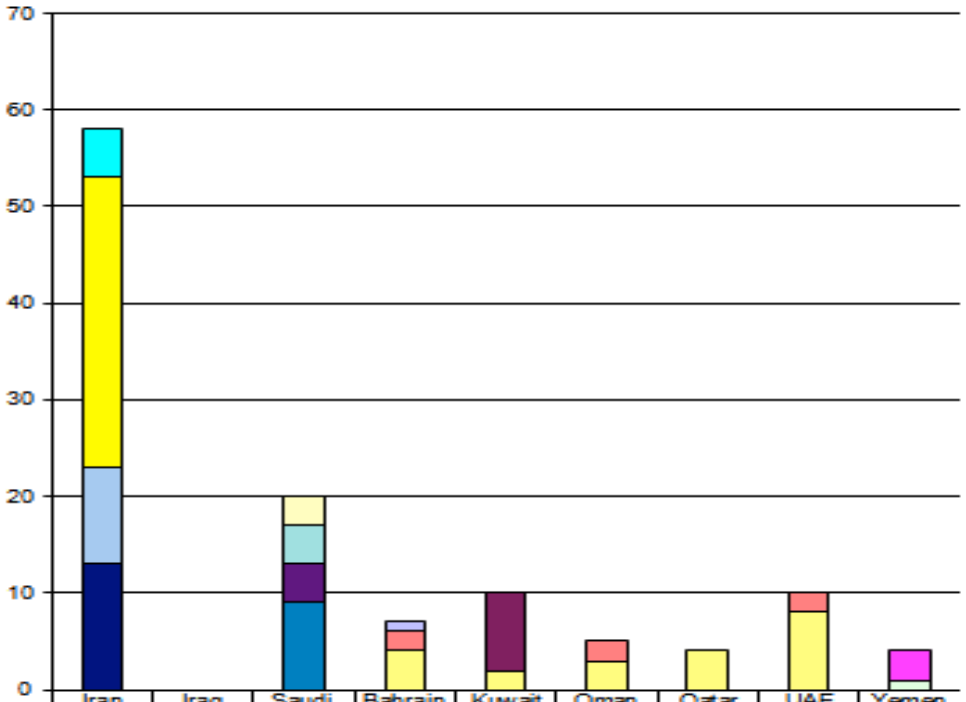
Missile-Armed Combat Warships: 2011



	Iran	Iraq	Saudi	Bahrain	Kuwait	Oman	Qatar	UAE	Yemen
Destroyers with MM-40 Exocet SSM			3						
Frigates with MM-40 Exocet SSM									
Frigates with Harpoon SSM				1					
Frigates with Otomat SSM			4						
Corvettes with CCS-N-4 SSM	5								
Corvettes with Harpoon SSM			4						
Corvettes with MM-40 Exocet SSM				2		2		2	
Patrol Craft with Harpoon SSM			9						
Patrol Craft with C-701 SSM	30								
Patrol Craft with C-802 SSM	10								
Patrol Craft with CSS-N-4 SSM	13								
Patrol Craft with Sea Skua SSM					8				
Patrol Craft with MM-40 Exocet SSM				4	2	3	4	8	0
Patrol Craft with SS-N-4 SSM									3
Patrol Craft with SS-N-2 SSM									1

Source: Adapted from IISS, The Military Balance, Periscope, JCSS, Middle East Military Balance, Jane's Sentinel and Jane's Defense Weekly. Some data adjusted or estimated by the author.

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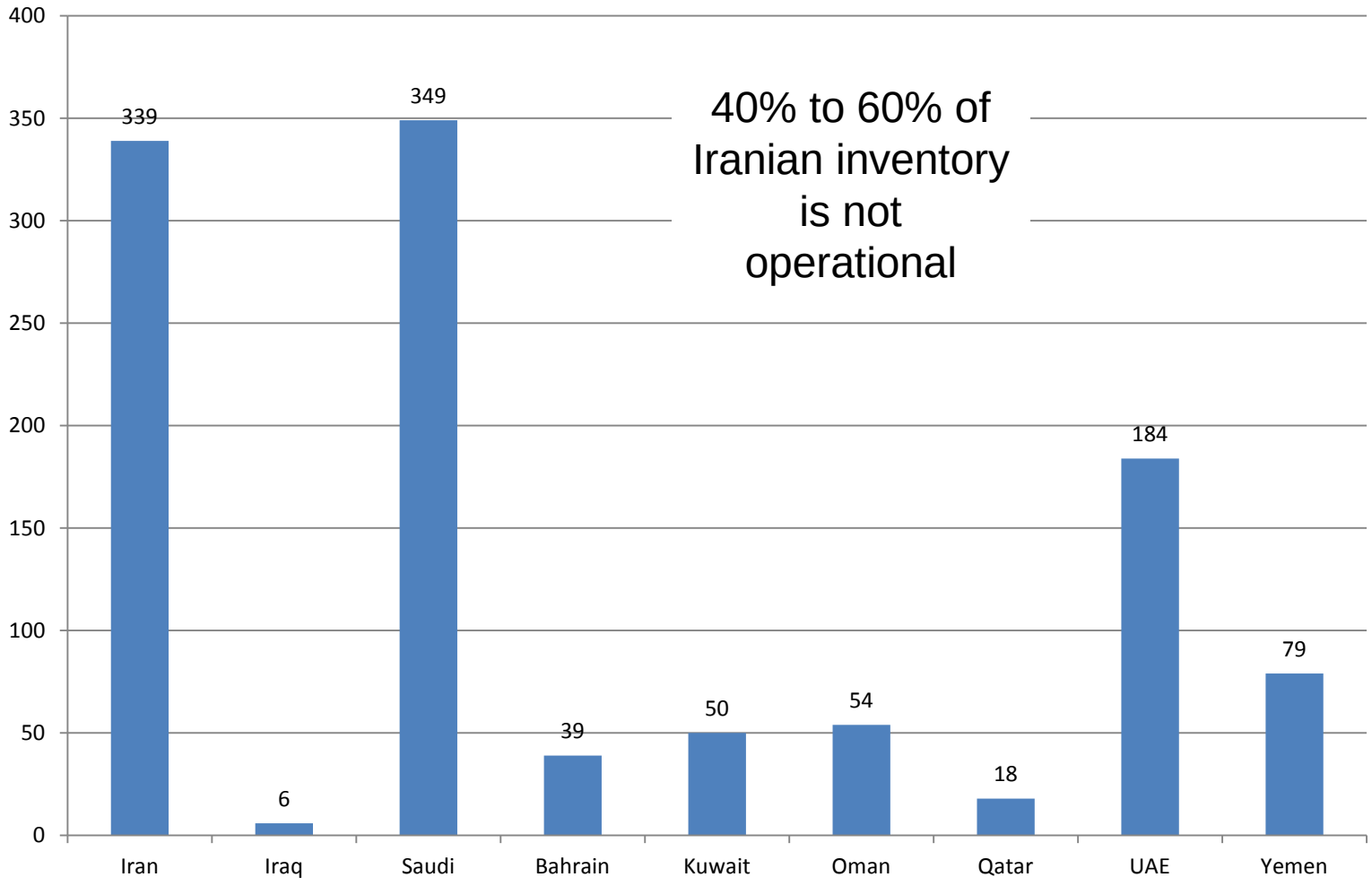
Air/Missile Threats

- **Precision air strikes on critical facilities: Raid or mass attack.**
- **Terror missile strikes on area targets; some chance of smart, more accurate kills.**
- **Variation on 1987-1988 "Tanker War"**
- **Raids on offshore and critical shore facilities.**
- **Strikes again tankers or naval targets.**
- **Attacks on US-allied facilities**
- **Use of UAVs as possible delivery systems (conventional or Unconventional munitions)**

But:

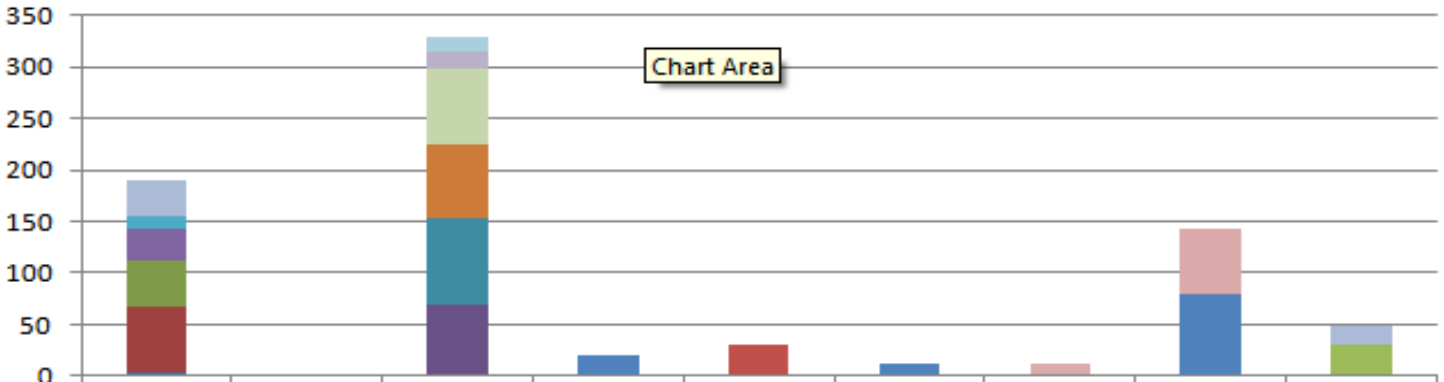
- ***Low near-term probability.***
- ***High risk of US and allied intervention.***
- ***Limited threat power projection and sustainability.***
- ***Unclear strategic goal.***

Comparative Gulf Fixed Wing Combat Air Strength in 2010



Note: Only armed or combat-capable aircraft are counted, not trainers, recce or other aircraft. Iraq has 6 Cessna AC-208Bs fulfilling dual recce and attack roles.

Comparative High Quality Fighter/Attack Aircraft in 2011



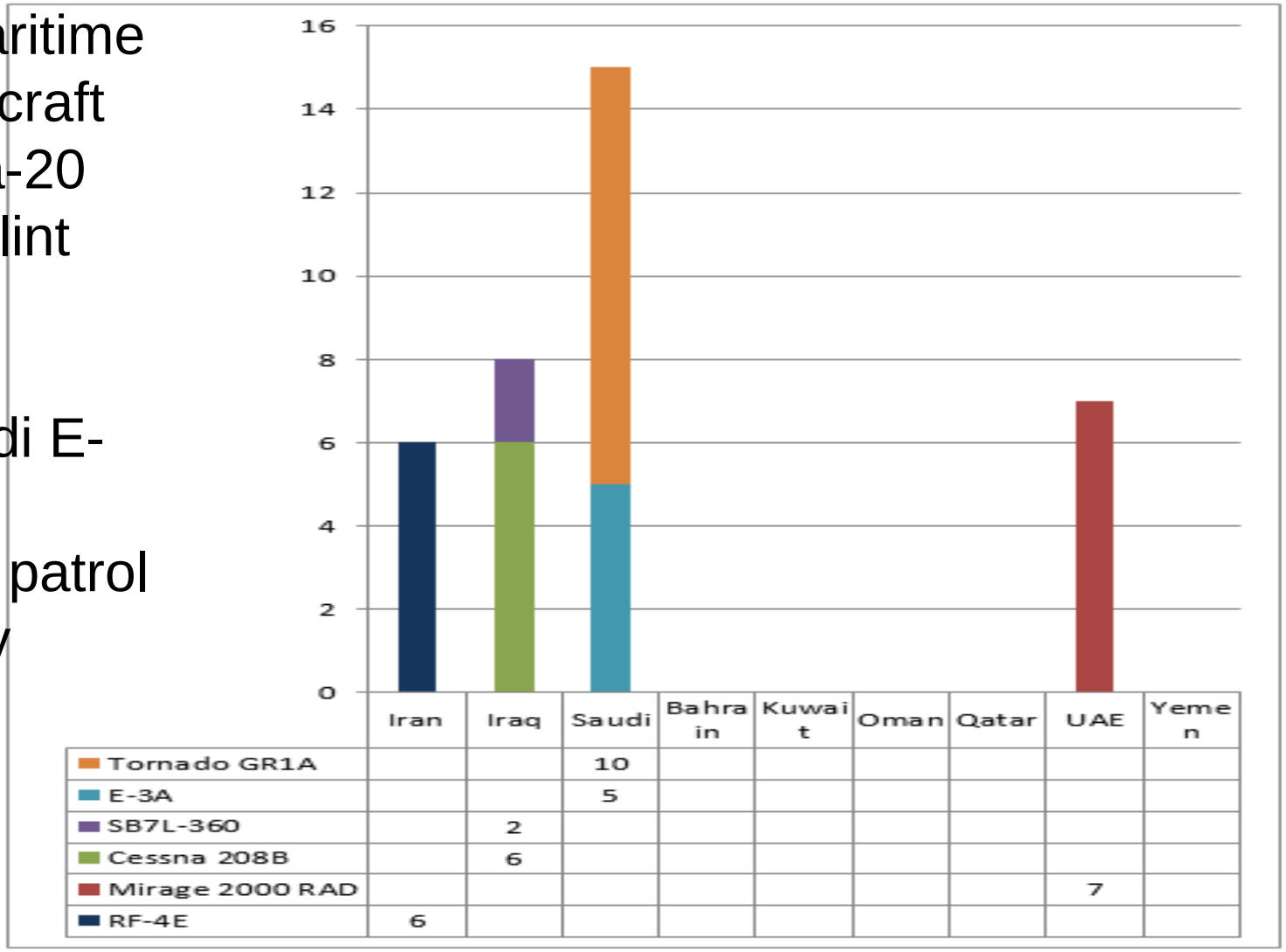
	Iran	Iraq	Saudi	Bahrain	Kuwait	Oman	Qatar	UAE	Yemen
Typhoon-2			16						
Tornado ADV			15						
Tornado IDS			75						
Mirage 2000							12	62	
MiG-29	35								18
MiG-25									
Su-25	13								
Su-24	30								
Su-20/22									30
F-18					31				
F-16				21		12		80	
F-15S			70						
F-15C/D			84						
F-15S			70						
F-14	44								
F-4D/E	65								
Saegheh	3								

Source: Adapted from the IISS, **Military Balance, 2011**; and the Jane's Sentinel series

Gulf Reconnaissance and AWACS Aircraft in 2011

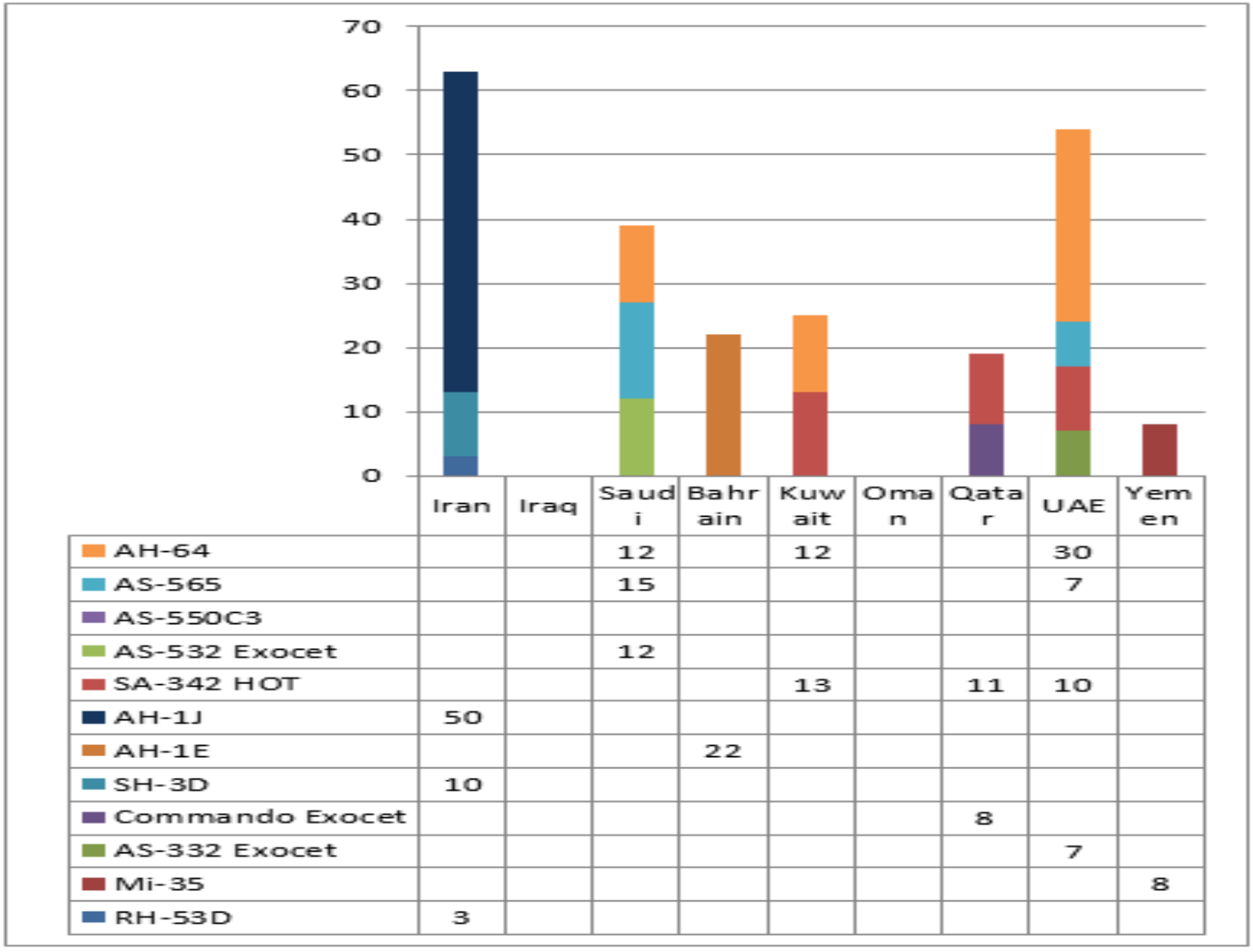
Iran has 3 P-3F Orion maritime patrol aircraft and 3 Da-20 Falcon Elint aircraft

The Saudi E-3A has maritime patrol capability



Source: Adapted from the IISS, **Military Balance, 2011**; and the Jane's Sentinel series

Gulf Attack & Naval Helicopters in 2011



	Iran	Iraq	Saudi	Bahrain	Kuwait	Oman	Qatar	UAE	Yemen
AH-64			12		12			30	
AS-565			15					7	
AS-550C3									
AS-532 Exocet			12						
SA-342 HOT					13		11	10	
AH-1J	50								
AH-1E				22					
SH-3D	10								
Commando Exocet							8		
AS-332 Exocet								7	
Mi-35									8
RH-53D	3								

Source: Adapted from IISS, The Military Balance, Periscope, JCSS, Middle East Military Balance, Jane's Sentinel and Jane's Defense Weekly. Some data adjusted or estimated by the author.

Illustrative Iranian UAV Projects /Assets

Prime Manufacturer	Designation	Development / Production	Operation	Payload Wt.	Endurance (hr.)	Range	Ceiling (ft.)	Mission
Unknown	Stealth	Underway / Underway	Deployed			700 km		R/S*
HESA	Ababil (Swallow)	Complete / Underway	Deployed	45 kg	1.5+	150 km	14,000	Multiple variants for R/S* - attack – ISR**
Shahbal Group, Sharif Univ.	Shahbal	Underway		5.5 kg		12 km	4,500	R/S*
Asr-e Talai Factories	Mini-UAV	Underway						Surveillance
FARC	Sobakbal	Underway / Underway	Deployed	0.35 kg	2	2.7 - 13.5 mi	19,686	Surveillance
Qods Aeronautics Industries	Mohajer II/III (Dorna); Mohajer IV (Hodhod); Saeqeh I/II; Tallash I/Endeavor; Tallash II Hadaf 3000	Complete / Underway	Deployed					Multirole aka Lightning Bolt Target drone - aka Target 3000

Iran is developing a range of UCAVs, and has made recent claims to a long-range “stealth” UCAV bomber

Source: Adapted by Adam C. Seitz from AIAA Aerospace 9 Worldwide UAV Roundup; available at: http://www.aiaa.org/Aerospace/images/articleimages/pdf/UAVs_APR2009.pdf.

*R/S: Reconnaissance / Surveillance; **ISR: Intelligence / Surveillance / Reconnaissance

Gulf Air Balance

Air Bases and Air Force Order of Battle (2009)

Three Main Iranian Nuclear Facilities

- Natanz: Uranium Enrichment Facility
- Arak: Heavy Water Nuclear Reactor and Possible Future Plutonium Production Reactor
- Esfahan: Nuclear Research Center. Uranium Conversion Facility (UCF)

Air Bases Source: Global Security.org
Order of Battle Source: Anthony Cordesman CSIS

	Combat A/C	Attack Helo's
Iran	319	95
Iraq	-	37
Kuwait	50	45
Bahrain	33	16
Qatar	18	25
UAE	184	67
Oman	64	41
Saudi Arabia	278	67
Yemen	179	18

Iran Airbases

Tabriz	F-5E/F, MiG-29
Hamadan	F-4E/D Su-24
Dezful	F-5E/F
Bushehr	F-4E/D F-14
Bandar Abbas	2 Helicopter Wings
Shiraz	Su-25 Su-24
Esfahan	F-5E Su-24
Tehran	MiG-29 Su-24
Zahedan	F-7M
Kermanshah	F-5E/F

Range of Iran's Air Power

Mission Profile:
Hi-Lo-Hi

F-4E (Bushehr):
(4) MK83 1000lb Bombs
(1) 600 Gallon Fuel Tank
10 Minutes loiter time
Range = 400 nmi

SU-24 (Shiraz):
(4) 500 kg/1000 lb Bombs
(1) 400 gallon tank
10 minutes loiter time
Range = 590 nmi

SU-25 (Shiraz):
(4) 500kg/1000lb Bombs
(1) 400 gallon tank
(2) 10 minutes loiter time
Range = 600 nmi

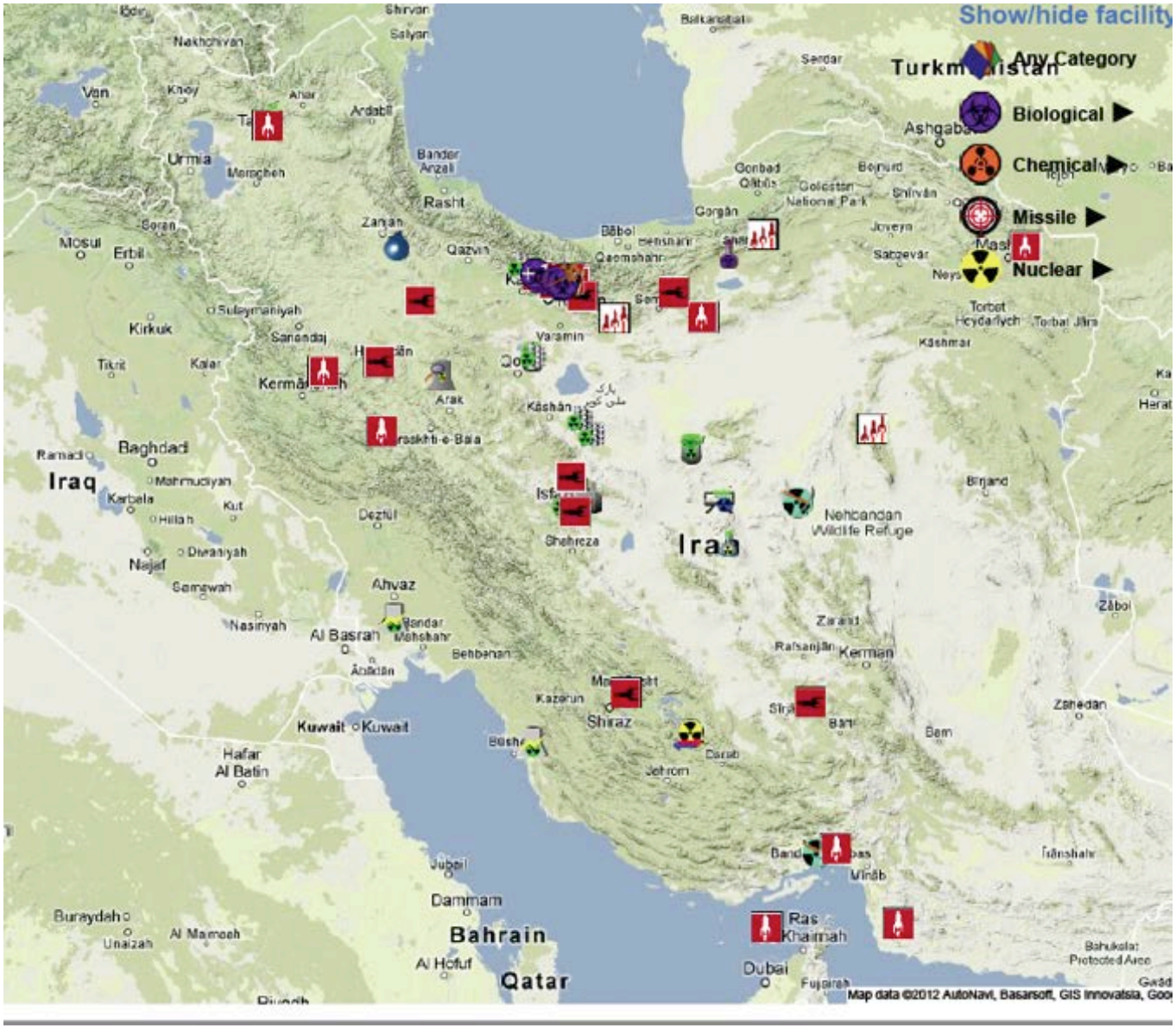
Gulf Land-Based Air Defenses In 2011

Country	Major SAM	Light SAM	AA Guns
Bahrain	8 I Hawk MIM-23B 60	RBS-70 18 FIM-92A Stinger 15 7 Crotale	27 guns Oerlikon 35 mm 12 L/70 40 mm
Iran	16/150 I Hawk 3/10 SA-5 45 SA-2 Guideline	SA-7/14/16, HQ-7 29 SA-15 Some QW-1 Misaq 29 TOR-M1 Some HN-5 5/30 Rapier 10 Pantsyr (SA-22) Some FM-80 (Ch Crotale) 15 Tigercat Some FIM-92A Stinger	1,700 Guns ZSU-23-4 23mm ZPU-2/4 23mm ZU-23 23mm M-1939 37mm S-60 57mm ZSU-57-2
Iraq			
Kuwait	5 / 24 I Hawk Phase III 12 5/40 Patriot PAC-2 12	Aspide Starburst Aspide Stinger	12 Oerlikon 35mm
Oman mm	None	Blowpipe 8 Mistral 2 SP 12 Panstsyr S1E 34 SA-7 6 Blindfire S713 Martello 20 Javelin 40 Rapier	26 guns 4 ZU-23-2 23 mm 10 GDF-005 Skyguard 35 12 L-60 40 mm
Qatar	None	10 Blowpipe 12 FIM-92A Stinger 9 Roland II 24 Mistral 20 SA-7	?
Saudi Arabia (NG)	16/128 I Hawk 4-6/16-24 Patriot 2 17/73 Shahine Mobile 16/96 PAC-2 launchers 17 ANA/FPS-117 radar 73/68 Crotale/Shahine	40 Crotale 500 Stinger (ARMY) 92 500 Mistral (ADF) 500 FIM-43 Redeye 8 50 AMX-30SA 30 mm 500 Redeye (ADF) 128 GDF Oerlikon 35mm 73-141 Shahine static 1 50 L-70 40 mm (in store) 130 M-2 90 mm (NG)	1,220 guns M-163 Vulcan 20 mm 30 M-167 Vulcan 20 mm
UAE	2/6/36 I Hawk	20+ Blowpipe 20 Mistral Some Rapier Some Crotale Some RB-70 Some Javelin Some SA-18	62 guns 42 M-3VDA 20 mm SP 20 GCF-BM2 30 mm
Yemen	Some SA-2, 3 Some SA-6 SP	Some 800 SA-7 Some SA-9 SP Some SA-13 SP Some SA-14	530 guns 20 M-163 Vulcan SP 20mm 50 ZSU-23-4 SP 23 mm 100 ZSU-23-2 23 mm 150 M-1939 37 mm 50 M-167 20mm 120 S-60 57 mm 40 M-1939 KS-12 85 mm

Source: Adapted by Anthony H. Cordesman from IISS, The Military Balance, Periscope, JCSS, Middle East Military Balance, Jane's Sentinel and Jane's Defense Weekly. Some data adjusted or estimated by the author.

Missile Defense and Missile Wars

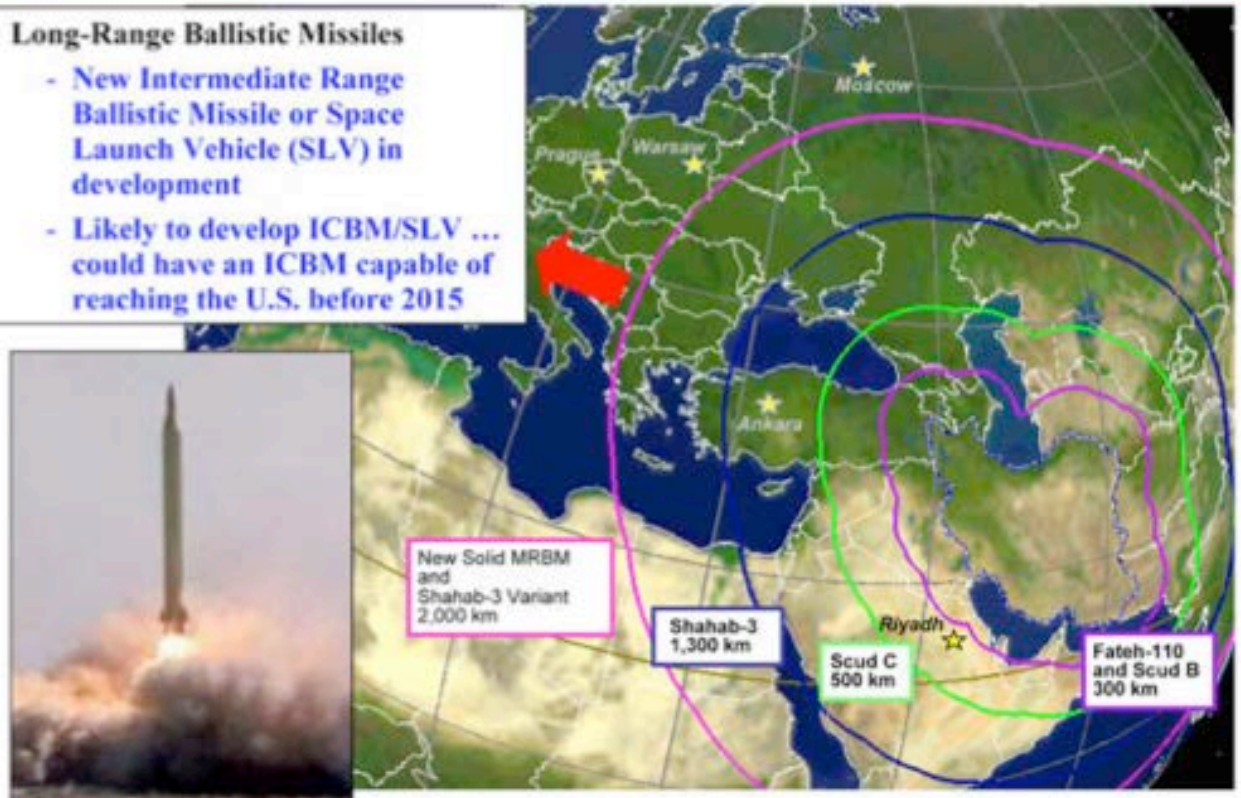
Iran: Major Open Source Missile and WMD Facilities



Source: NTI, http://www.nti.org/gmap/?country=iran&layers, September 2012

Iranian Missile Threat

- **Long-Range Ballistic Missiles**
  - **New Intermediate Range Ballistic Missile or Space Launch Vehicle (SLV) in development**
  - **Likely to develop ICBM/SLV … could have an ICBM capable of reaching the U.S. before 2015**



Shehab 3/3A

Range (km)	Payload (kg)
1,350	1,158
1,400	987
1,500	760
1,540	650
1,560	590.27
1,580	557.33
1,600	550
1,780	240
2,000	-

(Source: Missile Defense Program Overview for the European Union, Committee on Foreign Affairs, Subcommittee on Security and Defense. Dr. Patricia Sanders. Executive Director. Missile Defense Agency)

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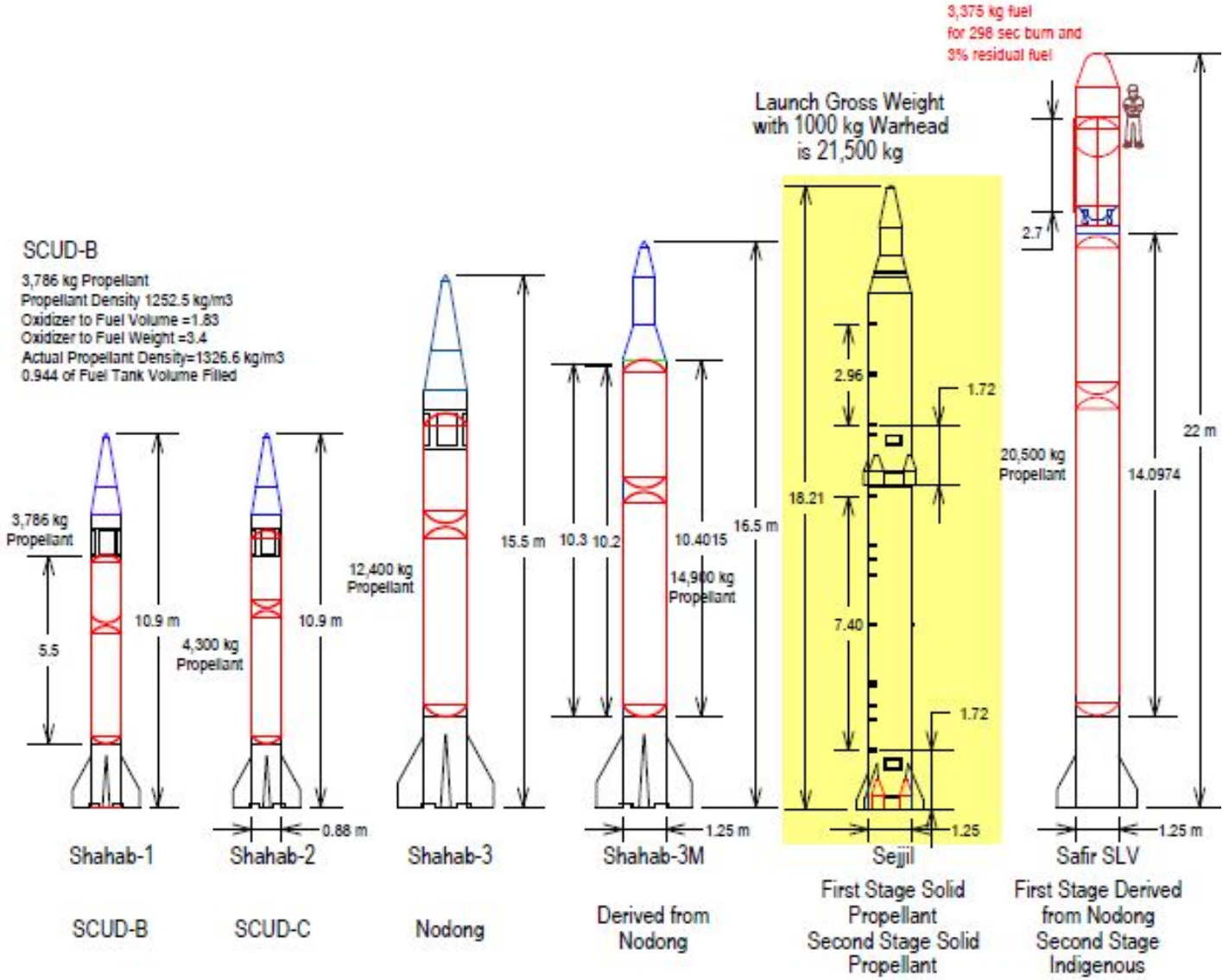
Iran's Longer-Range Missiles



(Reference: Theodre Postol, "A Technical Assessment of Iran's Ballistic Missile Program" May 6, 2009. Technical Addendum to the Joint Threat Assessment on Iran's Nuclear And Missile Potential.)

Missiles and States with Nuclear Weapons

Iran

SRBM < 1000 km	MRBM 1,000 – 3,000 km	IRBM 3,000 – 5,500 km	ICBM > 5,500 km
Shahab-1	Shahab-3	Shahab-5	Shahab-6
Shahab-2	Shahab-4	-	-
Mushak-120	Ghadr-101	-	-
Mushak-160	Ghadr-110	-	-
Mushak-200	IRIS	-	-
-	Sajil	-	-

Syria

SRBM < 1000 km	MRBM 1,000 – 3,000 km	IRBM 3,000 – 5,500 km	ICBM > 5,500 km
SCUD-B	-	-	-
SCUD-C	-	-	-
SCUD-D	-	-	-
SS-21b	-	-	-

Israel

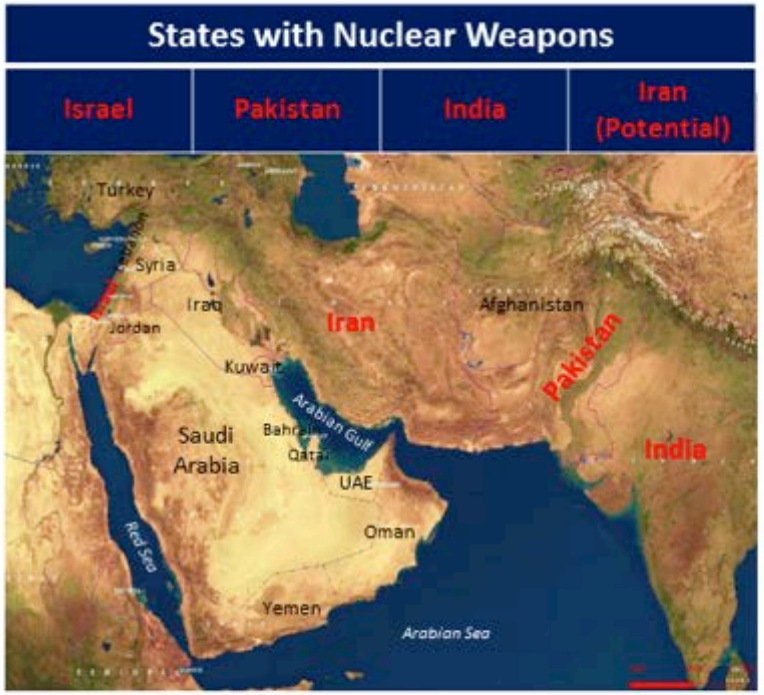
SRBM < 1000 km	MRBM 1,000 – 3,000 km	IRBM 3,000 – 5,500 km	ICBM > 5,500 km
-	Jericho II	-	Jericho III

Pakistan

SRBM < 1000 km	MRBM 1,000 – 3,000 km	IRBM 3,000 – 5,500 km	ICBM > 5,500 km
Shaheen I	Shaheen II	-	-
Hatf I	Ghauri I	-	-
Hatf II	Ghauri II	-	-
Hatf III	Ghauri II	-	-
M-11	-	-	-

India

SRBM < 1000 km	MRBM 1,000 – 3,000 km	IRBM 3,000 – 5,500 km	ICBM > 5,500 km
Agni I	Agni II	Agni III	Surya
Prithvi I			
Prithvi II			



Iran is the only state between the four that has signed and ratified the NPT Treaty.

Iran has been heavily investing in:

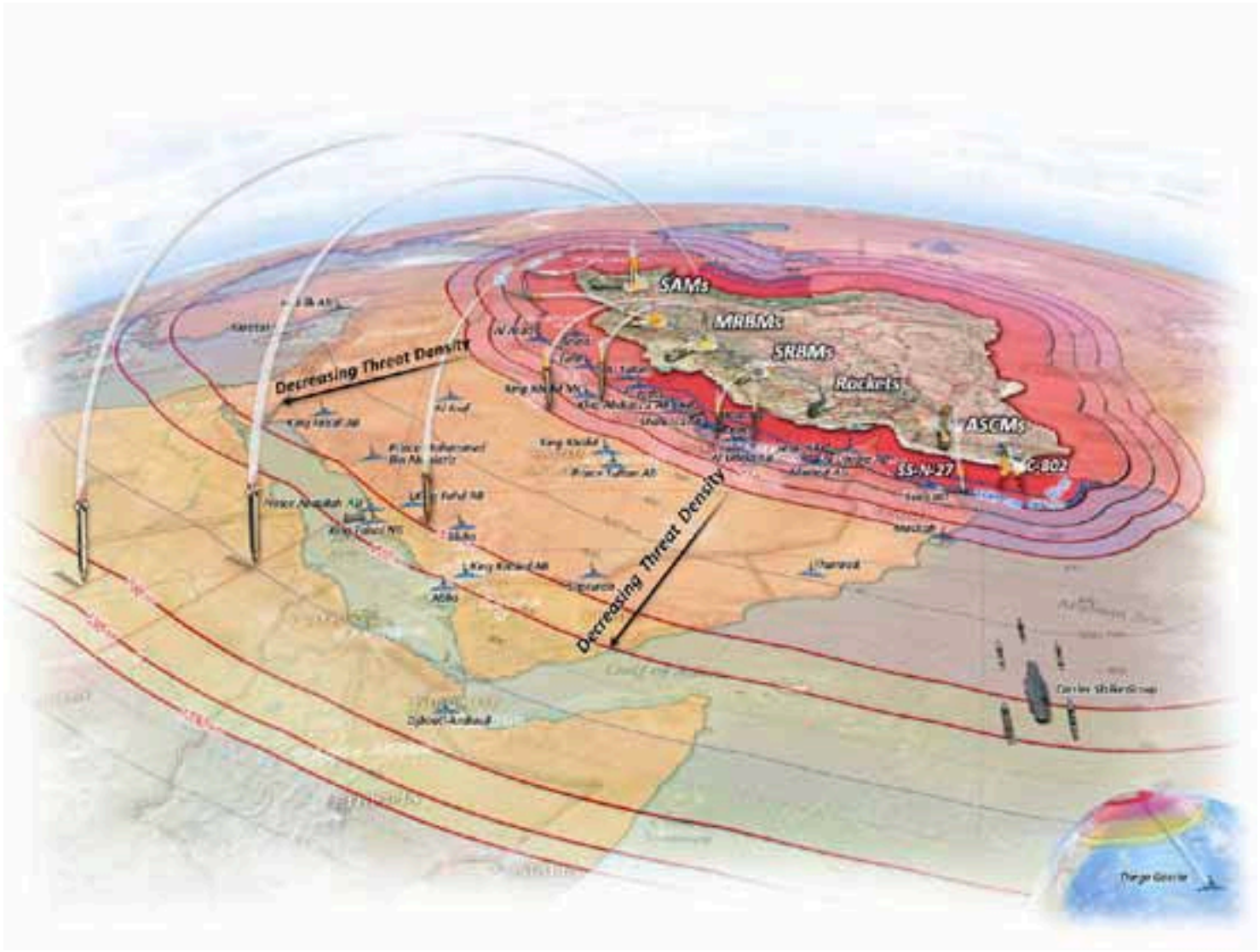
- Precision Strike Munitions
- Naval-anti-ship weapons such as the Chinese C802 that hit the Israeli Navy ship during the 2006 war in Lebanon and the Ra'ad 350 km anti-ship missile.
- Ballistic Missiles
- Cruise Missiles such as the Kh55 Russian land attack cruise missile, effective against Oil Platforms.

SRBM : Short Range Ballistic Missile
MRBM : Medium Range Ballistic Missile
IRBM : Intermediate Range Ballistic Missile
ICBM : Intercontinental Ballistic Missile

THE RANGE OF IRAN'S SHAHAB-3

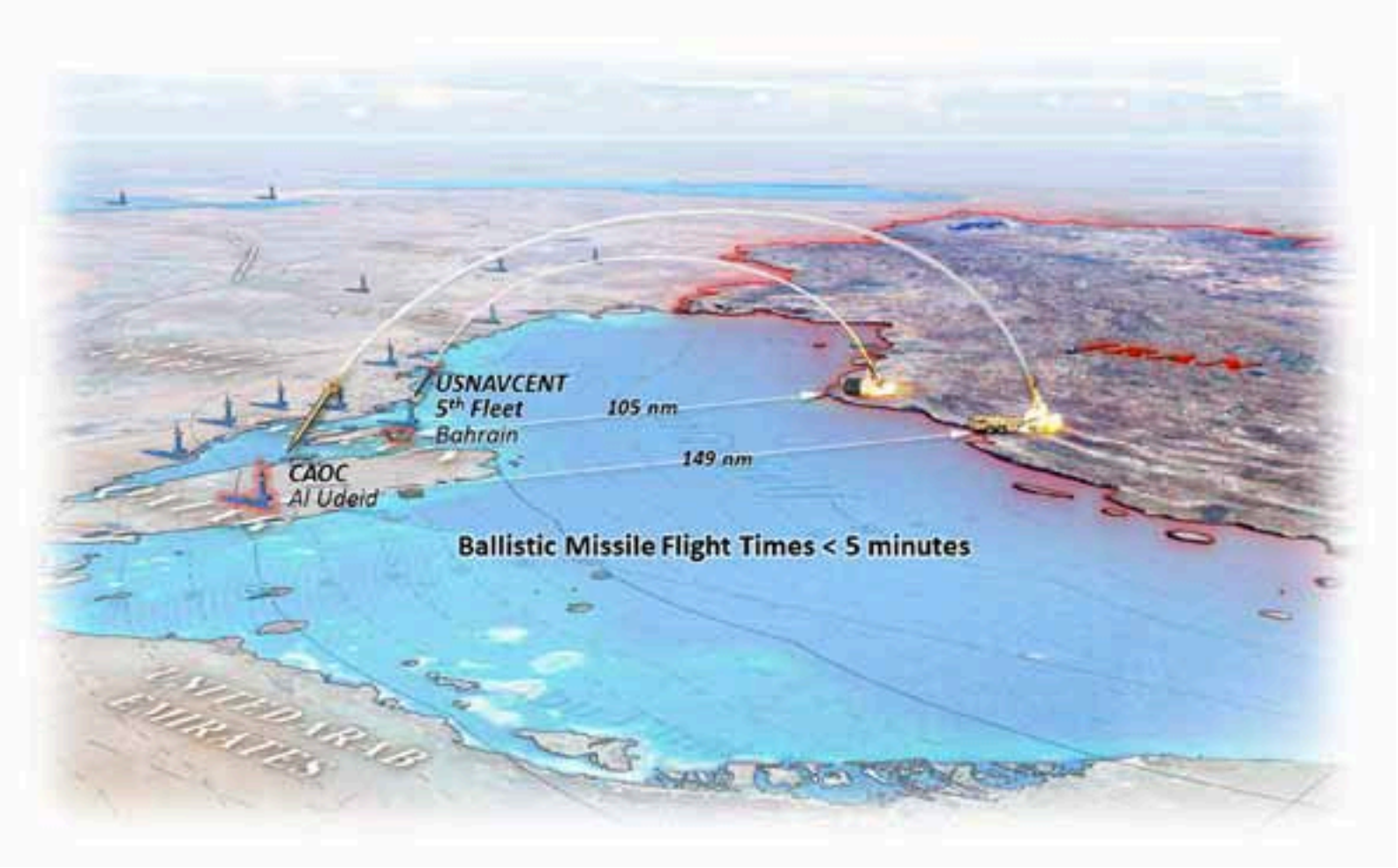
Source: Stratfor,
http://www.google.com/imgres?imgurl=http://digitaljournal.com/img/1/2/2/8/5/5/i/5/7/1/o/iran_missile_map.jpg&imgrefurl=http://digitaljournal.com/image/57146&h=364&w=400&sz=56&tbnid=nAmeBGGgErdwGM:&tbnh=90&tbnw=99&zoom=1&docid=fih86K5v8K5dAM&sa=X&ei=A947T_D9Ncbr0gHIvMjRCw&ved=0CDUQ9QEwAw&dur=235

Missile Attack Range and Density



Source: Adapted from Mark Gunzinger and Christopher Dougherty, *Outside-In Operating from Range to Defeat Iran's Anti-Access and Area-Denial Threats*, CBSA, Washington DC, 2011..

Missile Attack Timing



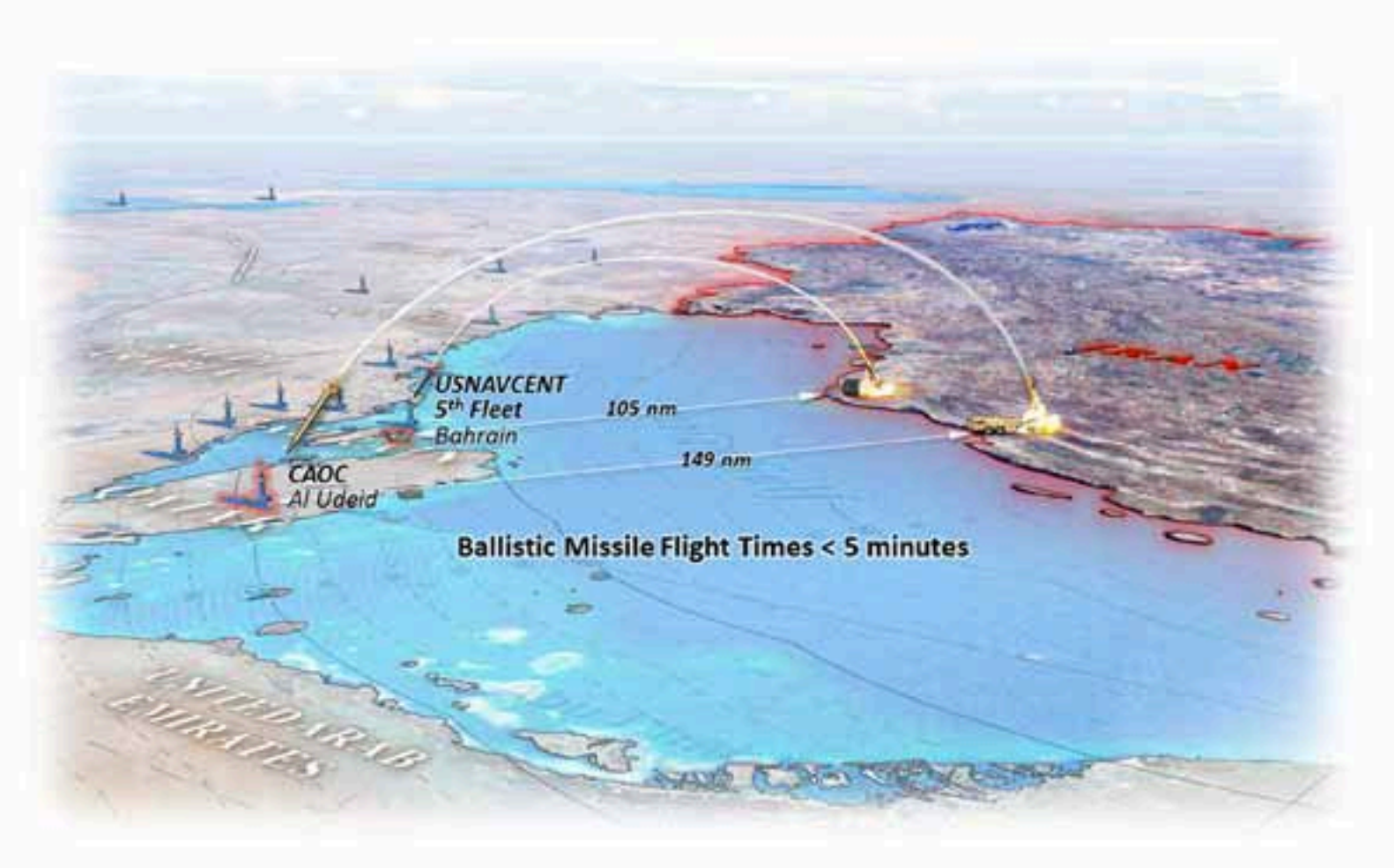
Source: Adapted from Mark Gunzinger and Christopher Dougherty, *Outside-In Operating from Range to Defeat Iran's Anti-Access and Area-Denial Threats*, CBSA, Washington DC, 2011..

Missile Threats and the Future WMD Balance

Iranian Missile Range

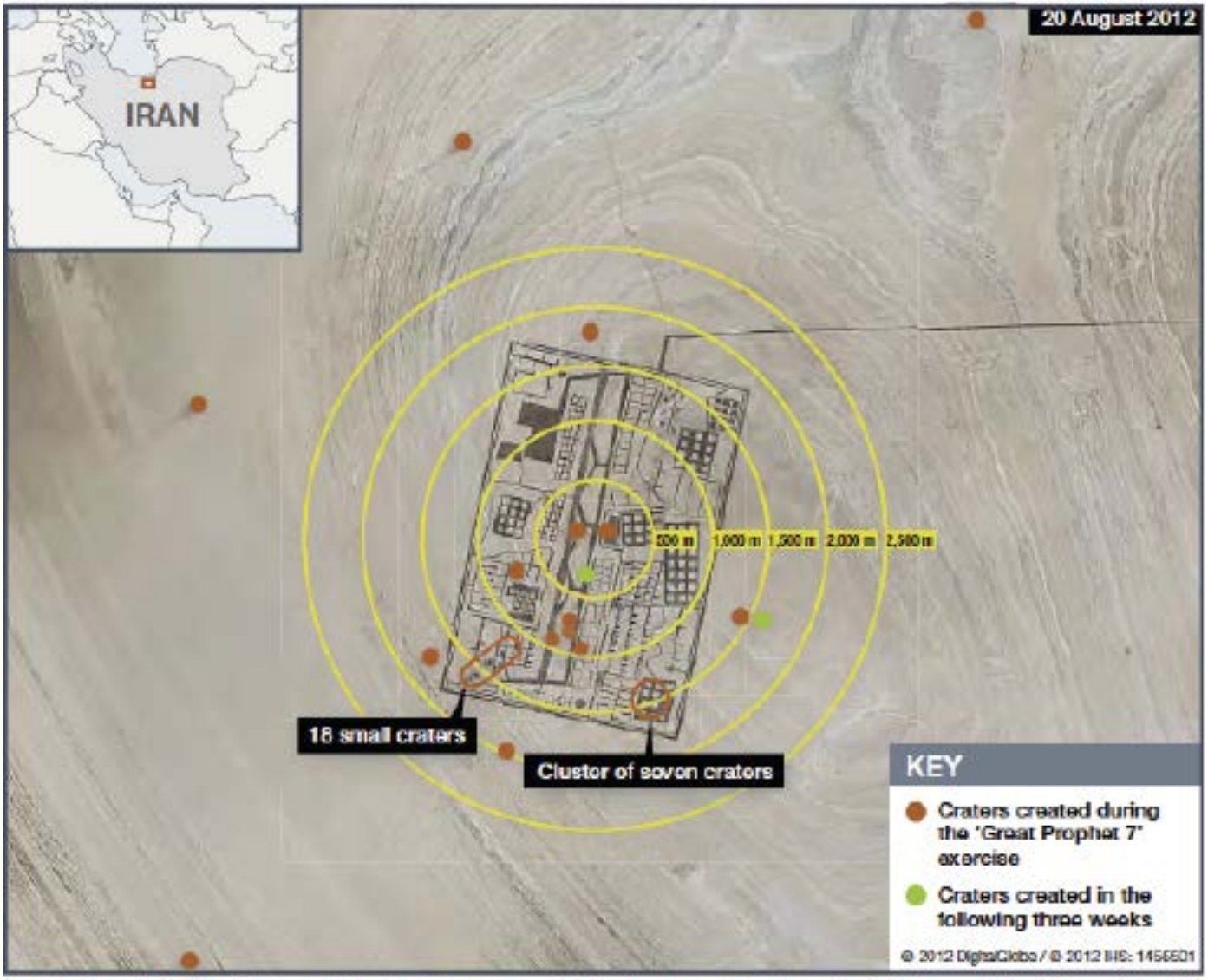
Source: Stratfor, http://www.google.com/imgres?imgurl=http://digitaljournal.com/img/1/2/2/8/5/5/i/5/7/1/o/iran_missile_map.jpg&imgrefurl=http://digitaljournal.com/image/57146&h=364&w=400&sz=56&tbnid=nAmeBGGgErdwGM:&tbnh=90&tbnw=99&zoom=1&docid=fih86K5v8K5dAM&sa=X&ei=A947T_D9Ncbr0gHIvMjRCw&ved=0CDUQ9QEwAw&dur=235

Missile Attack Timing



Source: Adapted from Mark Gunzinger and Christopher Dougherty, *Outside-In Operating from Range to Defeat Iran's Anti-Access and Area-Denial Threats*, CBSA, Washington DC, 2011..

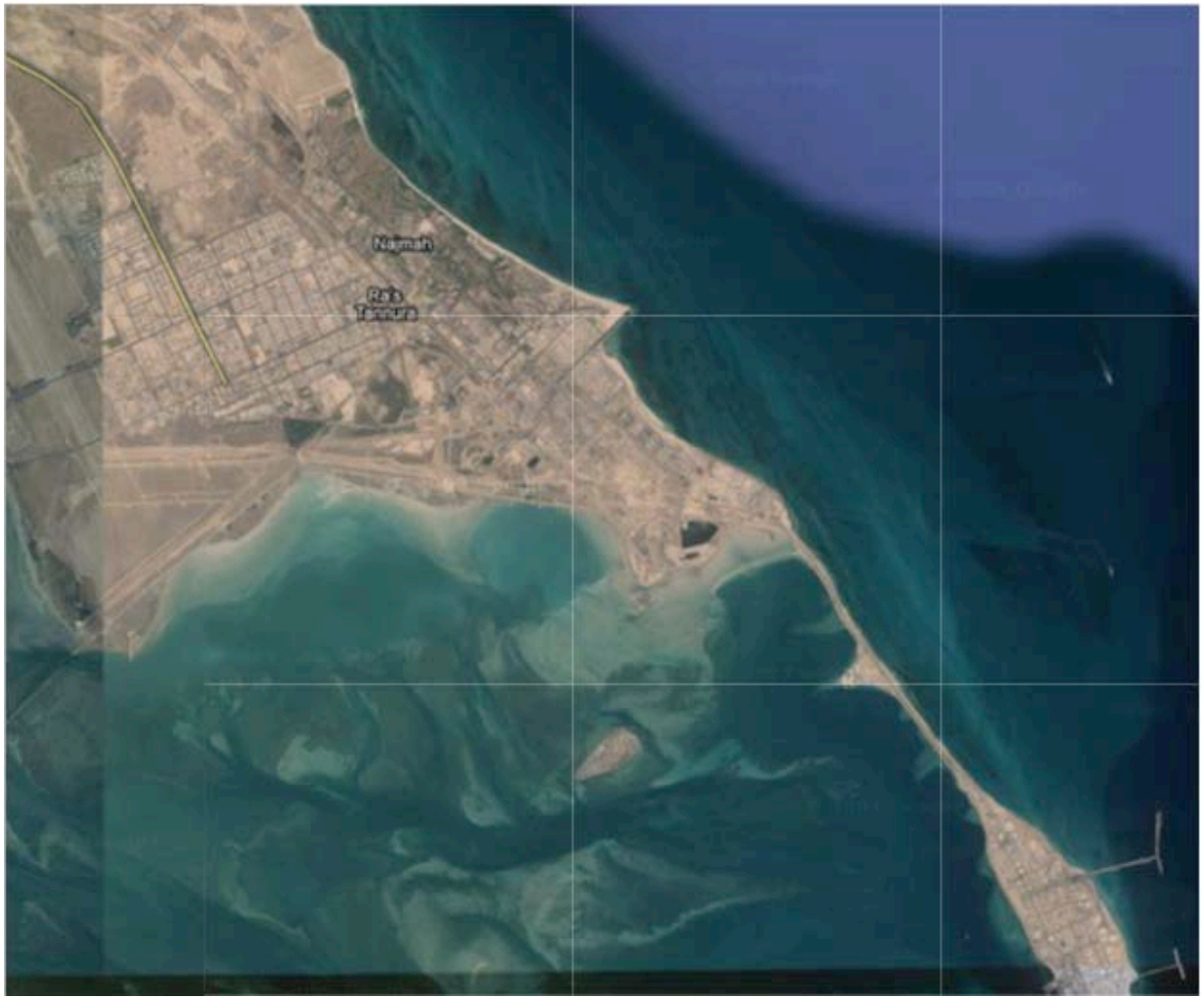
Missile Accuracy, Reliability, and Targeting



Iran's 'Great Prophet 7' exercise in July was explicitly designed to show that it is capable of targeting US bases in the region. A range of Iranian ballistic missiles and rockets were fired from different locations at a model air base that had been constructed in the desert 90 km southeast of the Semnan Space Centre. This DigitalGlobe satellite imagery shows the accuracy achieved during the exercise.

Source: Digital Globe And "2012 Annual Defense, Report," *Jane's Defence Weekly*, ,12 December 2012, p., 47

Ras Tanura



Source: Google maps

Desalination Plant

89

Source: Google maps

Sea Based Air Defenses
U.S. Navy's Role in Missile Defense Network

Role of the U.S. Navy Aegis System:

• Will provide an efficient and highly mobile sea-based defense against Short and Medium – Range Ballistic Missiles in their midcourse phase.

• The system will allow the BMD Command to move its defense capabilities close to the enemy sites.

• The system will have the Engagement & Long Range Tracking Capability

• Intercepting Short to Medium Range Ballistic Missiles in the midcourse phase of the flight with Standard Missile – 3.

• Serves as a forward deployed sensor, providing early warning and long range search & track capabilities for ICBMs and IRBMs.

Contributions:

•Will extend the battle space of the BMDs and contribute to an integrated layered defense. The Naval Aegis system extends the range of the Ground Missile defense (GMD) element by providing reliable track data used to calculate firing solutions.

• Aegis BMD will coordinate engagements of short and medium range ballistic missiles with terminal missile defense systems.

• As tracking information is shared among these systems, the BMDS will have the opportunity to follow the engagement of a target during the midcourse segment with coordinated terminal engagem

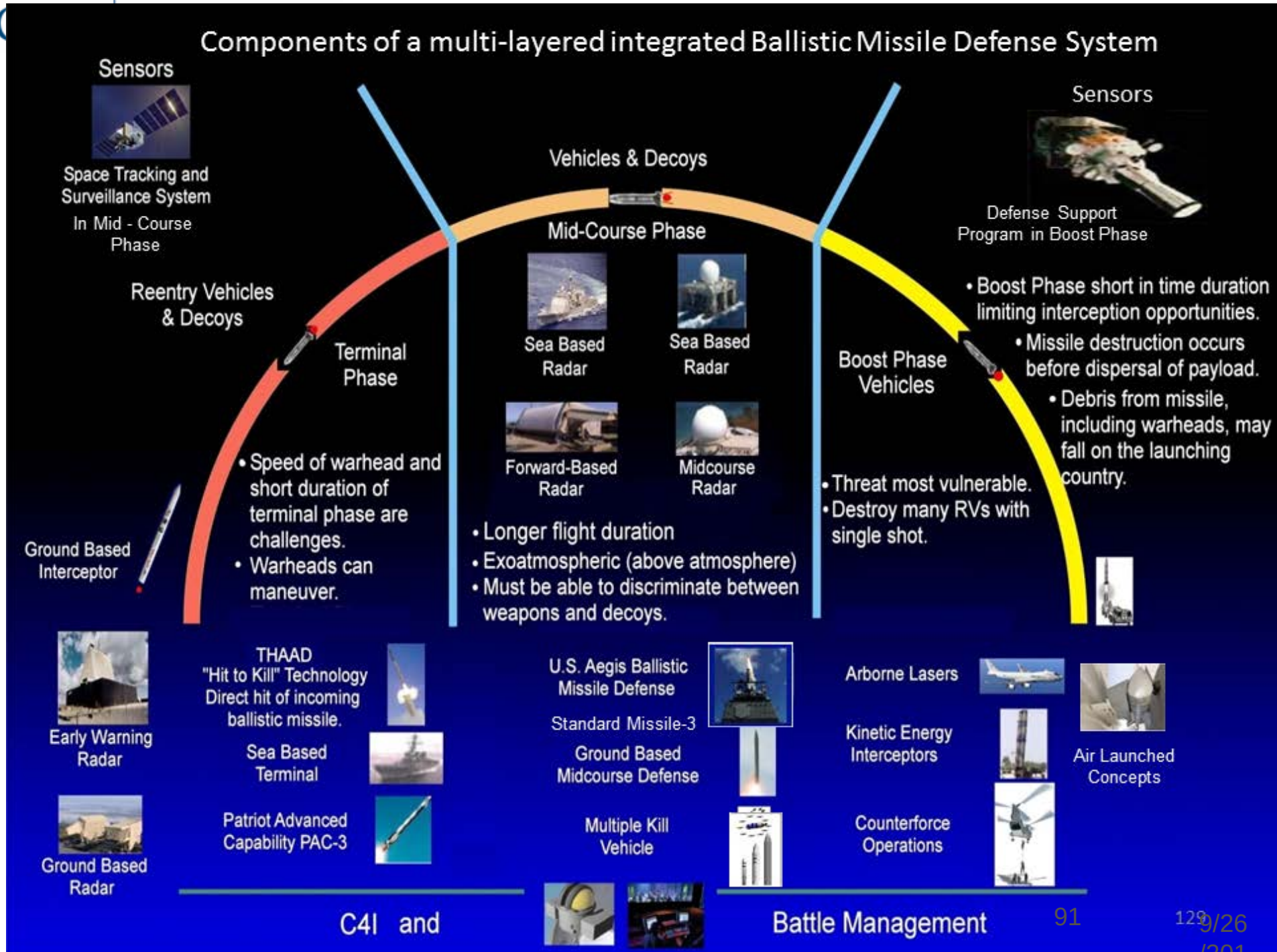
Sea Based Radar

Sea Based Radar

Aegis Ballistic Missile

(Source: Missile Defense Agency. (MDA) Department of Defense. "Testing Building Confidence", 2009)

Components of a multi-layered integrated Ballistic Missile Defense System

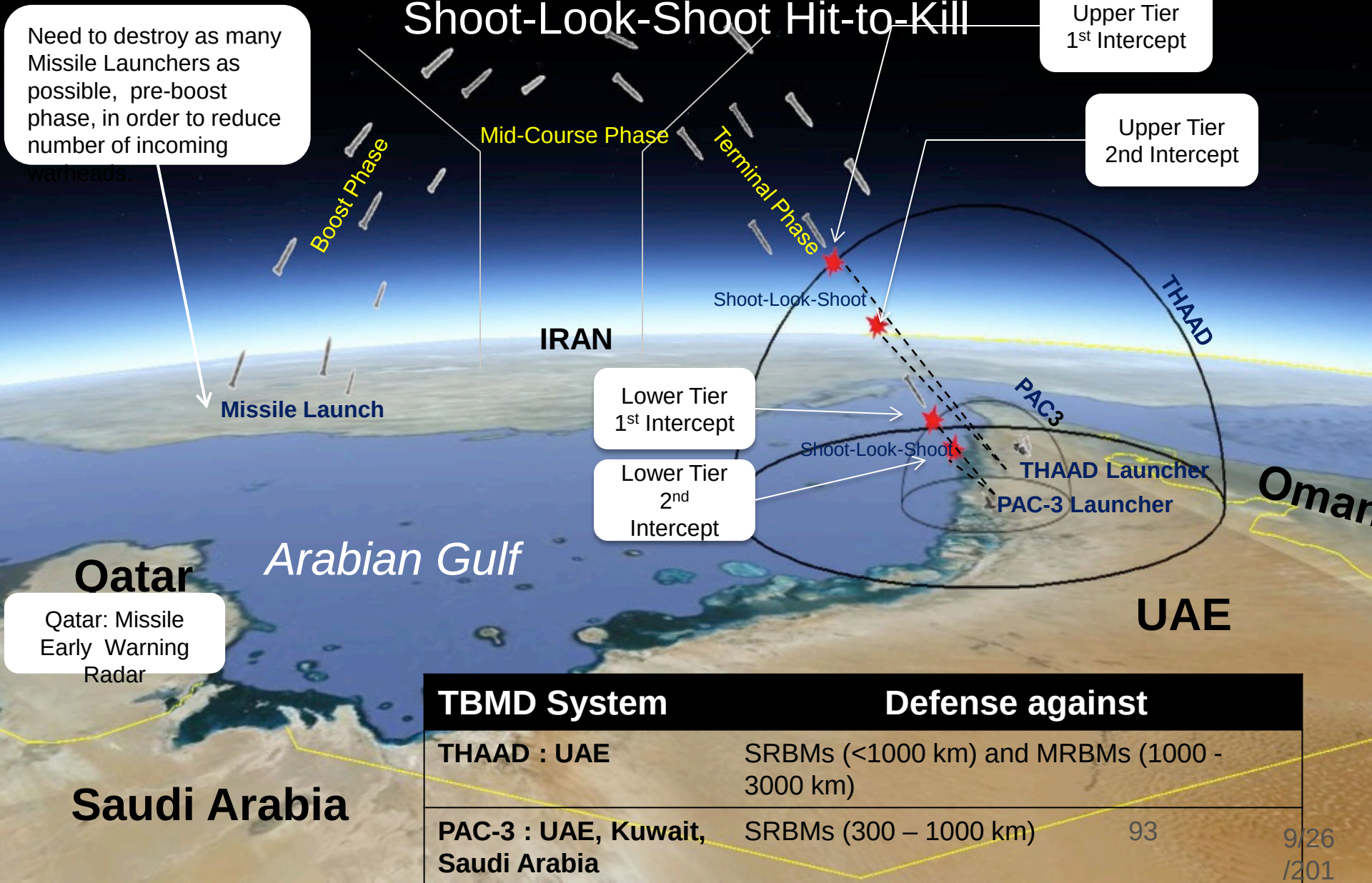


GCC Missile Defense Upgrades

Country	TBMD System
UAE	• The UAE is so far the first GCC country to buy the Terminal High Altitude Air Defense (THAAD) missile system. • On Dec 31, 2011 Pentagon announced that the UAE will be buying 2 full THAAD batteries, 96 missiles, 2 Raytheon AN/TPY-2 radars, and 30 years of spare parts. Total Value $3.34 billion. • In 2008 the UAE ordered Patriot PAC-3: 10 fire units, 172 missiles, First delivery 2009.
Kuwait	July 2012, Pentagon informed Congress of a plan to sell Kuwait $4.2 billion in weapon systems, including 60 PAC-3 missiles, 20 launching platforms and 4 radars. This will be in addition to the 350 Patriot missiles bought between 2007 and 2010. In 1992, Kuwait bought 210 of the earlier generation Patriots and 25 launchers. Kuwait bought a further 140 more in 2007.
Saudi Arabia	In 2011 Saudi Arabia signed a $1.7 billion US contract to upgrade it's Patriot anti-missile system.
Qatar	The U.S. is building a Missile Warning Facility in Qatar that would utilize an AN/TPY-2-X Band Radar.

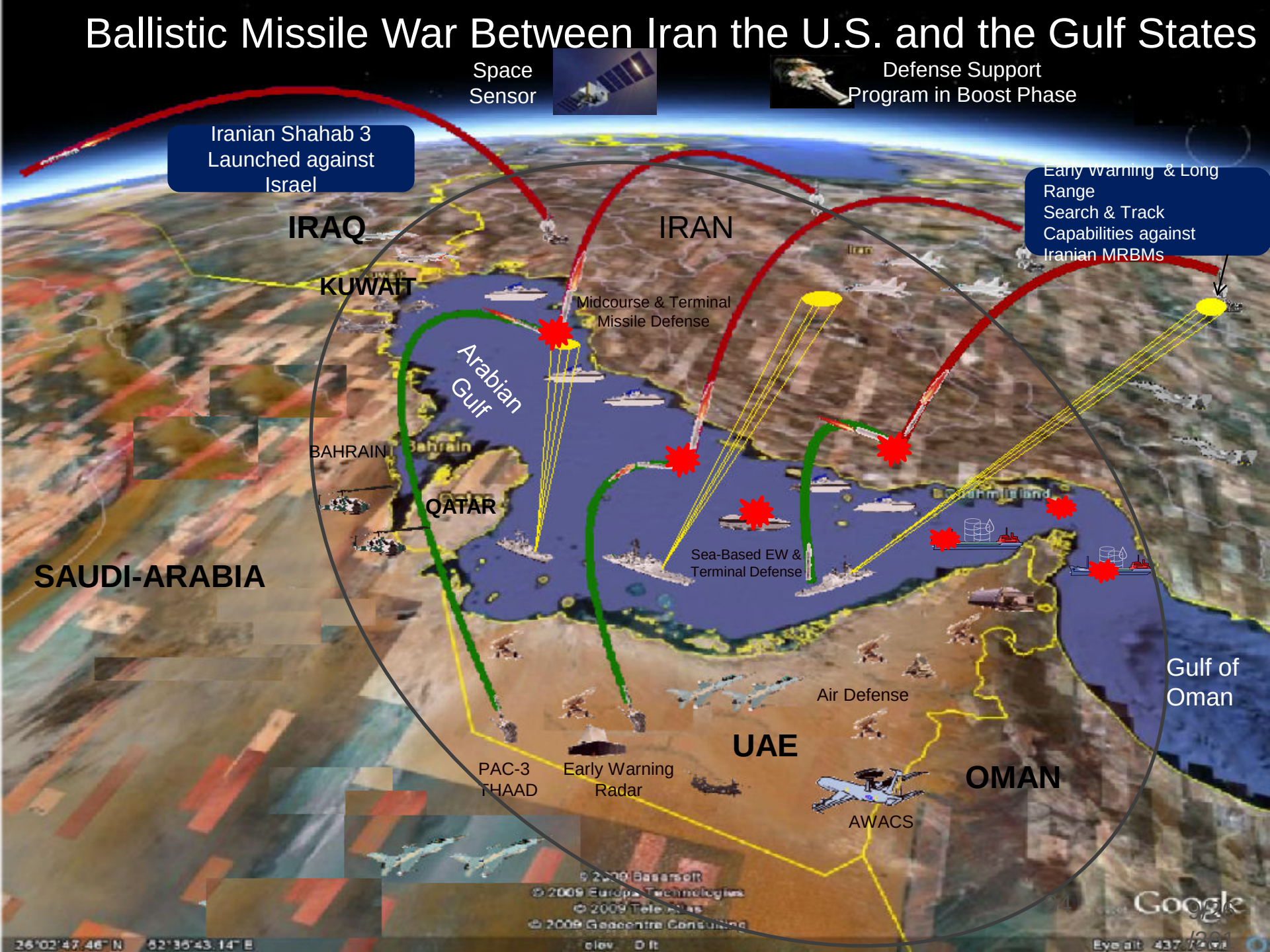
(Source: Anthony Cordesman and Alexander Wilner, "Iran and the Gulf Military Balance -1" July 11, 2012)

Two Tier Theater Ballistic Missile Defense (TBMD) – THAAD & PAC 3
Endo and Exo-Atmospheric Engagements using Shoot-Look-Shoot Hit-to-Kill



TBMD System	Defense against
THAAD : UAE	SRBMs (<1000 km) and MRBMs (1000 - 3000 km)
PAC-3 : UAE, Kuwait, Saudi Arabia	SRBMs (300 – 1000 km)

Ballistic Missile War Between Iran the U.S. and the Gulf States



Visualizing the Nuclear Threat


300 miles
500 km
TURKEY
CASPIAN SEA
TURKMENISTAN
Lashkar A' bad
Tehran
Sites circled in red
unknown pre-mid 2002
IRAQ
Arak
Natanz
Isfahan
IRAN
Saghand
Ardekan
AFGHANISTAN
PAKISTAN
KUWAIT
Bushehr
The Gulf
Gachin
BAHRAIN
SAUDI ARABIA
QATAR
Gulf of Oman
MIDDLE EAST
MW Megawatts
Uranium processing facility
Uranium mines
Heavy-water facility
Research reactors / research facilities
Uranium enrichment facility
Light-water reactor (under construction)
Source: IISSmaps
IISSmaps

Iran: The Broader Target List: 54+

Nuclear-Conversion
- Jabr Ibn Hayan Mulitpurpose Laboratories (JHL)
- Rudan Conversion Facility
- Uranium Conversion Facility (UCF)

Nuclear-Education and Training
- Amir Kabir University of Technology
- Imam Hussein University (IHU)
- Institute for Studies in Theoretical Physics and Mathematics (IPM)
- Malek Ashtar University (MAU)
- Sharif University of Technology (SUT)
- University of Tehran (UT)

Nuclear-Enrichment
- 7th of Tir Industries
- Defense Industries Organization (DIO)
- Farayand Technique
- Fordow Fuel Enrichment Plant
- Fuel Enrichment Plant (FEP)
- Kalaye Electric Company
- Kaveh Cutting Tools Company/Abzar Boresh Kaveh Co
- Lashkar Ab'ad
- Natanz Enrichment Complex
- Pars Trash
- Pilot Fuel Enrichment Plant (PFEP)
- Tehran Nuclear Research Center (TNRC)

Nuclear-Fuel Fabrication
- Fuel Fabrication Laboratory (FFL)
- Fuel Manufacturing Plant (FMP)
- Zirconium Production Plant (ZPP)

Nuclear-Heavy Water Production
- Heavy Water Production Plant (HWPP)

Nuclear-Mining and Milling
- Ardakan Yellowcake Production Plant
- Bandar Abbas Uranium Production Plant (BUP)
- Saghand

Nuclear-Power Reactors
- Darkhovin Nuclear Power Plant

Nuclear-Regulatory
- Atomic Energy Organization of Iran (AEOI)

Nuclear-Reprocessing
- Tehran Nuclear Research Center (TNRC)

Nuclear-Research Reactors
- IR-40
- Miniature Neutron Source Reactor (MNSR)
- Tehran Research Reactor (TRR)

Nuclear-Research and Development
- Bonab Atomic Energy Research Center
- Graphite Sub-Critical Reactor (ENTC GSCR)
- Heavy Water Zero Power Reactor (ENTC-HWZPR)
- Isfahan (Esfahan) Nuclear Fuel Research and Production Center (NFRPC)
- Isfahan (Esfahan) Nuclear Technology Center (INTC)
- Karaj Agricultural and Medical Research Center
- Light Water Sub-Critical Reactor (ENTC-LWSCR)
- Plasma Physics Research Center
- Tehran Nuclear Research Center (TNRC)
- Yazd Radiation Processing Center (YRPC)

Nuclear-Waste Management
- Anarak Waste Storage Facility
- Isafan (Esfahan) Nuclear Waste Storage Facility
- Karaj Waste Storage Facility
- Qom Waste Disposal Site

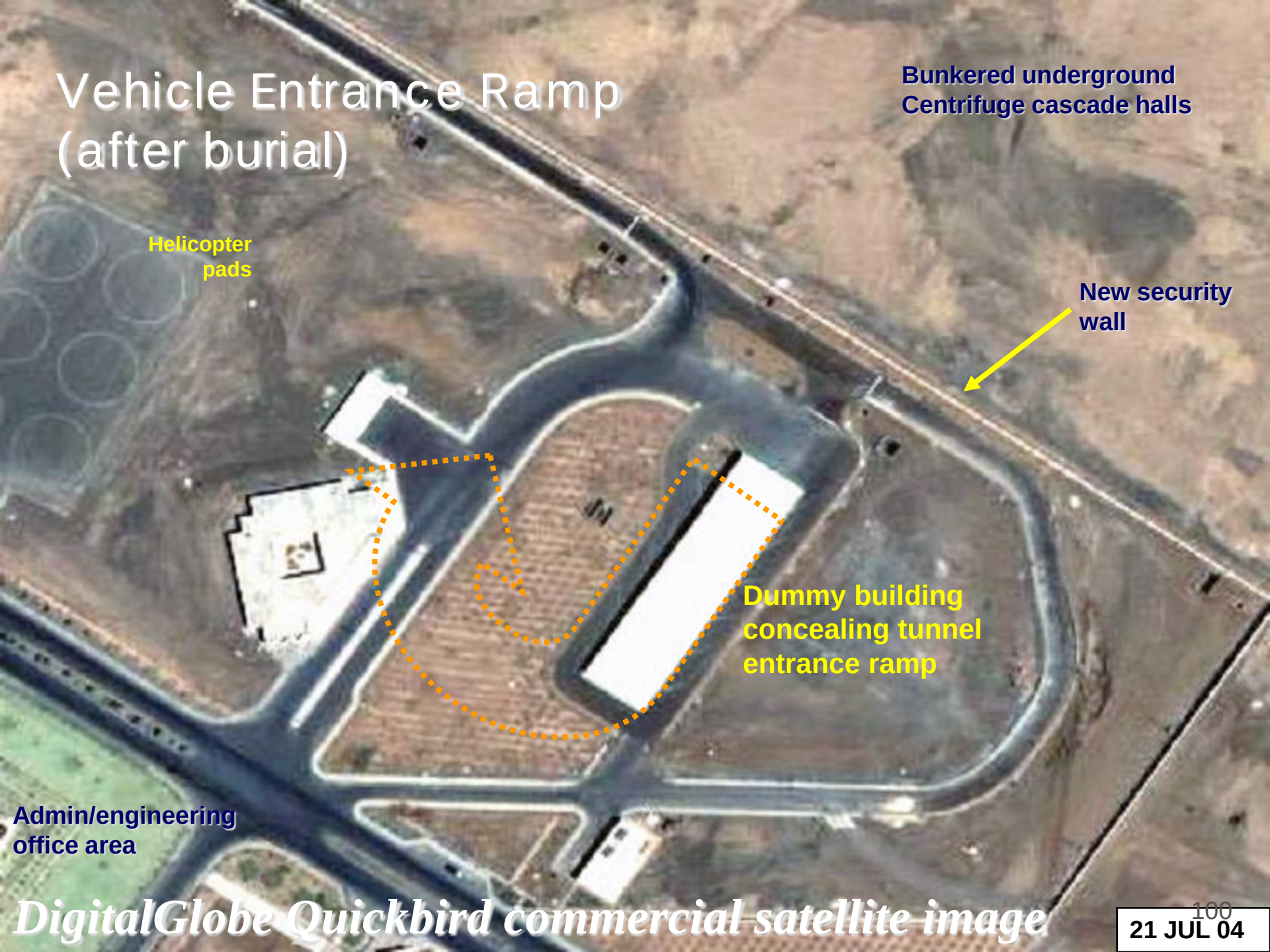
Nuclear-Weaponization
- Institute of Applied Physics (IAP)
- Kimia Maadan Company (KM)
- Parchin Military Complex
- Physics Research Center (PHRC)
- Tehran Nuclear Research Center (TNRC)

Source: Adapted from list by Nuclear Threat Initiative, September 2012, http://www.nti.org/country-profiles/iran/facilities/.

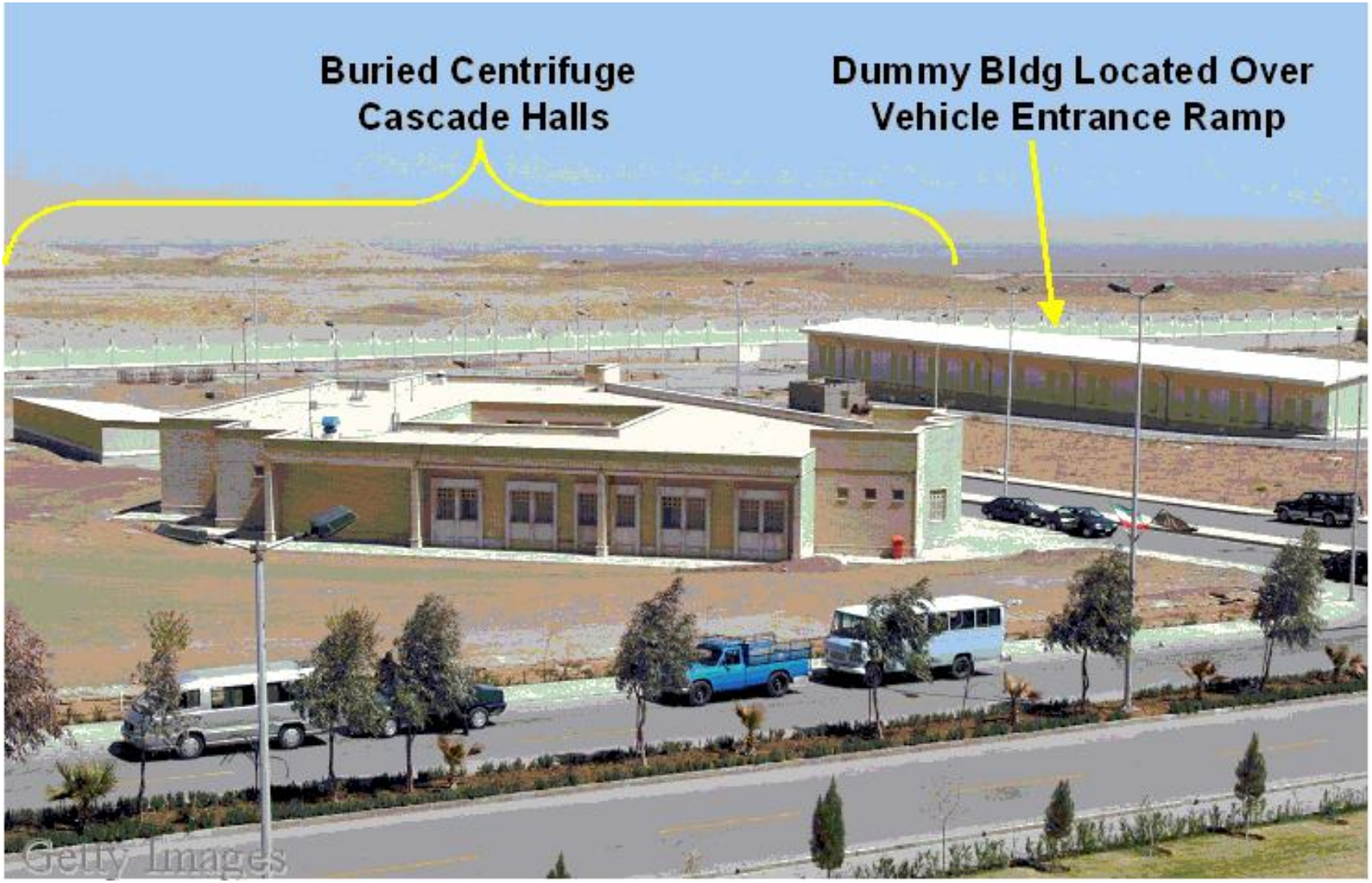
Natanz Upgrades in 2012

Source: Google http://www.dailymail.co.uk/news/article-2060213/Google-releases-satellite-images-Iranian-cities-UN-says-used-nuclear-weaponisation.html/


Vehicle Entrance Ramp
(before burial)
Bunkered underground
production halls
Admin/engineering
office area
DigitalGlobe Quickbird commercial satellite image
20 SEP 02


Vehicle Entrance Ramp
(after burial)
Bunkered underground
Centrifuge cascade halls
Helicopter
pads
New security
wall
Dummy building
concealing tunnel
entrance ramp
Admin/engineering
office area
DigitalGlobe Quickbird commercial satellite image
21 JUL 04

Natanz: Effective Concealment



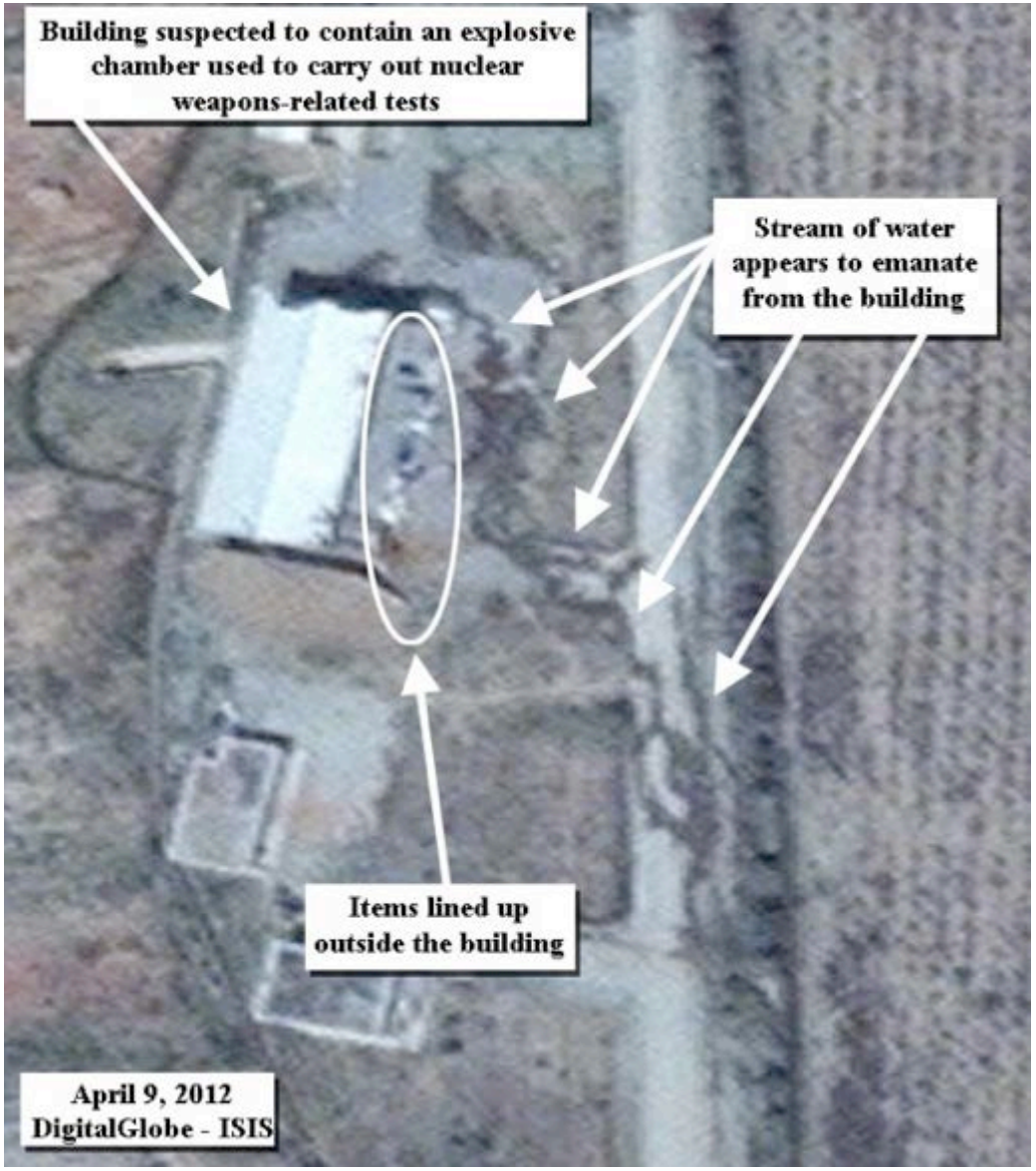
Heavy Water Reactor Facility at Arak in 2011

Source: Google http://www.dailymail.co.uk/news/article-2060213/Google-releases-satellite-images-Iranian-cities-UN-says-used-nuclear-weaponisation.html/

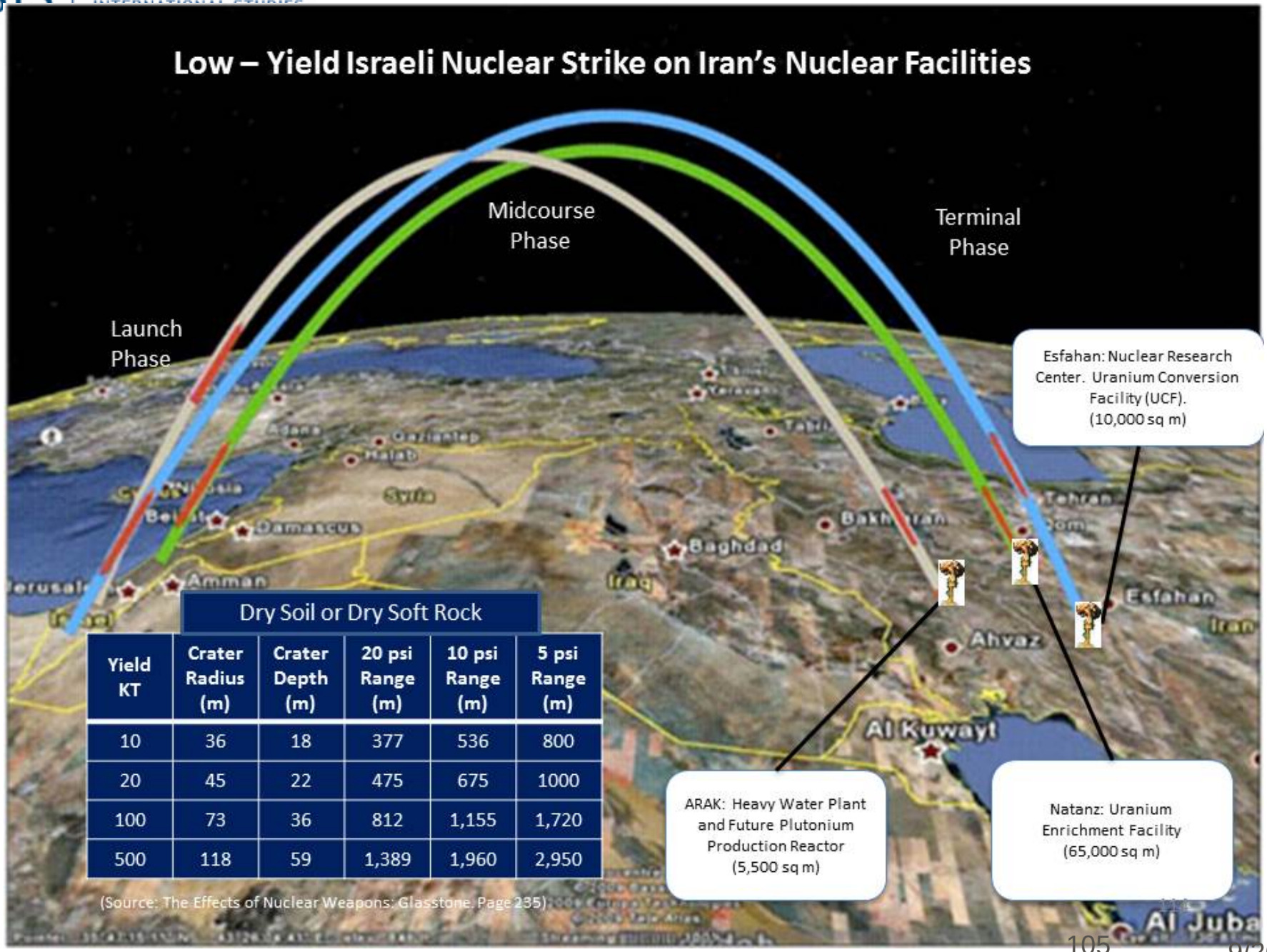
Fordow: 3,000 Centrifuges in a Mountain

Source: Ynet News:http://www.google.com/imgres?imgurl=http://www.ynetnews.com/PicServer2/13062011/3669116/AFP0661600-01-08809249_wa.jpg&imgrefurl=http://www.ynetnews.com/articles/

Razed Test Site (?) At Parchin



Source: ISIS and CNN, http://security.blogs.cnn.com/2012/05/30/cleanup-at-irans-parchin-site/



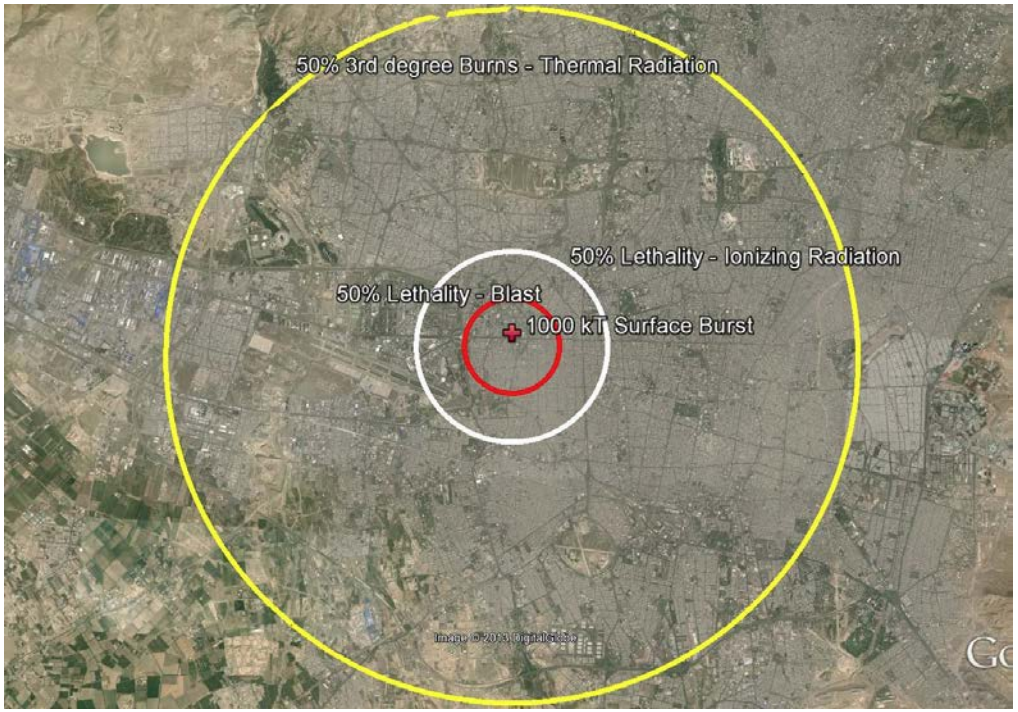
Dry Soil or Dry Soft Rock

Yield KT	Crater Radius (m)	Crater Depth (m)	20 psi Range (m)	10 psi Range (m)	5 psi Range (m)
10	36	18	377	536	800
20	45	22	475	675	1000
100	73	36	812	1,155	1,720
500	118	59	1,389	1,960	2,950

(Source: The Effects of Nuclear Weapons: Glasstone, Page 235)

Nuclear Capability and Risk

Tehran: 1 Megaton



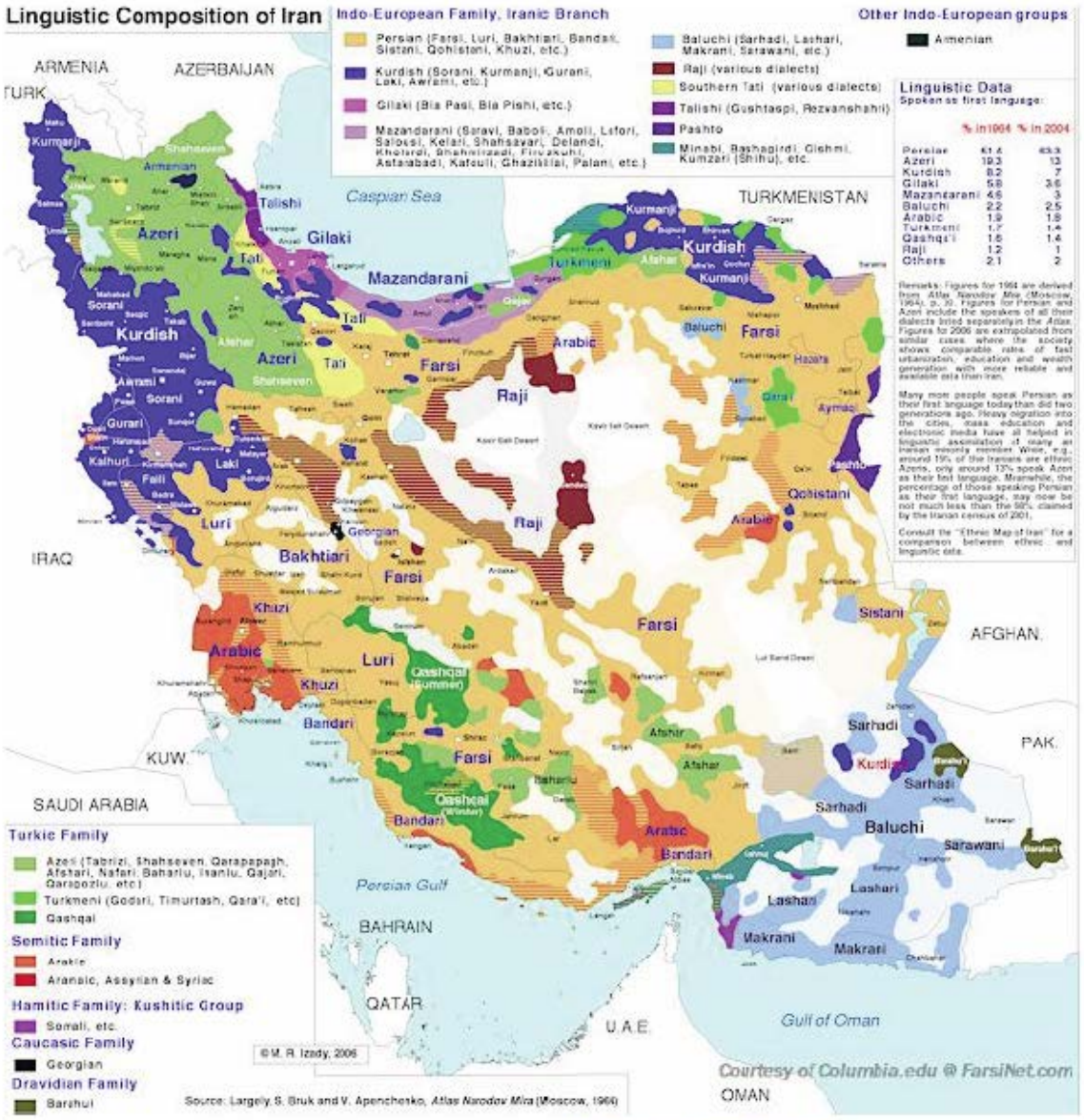
Population: 8.3 million urban,14 million wider area
Urban: 730 km^2 (280 sq mi)
Wider Area: 1,274 km^2 (492 sq mi)

Tel Aviv: 20 Kilotons

Population: 410,000+
Area: 52 km^2 (20 sq mi)

Maps based on estimates by dr. Abdullah Toukan

Iran's Ethnic Vulnerability to Nuclear Strikes



Source: Farsi – Persian Language, Farsi - Persian Language, http://www.farsinet.com/farsi/.

Iranian Counter Vulnerabilities:

- **Highly populated, state dominated, corrupt economy with high military spending and major state interference.**
- **Halting all oil exports critical to Iran. EIA reports that,**
  - **Pre-sanctions, Iran exported approximately 2.2 million bbl./d of crude oil. Iranian Heavy Crude Oil is Iran's largest crude export followed by Iranian Light. In 2011, Iran's net oil export revenues amounted to approximately $95 billion. Oil exports provide half of Iran's government revenues, while crude oil and its derivatives account for nearly 80 percent of Iran's total exports.**
  - **Kharg Island, the site of the vast majority of Iran's exports, has a crude storage capacity of 20.2 million barrels of oil and a loading capacity of 5 million bbl./d. Lavan Island is the second-largest terminal with capacity to store 5 million barrels and loading capacity of 200,000 bbl./d. Other important terminals include Kish Island, Abadan, Bandar Mahshar, and Neka (which helps facilitate imports from the Caspian region).**
  - **Iran is the second-largest oil consuming country in the Middle East, second only to Saudi Arabia. Iranian domestic oil demand is mainly for diesel and gasoline. Total oil consumption was approximately 1.8 million bbl./d in 2010, about 10 percent higher than the year before. Iran has limited refinery capacity for the production of light fuels, and consequently imports a sizeable share of its gasoline supply (Imports 300,000 bbbl of gasoline per day.). Iran's total refinery capacity in January 2011 was about 1.5 million bbl./d, with its nine refineries operated by the National Iranian Oil Refining and Distribution Company (NIORDC), a NIOC subsidiary.**
- **Refineries and gas distribution critical to economy. Are highly vulnerable.**
  - **Natural gas accounts for 54 percent of Iran's total domestic energy consumption.**
- **Key aspects of transportation and power grid are highly vulnerable. Today's precision strike assets allow to know out key, repairable links or create long term incapacity. They have become "weapons of mass effectiveness."**
  - **EIA reports Some power plants are running as low as 10 percent of their nameplate capacity as Iran's electricity infrastructure is largely in a state of dilapidation and rolling blackouts become endemic in summer months. The amount of generation lost in distribution is a central indicator of the disrepair of the electricity network, with upwards of 19 percent of total generation lost during transmission.**
- **Limited and vulnerable air defenses with only one modern and very short-range air and cruise missile defense system. Will remain vulnerable to stealth, cruise missiles, and corridor suppression of enemy air defenses unless can get fully modern mix of radars, C4I/BM assets, and S-300/400 equivalent.**
- **Needs imports of food and product.**
- **Rail system vulnerable. Can use smart mines on all ports.**
- **Naval embargo presents issues in maritime law, but can halt all Iranian traffic, "inspect" all incoming shipping.**
- **"No fly zone" would affect operations, especially if include helicopters. Warning could affect civil aviation.**