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Iran, Evolving Threats, and Strategic Partnership in the Gulf

Anthony H. Cordesman with the Assistance of Michael Peacock

CSIS | CENTER FOR STRATEGIC & INTERNATIONAL STUDIES | Burke Chair in Strategy

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This report is based on a series of reports by Dr. Anthony Cordesman on Iran, published by the Burke Chair, CSIS. They can be found at:

- ***Iran and the Gulf Military Balance - I: Conventional and Asymmetric Forces***, available on the CSIS web site at http://csis.org/publication/reassessing-gulf-military-balance-part-one-conventional-and-asymmetric-forces.

- ***Iran and the Gulf Military Balance II: The Missile and Nuclear Dimensions***, available on the CSIS web site at http://csis.org/publication/iran-and-gulf-military-balance-ii-missile-and-nuclear-dimensions.

- ***Iran and the Gulf Military Balance III: Sanctions, Energy Arms Control, and Regime Change,*** , available on the CSIS web site at http://csis.org/files/publication/130625_iransanctions.pdf

- ***Iran and the Gulf Military Balance IIV: The Gulf and the Arabian Peninsula***, available on the CSIS web site at http://csis.org/files/publication/120228_Iran_Ch_VI_Gulf_State.pdf

- ***Violence in Iraq***, available on the CSIS web site at https://csis.org/files/publication/120718_Iraq_US_Withdrawal_Search_SecStab.pdf

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Key Threats

- **Internal ethnic and sectarian tensions, civil conflict, continued instability, failed governance and economy.**
- **Syrian civil war. Iraq, Lebanon, "Shi'ite crescent."**
- **Sectarian warfare and struggle for future of Islam through and outside region. Sunni on Sunni and vs. Shi'ite struggles**
- **Terrorism, insurgency, civil conflict linked to outside state and non-state actors.**
- **Wars of influence and intimidation**
- **Asymmetric conflicts escalating to conventional conflicts.**
- **Major "conventional" conflict threats: Iran-Arab Gulf, Arab-Israeli, etc.**
- **Economic warfare: sanctions, "close the Gulf," etc.**
- **Missile and long-range rocket warfare**
- **Proliferation, preventive strikes, containment, nuclear arms race, extended deterrence, "weapons of mass effectiveness".**

The Problem of Strategic Triage

Major areas of concern:

- **Islamic extremism and terrorism**
- **Iranian nuclear, conventional, and asymmetric threats.**
- **Syrian civil war, Iraq, Lebanon, Jordan**
- **Yemen and AQAP**
- **Egypt and Arab states caught up in political turmoil.**
- **Iran and Arab Gulf states**
- **Arab-Israeli?**

The Gulf and Environs
Energy is Still the Prize

Key Global Energy Chokepoints

All estimates in million barrels per day. Includes crude oil and petroleum products. Based on 2013 data.

World chokepoints for maritime transit of oil are a critical part of global energy security. About 63% of the world's oil production moves on maritime routes. The Strait of Hormuz and the Strait of Malacca are the world's most important strategic chokepoints by volume of oil transit.

The U.S. Energy Information Administration (EIA) defines world oil chokepoints as narrow channels along widely-used global sea routes, some so narrow that restrictions are placed on the size of the vessel that can navigate through them. Chokepoints are a critical part of global energy security because of the high volume of petroleum and other liquids transported through their narrow straits.

In 2013, total world petroleum and other liquids production was about 90.1 million barrels per day (bbl/d).[1] EIA estimates that about 63% of this amount (56.5 million bbl/d) traveled via seaborne trade.[2] Oil tankers accounted for 30% of the world's shipping by deadweight tonnage in 2013, according to data from the United Nations Conference on Trade and Development (UNCTAD).[3]

International energy markets depend on reliable transport routes. Blocking a chokepoint, even temporarily, can lead to substantial increases in total energy costs and world energy prices. Chokepoints also leave oil tankers vulnerable to theft from pirates, terrorist attacks, shipping accidents that can lead to disastrous oil spills, and political unrest in the form of wars or hostilities.

Source: EIA/DOE, *World Oil Transit Chokepoints*, November 10, 2014, http://www.eia.gov/countries/regions-topics.cfm?fips=wotc&trk=p3 .

Gulf Oil Exports Amount to 20% of World Total Production of 90.1 Million Barrels a Day

63% of World Oil Production Moves by Sea

The Volume of Gulf oil exports amounts to some 20% of all the world's oil production of 90.1 million barrels a day.

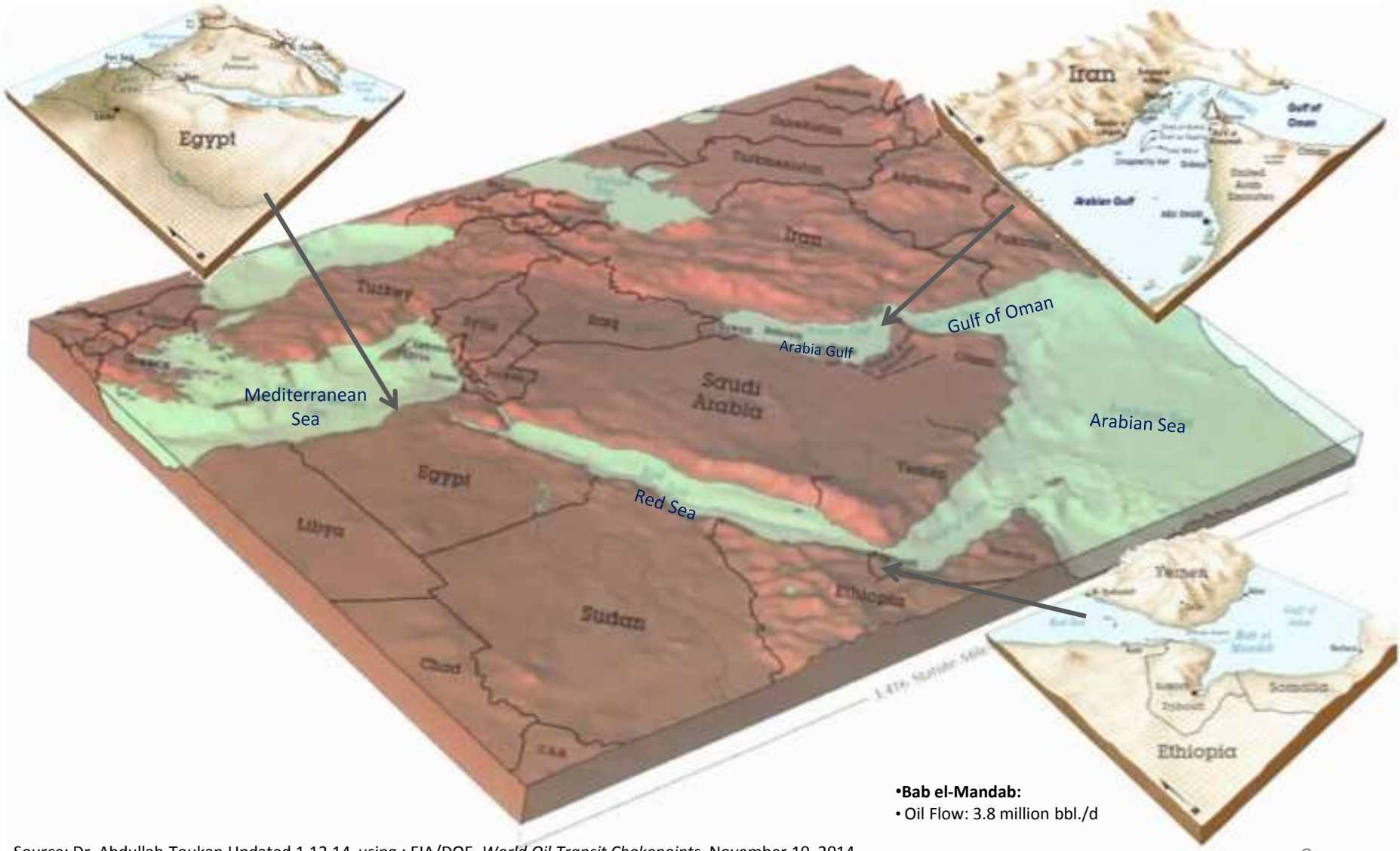
Location	2009	2010	2011	2012	2013
Strait of Hormuz	15.7	15.9	17.0	16.9	17.0
Strait of Malacca	13.5	14.5	14.6	15.1	15.2
Suez Canal and SUMED Pipeline	3.0	3.1	3.8	4.5	4.6
Bab el-Mandab	2.9	2.7	3.4	3.7	3.8
Danish Straits	3.0	3.2	3.3	3.1	3.3
Turkish Straits	2.8	2.8	3.0	2.9	2.9
Panama Canal	0.8	0.7	0.8	0.8	0.8
World maritime oil trade	**53.9**	**55.5**	**55.6**	**56.7**	**56.5**
World total oil supply	**84.9**	**87.5**	**87.8**	**89.7**	**90.1**

Source: EIA/DOE, *World Oil Transit Chokepoints*, November 10, 2014, http://www.eia.gov/countries/regions-topics.cfm?fips=wotc&trk=p3 .

Key Gulf Oil, Air, Sea Transit Chokepoints

•The Suez Canal/Sumed Pipeline:
• Oil Flow: 4.6 million bbl./d

•The Strait of Hormuz:
• Oil Flow: 17,.0 million bbl./d



•Bab el-Mandab:
• Oil Flow: 3.8 million bbl./d

Source: Dr. Abdullah Toukan,Updated 1.12.14, using : EIA/DOE, *World Oil Transit Chokepoints*, November 10, 2014, http://www.eia.gov/countries/regions-topics.cfm?fips=wotc&trk=p3

The Strategic Impact of the Strait of Hormuz

The Strait of Hormuz is the world's most important chokepoint with an oil flow of 17 million barrels per day in 2013, about 30% of all seaborne-traded oil.

Located between Oman and Iran, the Strait of Hormuz connects the Persian Gulf with the Gulf of Oman and the Arabian Sea. The Strait of Hormuz is the world's most important oil chokepoint because of its daily oil flow of 17 million barrels per day in 2013. Flows through the Strait of Hormuz in 2013 were about 30% of all seaborne-traded oil.

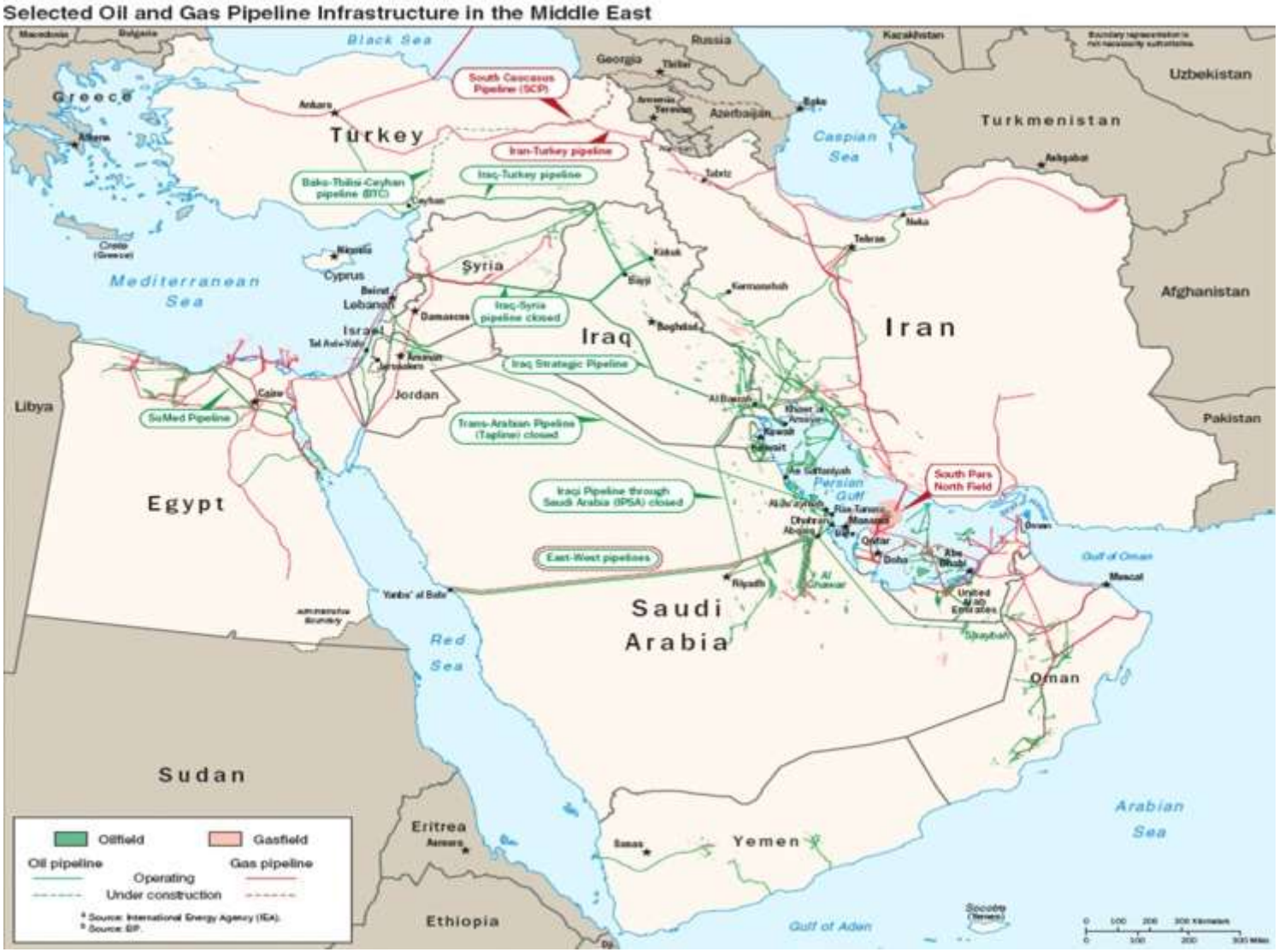
EIA estimates that more than 85% of the crude oil that moved through this chokepoint went to Asian markets, based on data from Lloyd's List Intelligence tanker tracking service.[6] Japan, India, South Korea, and China are the largest destinations for oil moving through the Strait of Hormuz.

Qatar exported about 3.7 trillion cubic feet (Tcf) per year of liquefied natural gas (LNG) through the Strait of Hormuz in 2013, according to BP's Statistical Review of World Energy 2014.[7] This volume accounts for more than 30% of global LNG trade. Kuwait imports LNG volumes that travel northward through the Strait of Hormuz.

At its narrowest point, the Strait of Hormuz is 21 miles wide, but the width of the shipping lane in either direction is only two miles wide, separated by a two-mile buffer zone. The Strait of Hormuz is deep and wide enough to handle the world's largest crude oil tankers, with about two-thirds of oil shipments carried by tankers in excess of 150,000 deadweight tons.

Source: EIA/DOE, *World Oil Transit Chokepoints*, November 10, 2014, http://www.eia.gov/countries/regions-topics.cfm?fips=wotc&trk=p3

Limited Overland Oil Supply Pipelines



(Source: http://www.eia.doe.gov/emeu/cabs/Persian_Gulf/images/pg_map.pdf)

Limited Real World Pipeline Capacity

Operating pipelines that bypass the Strait of

Pipeline name	Country	Status	Capacity	Throughput	Unused capacity
Petroline (East-West Pipeline)	Saudi Arabia	Operating	4.8	2.0	2.8
Abu Dhabi Crude Oil Pipeline	United Arab Emirates	Operating	1.5	0.6	0.9
Abqaiq-Yanbu Natural Gas Liquids Pipeline	Saudi Arabia	Operating	0.3	0.3	0.0
Iraqi Pipeline in Saudi Arabia (IPSA)	Saudi Arabia	*Converted to* natural gas	1.7	-	-
Total			**8.2**	**2.9**	**3.7**

Notes: All estimates expressed in million barrels per day (bbl/d). Unused Capacity is defined as pipeline capacity that is not currently utilized but can be readily available.
Sources: U.S. Energy Information Administration, Lloyd's List Intelligence

Pipelines available as bypass options

Most potential options to bypass Hormuz are currently not operational. Only Saudi Arabia and the United Arab Emirates (UAE) presently have pipelines able to ship crude oil outside of the Persian Gulf and have additional pipeline capacity to circumvent the Strait of Hormuz. At the end of 2013, the total available unused pipeline capacity from the two countries combined was approximately 4.3 million bbl/.

Saudi Arabia has the 746-mile Petroline, also known as the East-West Pipeline, which runs across Saudi Arabia from its Abqaiq complex to the Red Sea. The Petroline system consists of two pipelines with a total nameplate (installed) capacity of about 4.8 million bbl/d. The 56-inch pipeline has a nameplate capacity of 3 million bbl/d, and its current throughput is about 2 million bbl/d. The 48-inch pipeline had been operating in recent years as a natural gas pipeline, but Saudi Arabia converted it back to an oil pipeline. The switch increased Saudi Arabia's spare oil pipeline capacity to bypass the Strait of Hormuz from 1 million bbl/d to 2.8 million bbl/d, but this is only achievable if the system operates at its full nameplate capacity. Saudi Arabia also operates the Abqaiq-Yanbu natural gas liquids pipeline, which has a capacity of 290,000 bbl/d. However, this pipeline is currently running at capacity and cannot move any additional oil.

The UAE operates the Abu Dhabi Crude Oil Pipeline (1.5 million bbl/d) that runs from Habshan, a collection point for Abu Dhabi's onshore oil fields, to the port of Fujairah on the Gulf of Oman, allowing crude oil shipments to circumvent the Strait of Hormuz. The pipeline can transport more than half of UAE's total net oil exports. The government plans to increase this capacity in the near future to 1.8 million bbl/d.

Other pipelines are currently unavailable as bypass options

Saudi Arabia also has two additional pipelines that run parallel to the Petroline system and bypass the Strait of Hormuz, but neither of the pipelines currently has the ability to transport additional volumes of oil if the Strait of Hormuz is closed.The 1.65 million bbl/d, 48-inch Iraqi Pipeline in Saudi Arabia (IPSA), which runs parallel to the Petroline from pump station #3 (there are 11 pumping stations along the Petroline) to the port of Mu'ajjiz, just south of Yanbu, Saudi Arabia, was built in 1989 to carry 1.65 million bbl/d of crude oil from Iraq to the Red Sea. The pipeline closed indefinitely following the August 1990 Iraqi invasion of Kuwait. In June 2001, Saudi Arabia seized ownership of IPSA and converted it to transport natural gas to power plants. Saudi Arabia has not announced plans to convert the pipeline back to transport crude oil.

Other pipelines, such as the Trans-Arabian Pipeline (TAPLINE) running from Qaisumah in Saudi Arabia to Sidon in Lebanon, or a strategic oil pipeline between Iraq and Turkey, have been out of service for years because of war damage, disuse, or political disagreements. These pipelines would require extensive renovation before they can transport oil. Relatively small quantities, several hundred thousand barrels per day at most, could also be transported by truck if the Strait of Hormuz is closed.

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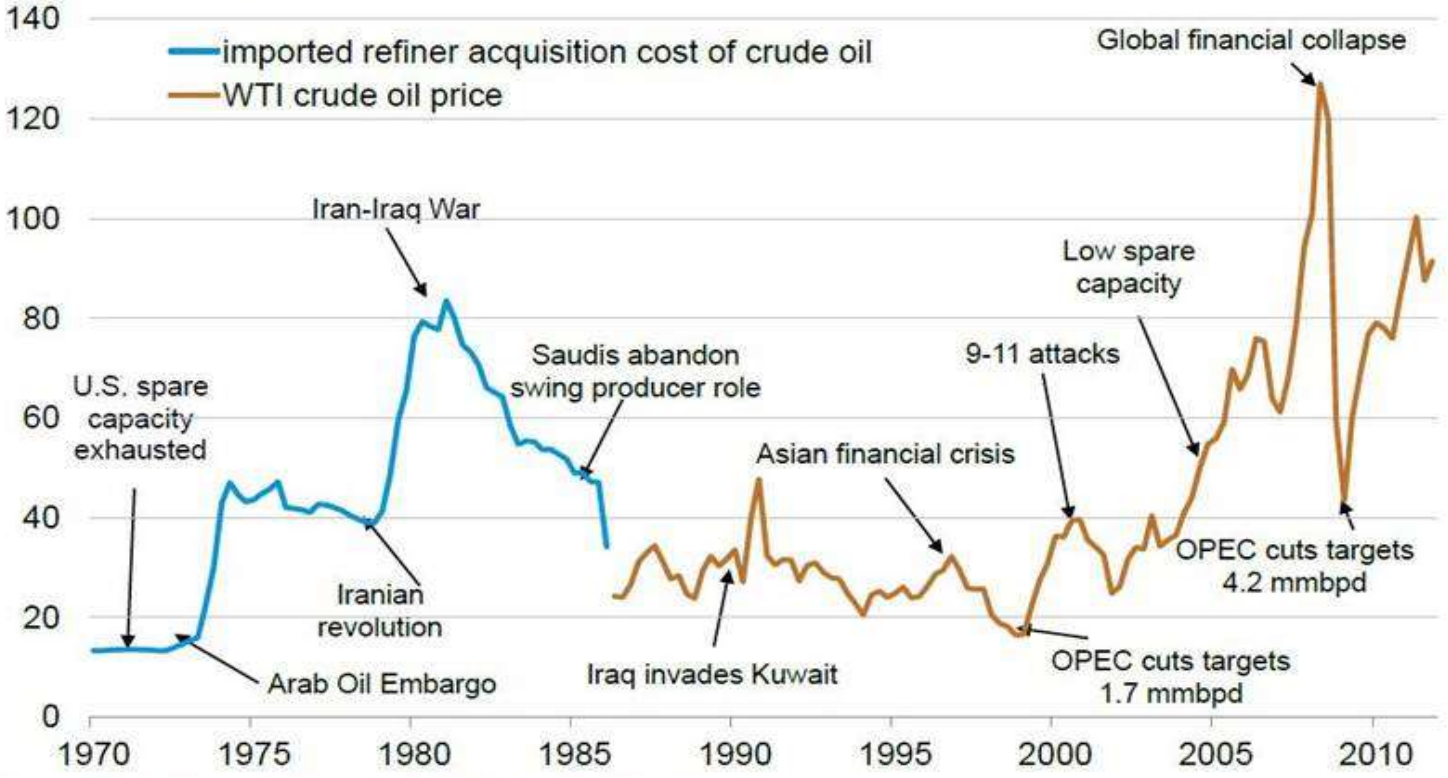
Source: EIA/DOE, *World Oil Transit Chokepoints*, November 10, 2014, http://www.eia.gov/countries/regions-topics.cfm?fips=wotc&trk=p3 .

Critical Threat to Global and US Economy

Crude oil prices react to a variety of geopolitical and economic events

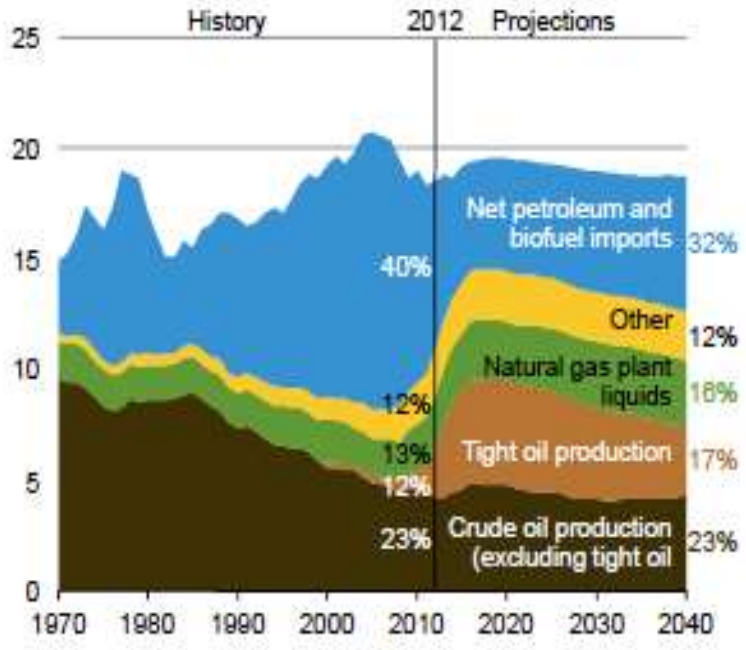
price per barrel
(real 2010 dollars, quarterly average)



Sources: U.S. Energy Information Administration, Thomson Reuters

No US "Energy Independence" Through 2040

U.S. petroleum and other liquid fuels supply by source, 1970-2040 (million barrels per day)



"U.S. use of imported petroleum and other liquid fuels continues to decline…mainly as a result of increased domestic oil production. Imported petroleum and other liquid fuels as a share of total U.S. use reached 60% in 2005 before dipping below 50% in 2010 and falling further to 40% in 2012. The import share continues to decline to 25% in 2016 and then rises to about 32% in 2040 in the *AEO2014* reference case, as domestic production of tight oil begins to decline in 2022

US economy pays world energy prices in a crisis.

US steadily more dependent on overall health of global economy.

Major indirect imports of Gulf oil through Asia and other exporters

- **Petroleum is limited share o f US imports: industrial supplies 32.9% (crude oil 8.2%), capital goods 30.4% (computers, telecommunications equipment, motor vehicle parts, office machines, electric power machinery), consumer goods 31.8% (automobiles, clothing, medicines, furniture, toys)**
- **The US currently imports some $2.3 trillion worth of goods a year, which is some 14% of a $16.7 trillion economy in official exchange rate terms. Like American exports, these imports are critical to every aspect of the US economy.**
- **The US indirectly imports a vast amount of oil and gas from Asian states that are critical dependent on Gulf oil. To quote two key examples, 19% of all American imports come from China and 6.4% from Japan.**
- **The US Census Bureau "year to date" estimates for part of 2014 indicated that if India, South Korea, and Taiwan were added to the totals for China and Japan, the resulting total share of US imports would increase to $554.5 billion. This would be 32% of the total 1,749.3 billion in imports for 2014 to date. .**

Sharing requirements of IAEA agreement

EIA, "Reference Case," AEO2014 Early Release Overview, December 2013, p. 1http://www.eia.gov/forecasts/aeo/er/pdf/0383er%282014%29.pdf, and CIA World Factbook, "United states, https://www.cia.gov/library/publications/the-world-factbook/geos/us.html.

As Egypt, Syria, Iraq, Yemen, Libya, and Tunisia show –

Internal Stability is More Critical than External Threats

Demographic Pressures

- **Massive population growth since 1950, and will continue through at least 2030.**
- **Matched by dislocation, hyperurbanization, and DP/IDP issues**
- **Broad pressure on agriculture at time need economies of scale and capital – not more farmers.**
- **Strain on all government services and infrastructure.**
- **Challenge of demographic pressure on expectations, status as important as classic economic pressures.**
  - **Failed secularism; unfairness, failed and corrupt governance.**
  - **Limits to education/health/infrastructure/water**
  - **Ethnic, sectarian and tribal pressures**
  - **Cost to leave home, marry**

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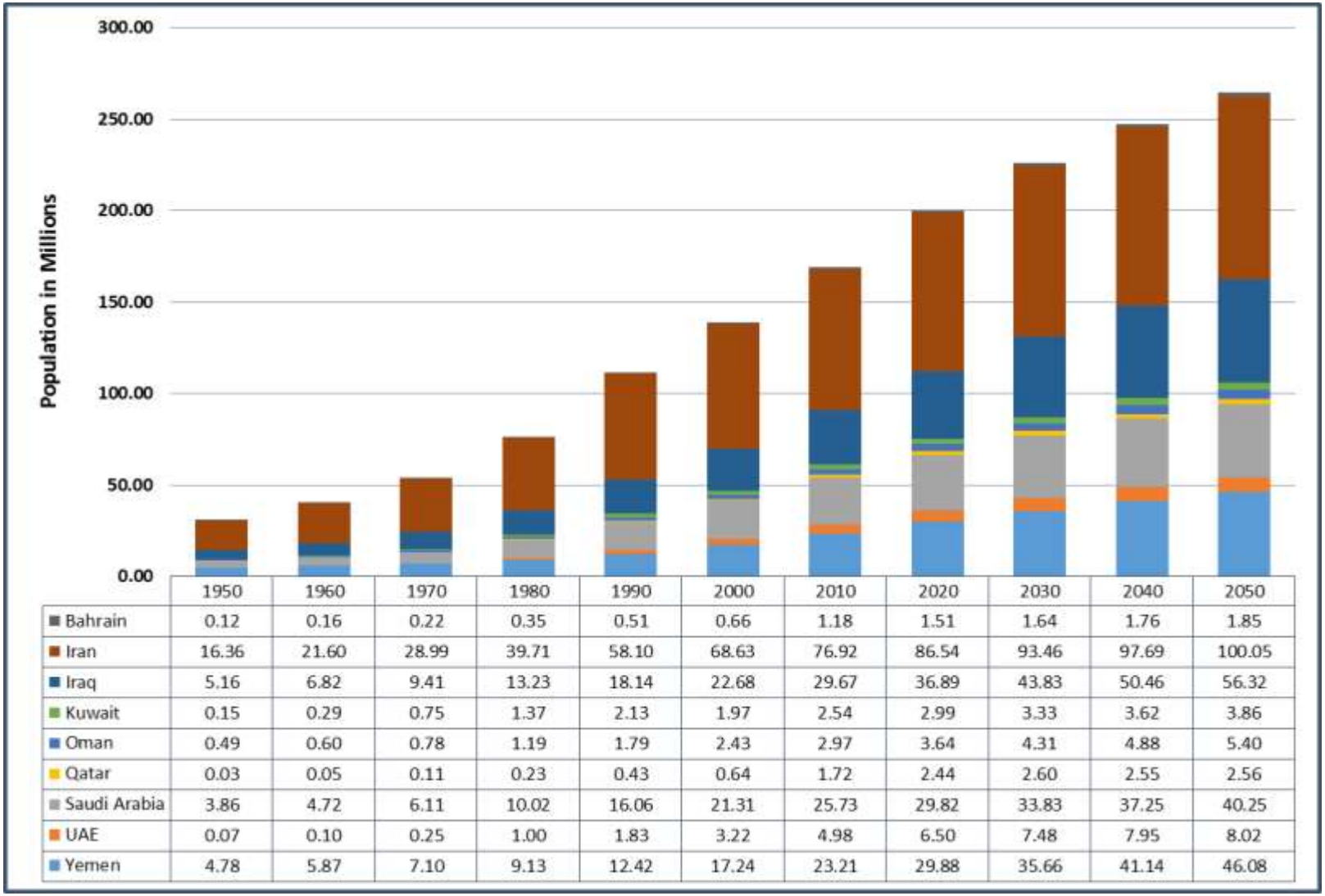
Gulf Demographic Pressure: 1950-2050

(In Millions)



	1950	1960	1970	1980	1990	2000	2010	2020	2030	2040	2050
Bahrain	0.12	0.16	0.22	0.35	0.51	0.66	1.18	1.51	1.64	1.76	1.85
Iran	16.36	21.60	28.99	39.71	58.10	68.63	76.92	86.54	93.46	97.69	100.05
Iraq	5.16	6.82	9.41	13.23	18.14	22.68	29.67	36.89	43.83	50.46	56.32
Kuwait	0.15	0.29	0.75	1.37	2.13	1.97	2.54	2.99	3.33	3.62	3.86
Oman	0.49	0.60	0.78	1.19	1.79	2.43	2.97	3.64	4.31	4.88	5.40
Qatar	0.03	0.05	0.11	0.23	0.43	0.64	1.72	2.44	2.60	2.55	2.56
Saudi Arabia	3.86	4.72	6.11	10.02	16.06	21.31	25.73	29.82	33.83	37.25	40.25
UAE	0.07	0.10	0.25	1.00	1.83	3.22	4.98	6.50	7.48	7.95	8.02
Yemen	4.78	5.87	7.10	9.13	12.42	17.24	23.21	29.88	35.66	41.14	46.08

Source: United States Census Bureau, International Data Base, Accessed April 2014.
http://www.census.gov/population/international/data/idb/informationGateway.php

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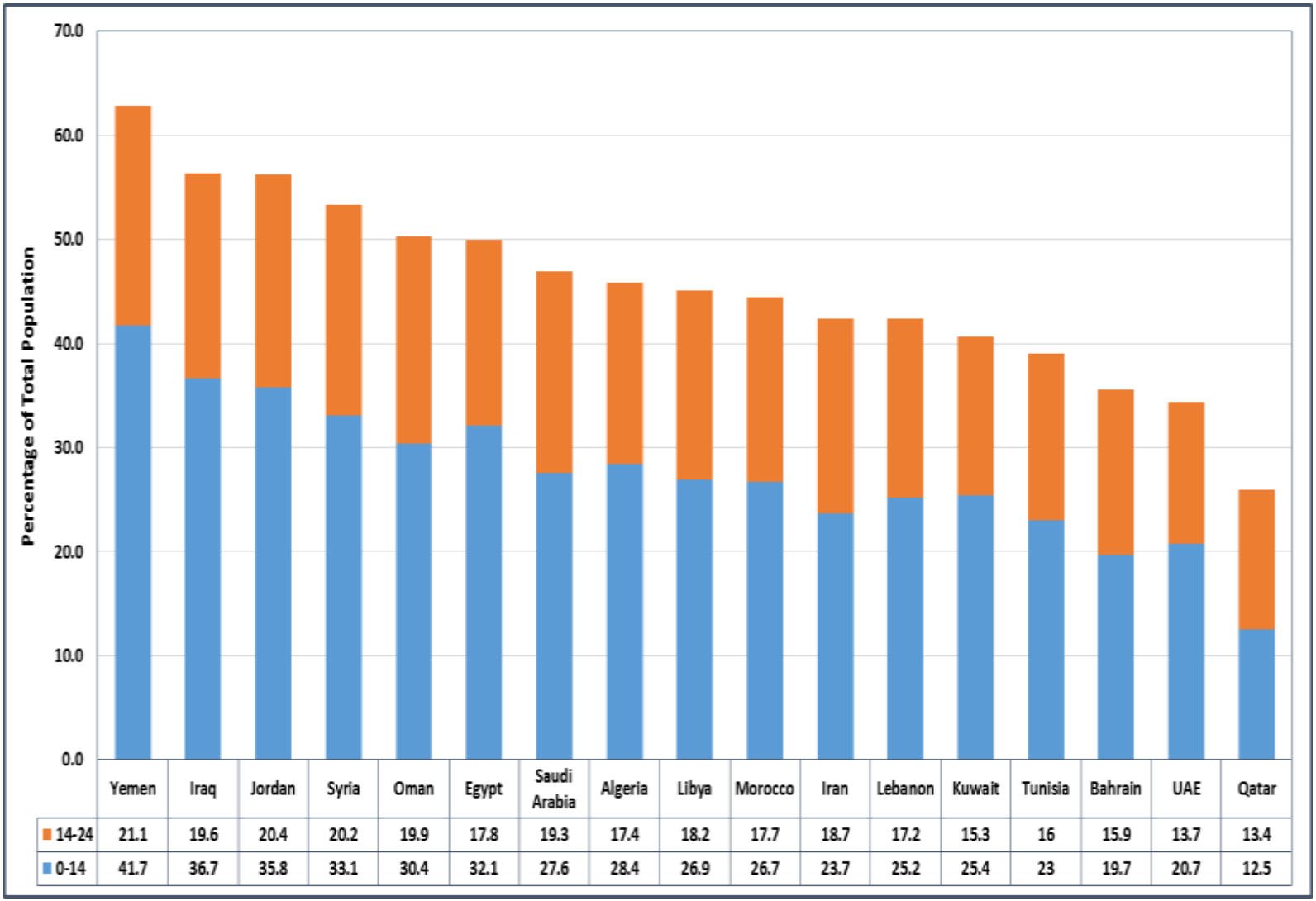
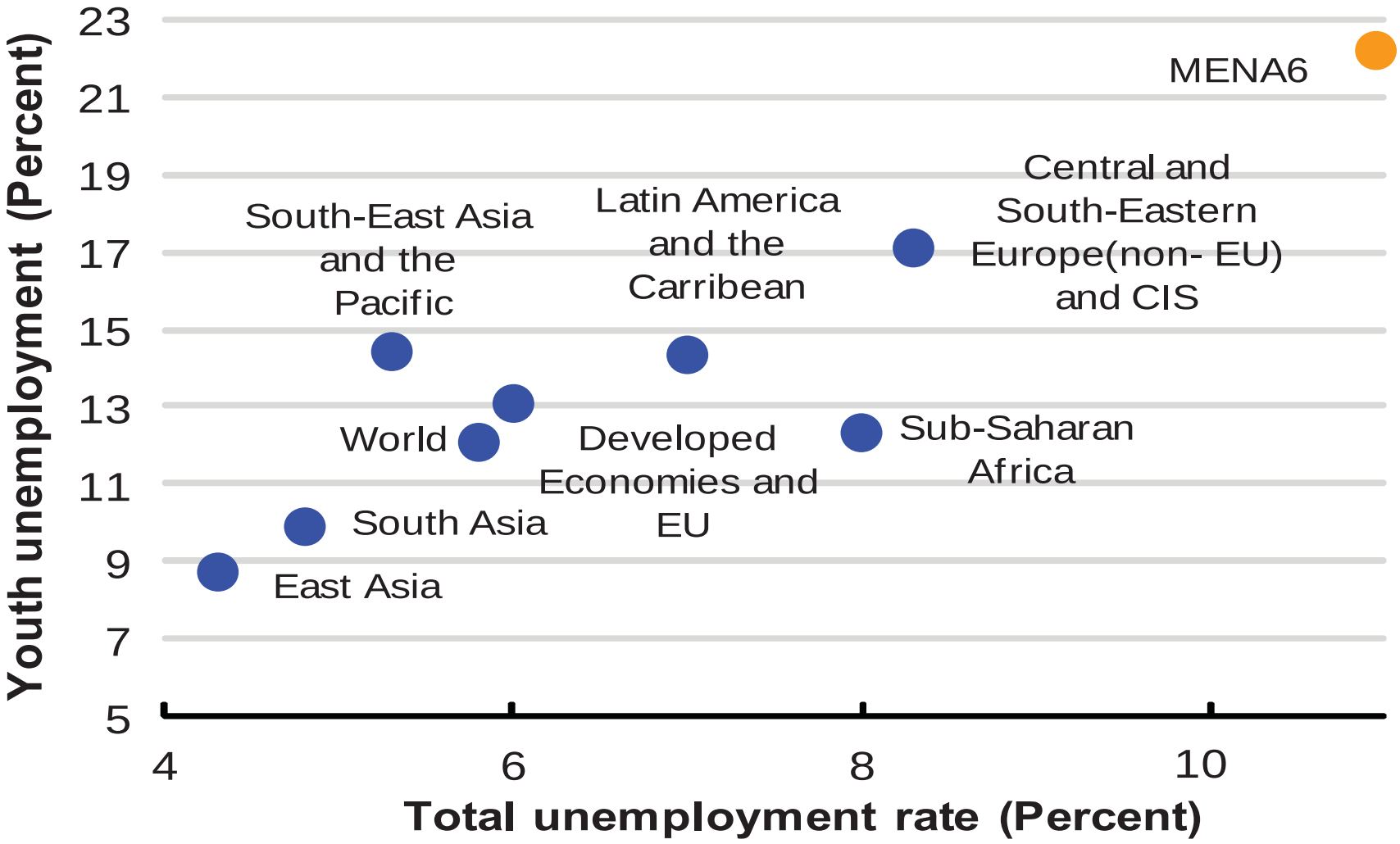
Demographic Pressures
(Percentage of Population Below 25)



	Yemen	Iraq	Jordan	Syria	Oman	Egypt	Saudi Arabia	Algeria	Libya	Morocco	Iran	Lebanon	Kuwait	Tunisia	Bahrain	UAE	Qatar
14-24	21.1	19.6	20.4	20.2	19.9	17.8	19.3	17.4	18.2	17.7	18.7	17.2	15.3	16	15.9	13.7	13.4
0-14	41.7	36.7	35.8	33.1	30.4	32.1	27.6	28.4	26.9	26.7	23.7	25.2	25.4	23	19.7	20.7	12.5

Source: Central Intelligence Agency, World Factbook 2014, Accessed April 2014, https://www.cia.gov/library/publications/the-world-factbook/

Total and Youth Unemployment Rates by Region (2008)



Source: IMF, *World Economic and Financial Surveys, Regional Economic Outlook, Middle East and Central Asia*, October 2010, *p. 38*

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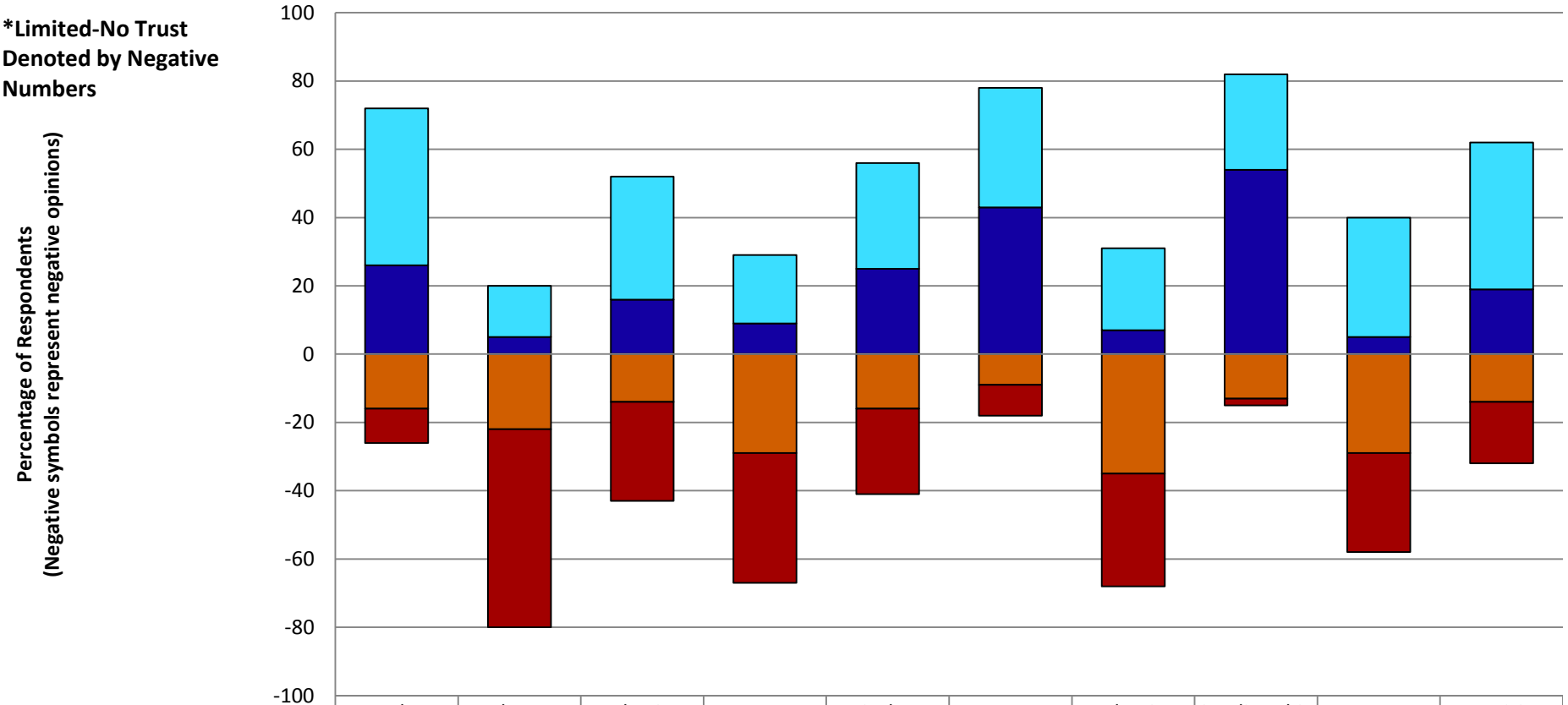
Popular Perceptions of State Institutions:

Popular Trust in the Government (Cabinet)

***Limited-No Trust Denoted by Negative Numbers**



	Jordan	Lebanon	Palestine	Yemen	Sudan	Egypt	Algeria	Saudi Arabia	Iraq	Tunisia
I absolutely do not trust it	-10	-58	-29	-38	-25	-9	-33	-2	-29	-18
I trust it to a limited extent	-16	-22	-14	-29	-16	-9	-35	-13	-29	-14
I trust it to a medium extent	46	15	36	20	31	35	24	28	35	43
I trust it to a great extent	26	5	16	9	25	43	7	54	5	19

Arab Reform Initiative Arab Democracy Barometer, Saud al-Sarhan, "Data Explanation of Why There Was No 'Day of Rage' in Saudi Arabia," delivered at *The Rahmania Annual Seminar* 1/11-13/2012. p. 3.

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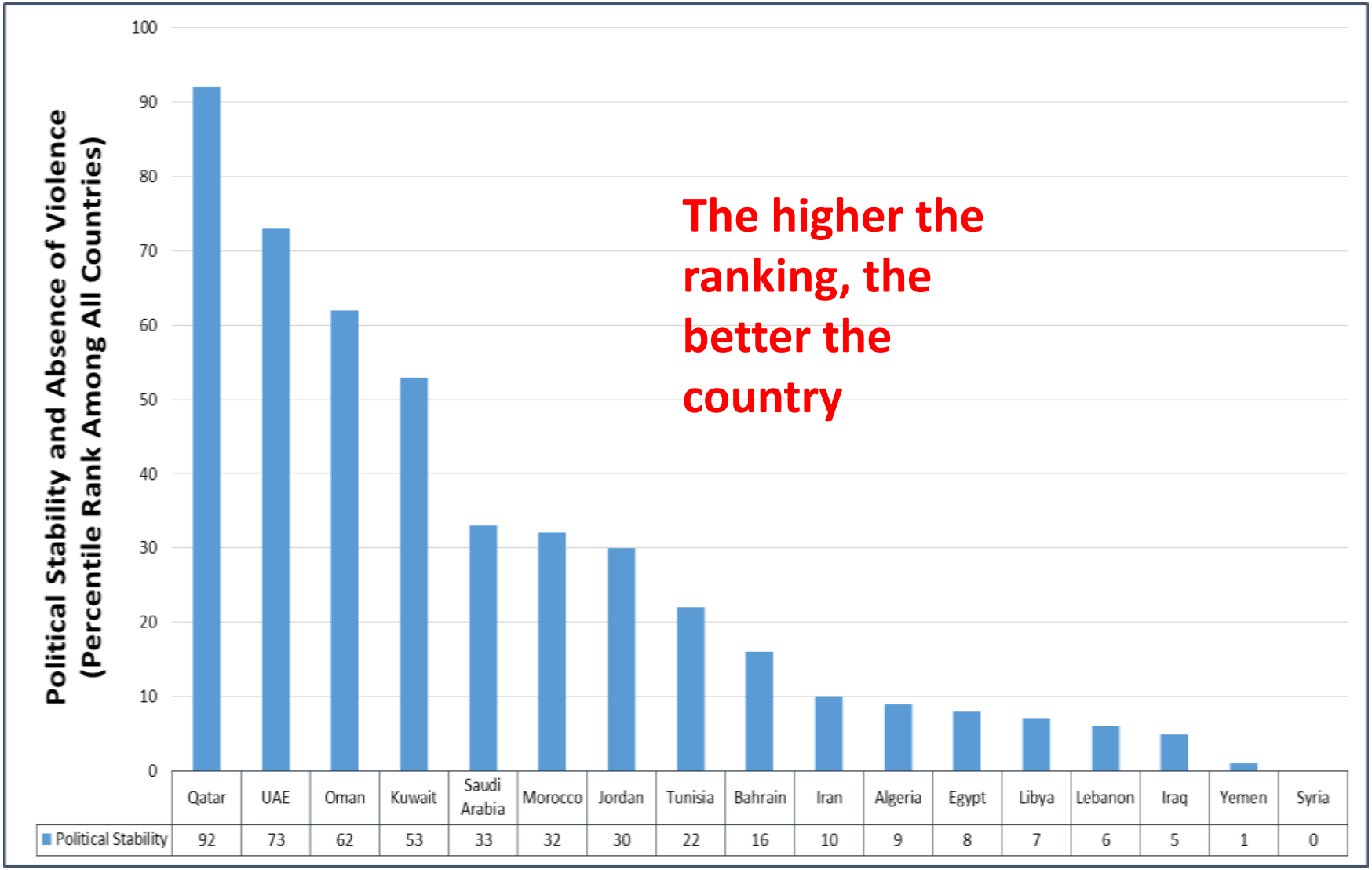
Political Stability and Absence of Violence

(Percentile Rank Among All Countries)



	Qatar	UAE	Oman	Kuwait	Saudi Arabia	Morocco	Jordan	Tunisia	Bahrain	Iran	Algeria	Egypt	Libya	Lebanon	Iraq	Yemen	Syria
Political Stability	92	73	62	53	33	32	30	22	16	10	9	8	7	6	5	1	0

Source: World Bank Governance Indicators, Accessed April, 2014.
http://info.worldbank.org/governance/wgi/index.aspx#home

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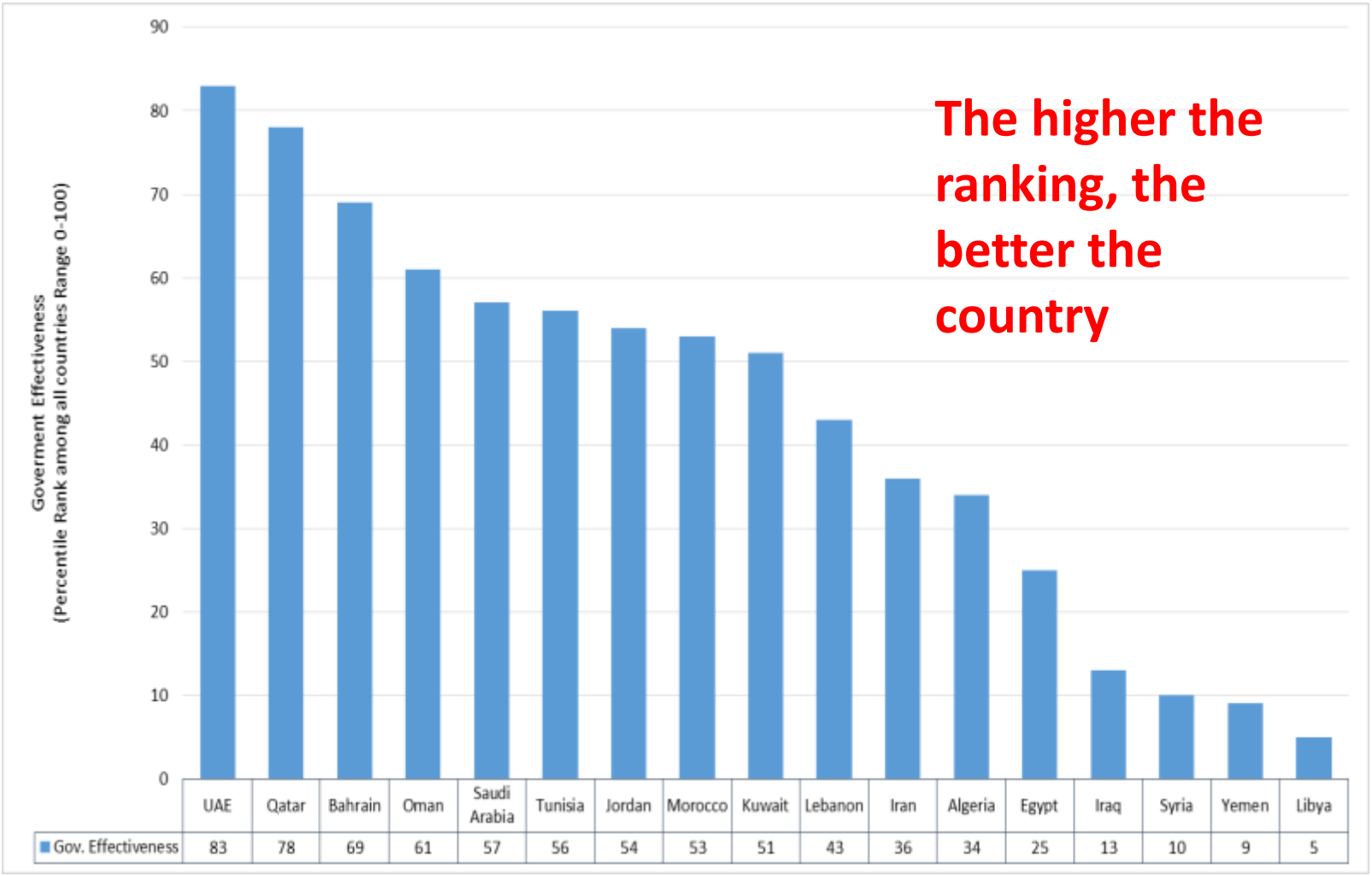
Government Effectiveness

(Percentile Rank among all countries)



	UAE	Qatar	Bahrain	Oman	Saudi Arabia	Tunisia	Jordan	Morocco	Kuwait	Lebanon	Iran	Algeria	Egypt	Iraq	Syria	Yemen	Libya
Gov. Effectiveness	83	78	69	61	57	56	54	53	51	43	36	34	25	13	10	9	5

Source: World Bank Governance Indicators, Accessed April, 2014.
http://info.worldbank.org/governance/wgi/index.aspx#home

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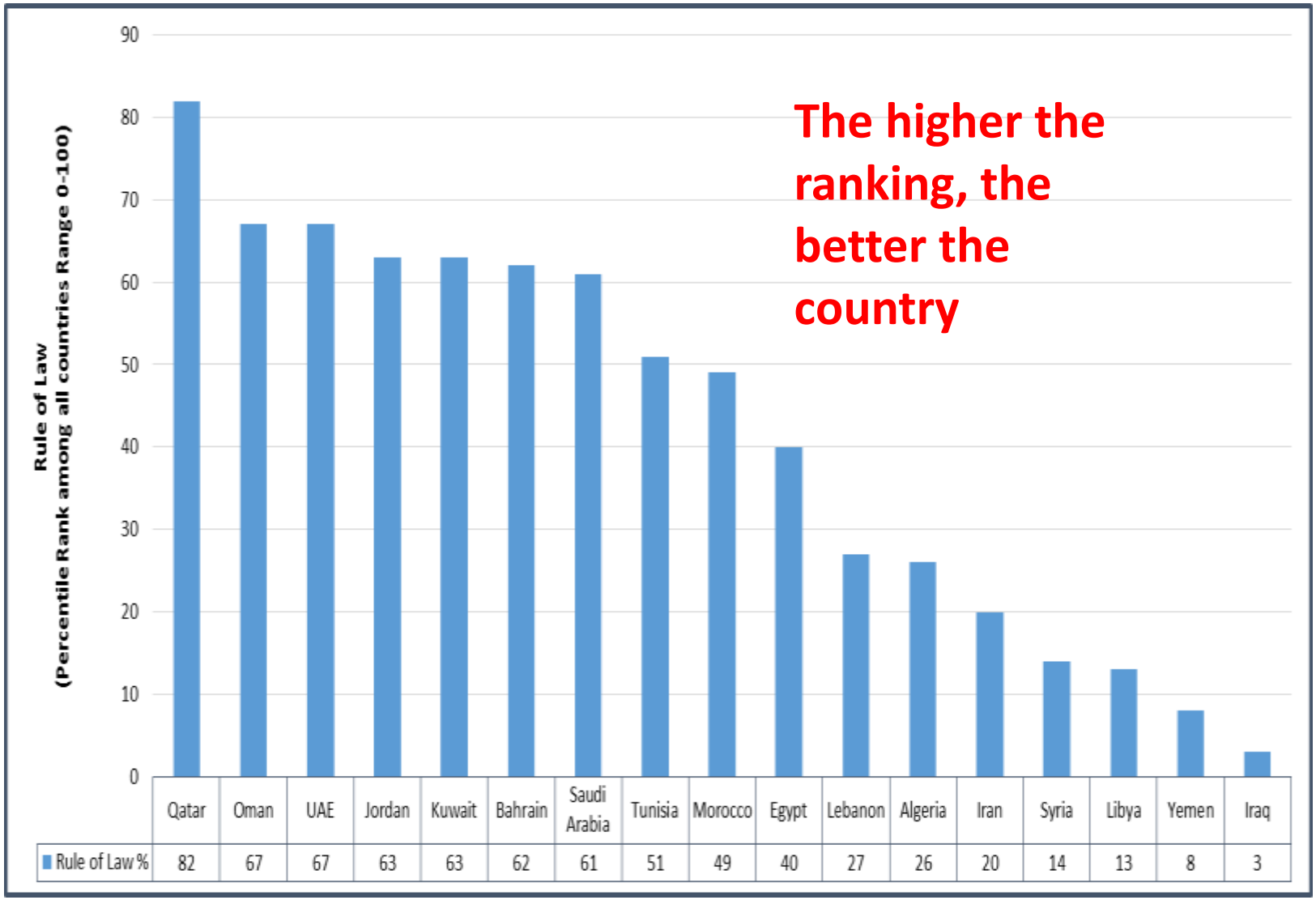
Rule of Law

(Percentile Rank among all countries)



	Qatar	Oman	UAE	Jordan	Kuwait	Bahrain	Saudi Arabia	Tunisia	Morocco	Egypt	Lebanon	Algeria	Iran	Syria	Libya	Yemen	Iraq
Rule of Law %	82	67	67	63	63	62	61	51	49	40	27	26	20	14	13	8	3

Source: World Bank Governance Indicators, Accessed April, 2014.
http://info.worldbank.org/governance/wgi/index.aspx#home

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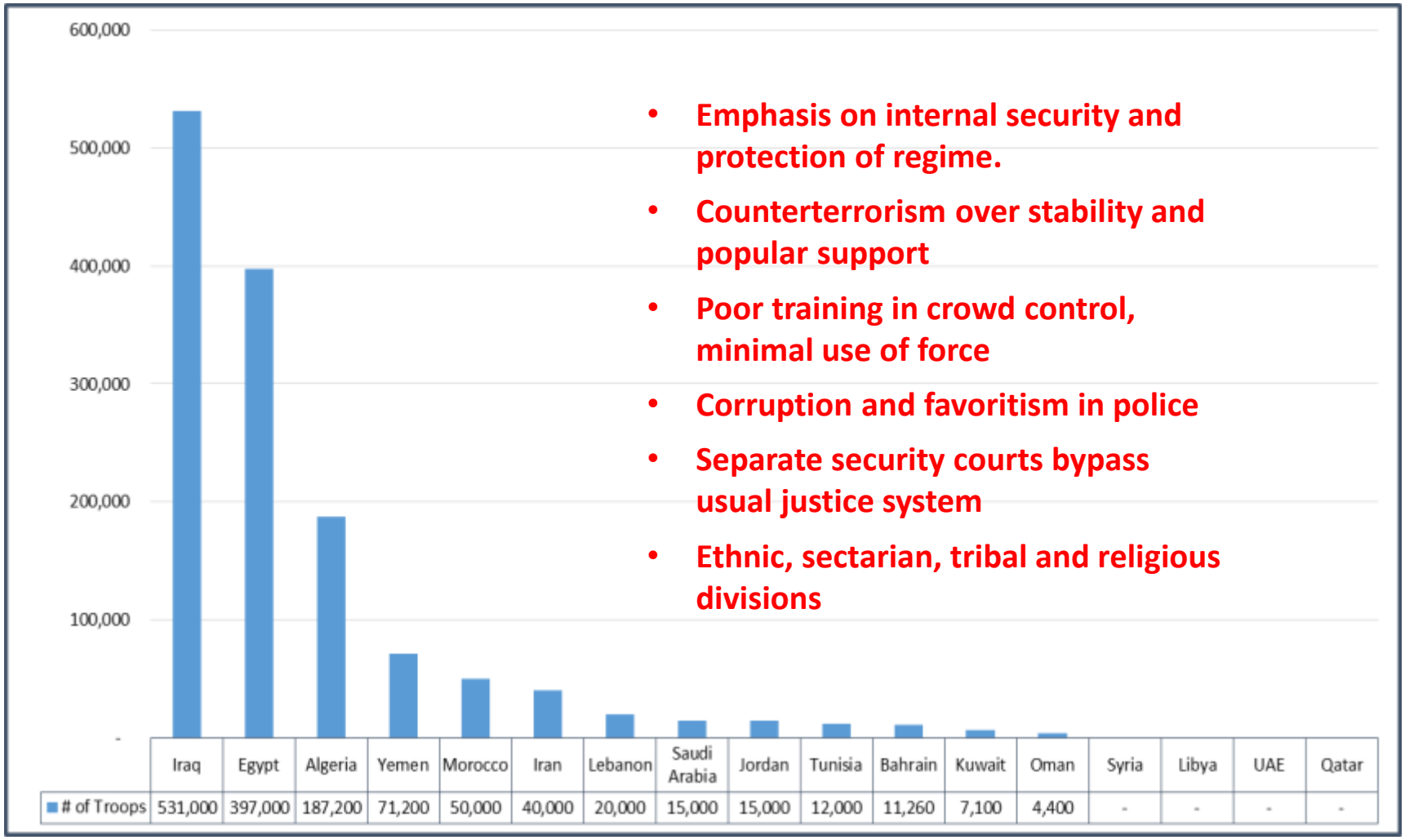
Excessively Large Paramilitary and National Security Forces



	Iraq	Egypt	Algeria	Yemen	Morocco	Iran	Lebanon	Saudi Arabia	Jordan	Tunisia	Bahrain	Kuwait	Oman	Syria	Libya	UAE	Qatar
# of Troops	531,000	397,000	187,200	71,200	50,000	40,000	20,000	15,000	15,000	12,000	11,260	7,100	4,400	-	-	-	-

- Emphasis on internal security and protection of regime.
- Counterterrorism over stability and popular support
- Poor training in crowd control, minimal use of force
- Corruption and favoritism in police
- Separate security courts bypass usual justice system
- Ethnic, sectarian, tribal and religious divisions

Source: IISS, *Military Balance 2014,* Adapted by Anthony Cordesman, Garrett Berntsen, and Tyler Duhame.

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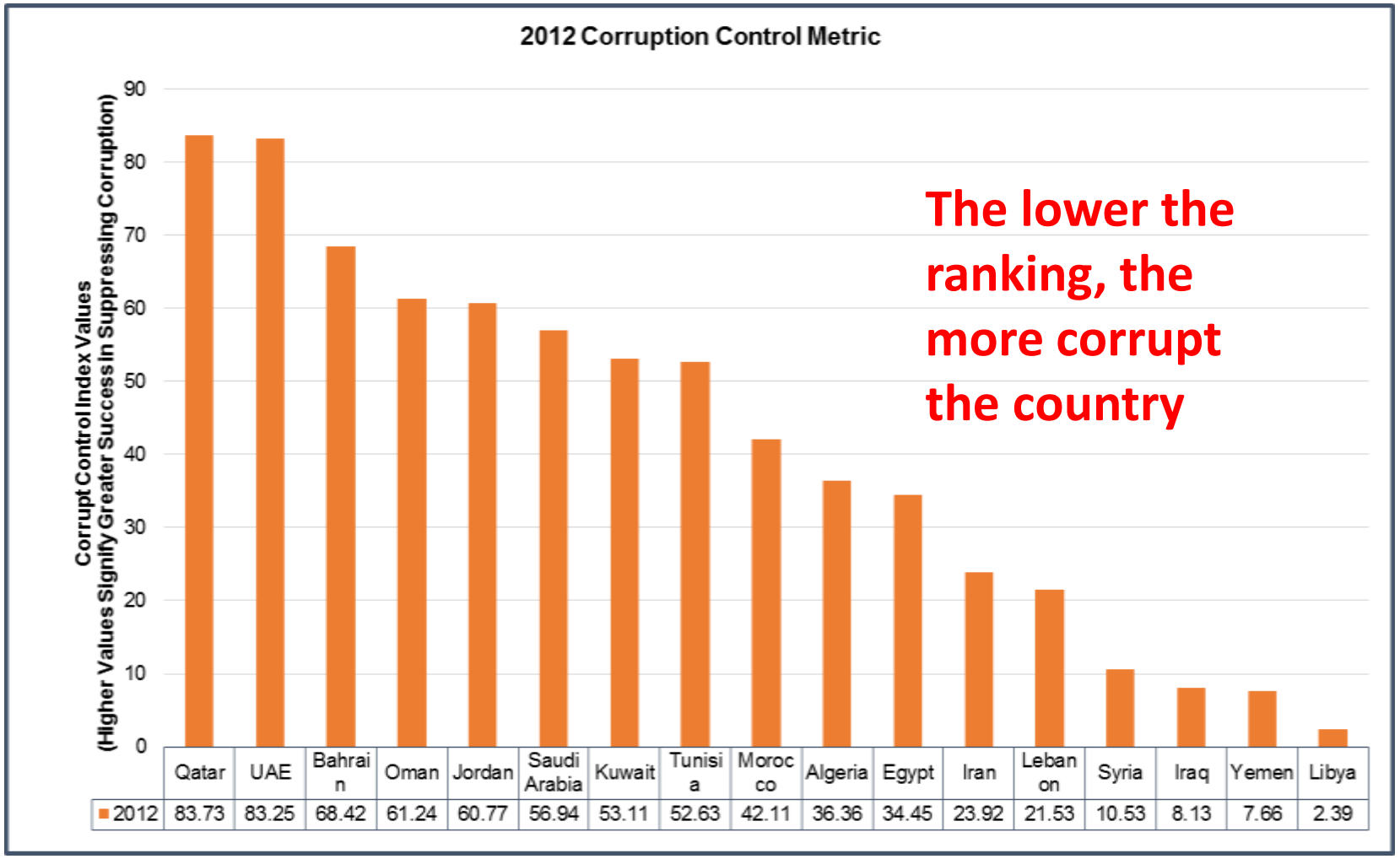
Control of Corruption
(by world percentile)



Control of Corruption: This World Bank ranking summarizes the views of think tanks, non-governmental organizations, international organizations, private sector firms, citizens, and experts on the control of corruption in each country.

Source: World Bank Governance Indicators, Accessed April, 2014. http://info.worldbank.org/governance/wgi/index.asp

Transparency International Corruption Perceptions Ranking (Out of 175, which is worst Country)

RANK	COUNTRY	2014 SCORE	2013 SCORE	2012 SCORE
25	United Arab Emirates	70	69	68
26	Qatar	69	68	68
37	Israel	60	61	60
55	Bahrain	49	48	51
55	Jordan	49	45	48
55	Saudi Arabia	49	46	44
64	Oman	45	47	47
67	Kuwait	44	43	44
79	Tunisia	40	41	41
80	Morocco	39	37	37
94	Egypt	37	32	32
100	Algeria	36	36	34
136	Iran	27	25	28
136	Lebanon	27	28	30
159	Syria	20	17	26
161	Yemen	19	18	23
166	Libya	18	15	21
170	Iraq	16	16	18

Transparency International Corruption Perceptions Index The Corruption Perceptions Index ranks countries and territories based on how corrupt their public sector is perceived to be. A country or territory's score indicates the perceived level of public sector corruption on a scale of 0 (highly corrupt) to 100 (very clean). A country or territory's rank indicates its position relative to the other countries and territories in the index. This year's index includes 175 countries and territories. Click on the column headings to sort the results, or use the drop-down menu to view results by region. Note that N/A means a country was not included in the index during a particular year.

Source: Transparency International Corruption Perceptions Index, Accessed December 2014.
http://www.transparency.org/cpi2014/results

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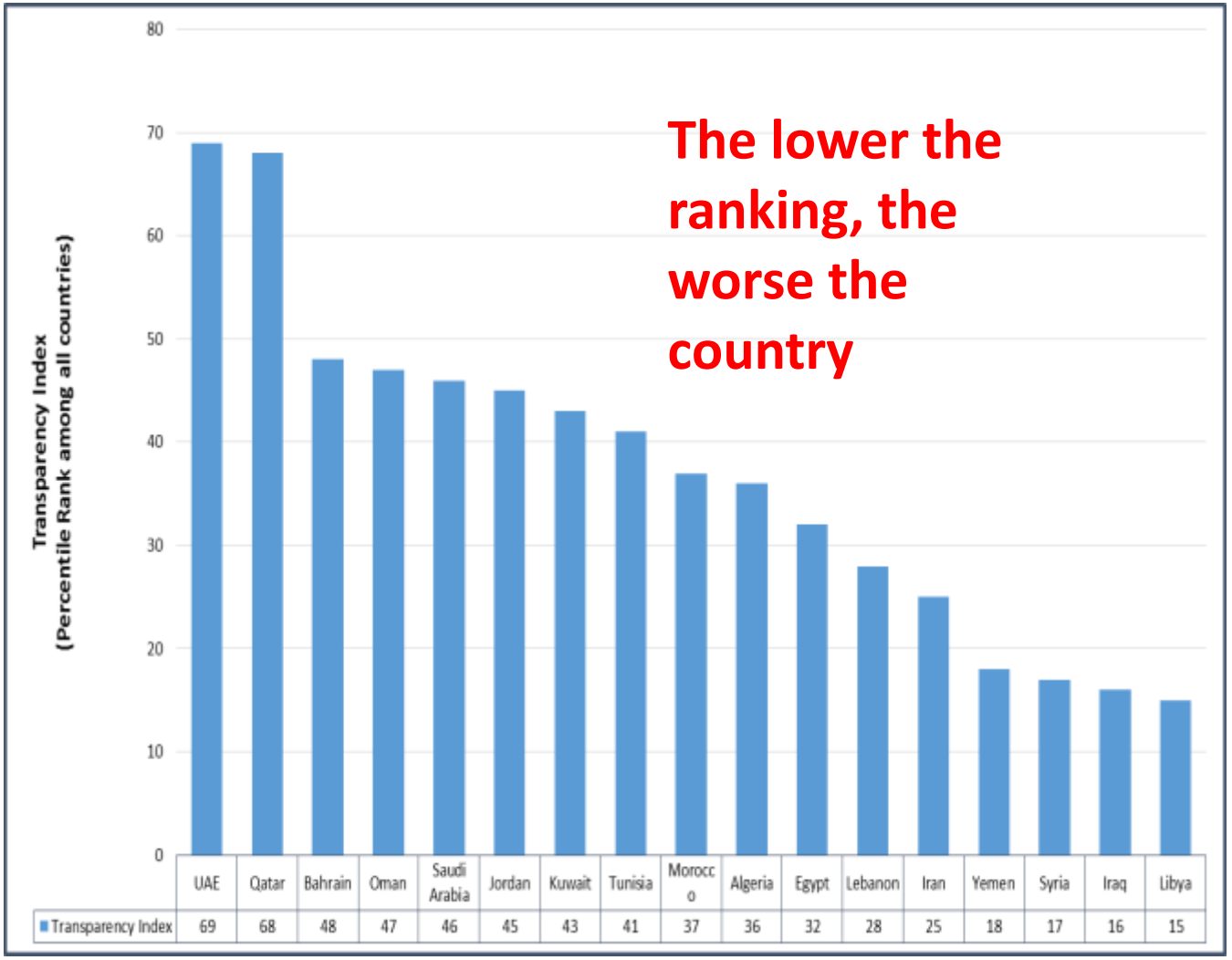
Transparency International Transparency Index



Transparency International Corruption Perceptions Index "The Corruption Perceptions Index ranks countries and territories based on how corrupt their public sector is perceived to be."

Source: Transparency International Corruption Perceptions Index, Accessed April 2014.http://cpi.transparency.org/cpi2013/results/

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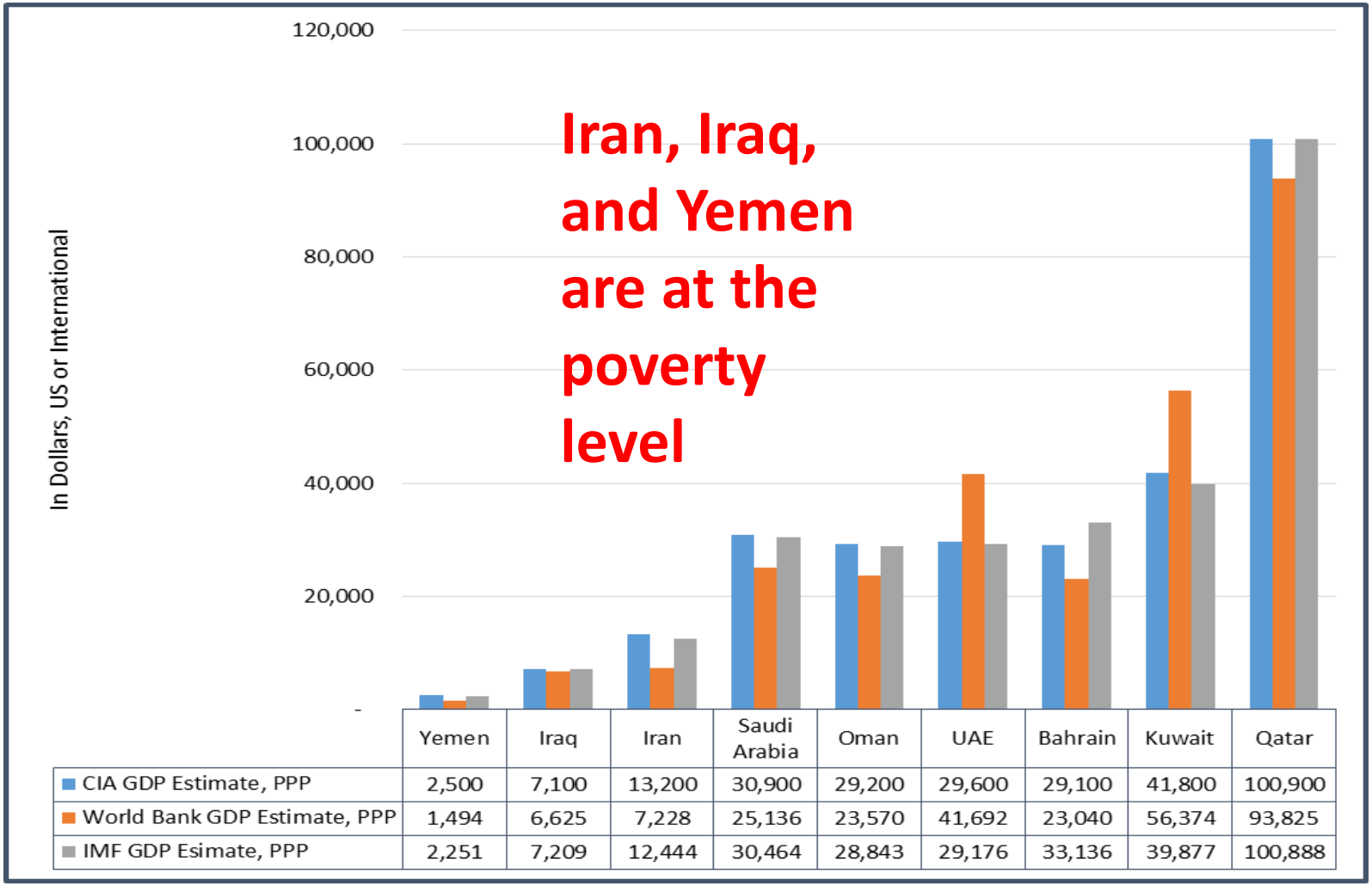
Gulf GDP Per Capita by Country: "Oil Wealth" Can Be Real Poverty



	Yemen	Iraq	Iran	Saudi Arabia	Oman	UAE	Bahrain	Kuwait	Qatar
CIA GDP Estimate, PPP	2,500	7,100	13,200	30,900	29,200	29,600	29,100	41,800	100,900
World Bank GDP Estimate, PPP	1,494	6,625	7,228	25,136	23,570	41,692	23,040	56,374	93,825
IMF GDP Esimate, PPP	2,251	7,209	12,444	30,464	28,843	29,176	33,136	39,877	100,888

Sources: World Bank Indicators: GDP Per Capita, http://data.worldbank.org/indicator/NY.GDP.PCAP.CD
CIA World Factbook, https://www.cia.gov/library/publications/the-world-factbook/
International Monetary Fund, http://www.imf.org
Accessed April, 2014.

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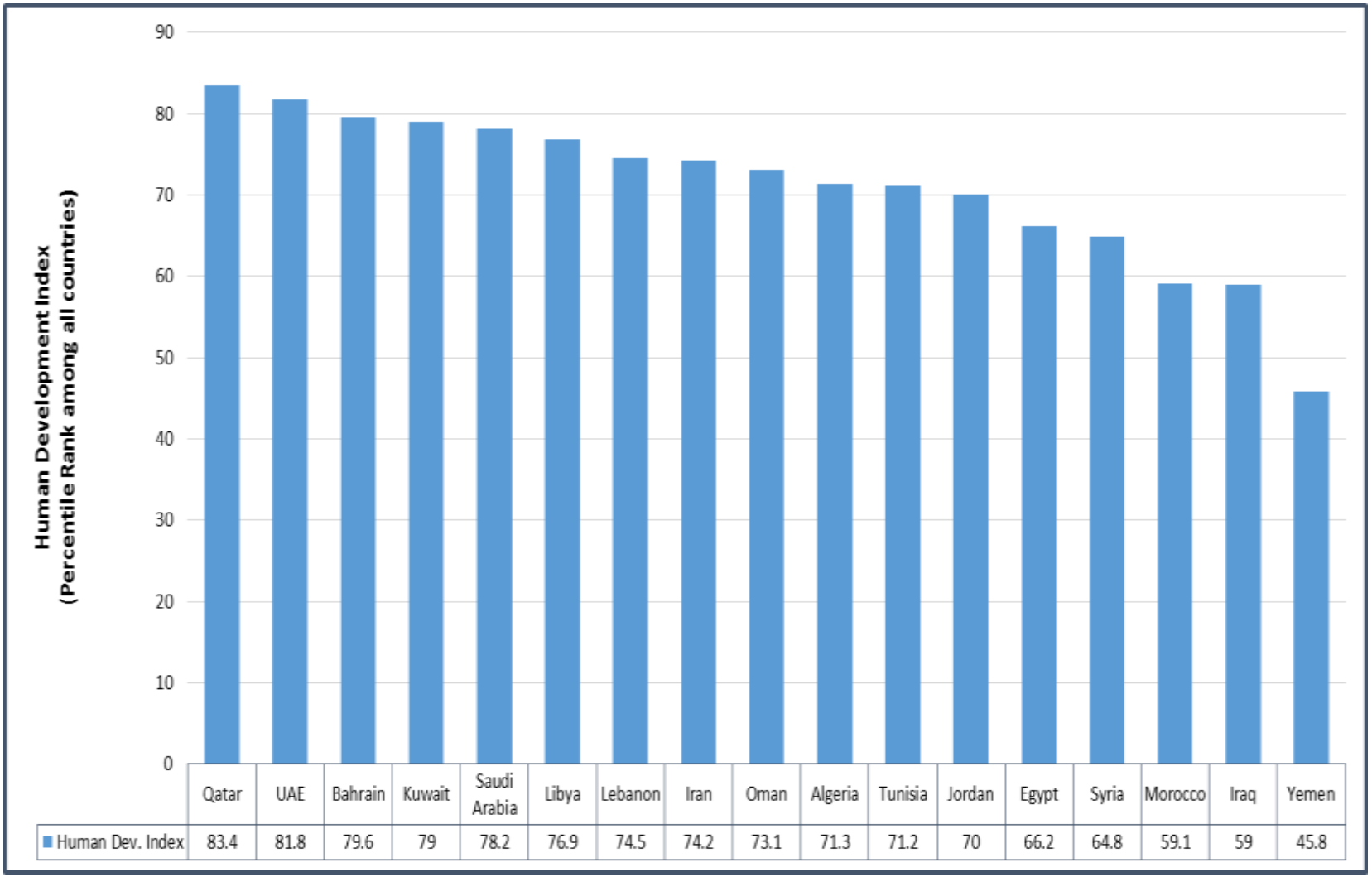
Human Development Index



Human Development Index "is a composite statistic of life expectancy, education, and income indices used to rank countries into four tiers of human development."

Source: United Nations Human Development Report, Accessed April 2014. http://hdr.undp.org/en/2013-report

Sunni on Sunni and Sunni vs. Shi'ite Power Struggles

- Sectarian conflict now extends from India to Lebanon.
- Hazara major issue in Afghanistan and Pakistan.
- Iran is key Shi'ite actor – but "Persian" as well as "Twelver."
- Fear/Hope of Iran-Iraq-Syria-Lebanon "Shi'ite" Axis.
- Bahrain and Saudi Eastern Province.
- Yemen: Houthi and other Shi'ite elements.
- No unity is Sunni attitudes: range from tolerance to treating Shi'ite as Apostate.
- Shi'ites divided by sect. Alewites in Syria only marginally Shi'ite

Post-Al Qa'ida and WOT clash within a civilization

Key Shi'ite Actors

- Iran Al Quds Force and MOIS
- Lebanese Hezbollah
- Syrian Alewites
- Iraqi Government, Sadrists, Asaib Ahl al-Haq
- Yemeni Houthi
- Afghan and Pakistani Hazara

http://www.cleantechloops.com/wp-content/uploads/2012/04/map-mena-middle-east-north-africa.jpg

US Strategy Gives Equal Priority to Middle East and Asia and Key in Gulf is US Power Projection Capability

Secretary Hagel on the US Commitment to the Gulf - I

We have a ***ground, air and naval presence of more than 35,000 military personnel in and immediately around the Gulf. Two years after our drawdown from Iraq, the U.S. Army continues to maintain more than 10,000 forward-deployed soldiers in the region, along with heavy armor, artillery, and attack helicopters to serve as a theater reserve and a bulwark against aggression.***

We've deployed our most advanced fighter aircraft throughout the region, including F-22s, to ensure that we can quickly respond to contingencies. Coupled with our unique munitions, no target is beyond our reach.

We've deployed our most advanced intelligence, surveillance and reconnaissance assets to provide a continuous picture of activities in and around the Gulf. And we have fielded an array of missile defense capabilities, including ballistic missile defense ships, Patriot batteries, and sophisticated radar.

As part of our efforts to ensure freedom of navigation throughout the Gulf, we ***routinely maintain a naval presence of over 40 ships in the broader region, including a carrier strike group, and conduct a range of freedom of navigation operations. These operations include approximately 50 transits of the Strait of Hormuz over the past six months***.

Earlier this year, we ramped up our minesweeping capabilities and added five coastal patrol ships to our fleet in this region. We are currently working on a $580 million construction program to support the expansion of Fifth Fleet capabilities.

Yesterday, I visited the Navy's ***new afloat forward staging base, the USS Ponce***, a unique platform for special operations, as well as humanitarian assistance and disaster relief in areas where we do not have a permanent fixed presence. I'll also be meeting with U.S. personnel stationed at ***the Combined Air Operations Center in Qatar***, where we have representatives from our GCC partners training and working together with us. We also maintain forces and assets at home and around the world ready to deploy to the region on a moment's notice.

The United States military has made this commitment in resources, personnel and capabilities because of our nation's deep and enduring interest in the Middle East. That will not change. Although the Department of Defense is facing serious budget constraints, we will continue to prioritize our commitments in the Gulf, while making sure that our military capabilities evolve to meet new threats. Even with new budgetary constraints, ***the United States will continue to represent nearly 40 percent of global total spending***. The U.S. military will remain the most powerful in the world, and we will honor our commitments, and the United States is not retreating, not retreating from any part of the world.

Secretary Hagel on the US Commitment to the Gulf -II

A key vehicle for increasing partner capabilities is foreign military sales and financing. Over the last 20 years, the sale of advanced weapons has helped to shift the military balance in the region away from Iran and in favor of our Gulf partners, and this shift is accelerating***. DOD has approved more than $75 billion in U.S. arms sales to GCC states since 2007. These sales during the past six years are worth nearly as much as those made previously totally in the previous 15 years***.

During my last trip to the region, we finalized agreements with nearly $11 billion that will provide access to high-end capabilities, including F-15s, F-16s, and advanced munitions, such as standoff weapons. These are the most advanced capabilities we have ever provided -- ever provided to this region. We'll continue to ensure that all of our allies and partners in the region, including both Israel and the Gulf states, have these advanced weapons.

Upgrades in military hardware have enabled the United States military to work more closely, more effectively with our partners and allies in a wide variety of joint exercises, training, and collaborative planning. American men and women in uniform, serving alongside the soldiers, sailors, and airmen of our partners in the region, are staring down the same threats, which is why we take these activities very seriously.

This year, our successful training efforts have included: ***Our Eagle Resolve*** exercise, which began as a seminar in 1999. This year, hosted by Qatar, it included naval, land and air components. It included12 nations, 2,000 U.S. soldiers, sailors, airmen and Marines, and 1,000 of their counterparts. Our Eager Lion exercise in Jordan this year involved 8,000 personnel from 19 nations, including 5,000 Americans from across the services. And here in Bahrain in May, U.S. Naval Forces Central Command hosted the International Mine Countermeasures Exercise, which included 40nations, 6,000 service members, and 35 ships across 8,000 nautical miles, stretching from the Gulf to the Strait of Hormuz.

… ***The United States supports this vision and is committed to supporting the GCC as an anchor for regional stability. The United States will continue to work closely with each of our partners in the GCC, but we must remain together, and we must do more to strengthen multilateral defense cooperation…In support of that goal today, I'm announcing several new initiatives.***

First, in addition to our Gulf-wide joint exercises and training, DOD will work with the GCC on better integration of its members' ***missile defense capabilities***. ***We applaud the efforts of many Gulf states to acquire new and enhanced missile defense capabilities in the face of growing regional missile threa***t.

Secretary Hagel on the US Commitment to the Gulf -III

But the United States continues to believe that a multilateral framework is the best way to develop interoperable and integrated regional missile defense. Such defenses are the best way to deter and, if necessary, defeat coercion and aggression.

To encourage this, we propose upgrading our regular air and air defense chiefs conference to include missile defense cooperation as a very distinct agenda item. We believe doing so will allow for continued progress in missile defense and will open the door to broader cooperation and burden-sharing within the GCC.

Second, we would like to expand our security cooperation with partners in the region by working in a coordinated way with the GCC, including through the sales of U.S. defense articles through the GCC as an organization. This is a natural next step in improving U.S.-GCC collaboration, and it will enable the GCC to acquire critical military capabilities, including items for ballistic missile defense, maritime security, and counterterrorism.

And, third, building on both this event and the U.S.-GCC Strategic Cooperation Forum***, I'm inviting our GCC partners to participate in an annual U.S.-GCC Defense Ministerial. This ministerial will affirm the United States' continued commitment to Gulf security, and it will allow the U.S. and GCC member nations to take the next step in coordinating our defense policies and enhancing our military cooperation***. I propose that our inaugural ministerial take place within the next six months. All of these new and ongoing initiatives will help strengthen the GCC and strengthen regional security.

Secretary of Defense Chuck Hagel, *IISS Manama Dialogue,* As Delivered by Secretary of Defense Chuck Hagel, Manama, Bahrain, Saturday, December 07, 2013, http://www.defense.gov/Speeches/Speech.aspx?SpeechID=1824.

US Diplomatic Emphasis on Middle East

	East Asia and Pacific	Western Hemisphere	Africa	Europe and Eurasia	South and Central Asia	Near East
Budget amount requested for diplomatic activities*	$0.3 billion	$0.3 billion	$0.4 billion	$0.6 billion	$1.2 billion	$1.6 billion
Gross domestic product, as a percentage of total GDP of all regions	31%	12%	2%	46%	4%	5%
Population, in billions	2.3	0.6	0.9	1.4	1.7	0.4

= 100 million

*FY 2015

David Nakamura, "US Pivot to Asia falls Short," *Washington Post*, 17.4.14, http://www.washingtonpost.com/politics/us-diplomatic-funding/2014/04/16/f9613164-c5cd-11e3-9f37-7ce307c56815_graphic.html

US Forces In the Gulf in 2014: Part I

The US forces that defend the Gulf and cover the western IOR, focus on the entire for the Middle East and are assigned to USCENTCOM. They include the forces the US deploys in support of the Gulf states, Jordan, Egypt, and the Red Sea states.

The level of these forces varies with the level of tension or conflict in the region, and is drawn from US forces in the US, in Europe and in the Pacific. The forces actually and deployed by USCENTCOM vary according to the contingency commitments the US makes in the CENTCOM region at any give time – a region which goes far beyond the IOR and extends from Egypt to Afghanistan and Pakistan.

These contingency commitments have changed steadily over the last decade and US forces are now phasing out of active combat. The size of troop deployments, for example, has been steadily cut since the last US combat troops left Iraq at the end of 2011, and is dropping further as the US transitions combat forces out of Afghanistan – with all to be removed by the end of 2014.

The US does, however, still maintain a major air-sea force as part of its 5th Fleet, which is headquartered in Bahrain. The US Navy has maintained a presence in the Gulf since 1949, has had facilities in Bahrain since 1971, and created the 5th Fleet in in 1995. In January 2014, the 5th Fleet had the following task forces:

- CTF-50 Strike Forces: 1 carrier, 1 cruiser, 1 Arleigh Burke-class destroyer, 1 frigate, 1 replenishment ship.
- CTF-51 Contingency Response: 1 LHD, 1 LHA, 2 LSDs, 1 AV-8B squadron, 2 helicopter units, one AH-1W attack helicopter unit.
- CTF-52 Mine Warfare: 1 MCM, 1 MH-53 helicopter unit.
- CTF-53 Logistics: 1 ammo ship, 1 logistic stores ship, 1 fast combat support ship, 1 dry cargo/ammo ship, 1 fleet replenishment oiler.
- CTF-54: 1 Ohio-class guided missile submarine, 1 Los Angeles-class submarine,
- CTF-55 Surface forces: US Navy and US Coast Guard patrol ships.

CTF-56 Expeditionary Forces: support for rapid power projection. EOD, marine mammals, inshore boats, riverine warfare,

CTF-57 Maritime Patrol Aircraft: P-3C Orion and ASW aircraft.

US Forces In the Gulf in 2014 - Part II

The overall US Army and US Air Force presence in the Gulf/Western IOR region is harder to quantify. The US had approximately 25,000 personnel in the area for all services in 2013, and major air facilities in Kuwait, Bahrain, Qatar, and the UAE. It also has a major air base and command facility at Al Udeid Air Force Base in Qatar called the Combined Air and Space Operations Center (COAC), and prepositioning and contingency facilities in Oman. The USAF had six air wings deployed in or near the IOR and two groups:

- 376th Air Expeditionary Wing Transit Center at Manas, Kyrgyzstan
- 379th Air Expeditionary Wing, Al Udeid Air Base, Qatar
- 380th Air Expeditionary Wing, Undisclosed Location, Southwest Asia
- 386th Air Expeditionary Wing, Undisclosed Location, Southwest Asia
- 438th Air Expeditionary Wing, Kabul International Airport, Afghanistan.
- 455th Air Expeditionary Wing, Bagram Airfield, Afghanistan
- 609th Air and Space Operations Center, Undisclosed Location, Southwest Asia
- 1st Expeditionary Civil Engineer Group, Undisclosed Location, Southwest Asia

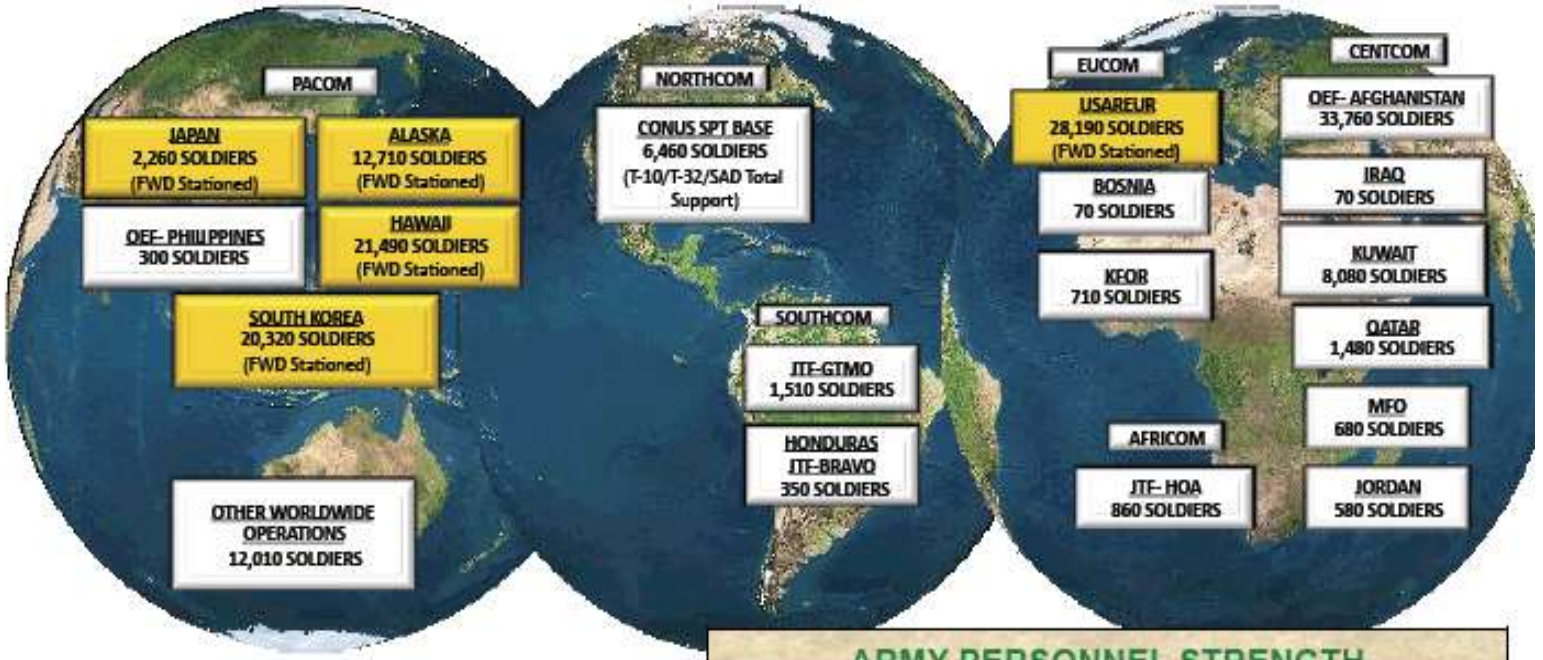
It is not possible to separate out aircraft numbers or activity levels for the Gulf from the entire range of USAF air activity in the Central Region – which i8ncluded Afghanistan. Total AFCENT activity in Afghanistan in 2013 does, however, provide a rough indication of US power projection and surge capabilities. The US flew over 21,000 close air support sorties, 31,000 IS&R sorties, 32,000 airlift sorties, and 12,000 tanker sorties – levels far lower than in the peak of the Iraq and Afghan Wars. These numbers illustrate the fact that airpower in the Gulf area at any given time is not a measure of US capability for a rapid deployment force. US 5th Fleet,

Source: "U.S. 5th Fleet, U.S. Naval Forces Central Command," Home Page, accessed January 4, 2014, http://www.cusnc.navy.mil/taskforces.html; Thom Shanker, "Hagel Lifts Veil on Major Military Center in Qatar," New York Times, December 11, 2013, http://www.nytimes.com/2013/12/12/world/middleeast/hagel-lifts-veil-on-major-military-center-in-qatar.html. AFCENT, http://www.centaf.af.mil/units/index.asp.

US Role in Gulf

- **US strategic guidance, budget submissions through FY2015, and 2014 QDR all give Middle East same priority as Asia.**
- **Key is not US forces in the Gulf, but pool of global power projection assets.**
- **US increasing missile defense ships, SOF, mine warfare, patrol boat forces to deal with Asymmetric threats in the Gulf.**
- **Forward presence and US Bases in Kuwait, Bahrain, Qatar, UAE, and preposition in Oman – plus GCC base over capacity greatly aid US power projection.**
- **US advantage in space systems, other IS&R assets, UAVs/UCAVs/cruise missiles, precision strike, electronic warfare, cyberwarfare.**
- **F-35, new ships and weapons will greatly improve US capability.**
- **"Extended deterrence?"**

US Army Global Pool of Land Forces



SOLDIERS DEPLOYED	66,920
SOLDIERS FWD STATIONED	84,970
TOTAL SOLDIERS	151,890

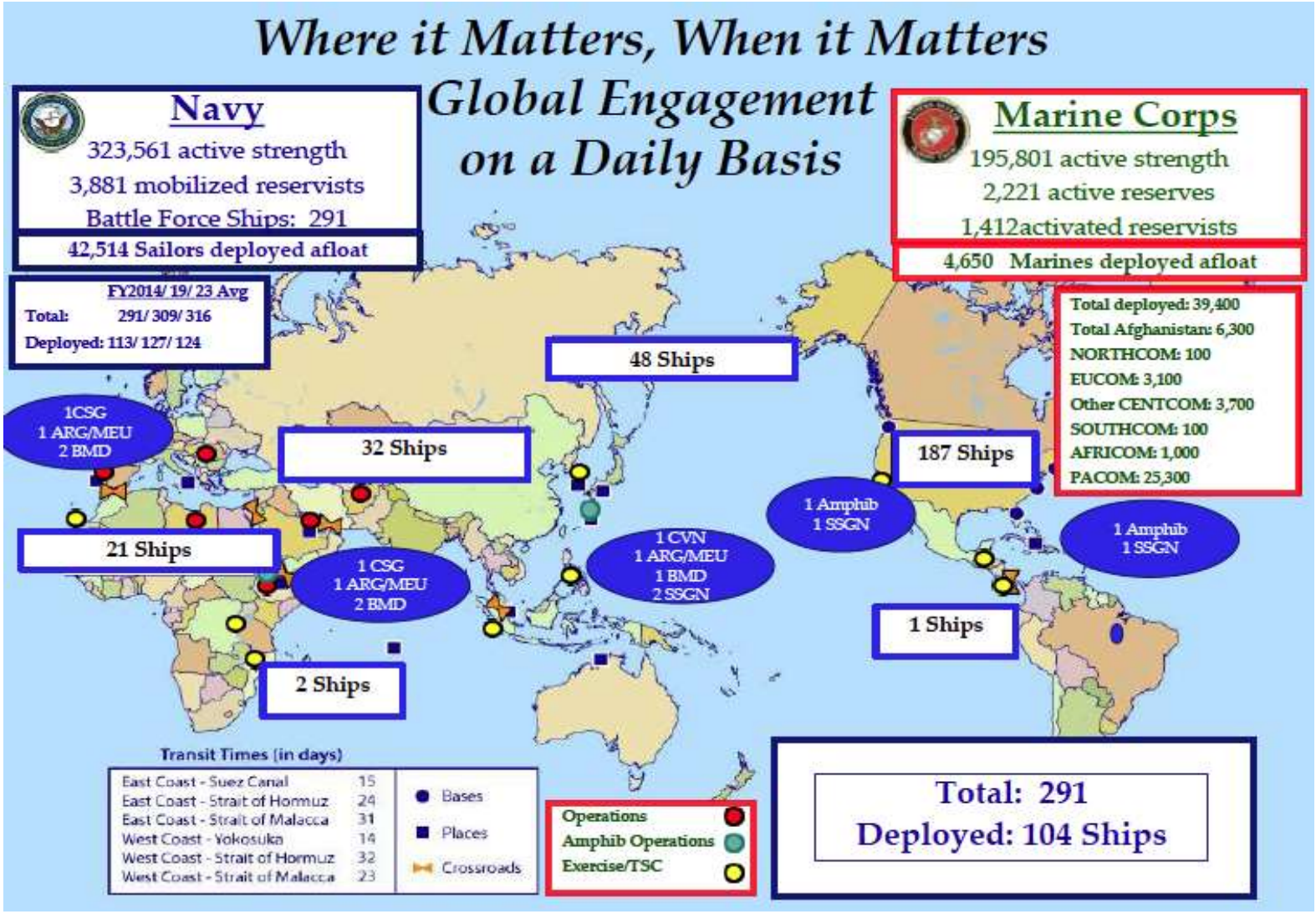
IN NEARLY 150 LOCATIONS WORLDWIDE

ARMY PERSONNEL STRENGTH

Component		RC AUTHORIZED FOR MOBILIZATION / ON CURRENT
ACTIVE (AC)	523,000	N/A
RESERVE (RC)		
USAR	196,730	13,250
ARNG	355,270	14,240
	1,075,000	27,490

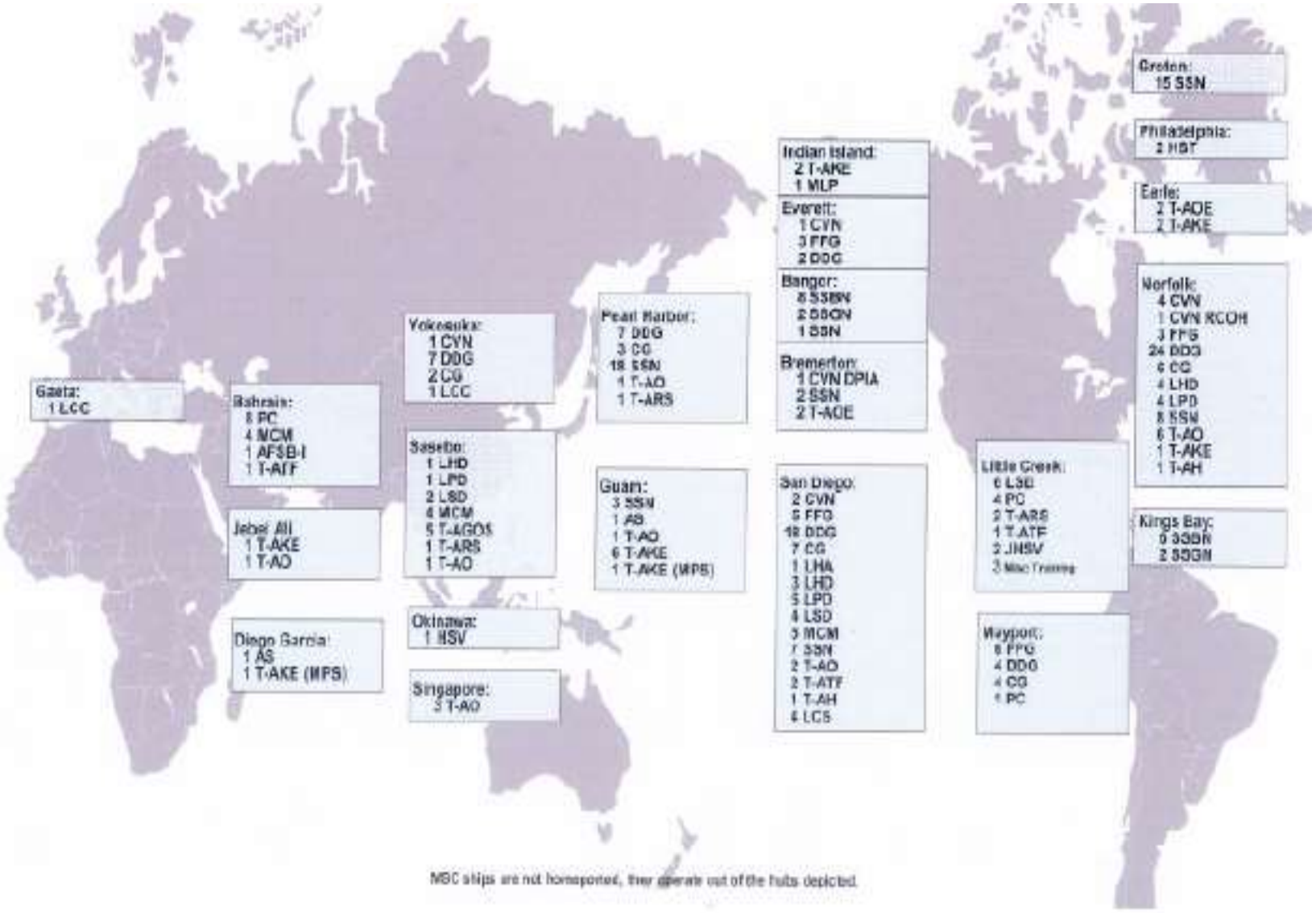
Source: US Army, March 5, 2014

US Global Pool of Naval and Marine Forces



Source: US Navy, March 5, 2014

US Global Pool of Naval Forces



Source: US Navy, March 5, 2014

US Global Pool of Air Forces

Total Aircraft				Aircraft by Function			
A10	243	HC130J	9	**Fighter Aircraft**		**Aerial Refueling Aircraft**	
AC130	34	HC130N	6	A10	243	KC135	352
B1	53	HC130P	14	F15C	174	KC46	0
B2	16	HH60	79	F15D	32	KC10	54
B52	63	KC10	54	F15E	192	*Total:*	*406*
C12	27	KC135	352	F16C	662	**Strategic Airlift Aircraft**	
C130H	227	KC46	0	F16D	60	C5	54
C130J	95	LC130	10	F22	166	C17	188
C17	188	MC12	37	F35	17	*Total:*	*242*
C20	11	MC130	39	*Total:*	*1546*	**Tactical Airlift Aircraft**	
C21	17	MD1	131			C130H	227
C32	6	MDQ1	129	**Heavy Bomber Squadrons:**		C130J	95
C37	10	MQ9	186	B52	63	HC130J	9
C38	2	RC135	17	B1	53	HC130N	6
C40	11	RQ4	31	B2	16	HC130P	14
C5	54	U2	24	*Total:*	*132*	LC130	10
CV22	41	UH1	42			*Total:*	*361*
E3	27	C25	2			**ISR Aircraft**	
E4	3	WC130H	19			MQ1	129
E8	13	*Total:*	*3640*			MQ9	186
E9	2					RC135	17
EC130	13					RQ4	31
F15C	174					U2	24
F15D	32					Total:	387
F15E	192					**Command and Control Aircraft**	
F16C	662					E3	27
F16D	60					E4	3
F22	166					E8	13
F35	17					*Total:*	*43*

Source: US Air Force, March 5, 2014

Syria, Iraq, Yemen, Egypt, Lebanon, Jordan AQAP, ISIS All Present Common Issues

But, Iran is the Key Challenge

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*

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/ MOIS and 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 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.**
- **Continued ISIL success**

Iran's "Positives," Impact of the US Invasion in 2003, and widened Range of Action

Key Positives

•Success in Lebanon, Gaza War, growing Assad dependence, ties to Iraqi Shi'ites, presence in Western Afghanistan and role with Hazaras.

• Lack of progress and coherence in GCC forces.

•Mistrust in US: The US is Iran's "Secret Ally:" Invasion of Iraq and aftermath; Uncertain & slipping nuclear "redline," faltering effort in Afghanistan, loss of allied confidence, in Egypt.

•Declining European power projection capabilities

• 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.

• Progress in modernization, adaptation, selective imports.

• Integration of regular and revolutionary forces.

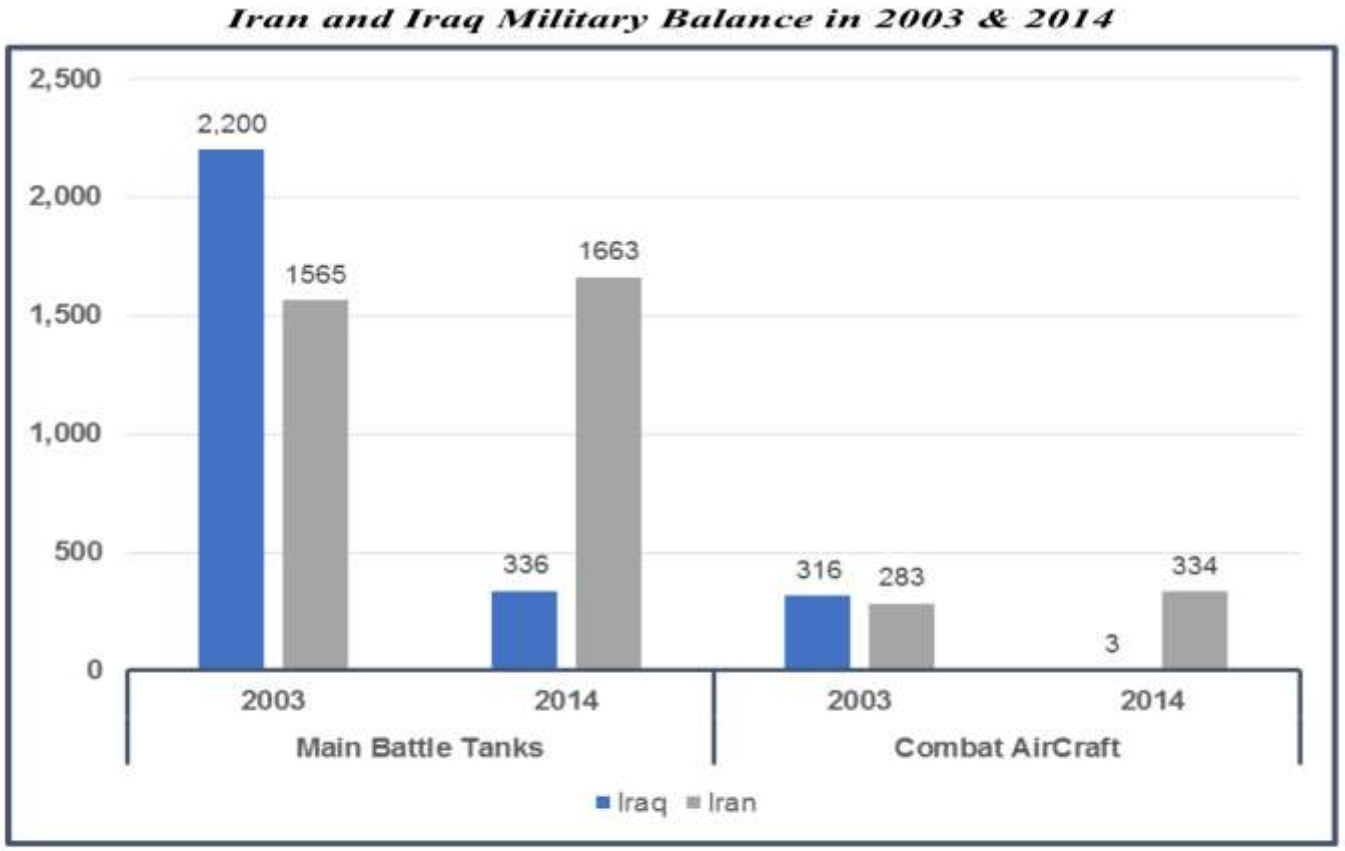
•Restructuring of Basij, internal security forces.

US Destruction of Iraq's Major Forces

Category	2003			2014		
	Iraq	Iran	Force Ratio	Iraq	Iran	Force Ratio
Active Manpower	424000	513000	4:5	271400	523000	1:2
Reserve Manpower	650000	350000	19:10	0	350000	NA
Main Battle Tanks	2200	1565	7:5	336	1663	1:5
AIFVs	1300	815	8:5	188	610	1:3
APCs	2400	590	4:1	3688	640	6:1
Towed Artillery	1900	2085	9:10	138	2030	1:20
Self-Propelled Artillery	150	310	1:2	48	292	1:6
Multiple Rocket Launchers	200	889	1:5	some	1476	NA
Combat Aircraft	316	283	11:10	3	334	1:100
Attack Helicopters	100	85	6:5	0	50	NA
Major SAM Launchers	225	205	11:10		529	NA

Source: Adapted by Anthony H. Cordesman and Garrett Berntsen from IISS, *Military Balance, 2014* and IHS Jane's Sentinel series

Iran vs. Iraq: Losing Both a Threat and a Shield



	Main Battle Tanks		Combat AirCraft	
	2003	2014	2003	2014
Iraq	2,200	336	316	3
Iran	1565	1663	283	334

Source: Adapted by Anthony H. Cordesman and Garrett Berntsen from IISS, *Military Balance, 2014* and IHS Jane's Sentinel series

The Potential "Shi'ite Crescent"
Influence in Bahrain, Gaza, Iraq, Lebanon and Yemen

Bahrain's Vulnerability

Ethnic groups:
Bahraini 46%, non-Bahraini 54% (2010 census)

Languages:
Arabic (official), English, Farsi, Urdu

Religions:
Muslim (Shia and Sunni) 81.2%, Christian 9%, other 9.8% (2001 census)

Population:
1,281,332 July 2013 est.
country comparison to the world: 157 *note:* includes 235,108 non-nationals

Age structure:
0-14 years: 20% (male 130,097/female 126,067)
15-24 years: 15.9% (male 113,973/female 89,602)
25-54 years: 56.2% (male 472,537/female 247,873)
55-64 years: 5.2% (male 43,884/female 23,352)
65 years and over: 2.6% (male 16,262/female 17,685) (2013 est.)
\

Iran's Advantage in Strategic Depth

Iran's "Negatives," Vulnerabilities and and Aging Conventional Forces

Key Negatives for Iran

- **A spoiler role is not strategic success: Unstable Lebanon, Iraq, Afghanistan, Uncertain Hamas.**
- **Coalition in war against Islamic State, hope for national Iraqi government**
- **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.**

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**

"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.**

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.**

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

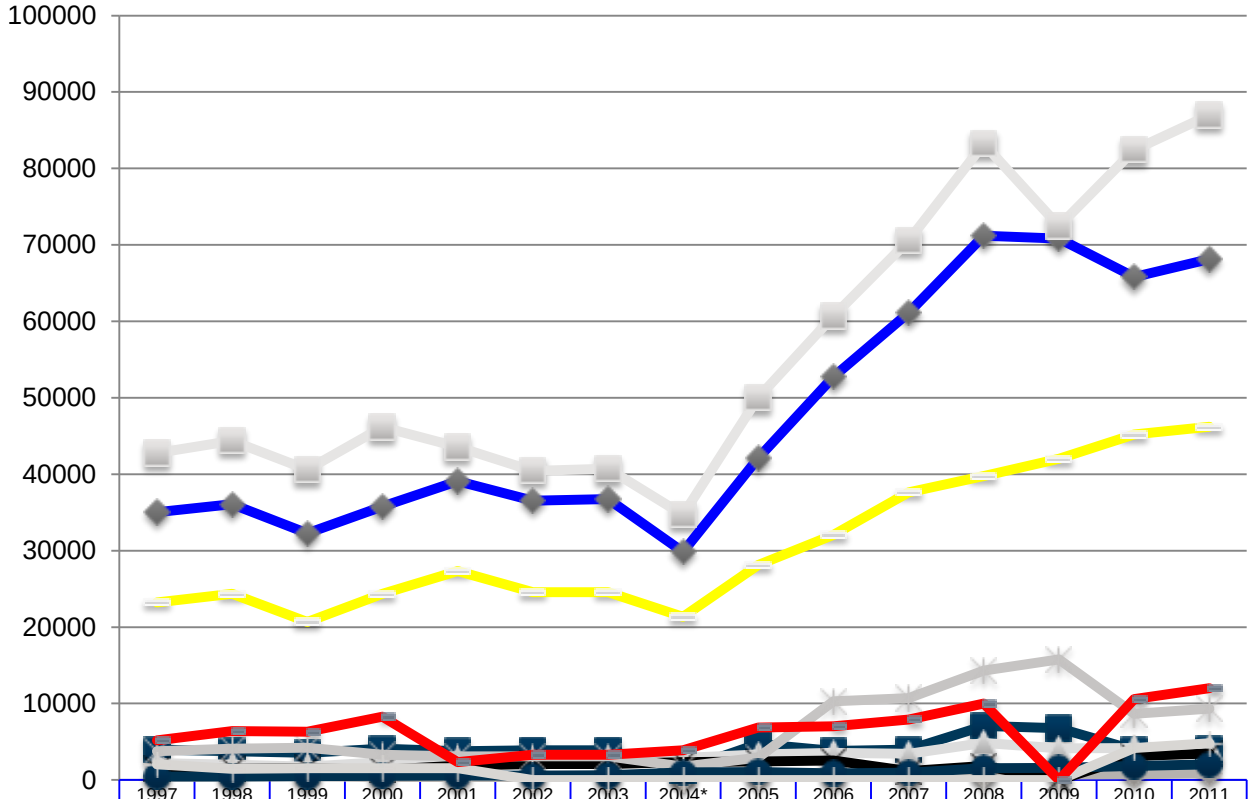
Iranian Conventional Vulnerabilities

- **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.**

Source: See http://www.eia.gov/countries/cab.cfm?fips=IR & cabs/OPEC_Revenues/Factsheet.html for energy data.

Overwhelming GCC Lead in Military Spending and Arms Imports

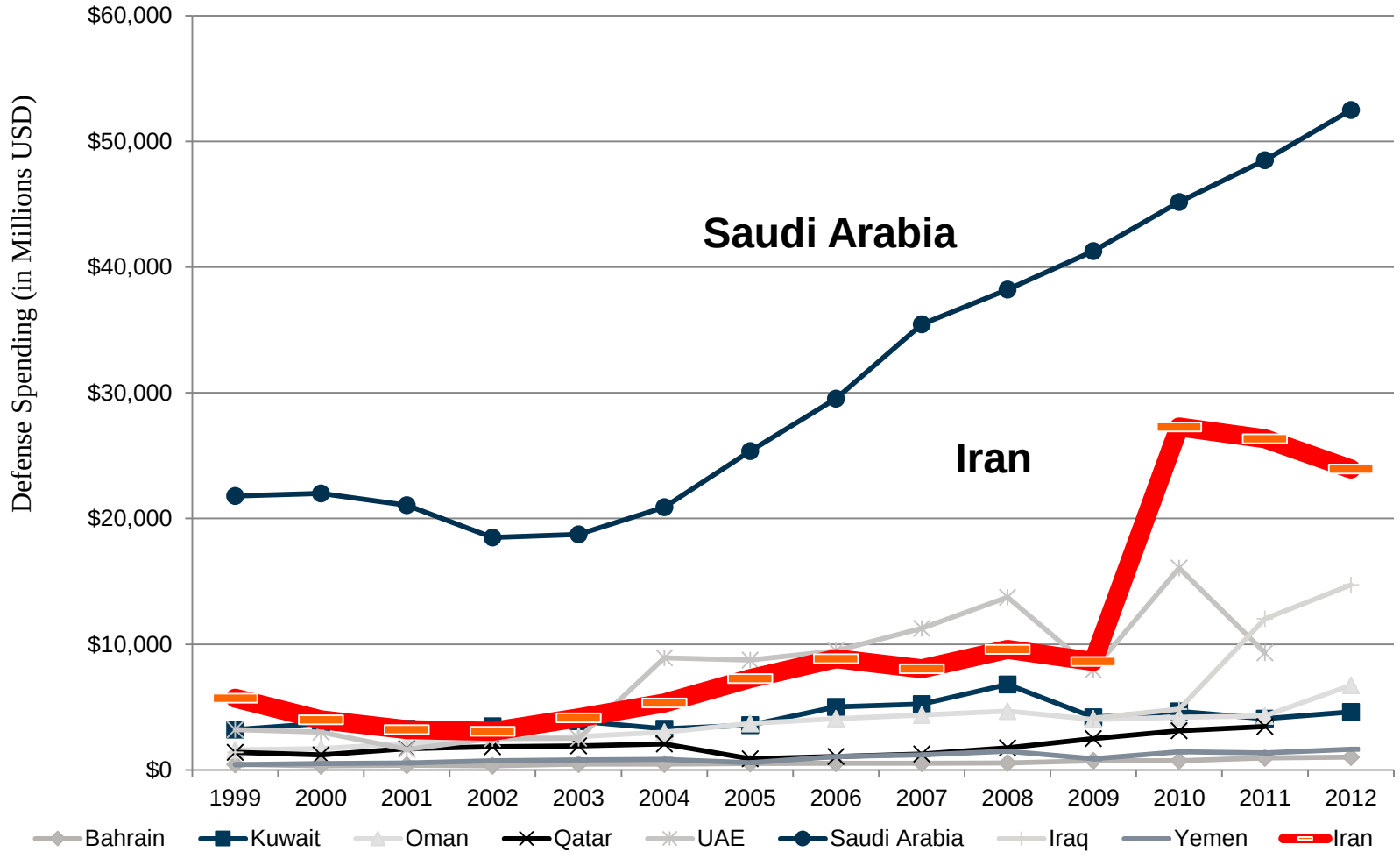
GCC Lead in Military Spending: IISS Estimate: 1997-2011
($US Current)



	1997	1998	1999	2000	2001	2002	2003	2004*	2005	2006	2007	2008	2009	2010	2011
Bahrain	403	445	491	356	370	366	364	199	582	518	573	575	711	747	873
Kuwait	3,984	3,762	3,540	4,094	3,762	3,873	3,873	1,327	4,725	3,789	3,986	7,089	6,783	3,910	4,050
Oman	2,213	1,991	1,771	2,324	2,656	2,545	2,766	2,877	3,342	3,550	3,433	4,861	4,141	4,180	4,270
Qatar	1,439	1,439	1,549	1,327	1,881	2,103	2,103	2,324	2,422	2,530	1,159	1,822	0	3,120	3,450
UAE	3,762	4,094	4,205	3,320	3,098	3,098	3,098	1,771	2,932	10,293	10,715	14,293	15,779	8,650	9,320
Yemen	455	438	475	551	593	569	620	979	1,042	893	965	1,551	1,581	1,830	2,040
Iraq	2,063	1,439	1,549	1,549	1,549	0	0	0	0	0	0	0	0	4,190	4,790
Iran	5,201	6,418	6,308	8,299	2,324	3,320	3,320	3,873	6,860	7,036	7,919	9,983	0	10,600	12,000
Saudi Arabia	23,238	24,345	20,693	24,345	27,332	24,567	24,567	21,356	28,107	32,073	37,630	39,766	42,024	45,200	46,200
GCC Total	35,039	36,076	32,249	35,766	39,099	36,552	36,770	29,854	42,111	52,754	61,119	71,211	70,827	65,807	68,163
Gulf Total	42,758	44,371	40,581	46,164	43,565	40,441	40,710	34,705	50,013	60,680	70,563	83,218	72,440	82,427	86,993

Adapted from annual editions of the IISS *Military Balance*.

IISS Estimate of the Iran vs. GCC Military Spending Gap – Less US, UK, France: 1999-2013



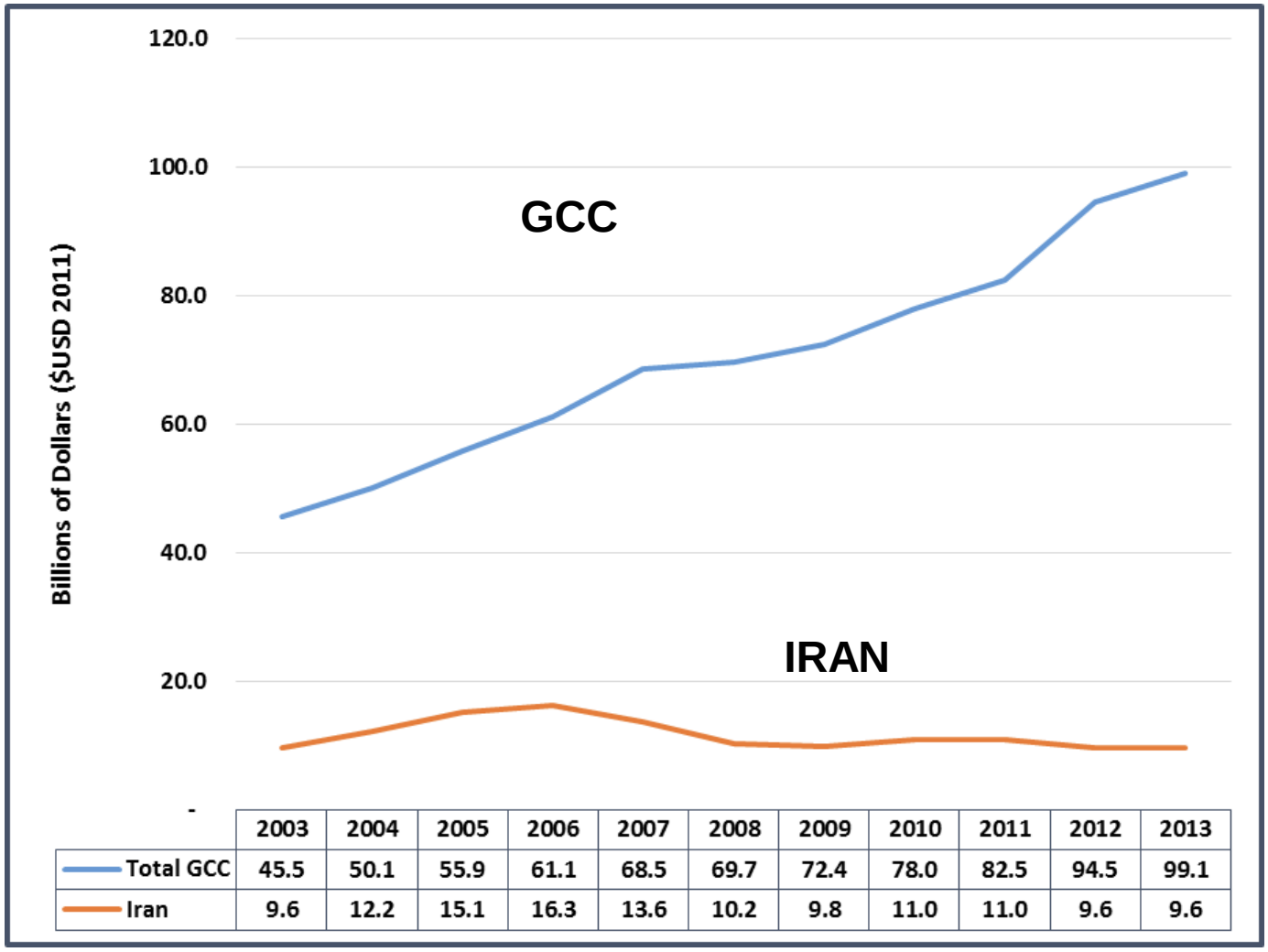
Source: Adapted from the IISS, Military Balance, 1999-2013

IISS Estimates by Country: 2003-2013
(In $US Current Millions)

Year	2009	2010	2011	2012	2013	2014
GCC						
Bahrain	705	747	943	1,020	1,390	-
Kuwait	4,180	4,650	4,070	4,620	4,070	-
Oman	4,020	4,180	4,290	6,720	9,250	-
Qatar	2,500	3,120	3,460	3,730	3,980	-
Saudi Arabia	41,300	45,200	48,500	56,700	59,600	-
UAE	7,880	8,650	9,320	9,320	10,100	-
Total	**60,585**	**66,547**	**70,583**	**82,110**	**88,390**	**-**
Saudi as % of Total GCC	**68%**	**68%**	**69%**	**68%**	**67%**	**-**
Other						
Iran	8,640	10,600	**26,400**	**25,200**	17,700	-
Iraq	4,900	4,190	12,000	14,700	16,900	-
Yemen	2,020	1,830	1,340	1,630	1,810	-
Jordan	2,330	1,360	1,370	1,220	1,450	-
Iran as % of Total GCC	**14%**	**16%**	**37%**	**31%**	**20%**	**-**

Source: Adapted from various editions of the IISS *Military Balance.*

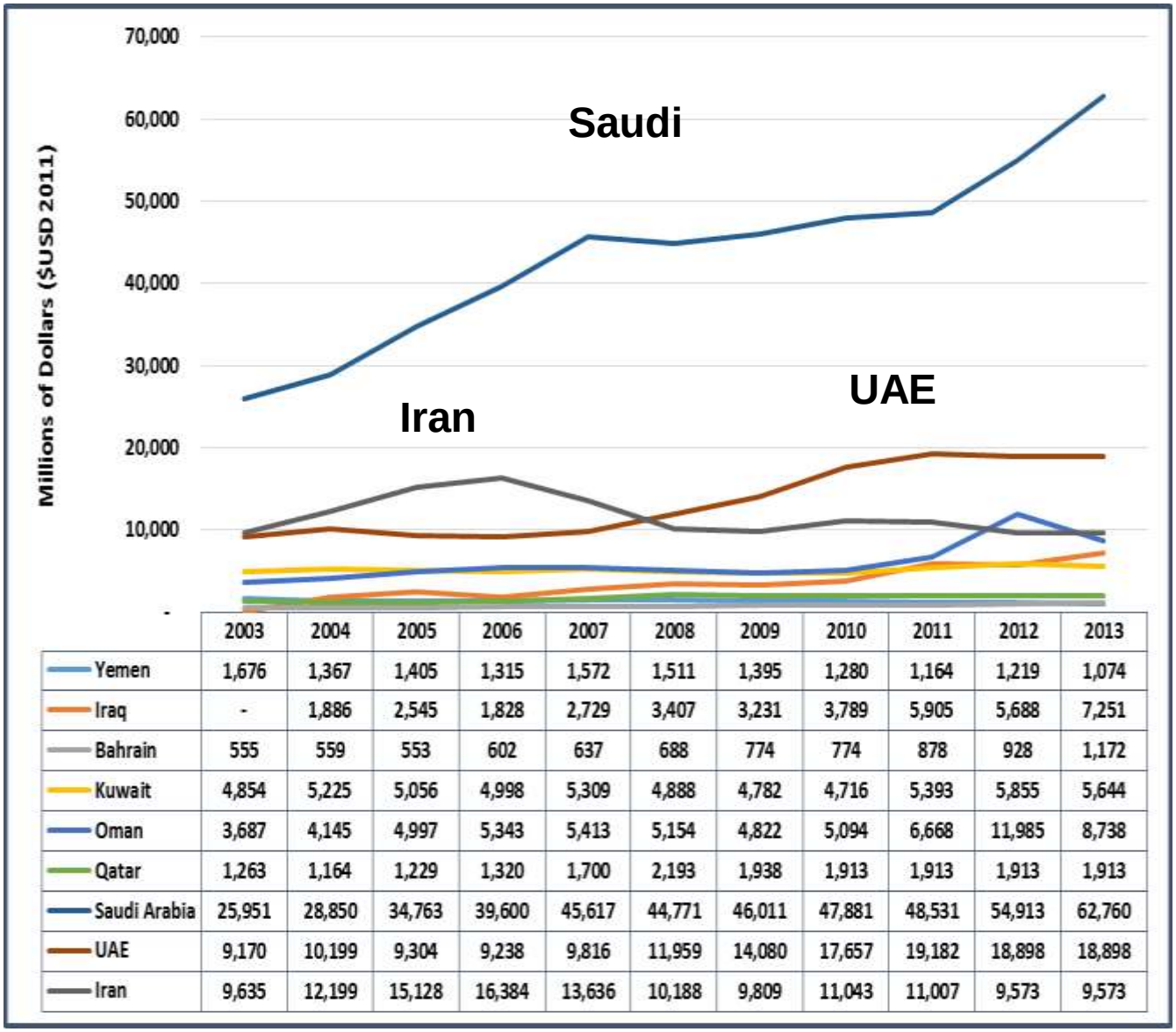
SIPRI Estimate of Trend in Total GCC Military Spending vs. Iran by Year: 2003-2013



	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Total GCC	45.5	50.1	55.9	61.1	68.5	69.7	72.4	78.0	82.5	94.5	99.1
Iran	9.6	12.2	15.1	16.3	13.6	10.2	9.8	11.0	11.0	9.6	9.6

Source: Adapted from SIPRI data as of 8.4.14

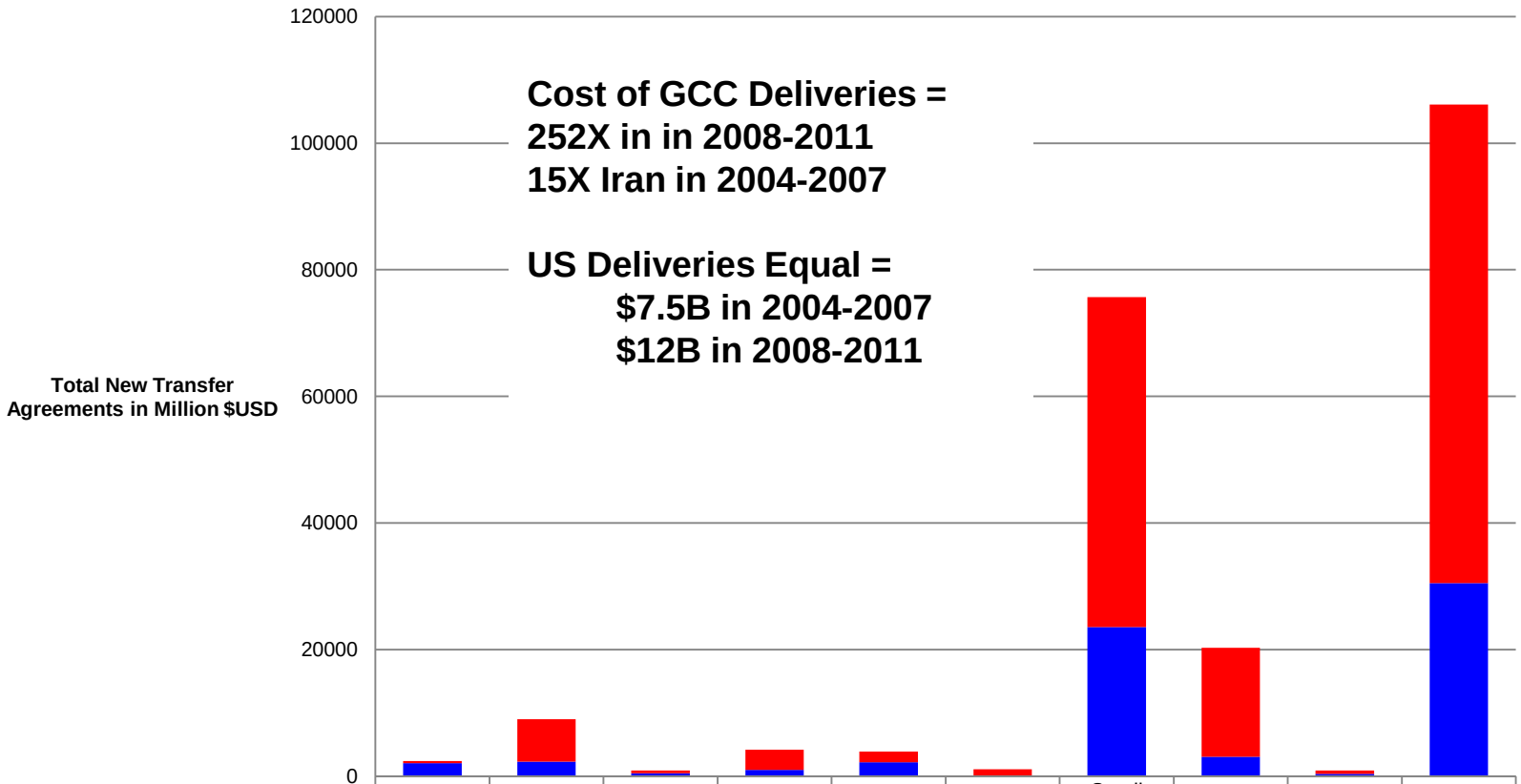
SIPRI Estimate of Trend in Gulf Spending by Country by Year: 2003-2013



	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Yemen	1,676	1,367	1,405	1,315	1,572	1,511	1,395	1,280	1,164	1,219	1,074
Iraq	-	1,886	2,545	1,828	2,729	3,407	3,231	3,789	5,905	5,688	7,251
Bahrain	555	559	553	602	637	688	774	774	878	928	1,172
Kuwait	4,854	5,225	5,056	4,998	5,309	4,888	4,782	4,716	5,393	5,855	5,644
Oman	3,687	4,145	4,997	5,343	5,413	5,154	4,822	5,094	6,668	11,985	8,738
Qatar	1,263	1,164	1,229	1,320	1,700	2,193	1,938	1,913	1,913	1,913	1,913
Saudi Arabia	25,951	28,850	34,763	39,600	45,617	44,771	46,011	47,881	48,531	54,913	62,760
UAE	9,170	10,199	9,304	9,238	9,816	11,959	14,080	17,657	19,182	18,898	18,898
Iran	9,635	12,199	15,128	16,384	13,636	10,188	9,809	11,043	11,007	9,573	9,573

Source: Adapted from SIPRI data as of 8.4.14

CRS: The Arms Delivery Gap: Iran vs. GCC 2004-2011



	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.

CRS: US Arms Delivery Estimates: 2003-2011

(In $US Current Billions)

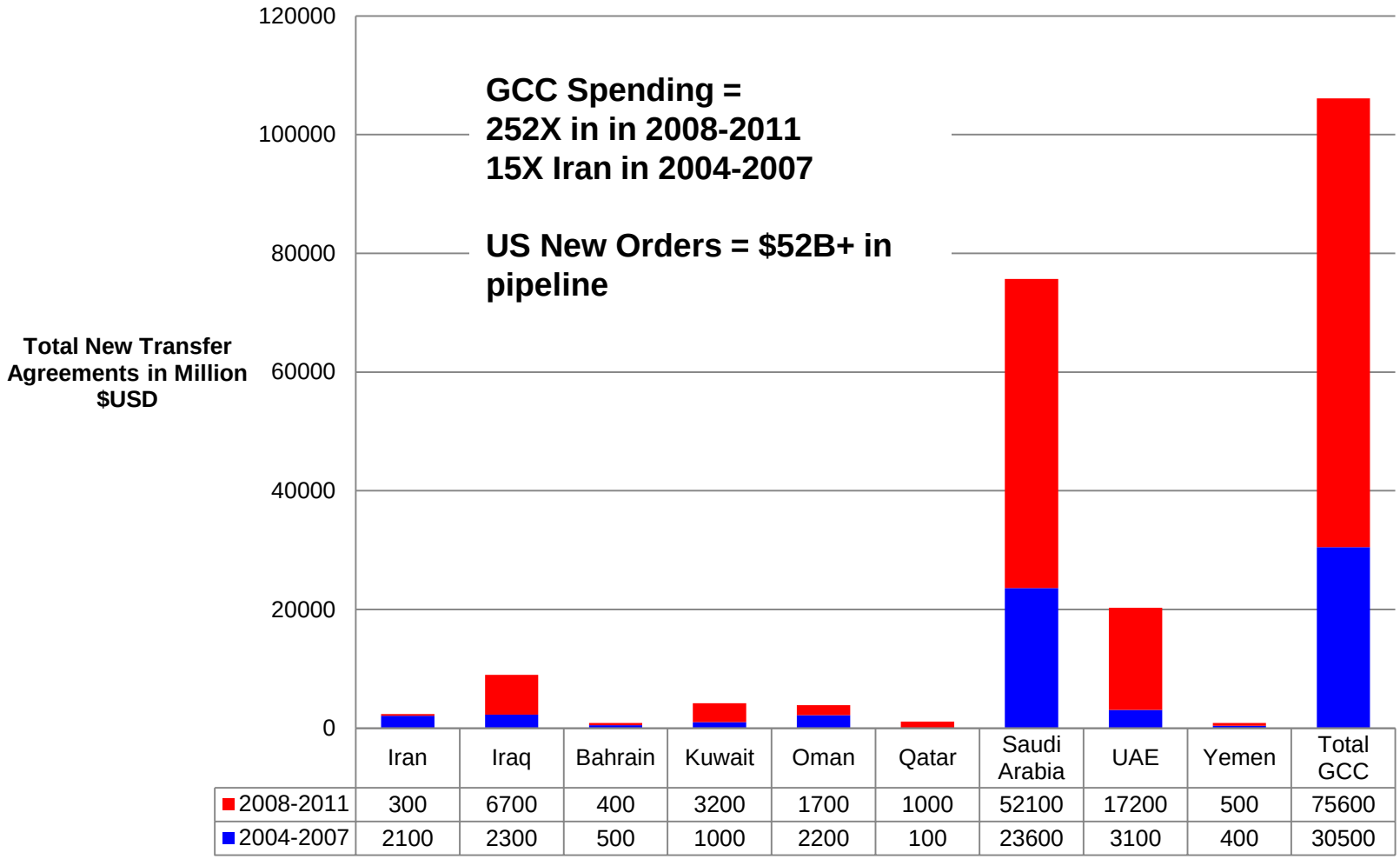
Recipient Country	U.S.	Russia	China	Major West European	All Other European	All Others	Total
2004-2007							
Bahrain	200	0	0	100	0	0	300
Iran	0	500	200	0	0	200	900
Iraq	200	100	0	100	300	100	800
Kuwait	1,500	0	0	0	0	0	1,500
Oman	700	0	0	300	0	0	1,000
Qatar	0	0	0	0	0	0	0
Saudi Arabia	4,300	0	200	9,900	100	100	14,600
UAE	600	200	0	4,000	400	0	5,200
Yemen	0	400	0	0	100	100	600
GCC Total	7,300	200	200	14,300	500	100	22,600

Recipient Country	U.S.	Russia	China	Major West European	All Other European	All Others	Total
2008-2011							
Bahrain	0	0	0	0	0	0	0
Iran	0	200	0	0	0	0	200
Iraq	2,600	300	0	300	100	100	3,400
Kuwait	1,300	100	100	0	0	0	1,500
Oman	200	0	0	500	0	0	700
Qatar	0	0	0	200	0	0	200
Saudi Arabia	5,900	0	700	3,300	300	0	10,200
UAE	2,000	300	100	600	300	0	3,300
Yemen	0	100	0	0	200	100	400
GCC Total	9,400	400	900	4,600	600	0	15,900

Notes: 0=data less than $50 million or nil. All data are rounded to the nearest $100 million.
a. Major West European category includes France, United Kingdom, Germany, and Italy totals as an aggregate figure.

Source: Richard F. Grimmett and Paul K. Kerr, Conventional Arms Transfers to Developing Nations, 2004-2011, Congressional Research Service, August 24, 2012. P. 44-45.

CRS: The New Arms Order Transfer Gap: Iran vs. GCC 2004-2011



	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.

CRS: US New Arms Transfer Estimates: 2003-2011

(In $US Current Billions)

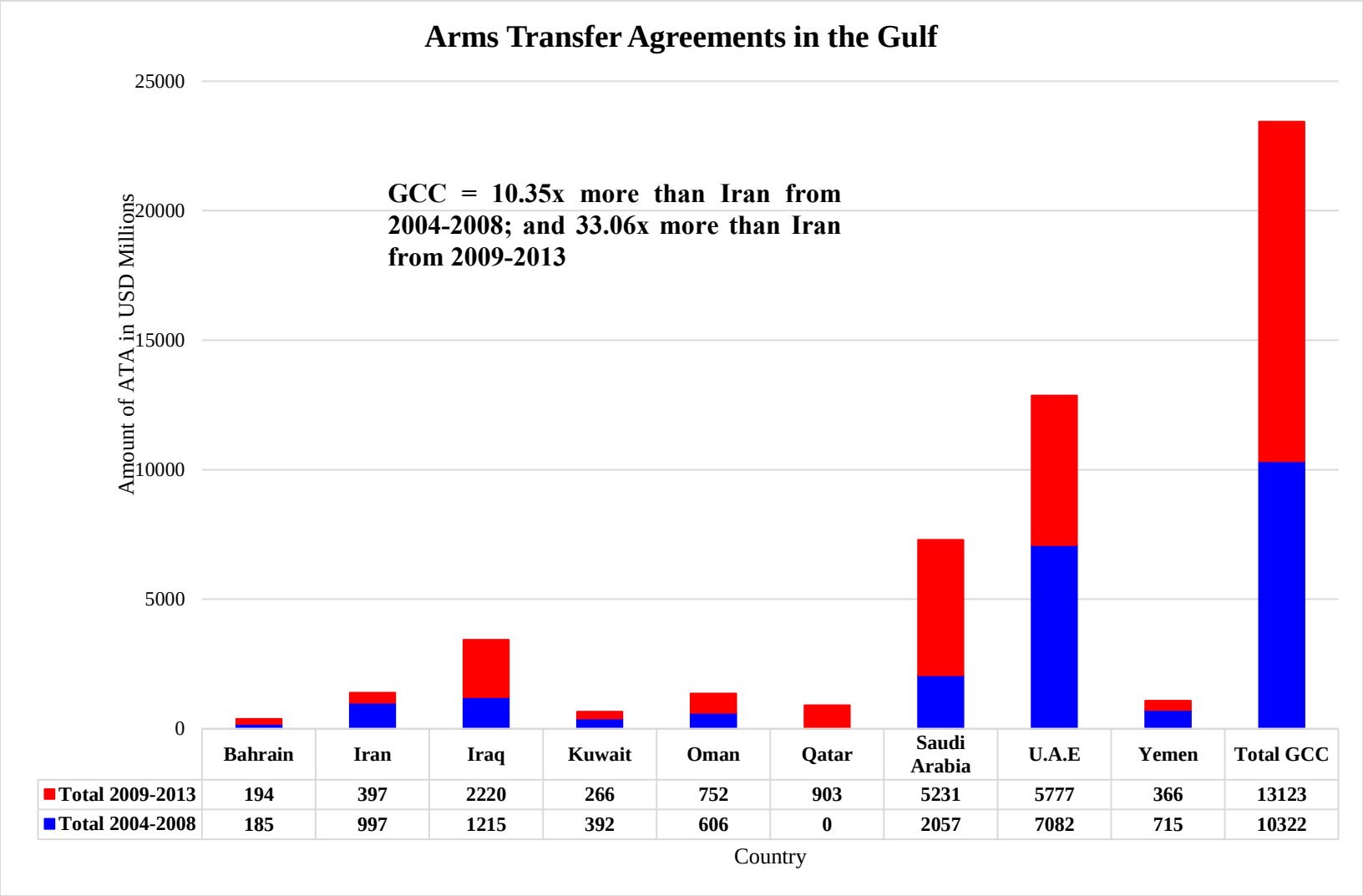
Recipient Country	U.S.	Russia	China	Major West European	All Other European	All Others	Total
2004-2007							
Bahrain	400	0	0	100	0	0	500
Iran	0	1,600	300	0	100	100	2,100
Iraq	1,100	100	100	200	600	200	2,300
Kuwait	1,000	0	0	0	0	0	1,000
Oman	100	0	0	2,100	0	0	2,200
Qatar	0	0	0	0	0	100	100
Saudi Arabia	5,000	0	800	16,900	800	100	23,600
UAE	1,400	300	100	1,100	200	0	3,100
Yemen	0	200	0	0	100	100	400

Recipient Country	U.S.	Russia	China	Major West European	All Other European	All Others	Total
2008-2011							
Bahrain	400	0	0	0	0	0	400
Iran	0	100	0	0	100	100	300
Iraq	4,800	300	0	500	900	200	6,700
Kuwait	2,500	700	0	0	0	0	3,200
Oman	1,500	0	0	200	0	0	1,700
Qatar	200	0	0	800	0	0	1,000
Saudi Arabia	45,600	0	0	5,300	1,100	100	52,100
UAE	14,300	100	0	1,600	1,100	100	17,200
Yemen	0	100	0	0	300	100	500

Notes: 0=data less than $50 million or nil. All data are rounded to the nearest $100 million.
a. Major West European category includes France, United Kingdom, Germany, and Italy totals as an aggregate figure.

Source: Richard F. Grimmett and Paul K. Kerr, Conventional Arms Transfers to Developing Nations, 2004-2011, Congressional Research Service, August 24, 2012. P. 44-45.

SIPRI: The Arms Order Gap – Iran vs. GCC 2004-2013



	Bahrain	Iran	Iraq	Kuwait	Oman	Qatar	Saudi Arabia	U.A.E	Yemen	Total GCC
Total 2009-2013	194	397	2220	266	752	903	5231	5777	366	13123
Total 2004-2008	185	997	1215	392	606	0	2057	7082	715	10322

Source: Stockholm International Peace Research Institute Arms Transfers Database, http://www.sipri.org/database/armstransfers
*France, Germany, Italy, United Kingdom Figures are SIPRI Trend Indicator Values (TIVs) expressed in US$ m. at constant (1990) prices, Figures may not add up due to the conventions of rounding, or lack of access to verification data at SIPRI. A '0' indicates that the value of deliveries is less than US$0.5m

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SIPRI: The Arms Order Gap – Iran vs. GCC 2004-2013

Recipient Country	U.S.	Russia	China	Major West European*	All Other European	All Others	Total
2004-2008							
Algeria	0	2486	61	44	34	96	**2721**
Bahrain	94	0	0	60	31	0	**185**
Egypt	2183	305	179	37	164	252	**3120**
Iran	0	699	215	0	0	83	**997**
Iraq	519	190	0	10	269	227	**1215**
Israel	4565	0	0	81	0	0	**4646**
Jordan	235	0	8	89	170	81	**583**
Kuwait	289	0	0	14	89	NA	**392**
Lebanon	1	0	0	3	0	3	**7**
Libya	0	39	0	7	0	0	**46**
Morocco	20	150	289	0	23	NA	**482**
Oman	531	0	0	56	0	19	**606**
Qatar	0	0	0	0	0	0	**0**
Saudi Arabia	1029	0	33	857	72	66	**2057**
Syria	0	90	20	0	0	346	**456**
Tunisia	5	0	0	168	0	0	**173**
U.A.E	3782	0	0	3161	89	50	**7082**
Yemen	8	478	0	70	110	49	**715**

Recipient Country	U.S.	Russia	China	Major West European*	All Other European	All Others	Total
2009-2013							
Algeria	22	3854	18	278	56	0	4228
Bahrain	134	0	0	17	29	14	194
Egypt	1038	886	72	75	286	NA	2357
Iran	0	125	272	0	0	NA	397
Iraq	1678	195	20	126	200	1	2220
Israel	304	0	0	699	0	14	1017
Jordan	117	224	0	1	429	35	806
Kuwait	115	101	0	49	1	0	266
Lebanon	78	0	0	2	9	80	169
Libya	0	61	0	39	1	2	103
Morocco	909	0	0	873	511	508	2801
Oman	75	0	0	615	59	3	752
Qatar	710	0	0	182	11	0	903
Saudi Arabia	1533	0	33	2852	606	207	5231
Syria	0	1314	0	0	0	235	1549
Tunisia	52	0	0	0	0	0	52
U.A.E	3488	670	0	942	473	204	5777
Yemen	16	90	0	0	11	249	366

Source: Stockholm International Peace Research Institute Arms Transfers Database, http://www.sipri.org/database/armstransfers
*France, Germany, Italy, United Kingdom Figures are SIPRI Trend Indicator Values (TIVs) expressed in US$ m. at constant (1990) prices, Figures may not add up due to the conventions of rounding, or lack of access to verification data at SIPRI. A '0' indicates that the value of deliveries is less than US$0.5m

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The Conventional Balance in the Gulf

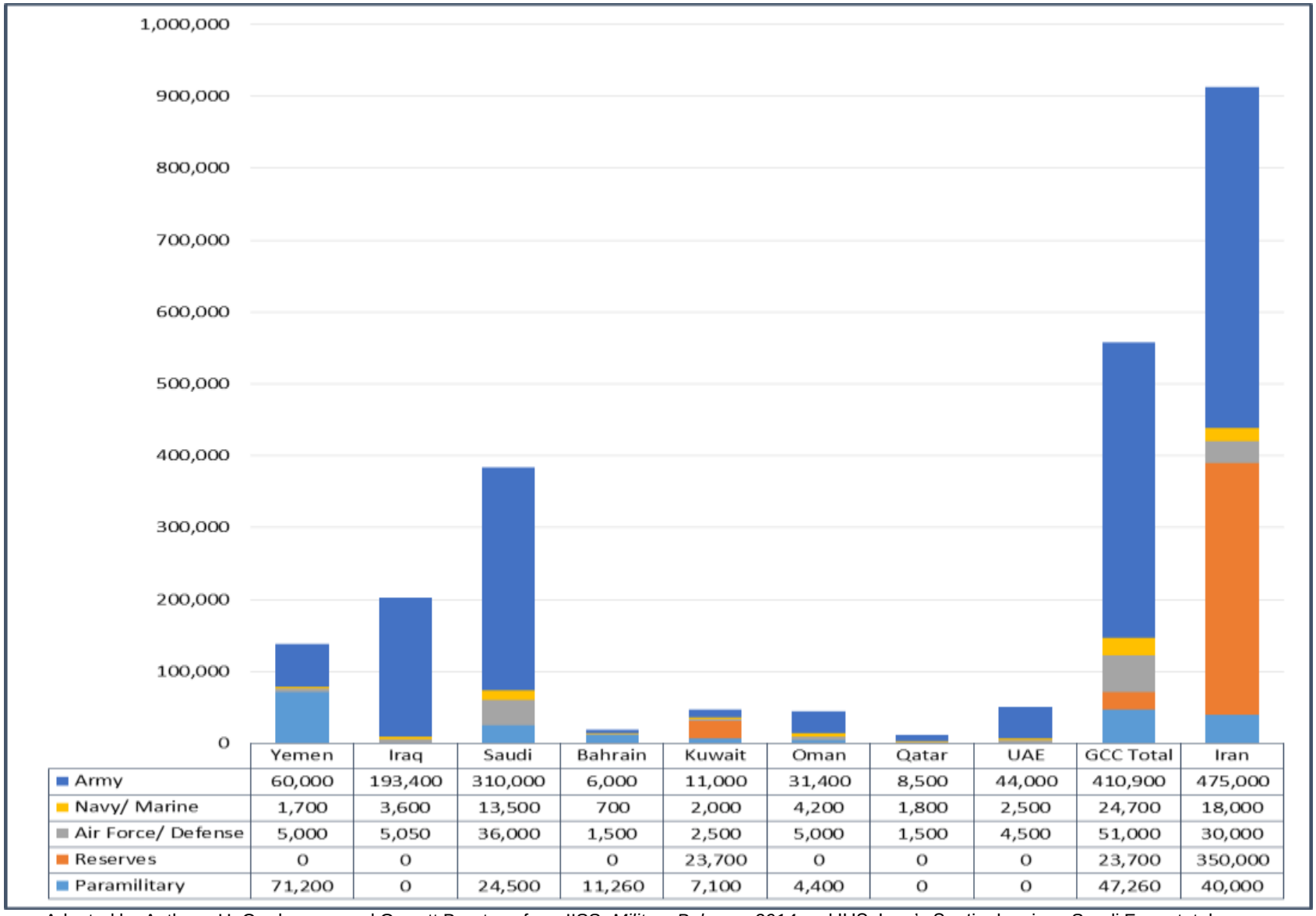
Iran's Advantage in Strategic Depth

GCC Lead in Key Land Force Weapons Even Without US, British, and French Power Projection

Land Threats

- **Iran superior in mass, but not weapons quality. Reliance on aging and worn armor, towed artillery.**
- **Limited Iranian ability to project and sustain armored forces.**
- ***No effective air cover, survivable naval escort and defense*.**
- **Not practice large-scale forced entry with amphibious forces, but significant capability for small raids and can quickly ferry substantial forces if invited in.**
- **Key GCC area of vulnerability is through Iraq to Kuwait: "Kuwaiti hinge. (Much depends on level of Iraqi ties to Iran.)**
- **Iranian IRGC, marines, special forces have significant raid capability in Gulf and near coastal areas. Raids on offshore and critical shore facilities.**
- **Covert operations, sabotage.**
- **Attacks on US-allied military facilities**

Total Combat Manpower without US and Other Allied Forces



	Yemen	Iraq	Saudi	Bahrain	Kuwait	Oman	Qatar	UAE	GCC Total	Iran
Army	60,000	193,400	310,000	6,000	11,000	31,400	8,500	44,000	410,900	475,000
Navy/ Marine	1,700	3,600	13,500	700	2,000	4,200	1,800	2,500	24,700	18,000
Air Force/ Defense	5,000	5,050	36,000	1,500	2,500	5,000	1,500	4,500	51,000	30,000
Reserves	0	0		0	23,700	0	0	0	23,700	350,000
Paramilitary	71,200	0	24,500	11,260	7,100	4,400	0	0	47,260	40,000

Source: Adapted by Anthony H. Cordesman and Garrett Berntsen from IISS, *Military Balance, 2014* and IHS Jane's Sentinel series. Saudi Force totals were provided by Nawaf Obaid. Projected Saudi Force growth goals are 300,000 in the Army, 200,000 in the National Guard, and 40,000 in the Navy by 2020. The Saudi National Guard (125,000) is included in the Saudi Army Total and the Saudi Industrial Security Force (9,000) is included in the Paramilitary category.

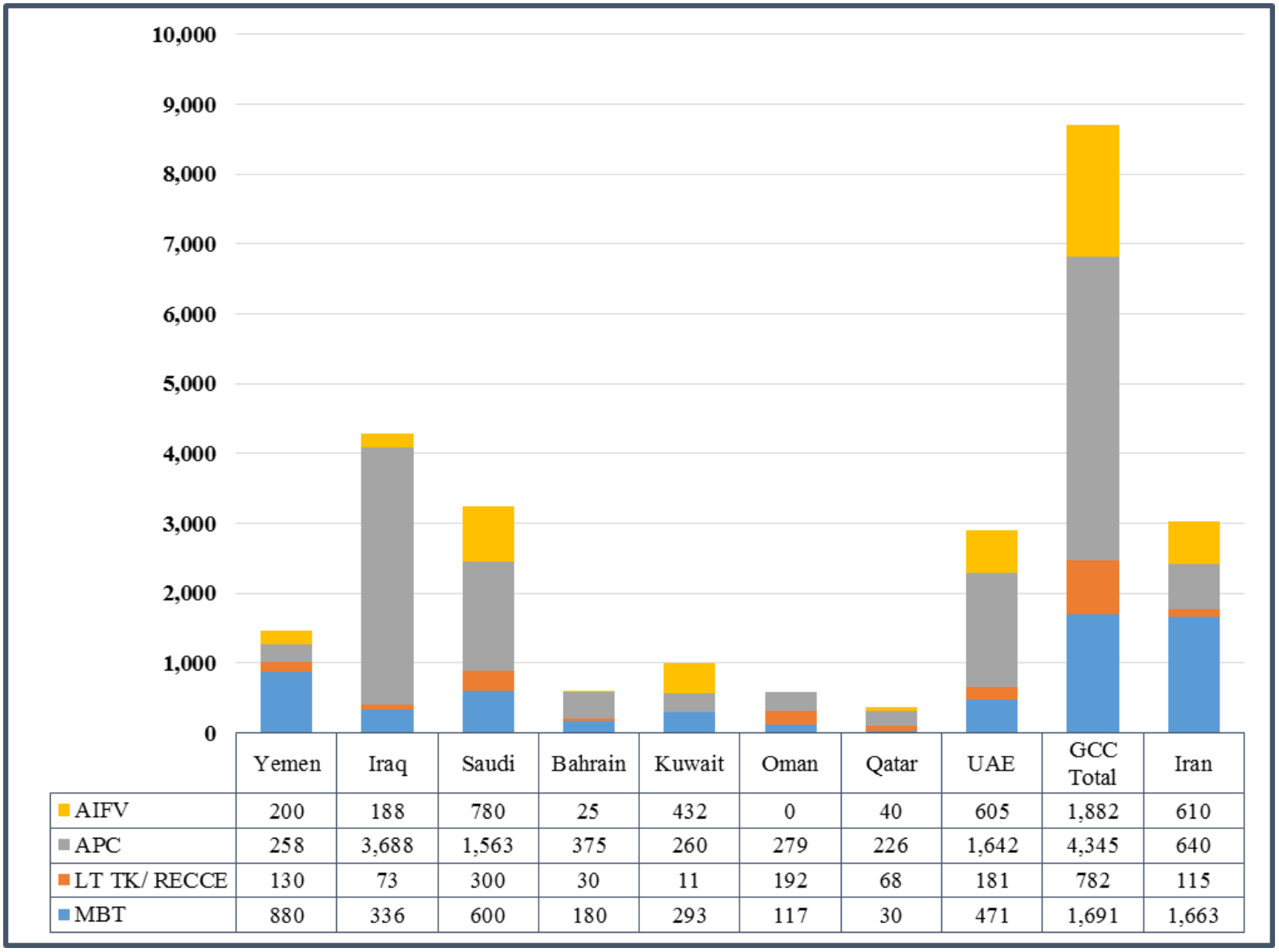
Iranian Reliance on Aging/ Mediocre Systems – Land

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

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

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

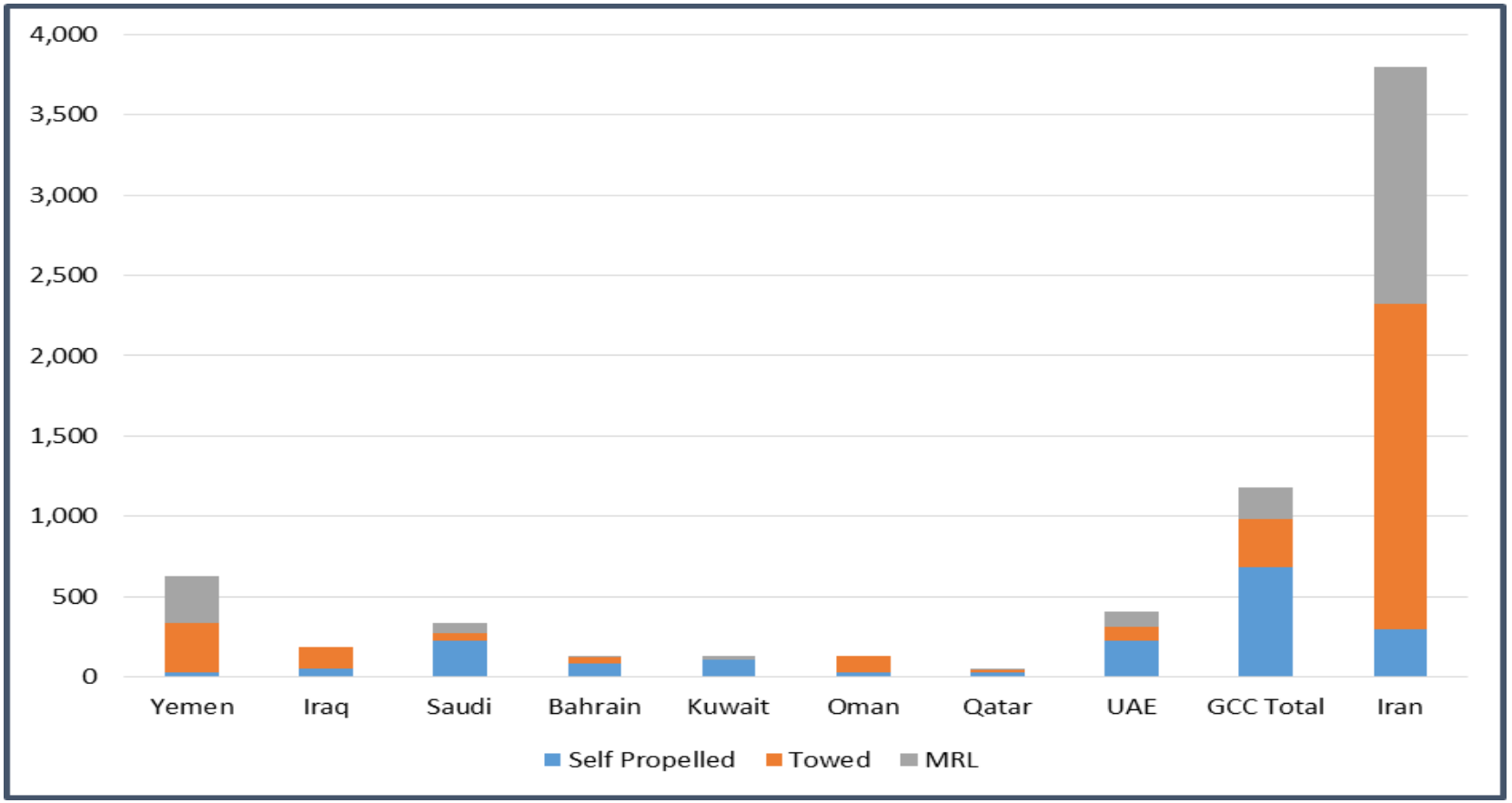
Total Major Armored Weapons without US and Other Allied Forces



	Yemen	Iraq	Saudi	Bahrain	Kuwait	Oman	Qatar	UAE	GCC Total	Iran
AIFV	200	188	780	25	432	0	40	605	1,882	610
APC	258	3,688	1,563	375	260	279	226	1,642	4,345	640
LT TK/ RECCE	130	73	300	30	11	192	68	181	782	115
MBT	880	336	600	180	293	117	30	471	1,691	1,663

Source: Adapted by Anthony H. Cordesman and Garrett Berntsen from IISS, *Military Balance, 2014* and IHS Jane's Sentinel series

Total Major Artillery Weapons without US and Other Allied Forces



	Yemen	Iraq	Saudi	Bahrain	Kuwait	Oman	Qatar	UAE	GCC Total	Iran
Self Propelled	25	48	224	82	106	24	28	221	685	292
Towed	310	138	50	36	0	108	12	93	299	2,030
MRL	294	some	60	9	27	0	4	92	192	1,476
Mortars	642	1,200	437	24	78	101	45	155	840	5,000

Source: Adapted by Anthony H. Cordesman and Garrett Berntsen from IISS, *Military Balance, 2014* and IHS Jane's Sentinel series

The “Kuwaiti Hinge”

GCC Lead in Airpower, Even Without US, British, and French Power Projection

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 tactics, "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.***

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)

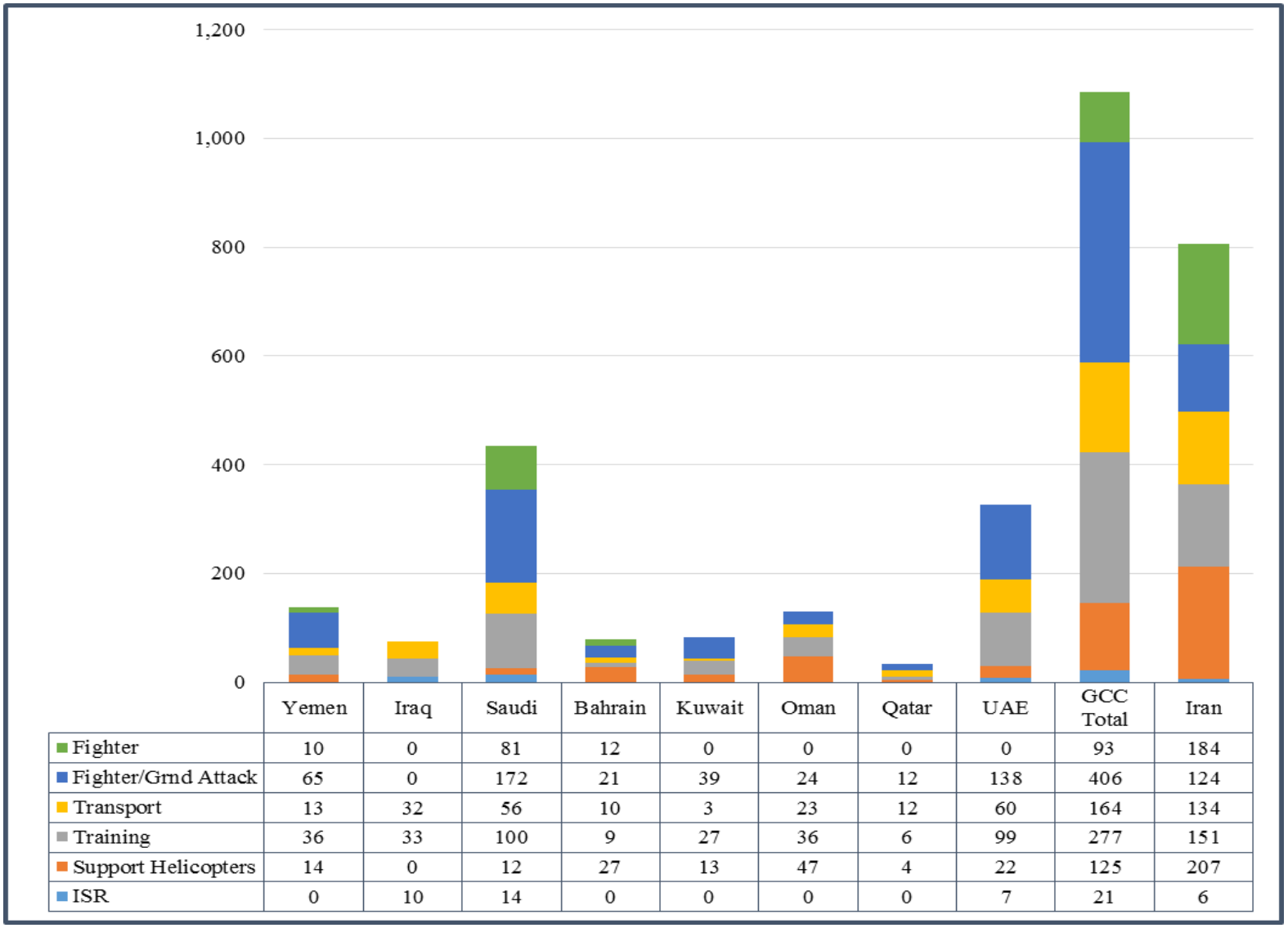
Air Bases Source: Global Security.org
Order of Battle Source: Anthony Cordesman CSIS

	Combat A/C	Attack Helo's
Iran	319	95
Iraq	-	37
Kuwait	50	45
Bahrain	33	16
Qatar	18	25
UAE	164	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

Total Combat Air Strength without US and Other Allied Aircraft



	Yemen	Iraq	Saudi	Bahrain	Kuwait	Oman	Qatar	UAE	GCC Total	Iran
Fighter	10	0	81	12	0	0	0	0	93	184
Fighter/Grnd Attack	65	0	172	21	39	24	12	138	406	124
Transport	13	32	56	10	3	23	12	60	164	134
Training	36	33	100	9	27	36	6	99	277	151
Support Helicopters	14	0	12	27	13	47	4	22	125	207
ISR	0	10	14	0	0	0	0	7	21	6

Source: Adapted by Anthony H. Cordesman and Garrett Berntsen from IISS, *Military Balance, 2014* and IHS Jane's Sentinel series

IISS Estimate of Iranian Air Strength

International Institute of Strategic Studies 2014 Estimate

Aircraft Type	Original Holding	In Service	Comments
Fighters			
F-5B	-	20	*
F5-E/F	-	55+	*
F-4D/EII	-	65	*
RF-4E	-	6	*
F-14	-	43	*
Mirage F-1EQ	-	10	*
F-7M	-	24	**
Mig-29A/U/UB	-	30	**
Su-24MK	-	30	**
Su-25K	-	7	**
Su-25T	-	3	**
Su-25UBK	-	3	**
Saegheh	-	6	Iranian made
Maritime Patrol			
P-3MP	-	*5*	
Attack Helicopter			
AH-1J	-	50	

*Only about 60% of the US and French supported combat aircraft are operational

**About 80% of the Russian and Chinese-supplied aircraft are operational.

Source: IISS, "Iran," *Military Balance, 2014*, pp. 319-321

IHS Jane's Estimate of Iranian Air Strength

IHS Jane's 2013 Estimate

Aircraft Type	Original Deliveries	Operational	First Delivery	Supplier and background
F-5B Smiorgh	13	12	n/a	US/iAMi supplied, F-5B converted from F-5A; at least 13 reported to have been completed
5F-E II	141	31	1974	US supplied
F5-FII	28	18	1974	US supplied
F-7N	-	30	-	PRC supplied
FT-7N	-	30	-	PRC supplied
Mirage F-1EQ	na	20	1991	French supplied, Impounded Iraqi aircraft; in case of Mirage, at least six F1BQ two-seaters and 15 F1EQ single-seaters are believed to be operated
F-4 D	32	5	1968	US supplied
F-4E	177	49	1971	US supplied
RF-4E	16	4	1971	US supplied
F-14A	79	44	1976	US supplied, only about 35 maintained in operational status at any given time
MiG-29	-	48	1990	Russian supplied, includes 21 impounded Iraqi aircraft; at least seven MiG-29UB 'Fulcrum B' two-seaters have been received; 35 to be overhauled and upgraded.
Su-24MK/Fencer D	30	29	1991	Russian supplied. Low estimate. Total includes 18 impounded Iraqi aircraft; more allegedly received from requirement for 100 ex-Russian aircraft; armed with Fajr-e-Darya AShMs; 24 to be overhauled and upgraded
Su-25 close support	13	13	1991	Russian supplied, Includes examples of the Su-25K, Su-25UBK and Su-25T versions, with at least five Su-25K/UBK being former Iraqi Air Force aircraft.
S-100 Saegheh	-	3	-	Iranian made fighter, still developmental.
IL-76 AEW	2	0-2	-	Total of 15 Il-76s acquired, including two ex-Iraqi aircraft modified for AEW mission. Of 13 pure transport aircraft, five were passed to Revolutionary Guards Corps, with only one Il-76TD reported active in 2011.
B-707-39JC Sigint	-	2		Iranian conversions of B-707s to signals intelligence mission.
AH-1J Sea Cobra/Toufan	-	45	1974	US supplied attack helicopters. Refurbishments began in 1998. Ten upgraded 'Toufan' aircraft reportedly delivered in 2010
Maritime Patrol				
PF-3 Orion		6	4	US-supplied, Obsolete but upgraded. To be replaced by version of Iran-140 Faraz

Source: IHS-Jane's, "Iran," *Sentinel Series, 2013*, pp. 23, 12-13

INSS Estimate of Iranian Air Strength

Israeli Institute of National Security Studies 2013 Estimate

Aircraft Type	Inventory	In Service	Since	Supplier	Comments*
Fighters					
F-5A/B/C	50	42	1975	US supplied,	obsolete
F-7	50	24	1987	PRC supplied,	obsolete
Mirage F-1-E	21	10	1991	French supplied	obsolescent
F-4 D/E	49	30	1968	US	obsolescent
F-14A	57	35	1972	US,	obsolescent
MiG-29	34	24	1990	Russian,	export version
Su-24 strike fighter	22	22	1991	Russian,	export version
Su-25 close support	13	13	1991	Russian,	upgraded
Saegheh	12	12	2006	Iranian made,	still developmental.
Azazakhsh	6	6	2000	Iranian made,	still developmental.
J-10	24	NA	NA		Possible buy from PRC.
Su-27	-	-	-		Possible buy from Russia.
Surveillance and Recce					
RC-130	2	2	1970	Obsolete	but upgraded.
RF-4E	6	?	1974	Obsolete	
Attack Helicopters					
AH-1J Cobra	90	65	1976	US supplied	badly worn and dated.
Shabaviz 2091/Toophan	?	?	?	Iranian upgrade	status uncertain.
Shahed 285	10	10	2009	Iranian upgrade	status uncertain.
Maritime Patrol					
PF-3 Orion	2	2	1974	US-supplied,	obsolete but upgraded.
CH-130HP	5	5	1970	US supplied,	obsolete. Also transport.
AN-140 Oghab	1	1	2012		
Y12	7	7	2000	Transport,	second mission uncertain.
Dornier DO-228	2	2	?	Transport,	second mission uncertain.

* By authors of study, not INSS.

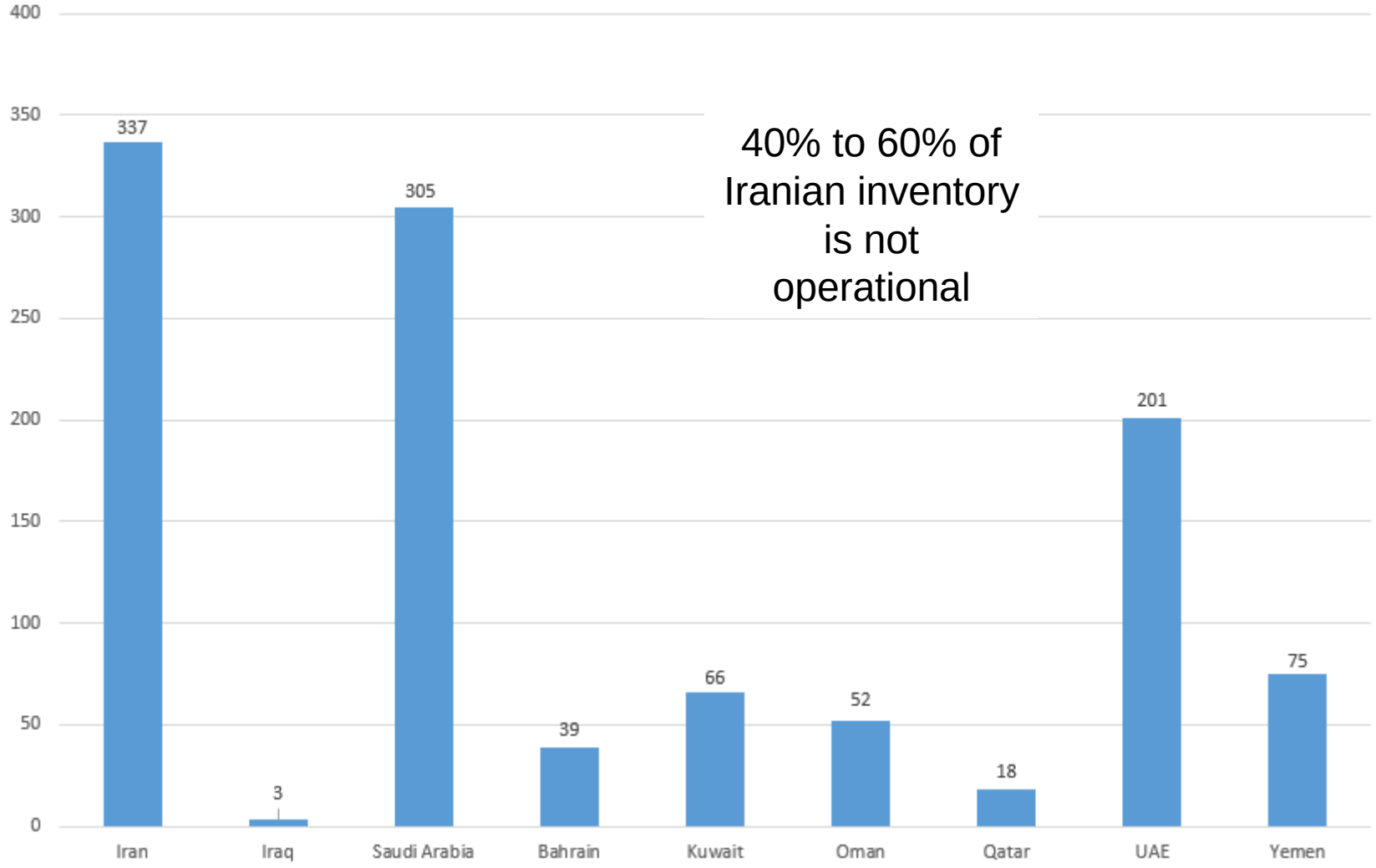
Source: Institute for National Security Studies, Military Force-Iran, http://inss.web2.moonsite.co.il/uploadimages/SystemFiles/iran.pdf, Updated as of 2/1/2013

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);

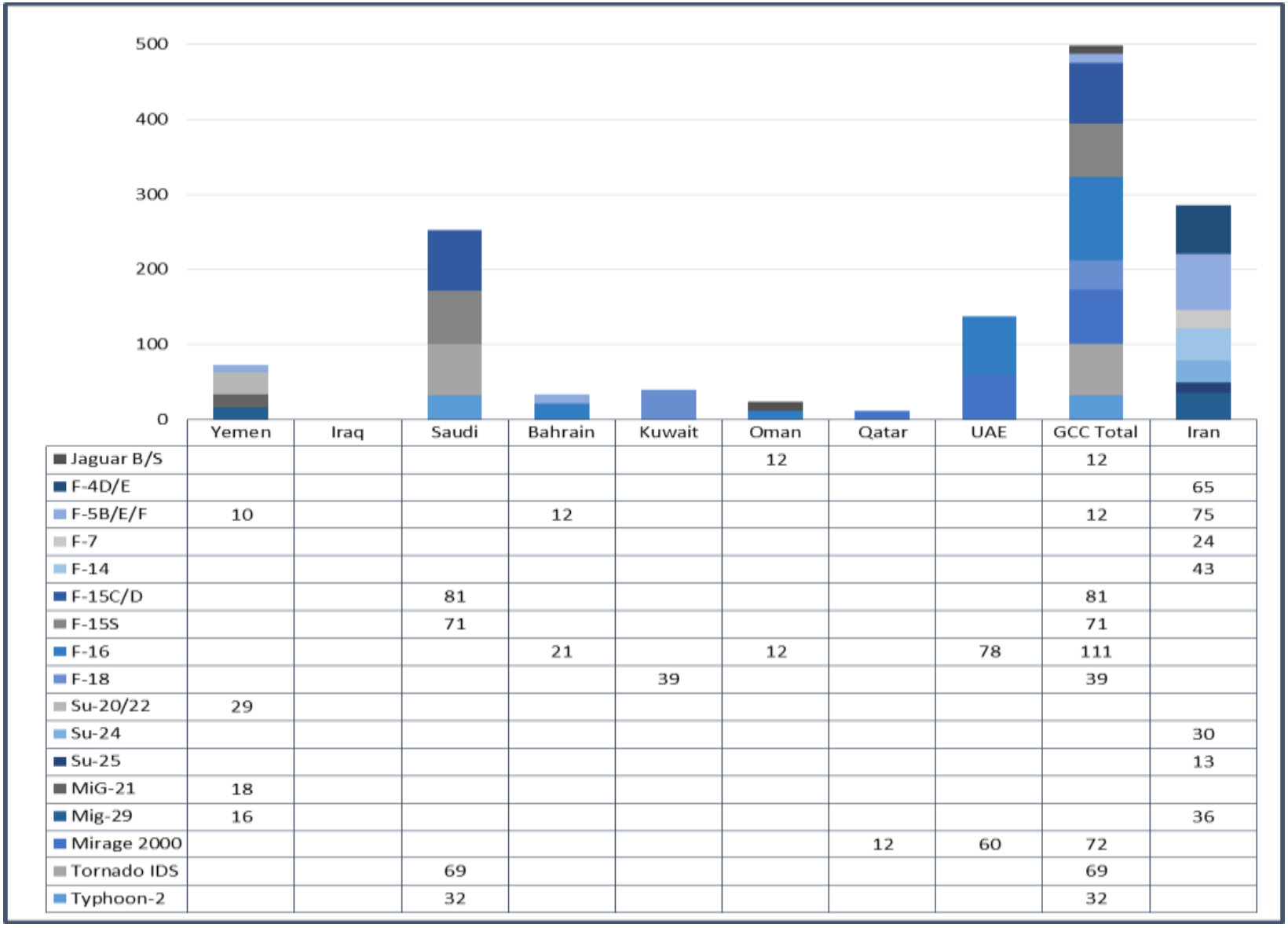
New Fighters? ISR? Tankers? UCAVs?S-300/S-400?

Operational Readiness is Critical: Comparative Gulf Fixed Wing Combat Air Strength in 2014



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.

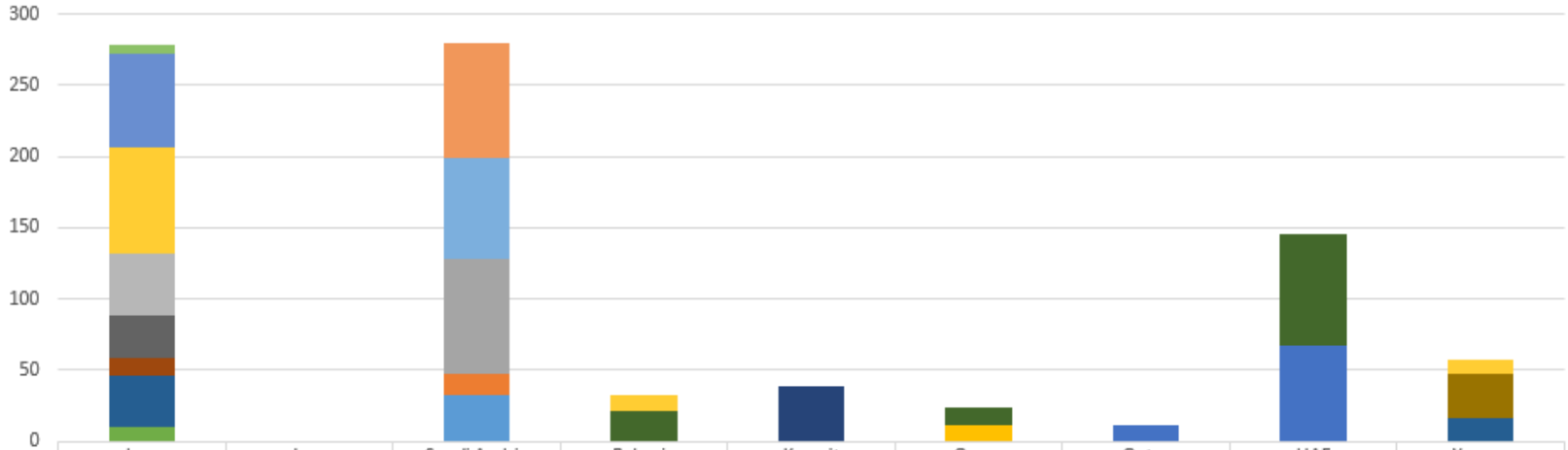
Comparative "Modern" Fighter Strength without US and Other Allied Aircraft



	Yemen	Iraq	Saudi	Bahrain	Kuwait	Oman	Qatar	UAE	GCC Total	Iran
Jaguar B/S						12			12	
F-4D/E										65
F-5B/E/F	10			12					12	75
F-7										24
F-14										43
F-15C/D			81						81	
F-15S			71						71	
F-16				21		12		78	111	
F-18					39				39	
Su-20/22	29									
Su-24										30
Su-25										13
MiG-21	18									
Mig-29	16									36
Mirage 2000							12	60	72	
Tornado IDS			69						69	
Typhoon-2			32						32	

Source: Adapted by Anthony H. Cordesman and Garrett Berntsen from IISS, *Military Balance, 2014* and IHS Jane's Sentinel series

BUT, All of the Iranian aircraft are Obsolescent or Limited Capability Export Versions



	Iran	Iraq	Saudi Arabia	Bahrain	Kuwait	Oman	Qatar	UAE	Yemen
Saegheh	6								
F-4D/E	65								
F-5	75			12					10
F-14	43								
F-15C/D			81						
F-15S			71						
F-16				21		12		78	
F-18					39				
Su-20/22									31
Su-24	30								
Su-25	13								
MiG-29	36								16
Mirage F1	10								
Mirage 2000							12	67	
Jaguar						12			
Tornado IDS			81						
Tornado ADV			15						
Typhoon-2			32						

Obsolete

Obsolete

Obsolete

Export Version

Iraqi Transfer

Export Version

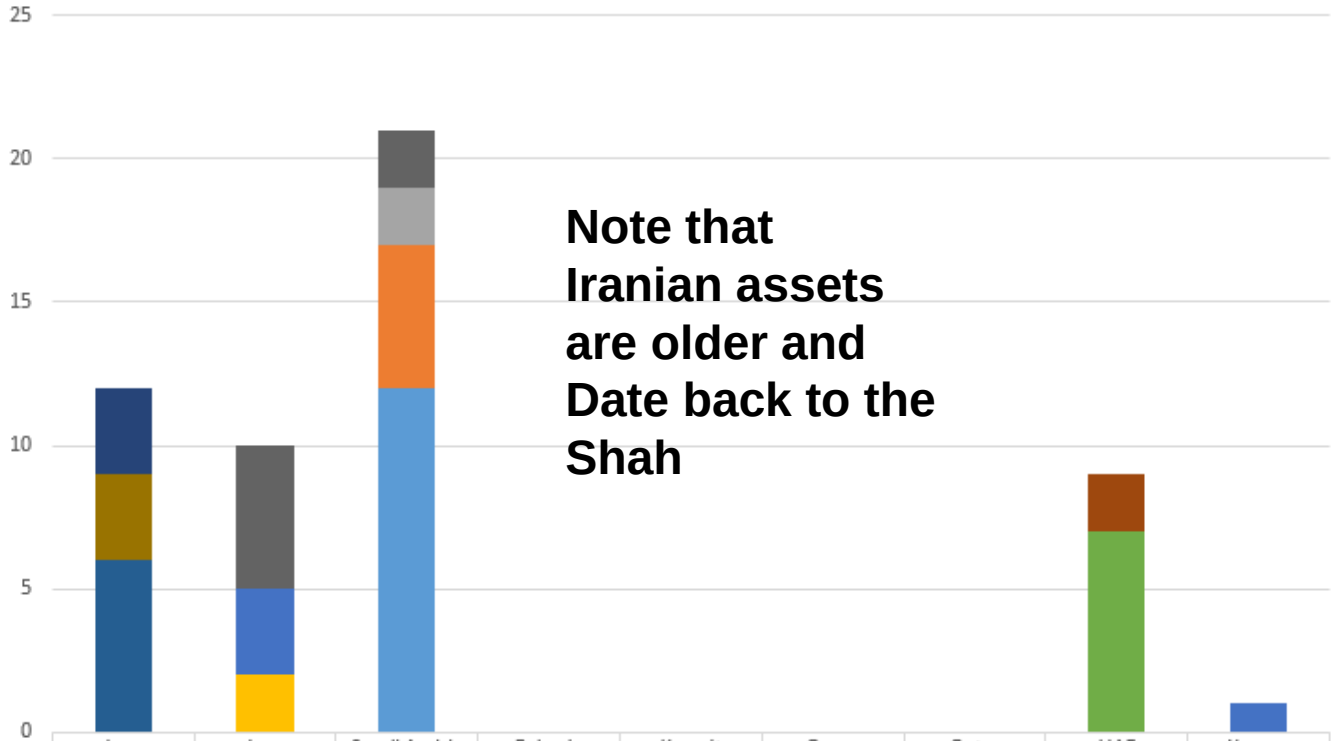
Obsolete

Source: Adapted from the IISS, **Military Balance, 2014**

Gulf Reconnaissance and AWACS Aircraft in 2014

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

The Saudi E-3A has maritime patrol capability

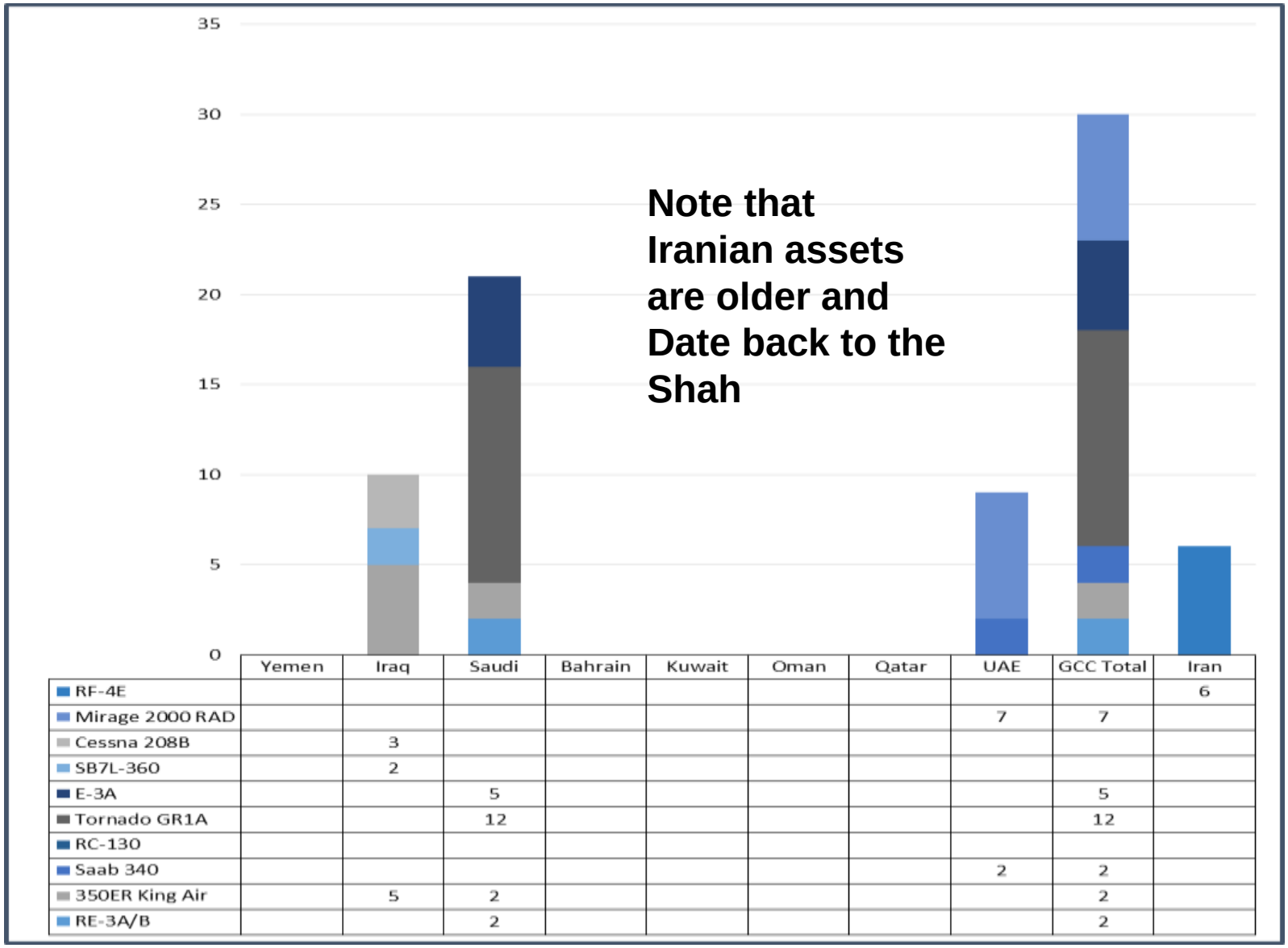


Note that Iranian assets are older and Date back to the Shah

	Iran	Iraq	Saudi Arabia	Bahrain	Kuwait	Oman	Qatar	UAE	Yemen
Falcon 20	3								
P-3F	3								
Beech 350ER King Air		5	2						
Saab 340 Erieye								2	
RF-4E	6								
Mirage 2000 RAD								7	
Cessna 208B		3							1
SB7L-360 Seeker		2							
RE-3A/B			2						
E-3A			5						
Tornado GR1A			12						

Source: Adapted from the IISS, **Military Balance, 2014**

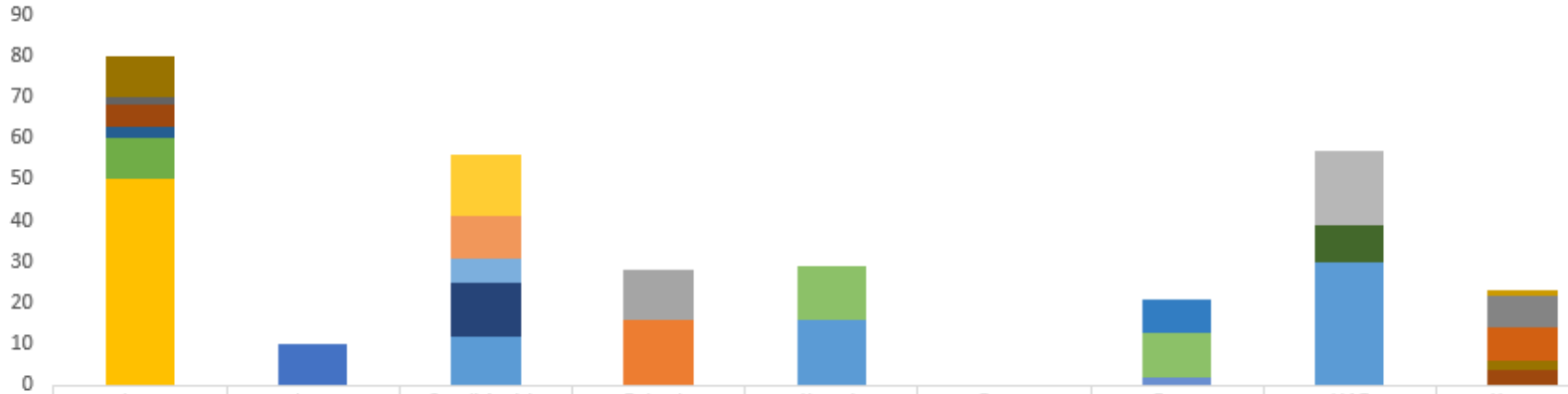
Comparative Reconnaissance, Major Intelligence, & Air Control and Warning (AEW/ AWACS) Aircraft Strength without US and Other Allied Aircraft



	Yemen	Iraq	Saudi	Bahrain	Kuwait	Oman	Qatar	UAE	GCC Total	Iran
RF-4E										6
Mirage 2000 RAD								7	7	
Cessna 208B		3								
SB7L-360		2								
E-3A			5						5	
Tornado GR1A			12						12	
RC-130										
Saab 340								2	2	
350ER King Air		5	2						2	
RE-3A/B			2						2	

Source: Adapted by Anthony H. Cordesman and Garrett Berntsen from IISS, *Military Balance, 2014* and IHS Jane's Sentinel series

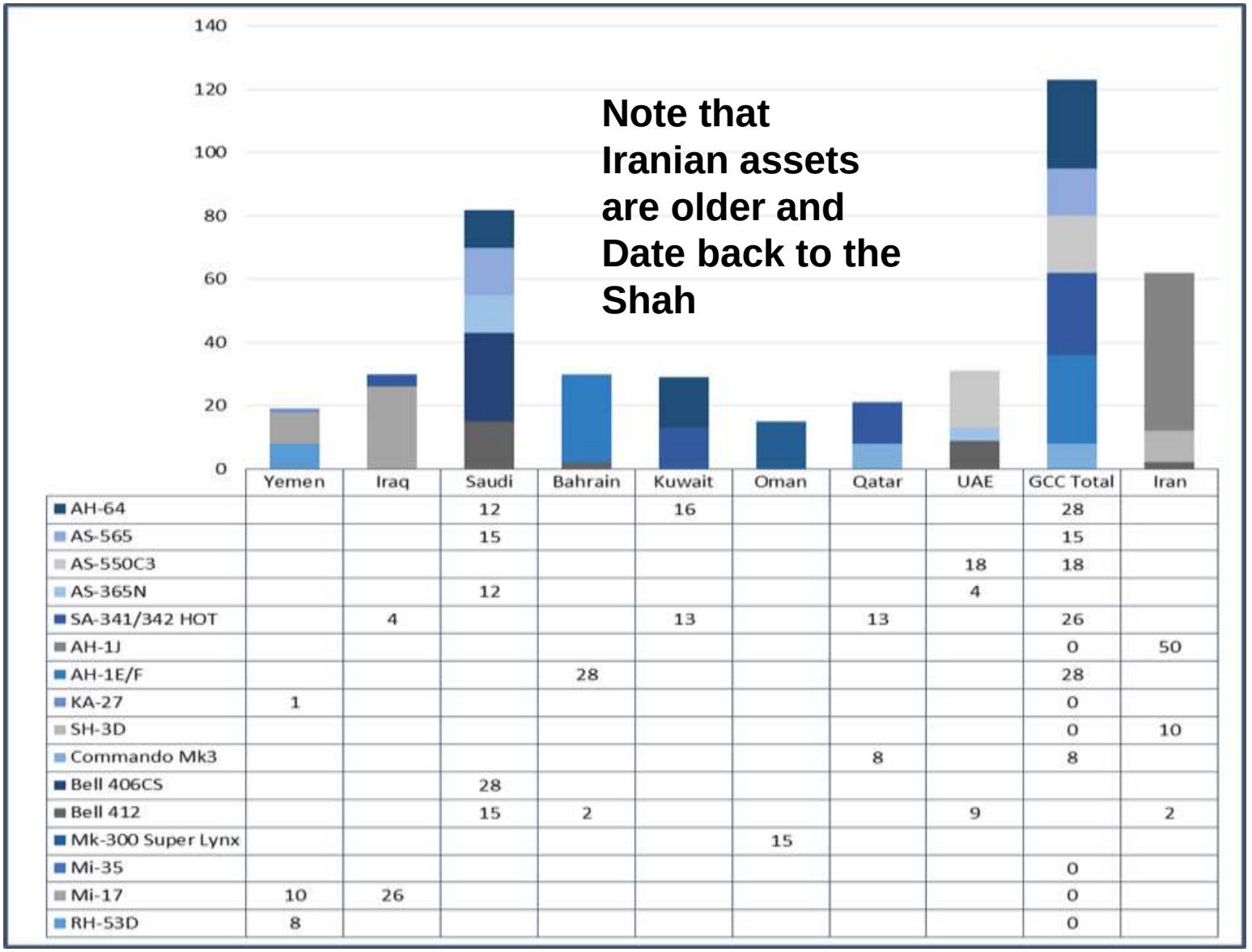
Gulf Attack & Naval Helicopters in 2014



	Iran	Iraq	Saudi Arabia	Bahrain	Kuwait	Oman	Qatar	UAE	Yemen
Ka-27									1
Mi-35									8
Mi-8									8
Commando Mk3							8		
SA-342					13		11		
SA-341							2		
AS-565			15						
AS-550C3								18	
AS-532			10						
AS365N Dauphin 2			6						
Bell 412 Twin Huey								9	
Bell 406CS			13						
Bell 212	10								2
Bell 206	2								
Bell 205	5								4
RH-53D	3								
SH-3D	10								
OH-58C		10							
AH-1J	50								
AH-1F				12					
AH-1E				16					
AH-64			12		16			30	

Source: Adapted from IISS, The Military Balance, 2014. Some data adjusted or estimated by the author.

Comparative Attack, Armed, and Naval Combat Helicopters Strength without US and Other Allied Aircraft



	Yemen	Iraq	Saudi	Bahrain	Kuwait	Oman	Qatar	UAE	GCC Total	Iran
AH-64			12		16				28	
AS-565			15						15	
AS-550C3								18	18	
AS-365N			12					4		
SA-341/342 HOT		4			13		13		26	
AH-1J									0	50
AH-1E/F				28					28	
KA-27	1								0	
SH-3D									0	10
Commando Mk3							8		8	
Bell 406CS			28							
Bell 412			15	2				9		2
Mk-300 Super Lynx						15				
Mi-35									0	
Mi-17	10	26							0	
RH-53D	8								0	

Source: Adapted by Anthony H. Cordesman and Garrett Berntsen from IISS, *Military Balance, 2014* and IHS Jane's Sentinel series

Illustrative Iranian UAV Projects /Assets

Name	Weapons, payload	Range (km) and Ceiling (ft.)	Endurance (hr.)	Purpose
Fotros (Petros)	Air to surface missiles; hellfire missile derivative; anti-tank missiles	R: 2,000 C: 25,000	16-30	ISR, attack
Ababil and variants (B, S, T, II, III, and V)	Ababil-T has small warhead, "kamikaze" attack	R: 100-150 C: 5,000-14,000	Up to 4	ISR, attack [ii]
Mohajer Series (1-4)	RPGs	R: 150 C: 15,000	1.5-3	ISR, attack
Karrar	Hardpoint for 230kg of munitions	R: 970-1,000 C: 40,000 (est.)		reconnaisance and attack
Shahed 129	Two hardpoints, anti-tank missiles	R: 1,700m C: 24,000	24+	Reconnaissance and attack
RQ-170 derivative	none			ISR

Iran is

[ii] Jeremy Binnie, "Iranian media identifies Ababil-3 UAV," *HIS Jane's 360*, July 7, 2014, http://www.Jane's.com/article/40484/iranian-media-identifies-ababil-3-uav

[iii] http://www.janes.com/article/40484/iranian-media-identifies-ababil-3-uav

[iv] David Cenciotti, "Syrian Mohajer 4 Drone Spying on the Clashes in Syria," *The Aviationist*, February 25, 2012, http://theaviationist.com/2012/02/25/syrian-mohajer-4/

[v] http://thearkenstone.blogspot.com/2011/02/mohajer-uav.html

[vi] http://www.presstv.com/detail/2013/11/18/335294/iran-unveils-biggest-indigenous-drone/

Iranian UAV Programs - I

Name	Translation	Date of usage	Weapons, payload	Range (km) and Ceiling (ft.)	Specifications	Purpose
Fotros (Petros)	"Peter," "Fallen Angel"	November 2013-Present	Air to surface missiles; hellfire missile derivative[315]; anti-tank missiles	R: 2,000 C: 25,000	Can remain aloft for 16-30 hours; ceiling of 25k feet. Able to cover much of the Middle East, including Israel	Reconnaissance, and missile strikes[316]
Ababil and variants (B, S, T, II, III, and V)	"Swallow"	1986-present	The Ababil-T variant is armed with an explosive warhead. Its use, however, ensures total destruction of the UAV.[317]	R: 100-150 C: 5,000-14,000[318]	Pneumatic or rocket boosters[319]	The primary purpose of the Ababil series is ISR. Historically, Iran deployed this family of UAVs during the Iran-Iraq War, and has provided some to the Iraqi government for ISR missions against ISIL.[320]
Mohajer Series (1-4)	"Immigrant"	Late 1980s-present	RPGs	R: 150 C: 15,000[321]	Max Speed: 120mph; Launched off rail and assisted by rocket booster.	ISR; Used in Syrian Civil war by Assad; a variation was used by Hezbollah in 2006 war with Israel. The most recent variation is said to be able to generate maps for military and civilian purposes[322]
Karrar	"Striker"	August 2010-Present	Can carry a single bomb or two anti-ship missiles	R: 970-1000 C: 40,000 (est.)	Turbojet-propelled	Long-range reconnaissance and attack; Based on the BQM-126 target drone[323]
Yasir (Yaseer)	"Expedient	2009	Electro-optical		Reverse	ISR

Iranian UAV Programs - II

	"		or infrared camera.	C: 16,000	engineered U.S. Scan Eagle.[324, 325] Able to operate 16 hours.	
H-110 Sarir	"Throne"	2013-Present	Air to air missiles	*Unknown	Speculative stealth capabilities	ISR and combat
Hazem series		2012-Present	Can be equipped with missiles	Short, medium, and long range	Stealth; not originally designed for carrying missiles, but the Hazem 3 may be equipped with them; rocket propelled	Bombing and reconnaissance [326]
Shahed 129	"Witness"	Sept. 2012-present	8 bombs or smart missiles	R: 1,700m C: 24000	24 hour non-stop flight capability; similar to U.S. Predator and Reaper drones	Combat
Hamaseh	"Epic"	May 2013-present	Missiles and rockets	High altitude and range[327]	HALE (High Altitude Long Endurance); Purported stealth capabilities, but structurally impossible.	Reconnaissance and combat
Ra'ad 85	"Thunder," "Thunder Bolt"	Sept. 2013-present		R: 100 C:	Suicide drone "capable of destroying fixed and mobile targets"[328]	
Nazer	"Observer"				Small chopper drone;	Reconnaissance and border patrol (drug trafficking)
Sadeq[329]	"Sincere"	Sept. 2014-present	Air-to-air missiles		Sent aloft by launcher;	
RQ-170 variant	"Sentinel"	May 2014-present			Stealth; copy of U.S. made system.	

Source: *Iran's Rocket and Missile Forces and Strategic Options*; Anthony H. Cordesman with the assistance of Scott Modell, Aaron Lin, and Michael Peacock, **A Report of the CSIS Burke Chair in Strategy**, **Final Review Draft, October 6, 2014**

What Iran lacks in Air Power

The following are some general criteria that would be required for Iran to try and maintain a technological and qualitative edge over the GCC Airforces:

- **Aircraft:**
  - **Multi-mission capability.**
  - **High Operational Readiness/Full Mission Capable state and high sortie rates.**
  - **All weather day / night operational capability**
  - **Quick response / ground launched interceptors against incoming intruders.**
  - **High Endurance.**
  - **Airborne Electronic Warfare (ESM/ECM/ECCM) survivability**
  - **Detect track and engage multiple mobile ground targets as well as Hard and Deeply Buried Targets (HDBTs).**
  - **Rapidly destroy advanced air defense systems.**
  - **Capable of carrying out deep strike missions.**
  - **Short C4I Early Warning delay time due to having antiquated System, semi-automated man in the loop, giving rise to long Response / Scramble Time by Combat Aircraft**

- **Air to Air Missiles:**
  - **Aircraft to be capable of multiple target engagement. Fire and Forget/Launch and leave with high single shot kill capability.**
  - **Good target discrimination and enhanced resistance to countermeasures.**
  - **Increase in range of firing missile at the same time shortening the flight time to the target.**
  - **low Loss Exchange Ratio in a Closing / BVR Environment and Visual Engagement Environment.**

•

Source: Dr. Abdullah Toukan

Range of Iran's Air Power

Source: Dr. Abdullah Toukan, April 29, 2014

Iran's Maximum Sortie Generation Rate

(Ignores severe limits to operational availability: 40-60% of force)

Iran Airforce Tactical Fighter Capabilities - 2014

Type	No	Operational Readiness (%)	Force Available	Total Sortie Per Day	Postulated Employment
MiG-29A	36	60	22	44	Air Defense/Escort/FS/BAS
Su-25	13	60	8	16	CAS/BI/Deep Strike
SU-24	30	60	18	36	CAS/BI/Deep Strike
F-14	43	60	26	52	Air Defense/FS CAS/BI/Deep
F-4E/D	65	60	39	78	Strike/SEAD
Total	187		113	226	

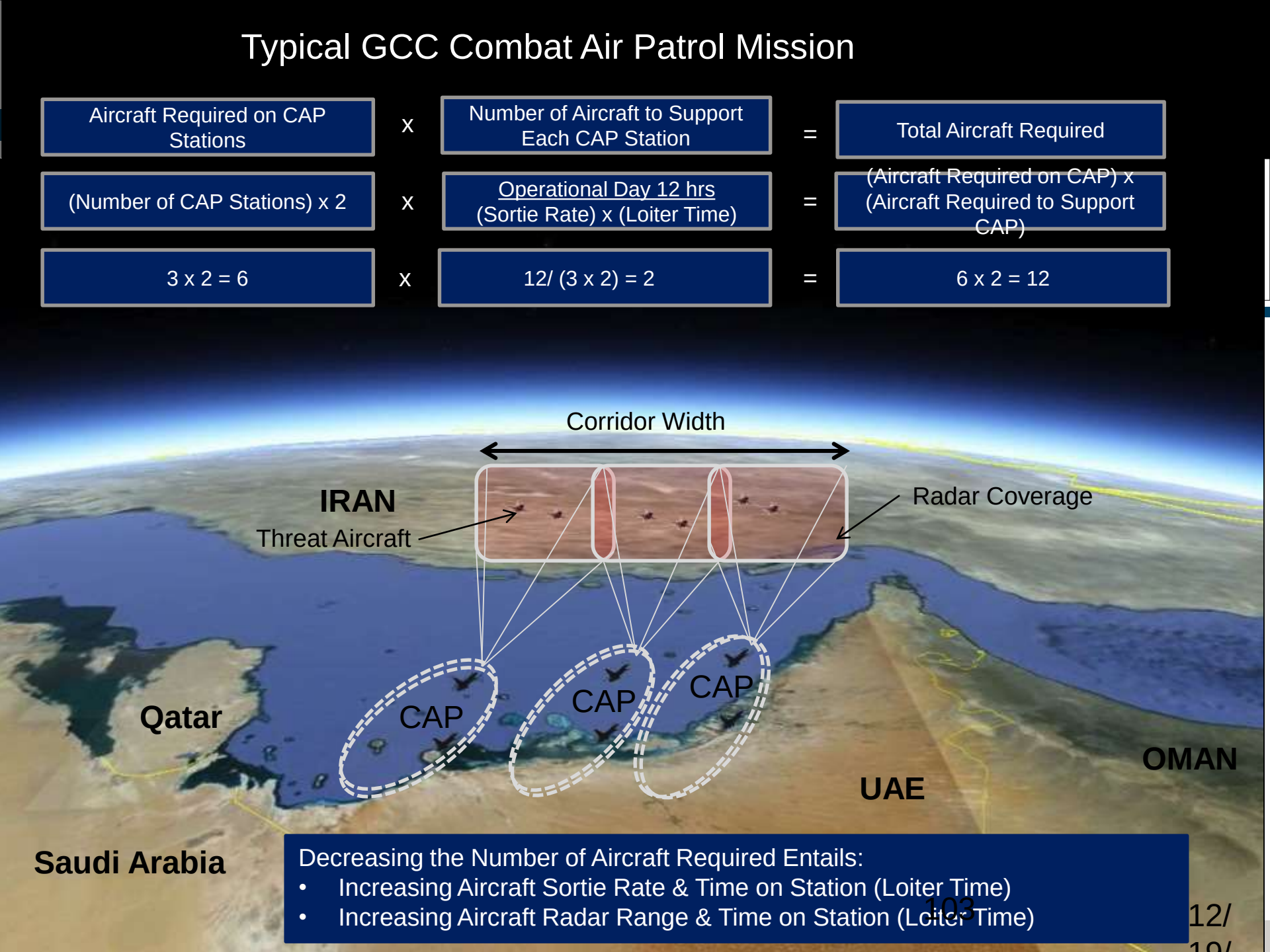
BAS: Battlefield Air Superiority
CAS: Close Air Support
BI: Battlefield Interdiction
DS: Defense Suppression
FS: Fighter Sweep
Sustained Conditions : 12 hr Operational Day
18 hr Maintenance Day
2 Sorties per Aircraft per day

Source: Dr. Abdullah Toukan, April 29, 2014

Range of GCC Air Power

Typical GCC Combat Air Patrol Mission

Aircraft Required on CAP Stations	x	Number of Aircraft to Support Each CAP Station	=	Total Aircraft Required
(Number of CAP Stations) x 2	x	Operational Day 12 hrs / (Sortie Rate) x (Loiter Time)	=	(Aircraft Required on CAP) x (Aircraft Required to Support CAP)
3 x 2 = 6	x	12/ (3 x 2) = 2	=	6 x 2 = 12



Decreasing the Number of Aircraft Required Entails:

- Increasing Aircraft Sortie Rate & Time on Station (Loiter Time)
- Increasing Aircraft Radar Range & Time on Station (Loiter Time)

12/

GCC's Maximum Sortie Generation Rate

GCC Airforce Tactical Fighter Capabilities - 2014

Type	Order of Battle	Operational Ready %	Force Available	Force Total Sorties per Day	Postulated Employment
Tornado IDS	Saudi Arabia: 69	75	52	156	Deep Strike
Typhoon-2	Saudi Arabia: 32	75	24	72	FS, BAS, AD, Escort
Mirage 2000	UAE: 60 Qatar: 12 (Total: 72)	75	UAE: 45 Qatar: 9 (Total: 54)	UAE: 135 Qatar: 27 (Total: 162)	FS, BAS, AD, Escort
F-18	Kuwait: 39	75	29	87	FS, BAS, AD, Escort, CAS, BI, SEAD
F-16C/D	Bahrain: 21 Oman: 12 UAE: 78 (Total: 111)	75	Bahrain: 15 Oman: 9 UAE: 58 (Total: 82)	Bahrain: 45 Oman: 27 UAE: 174 (Total: 246)	FS,BAS, AD, Escort, CAS, BI
F-15C/D	Saudi Arabia: 81	75	61	183	FS, BAS, AD, Escort, CAS, BI
F-15S	Saudi Arabia: 71	75	53	159	Deep Strike, FS, AD, Escort, CAS, BI
Total	**475**		355	1065	

FS: Fighter Sweep, BAS: Battlefield Air Superiority, AD: Air Defense,
CAS: Close Air Support (Air to Ground Role), BI: Battle Field Interdiction (Air to Ground Role)
SEAD: Suppression of Enemy Air Defense

Sustained Conditions : 12 hr Operational Day
18 hr Maintenance Day
3 Sorties per aircraft per day

Source: Dr. Abdullah Toukan, April 29, 2014

Land-based Air Defenses

Iran's Current Land Based Air Defense Systems

- **Iran has extensive surface-to-air missile assets, but most are obsolete or obsolescent. Iran's systems are poorly netted, have significant gaps and problems in their radar and sensor coverage and modernization, and a number of its systems are vulnerable to electronic warfare**

- **U.S. never delivered integrated system before fall of Shah so Iran never had a fully functioning air defense system.**

- **Iran has made many statements that it has upgraded and modernized many of the components of such its Air Defense systems using Russian, Chinese, US, European, and Iranian-designed and made equipment. But Iran does not have the design and manufacturing capability to create truly modern system, one that is immune to electronic warfare, and one that can function without become tactically vulnerable to anti-radiation weapons and other forms of active "suppression of enemy air defense" (SEAD) systems.**

- **Only modern short-range point defense system is TOR-M. Other short-range systems mix of older Russian system, SHORADs (Short Range Air Defense), and aging – possible inactive British and French systems.**

- **Medium to long-range systems are low capability or obsolescent. Iran has some 150 HAWKS and IHAWKs do not have capable ECM. Date back to 1960s and 1970s. It claims to be able to produce its own IHAWK missiles. Has various versions of SA-2 obsolete.**

- **Radar sensor and battle management/C4I systems have major limitations.**

- **Regardless of how much Iran states that it has made progress, it will still be vulnerable to the advanced technology U.S. combat aircraft as well as the electronic warfare and defense suppression weapon systems. This will give the U.S. Strike Force the freedom, if required after the first strike, to conduct a sustained campaign of strikes over a few days.**

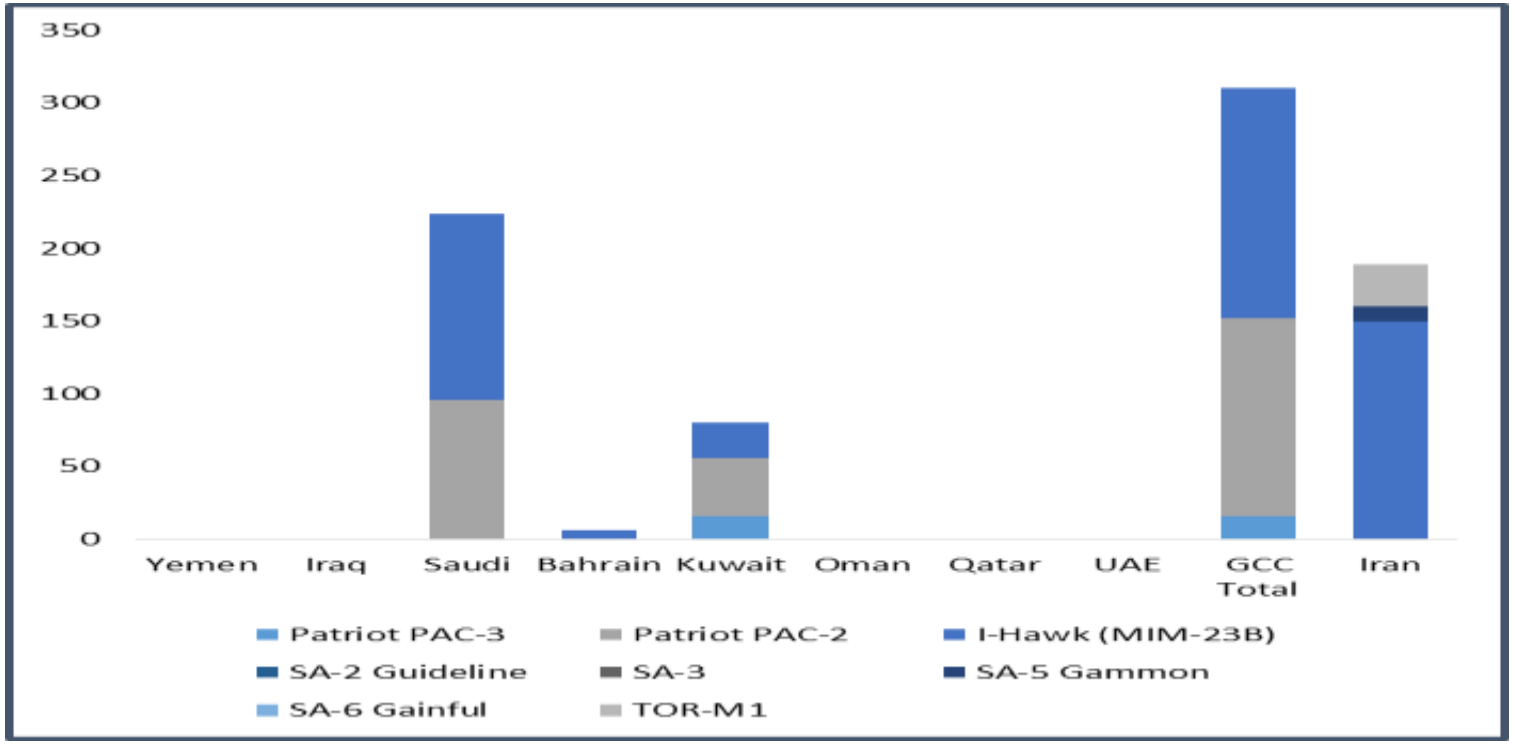
Source: Anthony H. Cordesman and Dr. Abdullah Toukan

Medium to Long Range Surface To Air Missile Systems

Air Defense System	Associated Early Warning/Acquisition Radars	Associated Tracking & Guidance Radars	Missile Ranges (km) Altitude (ft)	In Service Date
SA-2	Spoon Rest D (P-18) Flat Face A (P-15)	Fansong A/B	Max (km): 40 Min (km) : 8 Altitude (ft): 3,000 to 90,000	1971 Upgraded
SA-3	Flat Face B (P-19) Squat Eye	Low Blow	Max (km) : 30 Min (km) : 6 Altitude (ft): 150 to 160,000	1971
SA-6	Long Track (P-40) Height Finder: Thin Skin B (PRV-9)	Straight Flush	Max (km): 24 Min (km) : 4 Altitude (ft): 50 to 45,000	1973
SA-8	Flat Face B (P-19) Long Track (P-40) Height Finder: Thin Skin B (PRV-9)	Land Roll	Max (km) : 15 Min (km) : 0.2 Altitude (ft): 40 to 40,000	1982
SA-5	Back Trap (P-80) Tall King C (P-14) Spoon Rest D (P-18) Height Finder: Odd pair (PRV-13) Odd Group (PRV-16)	Square Pair	Max (km) : 250 Min (km) : 20 Altitude (ft): 1,500 to 130,000	1983
IHAWK	AN/MPQ-50 AN/MPQ-55(PIP II)/62 (PIP III) Range only Radar	AN/MPQ-57 (PIP II)/61 (PIP III)	Max (km): 35 Min (km): 3 Altitude (ft): 0 to 55,000 ft	1971
Patriot PAC-2	AN/MPQ-53 Phased-Array Radar Carries out Search, target detection, track and identification, missile tracking and ECCM functions	AN/MSQ-104 Engagement Control Station (ECS)	Max (km): 70 Min (km): 3 Altitude (ft): 80,000	1990

(Source: Iranian Weapons of Mass Destruction. Anthony Cordesman CSIS and Dr. Abdullah Toukan)

Major Surface-to-Air and Ballistic Missile Defense Launcher Strength without US and Other Allied Forces



	Yemen	Iraq	Saudi	Bahrain	Kuwait	Oman	Qatar	UAE	GCC Total	Iran
Patriot PAC-3					16			some	16	
Patriot PAC-2			96		40				136	
I-Hawk (MIM-23B)			128	6	24			some	158	150
SA-2 Guideline										
SA-3	some									
SA-5 Gammon										10
SA-6 Gainful	some									
TOR-M1										29

Source: Adapted by Anthony H. Cordesman and Garrett Berntsen from IISS, *Military Balance, 2014* and IHS Jane's Sentinel series

A Dated Estimate of Iran's SAM Coverage

Legend: HQ-2 Sites are red; HAWK sites are orange; S-200 sites are purple; 2K12 sites are bright green, and Tor-M1E sites are faded green.

Source: Sean O'Connor, "Iranian Strategic Sam Deployment," January 4, 2010, http://geimint.blogspot.com/2007/09/iranian-sam-network.html

Map: http://geimint.blogspot.com/2007/09/iranian-sam-network.html

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)

S-300/S-400?

MANPAD FIM-92A *Stinger*; 9K32 *Strela*-2 (SA-7 *Grail*)‡

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

Gulf Land-Based Air Defenses In 2014

Country	Major SAM	Light SAM	AA Gun
Bahrain	6 Hawk MIM-23B	60 RBS-70 18 FIM-92A Stinger 7 Crotale	12 Oerlikon 35mm 12 L/70 40mm
Iran	150+ I-HAWK 10 SA-5 75 SA-2	SA-7/14/16, HQ-7 29 SA-15 Tor-M1 Misaq 1(QW-1 Vanguard) Misaq 2(QW-11) HN-54 30 Rapier SA-22 Pantsyr 250 Crotale 15 Tigercat FIM-92A Stinger	100 ZSU-23-4 23mm ZPU-2/4 23mm 300 ZU-23-2 23mm 92 Skyguard 35mm M-1939 37mm 200 S-60 57mm 80 ZSU-57-2 300 M1939 85mm 50 L/70
Iraq			
Kuwait	24 I-HAWK Phase III 40 Patriot PAC-2	12 Aspide 48 Starburst 12 Skyguard/Aspide	12+ Oerlikon 35mm
Oman	none	8 Mistral 2 SA-7 Javelin 40 Rapier	4 ZU-23-2 23mm 10 GDF-005 (with Skyguard) 12 L/60 (towed) 40mm
Qatar		9 Roland II 24 Mistral 10 Blowpipe 12 FIM-92A Stinger 20 SA-7 (9K32 Strela-2)	
Saudi Arabia	128 MIM-28B I-HAWK 96 Patriot PAC-2	40 Crotale 500 FIM-43 Redeye 500 FIM-92A Stinger 500 FIM-92A Avenger 73 Shahine 68 Crotale/Shahine	92 M163 Vulcan 20mm 30 M167 Vulcan 20mm 850 AMX-30SA 30mm 128 GDF Oerlikon 35mm 150 L/70 40mm (in store) 130 M2 90mm
UAE	MIM-23B I-HAWK Patriot PAC-3	Crotale RBS-70 Rapier SA-18 (9K38 Igla) 50 Pantsir-S1 20+ Blowpipe 20 Mistral	42 M3 VDAA 20 GCF-BM2
Yemen	SA-2 SA-3	SA-6 (2K12 Kub) SA-7 (9K32 Strela 2) SA-9 (9K31 Strela-1) SA-13 (9K35 Strela-10) SA-14 (9K36 Strela-3)	50 M167 Vulcan 20mm 100 ZU-23-2 23mm 150 M-1939 37mm 120 S-60 57mm 40 M-1939 KS-12 85mm

GCC Challenged in Seapower Without US, British, and French Power Projection, but Major Lead in Total Modern Air-Sea Assets

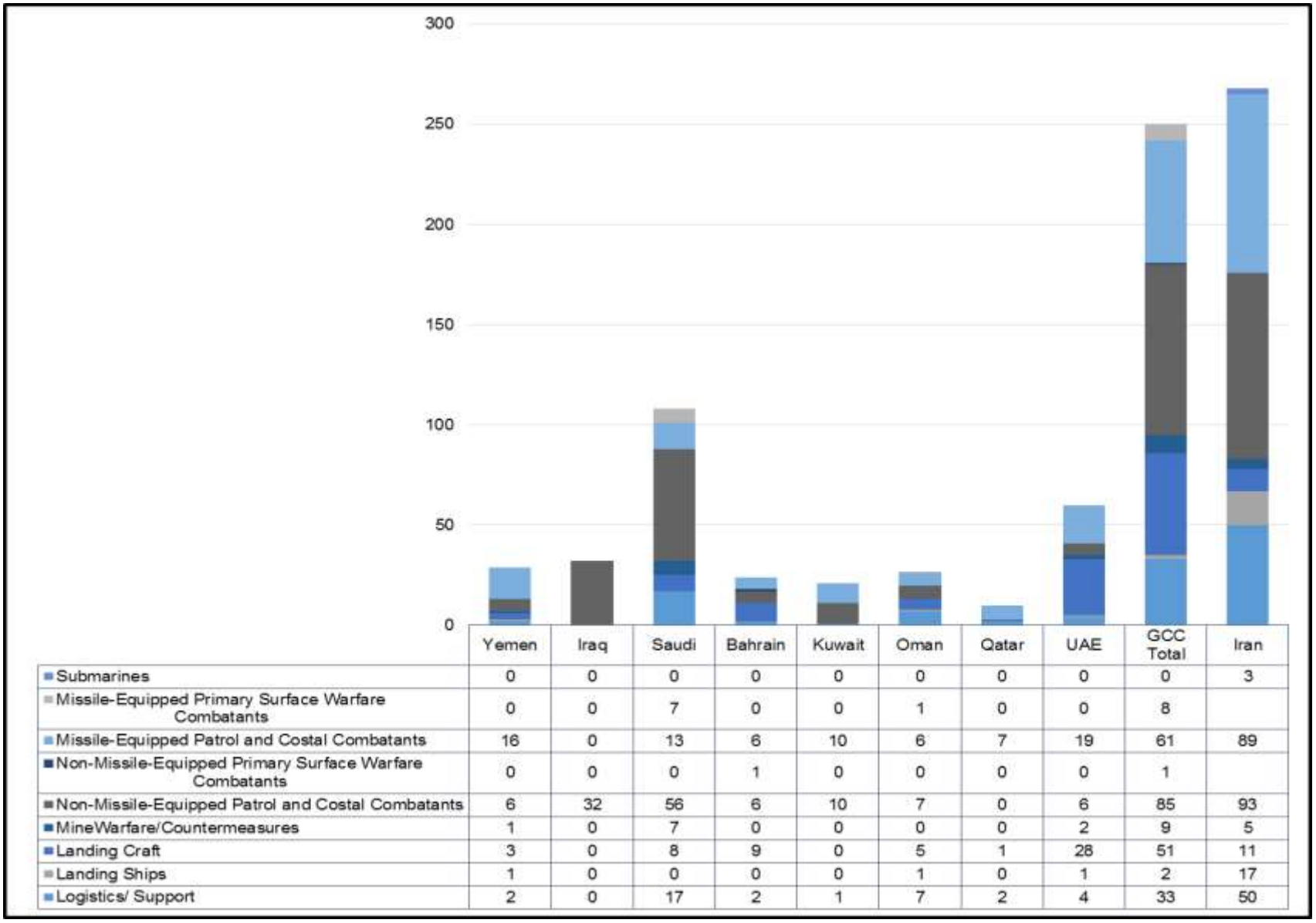
Naval Threats

- **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 Combat Ship Strength without US and Other Allied Forces



	Yemen	Iraq	Saudi	Bahrain	Kuwait	Oman	Qatar	UAE	GCC Total	Iran
Submarines	0	0	0	0	0	0	0	0	0	3
Missile-Equipped Primary Surface Warfare Combatants	0	0	7	0	0	1	0	0	8	
Missile-Equipped Patrol and Costal Combatants	16	0	13	6	10	6	7	19	61	89
Non-Missile-Equipped Primary Surface Warfare Combatants	0	0	0	1	0	0	0	0	1	
Non-Missile-Equipped Patrol and Costal Combatants	6	32	56	6	10	7	0	6	85	93
MineWarfare/Countermeasures	1	0	7	0	0	0	0	2	9	5
Landing Craft	3	0	8	9	0	5	1	28	51	11
Landing Ships	1	0	0	0	0	1	0	1	2	17
Logistics/ Support	2	0	17	2	1	7	2	4	33	50

Source: Adapted by Anthony H. Cordesman and Garrett Berntsen from IISS, *Military Balance, 2014* and IHS Jane's Sentinel series

Iranian 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?

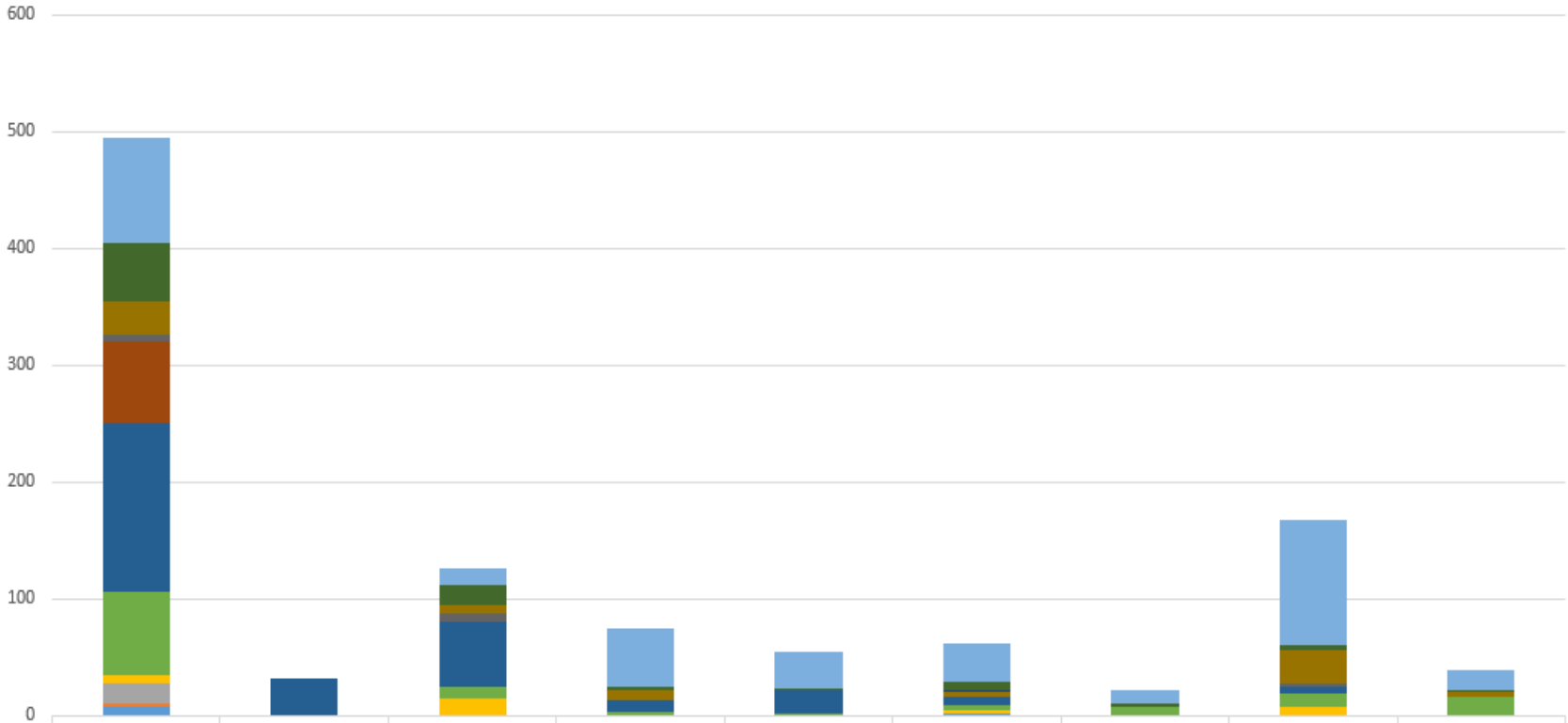
Does it matter?

ASMs?

SSMs?

Air/UAVs?

Comparative Gulf Naval Combat Ships: 2014



	Iran	Iraq	Saudi Arabia	Bahrain	Kuwait	Oman	Qatar	UAE	Yemen
CG/Paramilitary Patrol	90		14	50	32	33	12	107	17
Support	50		17	2	1	7	2	4	2
Amphibious Ships						1			
Landing Craft	28		8	9		5	1	29	4
Mine	5		7					2	
Armed Boats	70								
Other Patrol	145	32	56	10	20	7		6	
Missile Patrol	71		9	2	2	4	7	12	15
Major Other Combat	1								
Major Missile Combat	6		15	1		3		7	1
Midget Submarines	17								
Submarines	3								
SDVs	8					2			

Source: Adapted from the IISS, **Military Balance, 2014**; and the Jane's Sentinel series.

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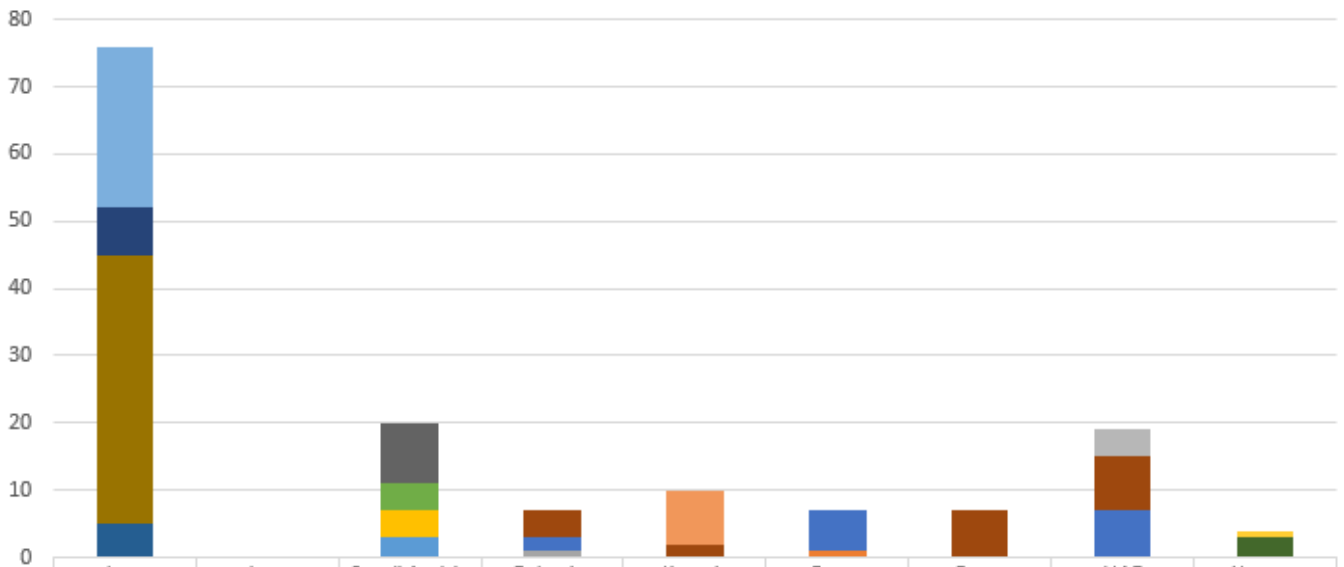
Missile-Armed Combat Warships: 2014



	Iran	Iraq	Saudi Arabia	Bahrain	Kuwait	Oman	Qatar	UAE	Yemen
Patrol Craft with SS-N-2									1
Patrol Craft with Marte Mk2								4	
Patrol Craft with Sea Skua					8				
Patrol Craft with C-802	24								
Patrol Craft with C-801									3
Patrol Craft with C-704	7								
Patrol Craft with C-701	40								
Patrol Craft with Harpoon			9						
Patrol Craft with Exocet MM-40				4	2		7	8	
Corvettes with C-802	5								
Corvettes with Harpoon			4						
Corvettes with Exocet MM-40				2		6		7	
Frigates with Otomat			4						
Frigates with Harpoon				1					
frigates with Exocet MM-40						1			
destroyers with Exocet MM-40			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.

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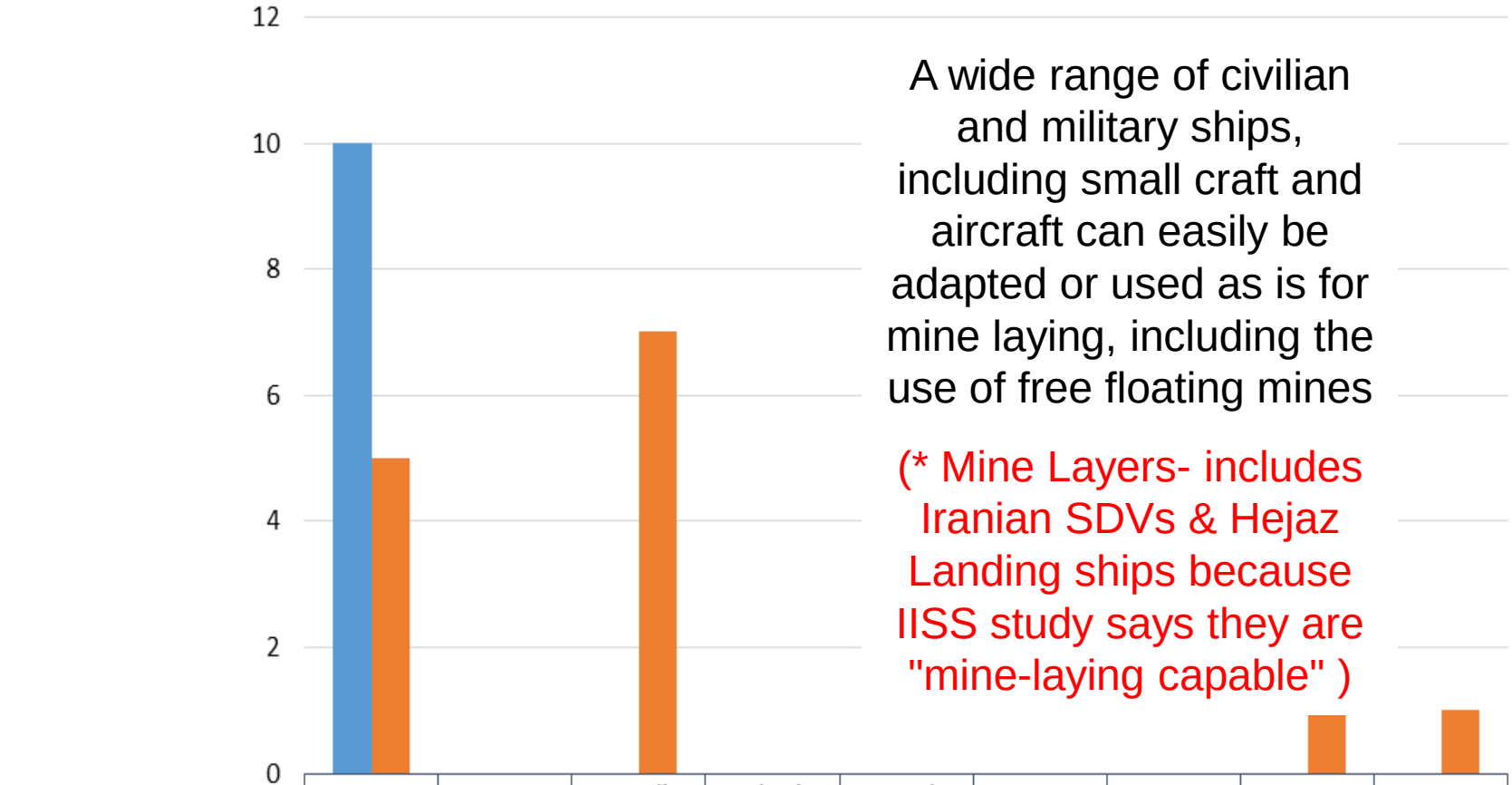
Mine Warfare Ships



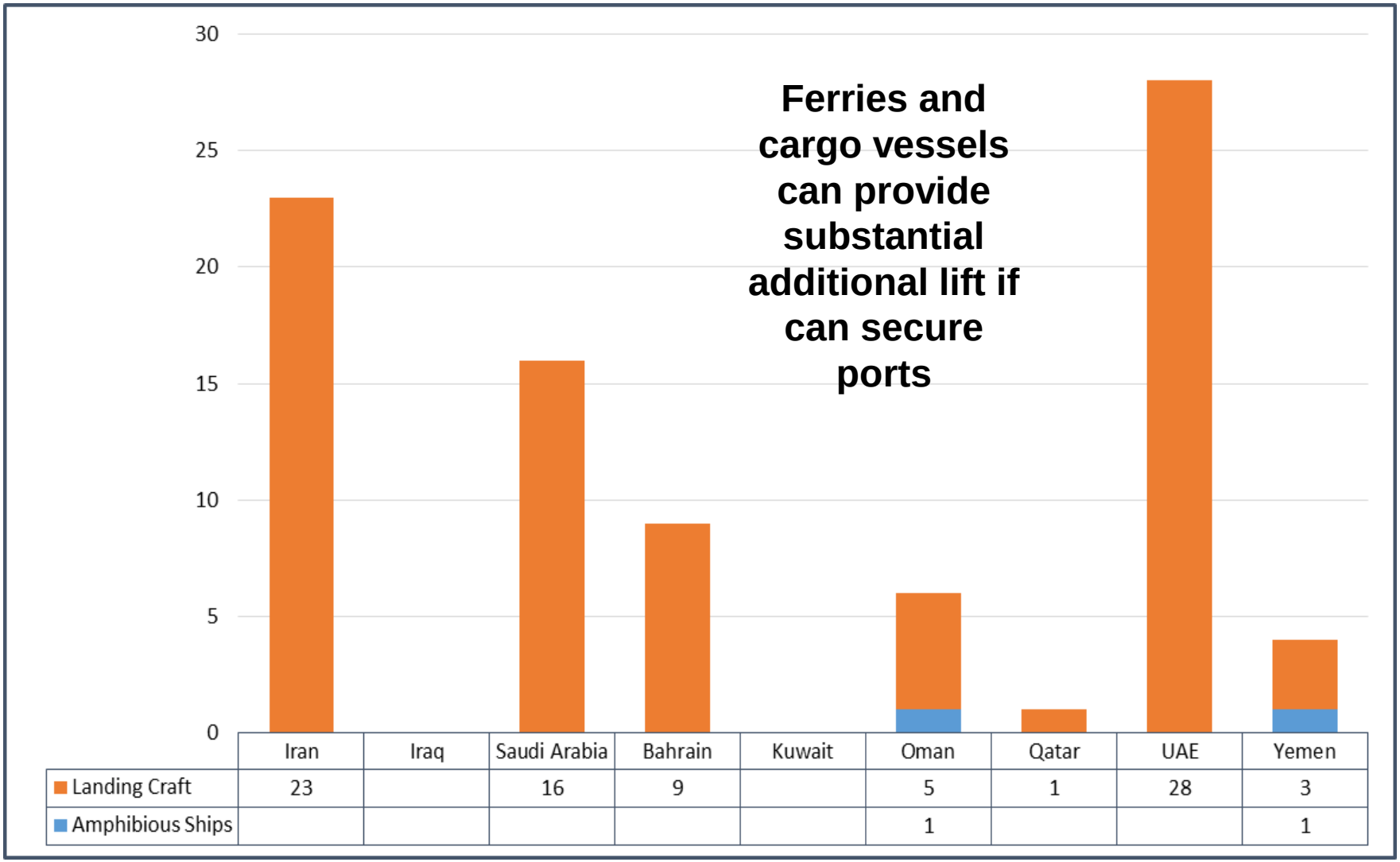
	Iran	Iraq	Saudi	Bahrain	Kuwait	Oman	Qatar	UAE	Yemen
Mine Layers	10								
Mine Countermeasures	5		7					2	1

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

(* Mine Layers- includes Iranian SDVs & Hejaz Landing ships because IISS study says they are "mine-laying capable")

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

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..

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.

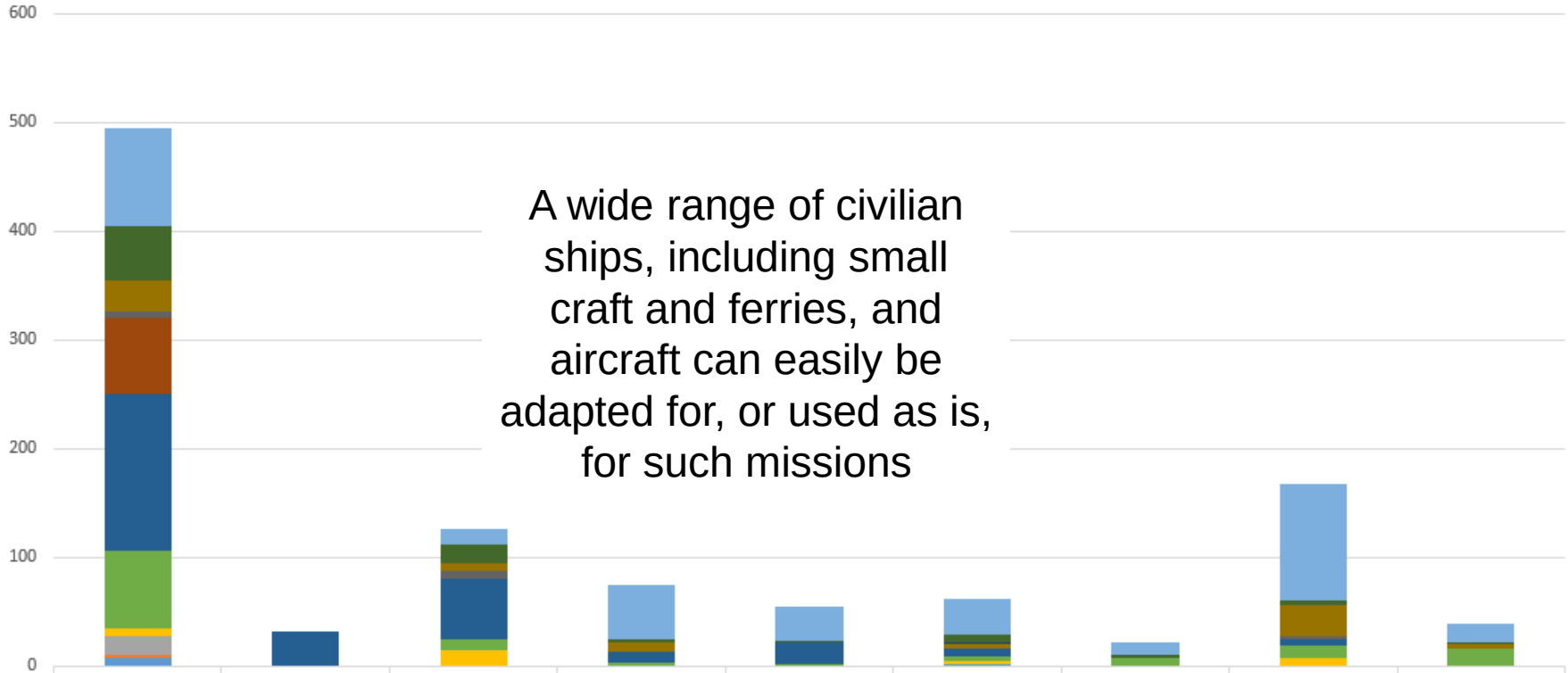
IRGC put in charge of defending Iran's Gulf coast in September 2008 and is operational in the Gulf and the Gulf of Oman, and could potentially operate elsewhere if given suitable sealift or facilities.

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.

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 Arabia	Bahrain	Kuwait	Oman	Qatar	UAE	Yemen
CG/Paramilitary Patrol	90		14	50	32	33	12	107	17
Support	50		17	2	1	7	2	4	2
Amphibious Ships						1			
Landing Craft	28		8	9		5	1	29	4
Mine	5		7					2	
Armed Boats	70								
Other Patrol	145	32	56	10	20	7		6	
Missile Patrol	71		9	2	2	4	7	12	15
Major Other Combat	1								
Major Missile Combat	6		15	1		3		7	1
Midget Submarines	17								
Submarines	3								
SDVs	8					2			

Source: Adapted by Anthony H. Cordesman from IISS, The Military Balance, 2014

The Broader Threat in the Gulf: "Closing the Gulf"

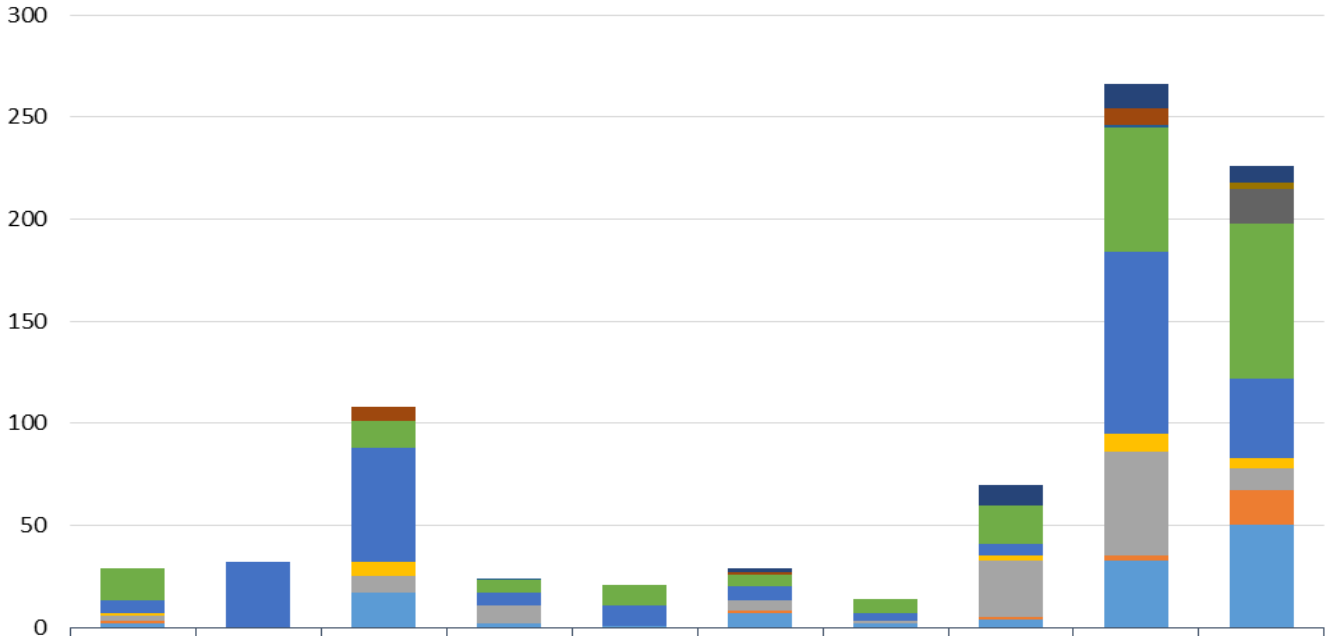
Operational Threats

- **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.***

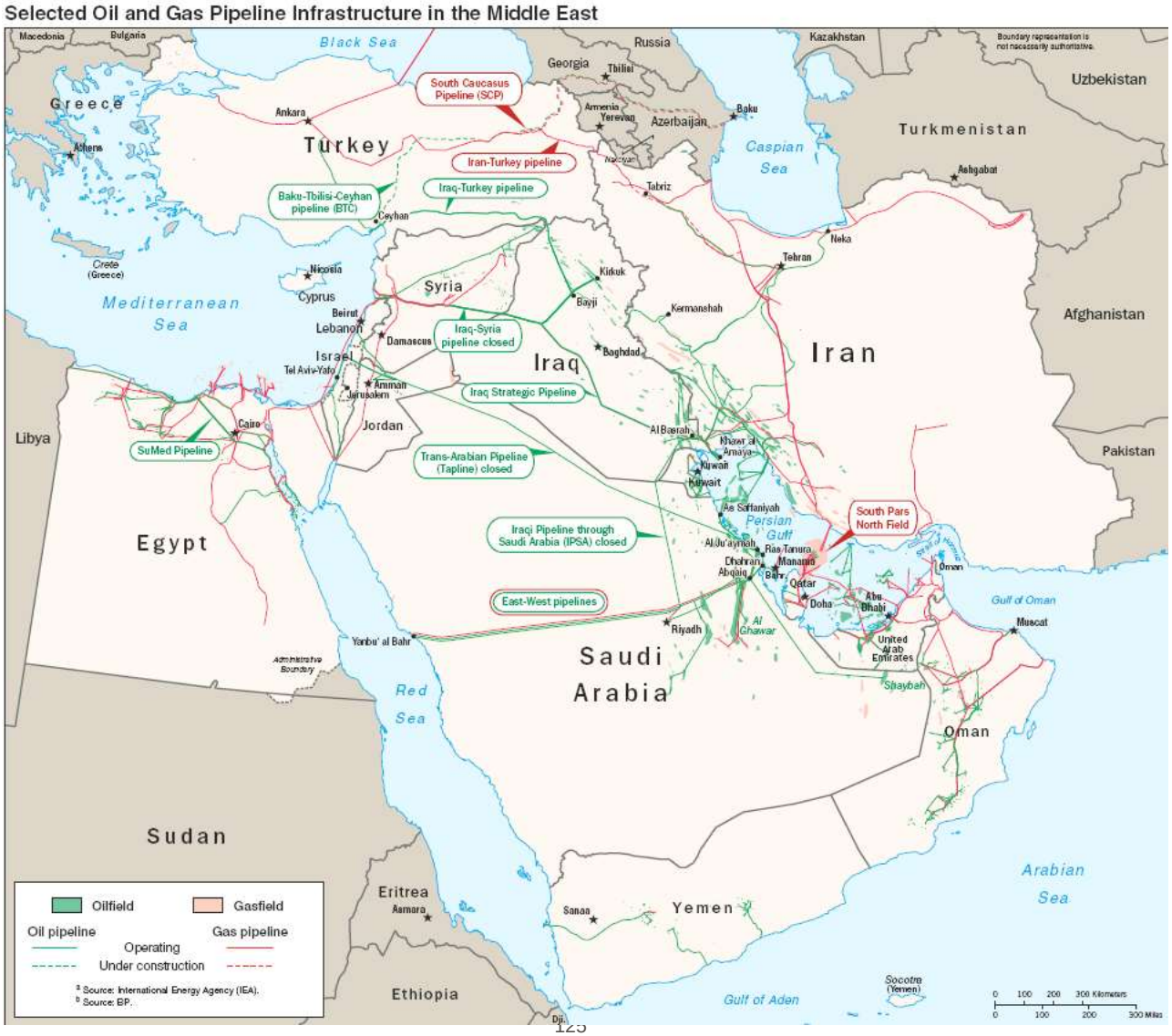
Comparative Asymmetric Ship and Boat Strength without US and Other Allied Forces



	Yemen	Iraq	Saudi	Bahrain	Kuwait	Oman	Qatar	UAE	GCC Total	Iran
SDVs						2		10	12	8
Submarines									0	3
Midget Submarines									0	17
Primary Missile Combat			7			1			8	
Primary Non-Missile Combat				1					1	
Missile Patrol	16		13	6	10	6	7	19	61	76
Non-Missile Patrol	6	32	56	6	10	7	4	6	89	39
Mine Warfare	1		7					2	9	5
Landing craft	3		8	9		5	1	28	51	11
Landing ships	1					1		1	2	17
Support	2		17	2	1	7	2	4	33	50

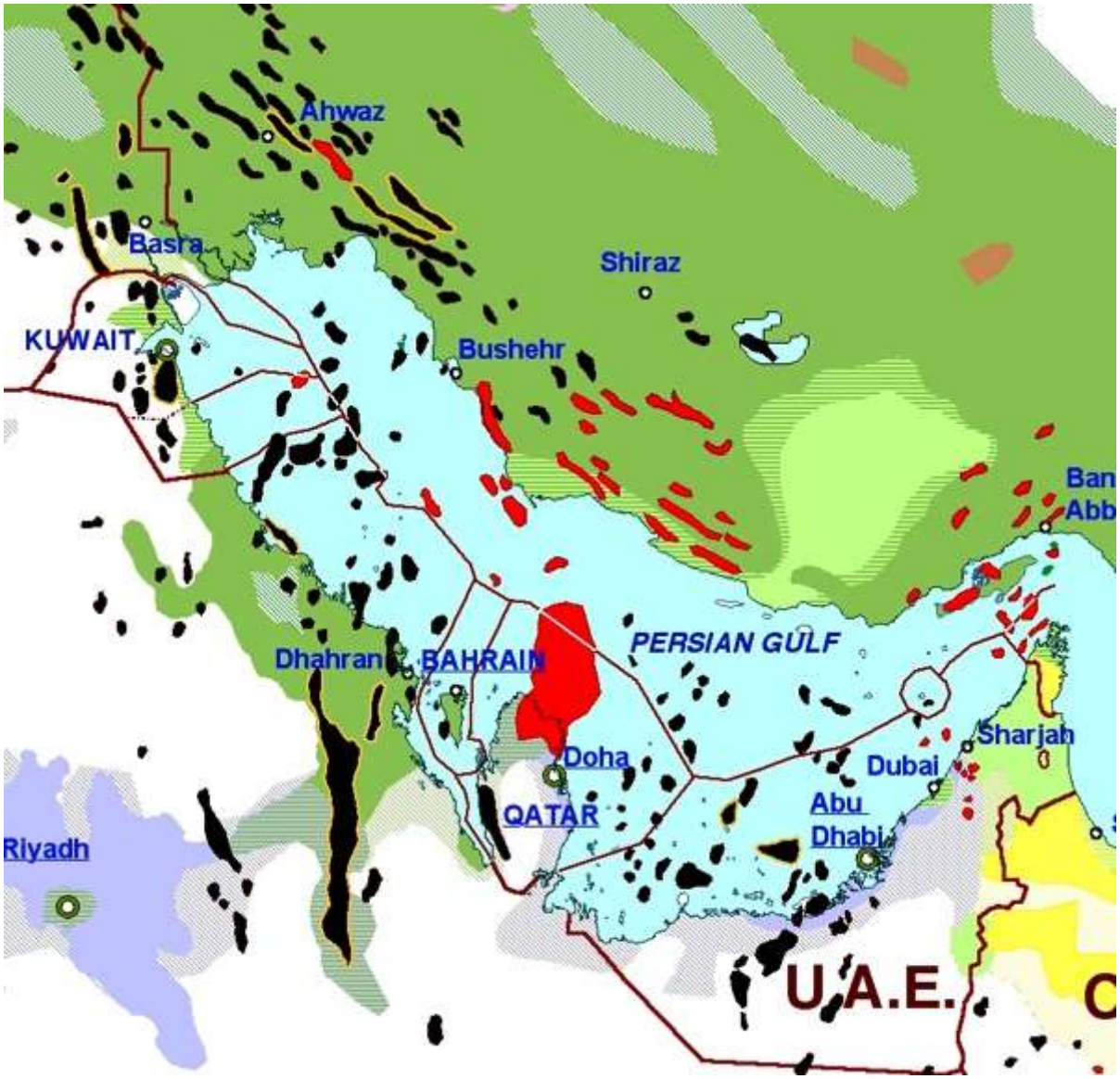
Source: Adapted by Anthony H. Cordesman and Garrett Berntsen from IISS, *Military Balance, 2014* and IHS Jane's Sentinel series

Vulnerability of Gulf Ports vs. Pipelines



Source: EIA, accessed July 23, 2014

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

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 Issue is Not the Strait: Iran Exercises Breaking the Bottle at Every Point

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

Iranian Military Installations Inside and Outside the Gulf

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)

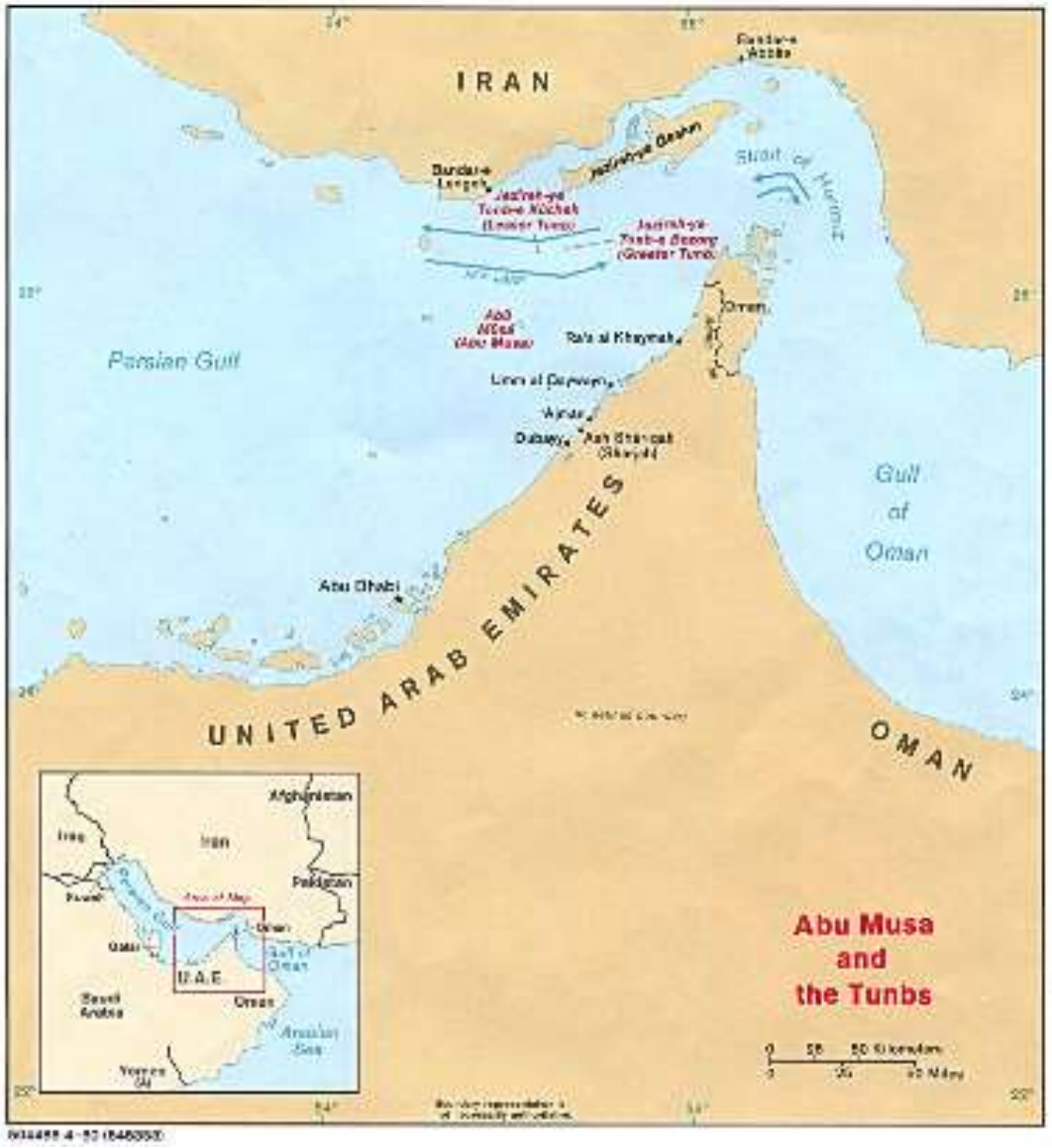
Occupied by Iran but claimed by the UAE. Suspected to house a small number of IRGCN forces. Also known to house HAWK SAMs and HY-2 "Silkworm" anti-ship missiles.

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..

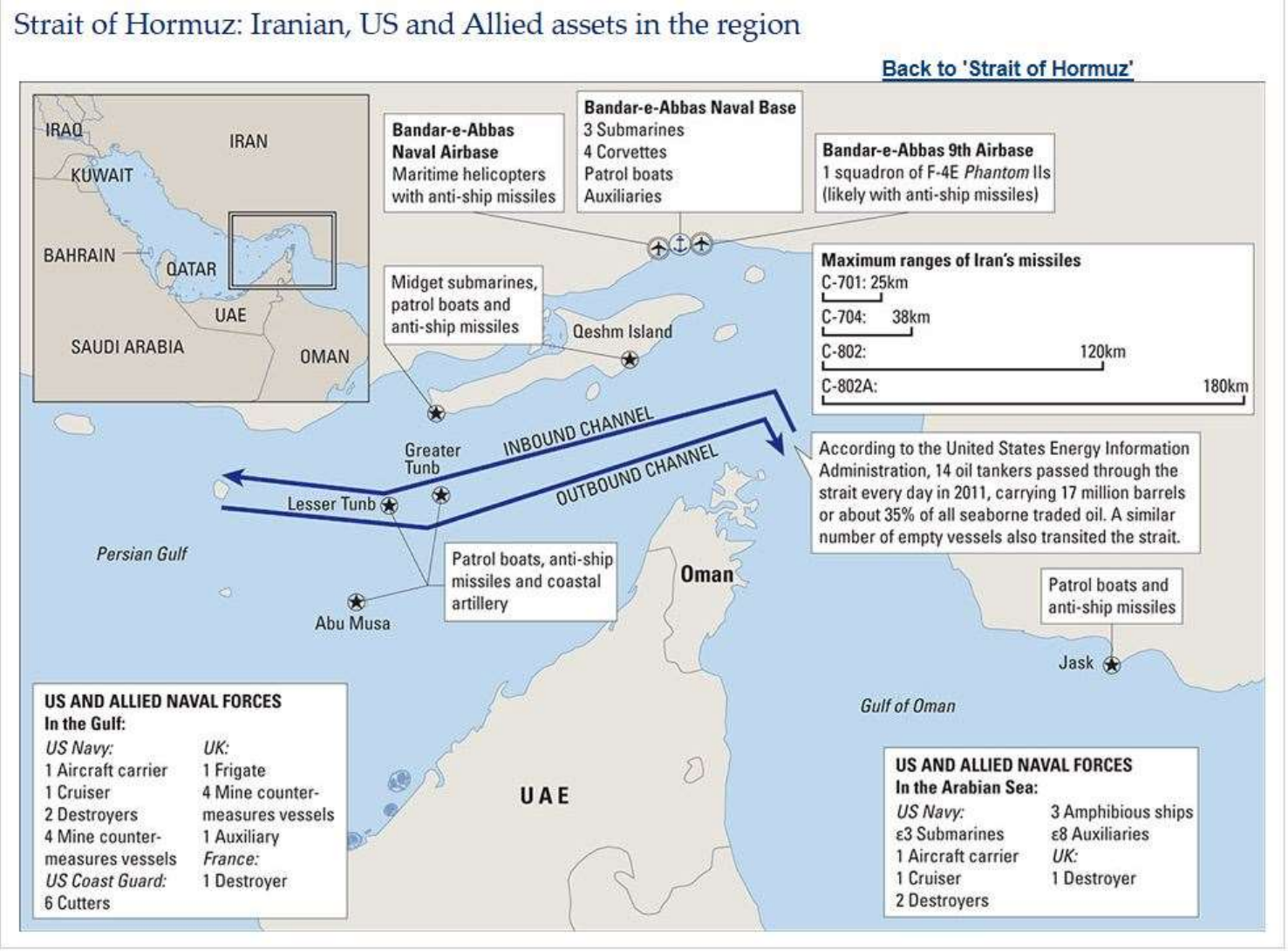
Hormuz: Breaking the Bottle at the Neck



- **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.**

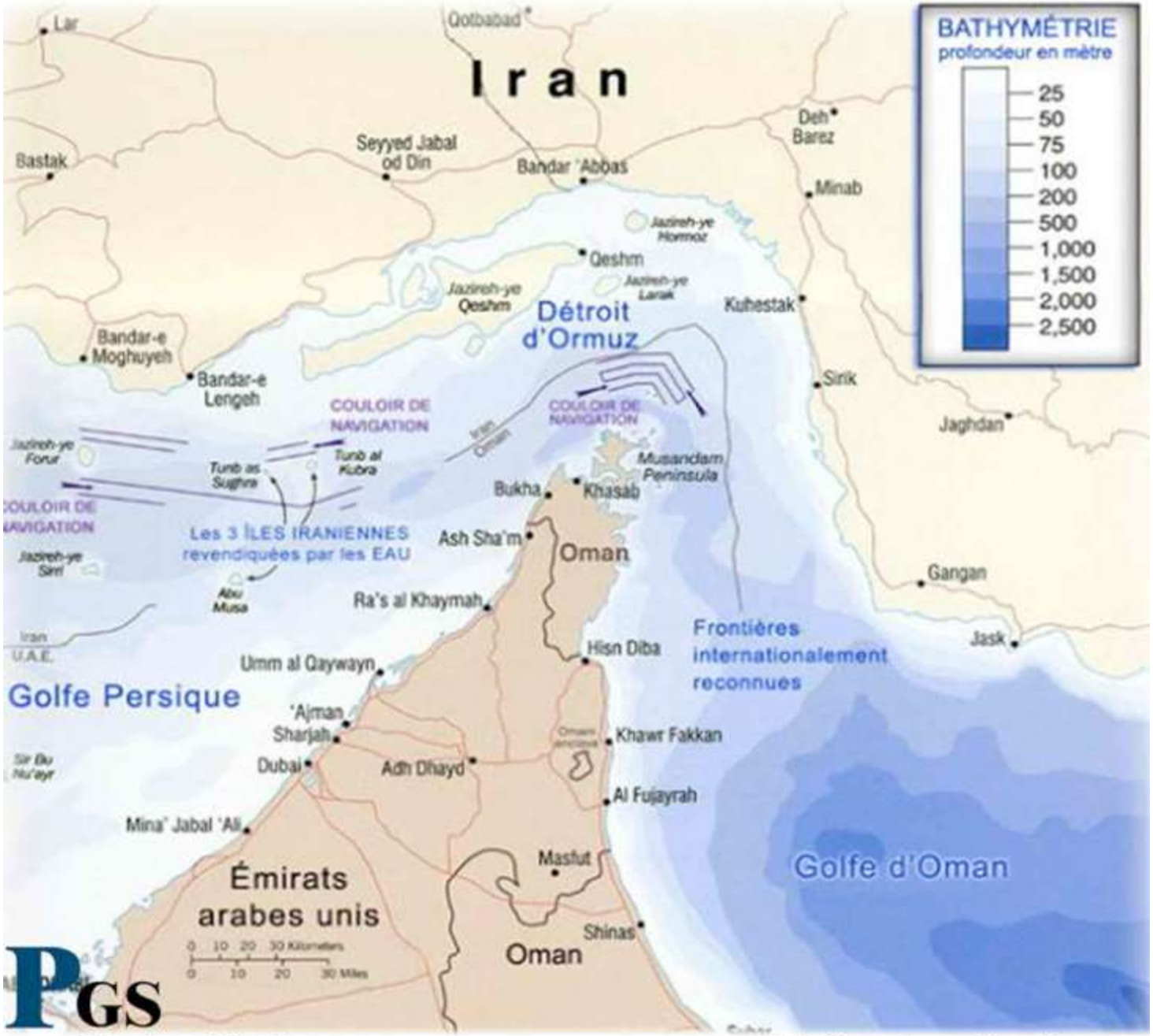
Source: http://www.lib.utexas.edu/maps/middle_east_and_asia/hormuz_80.jpg; DOE/EIA, World Oil Transit Chokepoints, February 2011,

One Estimate of Naval Balance Less Air and Mine Warfare



Abu Musa

Source: Google maps



EIA Estimate in 9/2012:

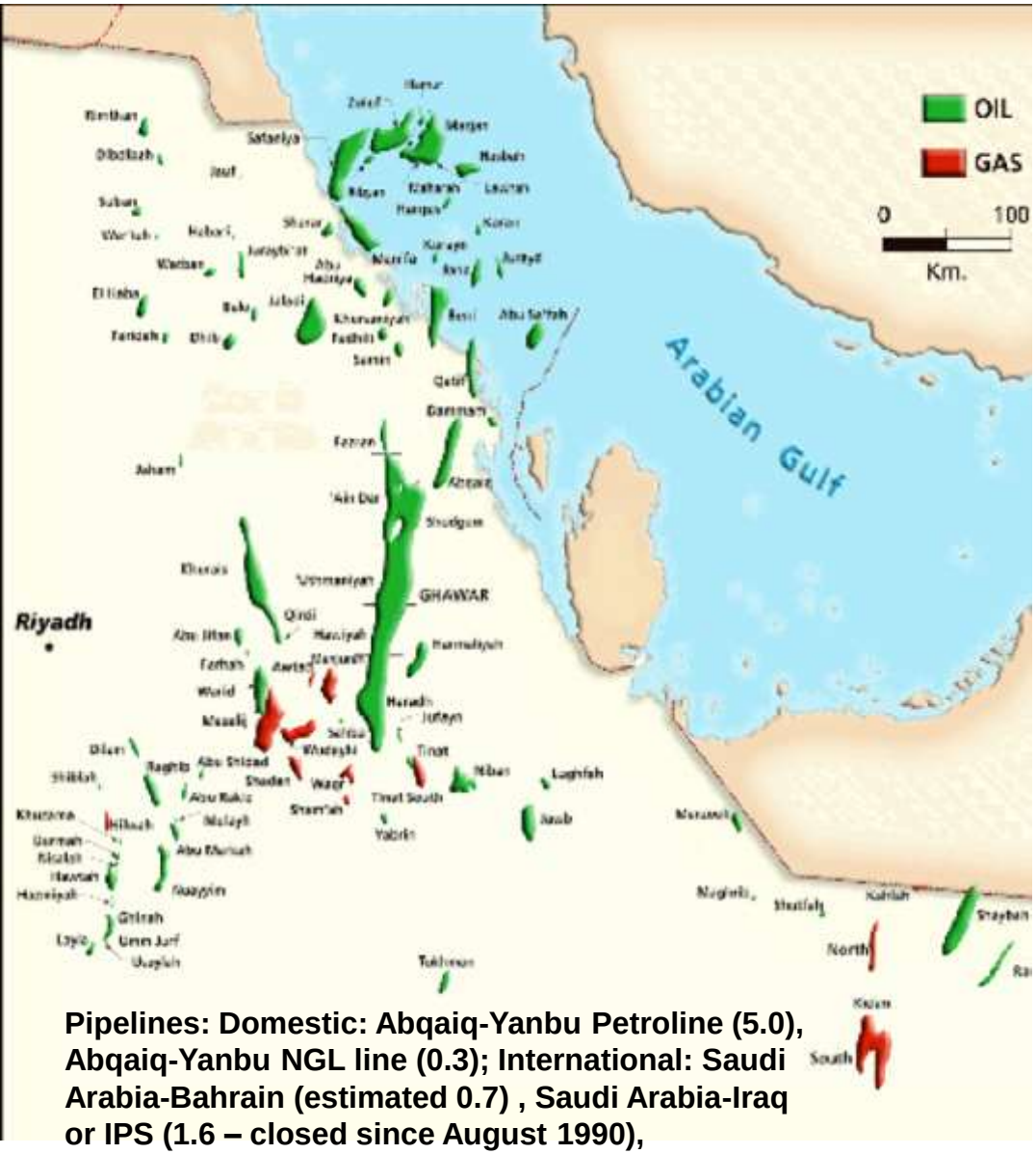
Hormuz is the world's most important oil chokepoint

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.

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

Ras Tanura

Source: Google maps

Desalination Plant

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Source: Google maps

Wider Area of Operations: Arabian Sea

Conventional Missiles and Artillery Rockets

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

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 Source: Dr. Abdullah Toukan

A Missile-Armed Region

Country	SRBM < 1,000 KM	MRBM 1,000 – 3,000 km	IRBM 3,000 – 5,500 km	ICBM > 5,500 km
Iran	Shahab - 1	Shahab - 3	Shahab - 5	Shahab - 6
	Shahab - 2	Shahab – 3M	-	-
	Mushak - 120	Ghadr - 101	-	-
	Mushak - 160	Ghadr - 110	-	-
	Mushak - 200	IRIS	-	-
	-	Sejil	-	-
	-	Safir	-	-
Syria	SCUD-B	-	-	-
	SCUD-C	-	-	-
	SCUD-D	-	-	-
	SS-21b	-	-	-
ISRAEL	Jericho-2			Jericho-3
Pakistan	Shaheen I	Shaheen II	-	-
	Hatf I	Ghauri I	-	-
	Hatf II	Ghauri II	-	-
	Hatf III	Ghauri III	-	-
	M-11	-	-	-
India	Agni I	Agni II	Agni III	Surya
	Prithvi I	-	-	-
	Prithvi II	-	-	-

Source: Dr. Abdullah Toukan, November 2014.

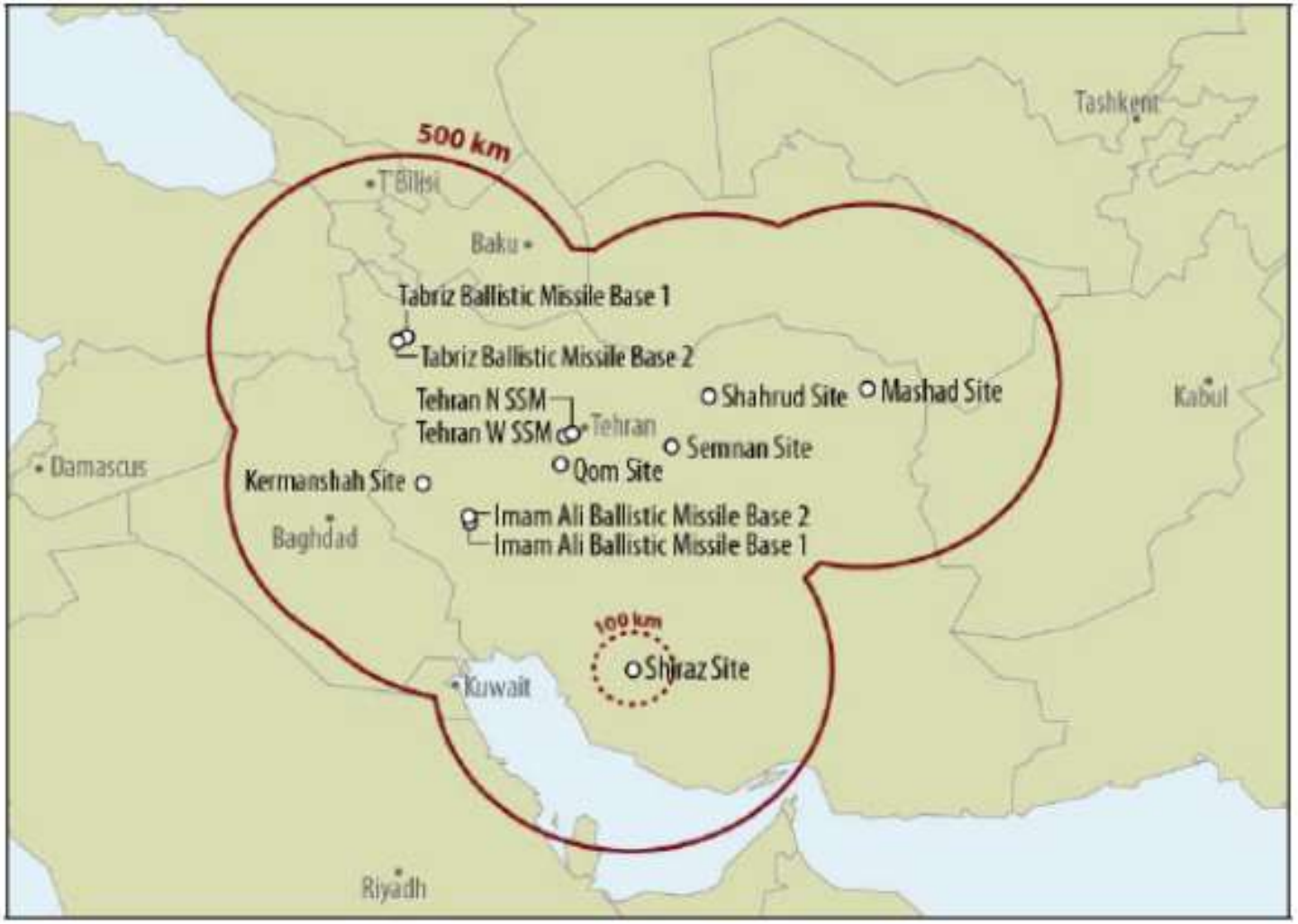
Iran's Artillery Rockets

Type	Max. Range (KM)	Diameter (MM)	Warhead (KG)	Comment
Arash BM-11 BM-21	20-45	122	18	Vehicle mounted or towed MRL. Made DIO. Arash has range of 20.5 KM. Other vary by type and age.
Fajr-3	45	240	90 (45 HE)	MRL launched system. Vehicle mounted In Iranian Army artillery
Fajr-5 (Faqr-5?)	75-80	333	175 (90 HE) May be CW version	MRL launched system. Vehicle mounted In Iranian Army artillery. North Korean design origin. Reports of a single round version with rage of 190 KM, and radar guided anti-ship version.
Haseb-1 (Fajr 1) Type 63	8-9	107 (106.7)	8	MRL launched system. Towed. In Iranian Army artillery. PRC design
Mushak-120 Zelzal-1 Zelzal 1A	100-215 130 160	450-601	500-600	Cited as mobile, or in fixed sites of 3, TEL launched artillery rocket. Status uncertain, some reports is follow-on to FROG and larger than Nazeat. Some reports are 1A,2,3, and 3B versions.
Nazeat-4	70		550	Russian FROG 9M21 Luna. Status unclear.
Nazeat-5	90			Single launcher FROG (LUNA A) development
Nazeat-6-H	105	355	850	Single launcher FROG (LUNA A) development
Nazeat-10-H	140	450	250	Single launcher FROG (LUNA A) development. New version may have separable parachuted fragmentation warhead. Claim CEP=5% of range. Some reports of PRC design aid.
Noor	18	122	18	MRL 3-tube launch system. In Iranian Army artillery. Sometimes listed Iranian copy of C-802 anti-ship missile
Oghab	34-45	230	70	Development form PRC Type-83. Triple rail launched system. In Iranian Army and IRGC artillery. Very inaccurate. CEP in excess of 500 meters. Some 260-270 fired in Iran-Iraq War.
Shahin-1	13	333	190	Short-range heavy artillery rocket
Shahin-2	20	333	190	Short-range heavy artillery rocket
Zelzal-2 Mushak-200	100-210	610	500-600	Uncertain developmental system with various names, Some reports is copy of, derived from FROG-7

Note: None are guided. All are fin guided, Most systems are spin stabilized.

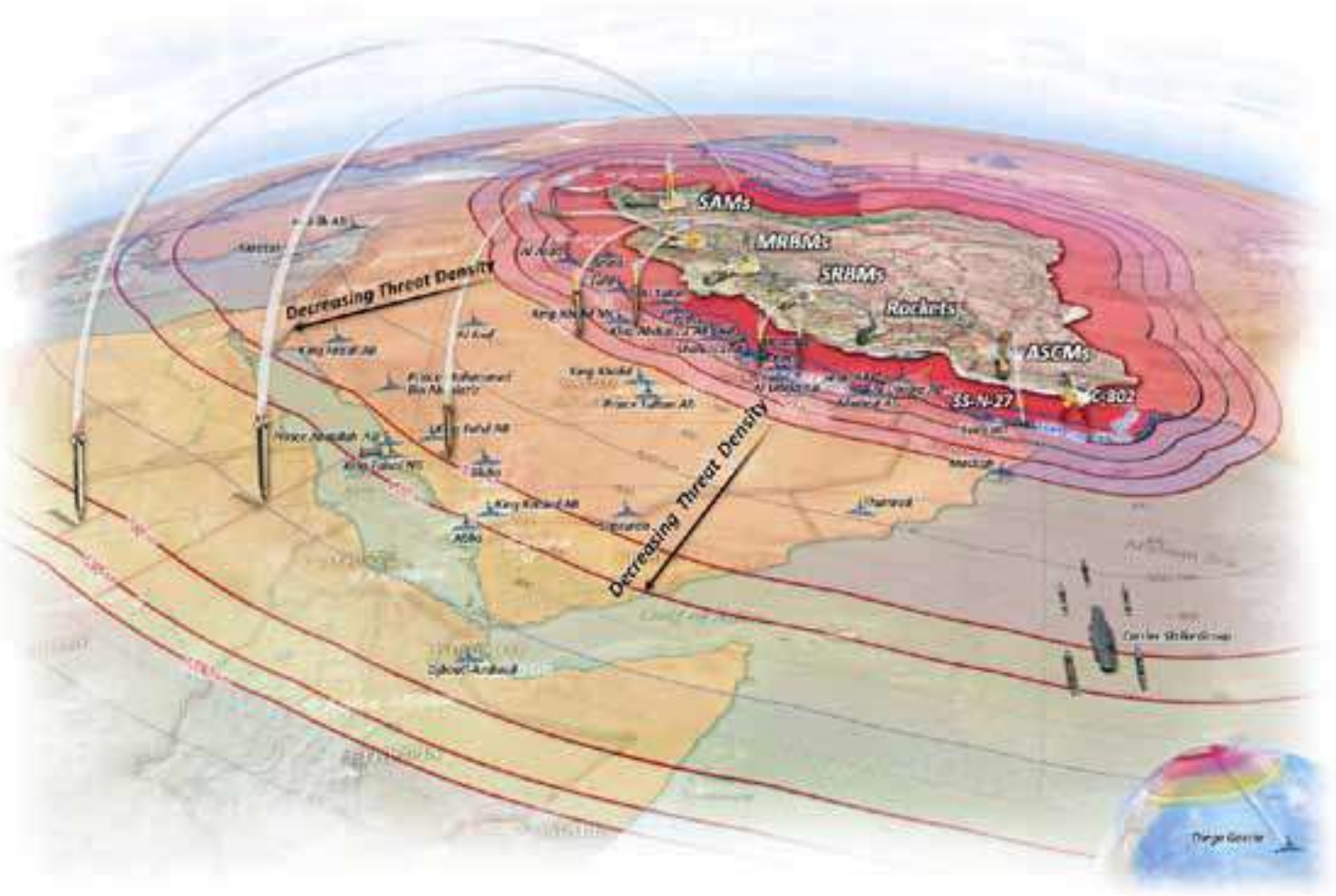
Source: IHS-Jane's, Global Security, and FAS, "Iranian Artillery Rockets, http://www.fas.org/man/dod-101/sys/land/row/mrl-iran.html

Iran's SRBM Sites and Ranges



Source: Steven A. Hildreth, Iran's Ballistic Missile and Space Launch Programs, Congressional Research Service R42849, December 6, 2012, p. 16.

Shorter Range 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.

Iran's Missile Arsenal

Missile	Translation	Fuel Type	Estimated Range	Payload
Fajr-3	*Dawn-3*	Solid	45 km	45 kg
Fajr-5	*Dawn-5*	Solid	75 km	90 kg
Fateh-110	*Victorious*	Solid	20 km	500 kg
Ghadr-1	*Powerful-1*	Liquid	1600 km	750 kg
Iran-130/Nazeat	*Removal*	Solid	90-120 km	150 kg
Kh-55		Liquid	2500-3000 km	400-450 kg
Nazeat-6	*Removal-6*	Solid	100 km	150 kg
Nazeat-10	*Removal-10*	Solid	140-150 km	250 kg
Oghab	*Eagle*	Solid	40 km	70 kg
Sajjil-2	*Baked Clay-2*	Solid	2200-2400 km	750 kg
Shahab-1	*Meteor-1*	Liquid	300 km	1000 kg
Shahab-2	*Meteor-2*	Liquid	500 km	730 kg
Shahab-3	*Meteor-3*	Liquid	800-1000 km	760-1100 kg
Shahin-1	*Hawk-1*	Solid	13 km	
Shahin-2	*Hawk-2*	Solid	20 km	
Zelzal-1	*Earthquake-1*	Solid	125 km	600 kg
Zelzal-2	*Earthquake-2*	Solid	200 km	600 kg

Source: 2010 IISS Iran's Ballistic Missile Capabilities: A Net Assessment.

((This table does not include other missiles, such as the Qiam-1 SRBM, the Khorramshahr MRBM, or the Badr-313 SRBM))

Iran's Major Missile Forces

	Shahab-1	Shahab-2	Shahab-3	Ghadr-1	Sejjil	Khalij Fars	Fateh-100	Zelzal-1/2/3
Payload (kg)	1000	1000-700	1000	1000-750	1000	650	500	600
CEP (m)	450-1000	50-700	190-2500	1000	Unknown	<50	100-300	100-3000
Number in Service	200-300	100-200	25-1--	25-300	Unknown	Unknown	Unknown; likely in hundreds	Unknown; likely in thousands
Fuel	Liquid	Liquid	Liquid	Liquid	Solid	Solid	Solid	Solid

(Source: Anthony Cordesman. "Iran's Rocket and Missile Forces and Strategic Options" CIS October 7, 2014)

Figure (30) shows that in the best case assumption the Shahab Missile has a CEP of 500m, which is large compared to the lethal radius of hardened structures. A large number of missiles with unitary warheads will be required to ensure destruction of such targets, much more than what is reported to be in service.

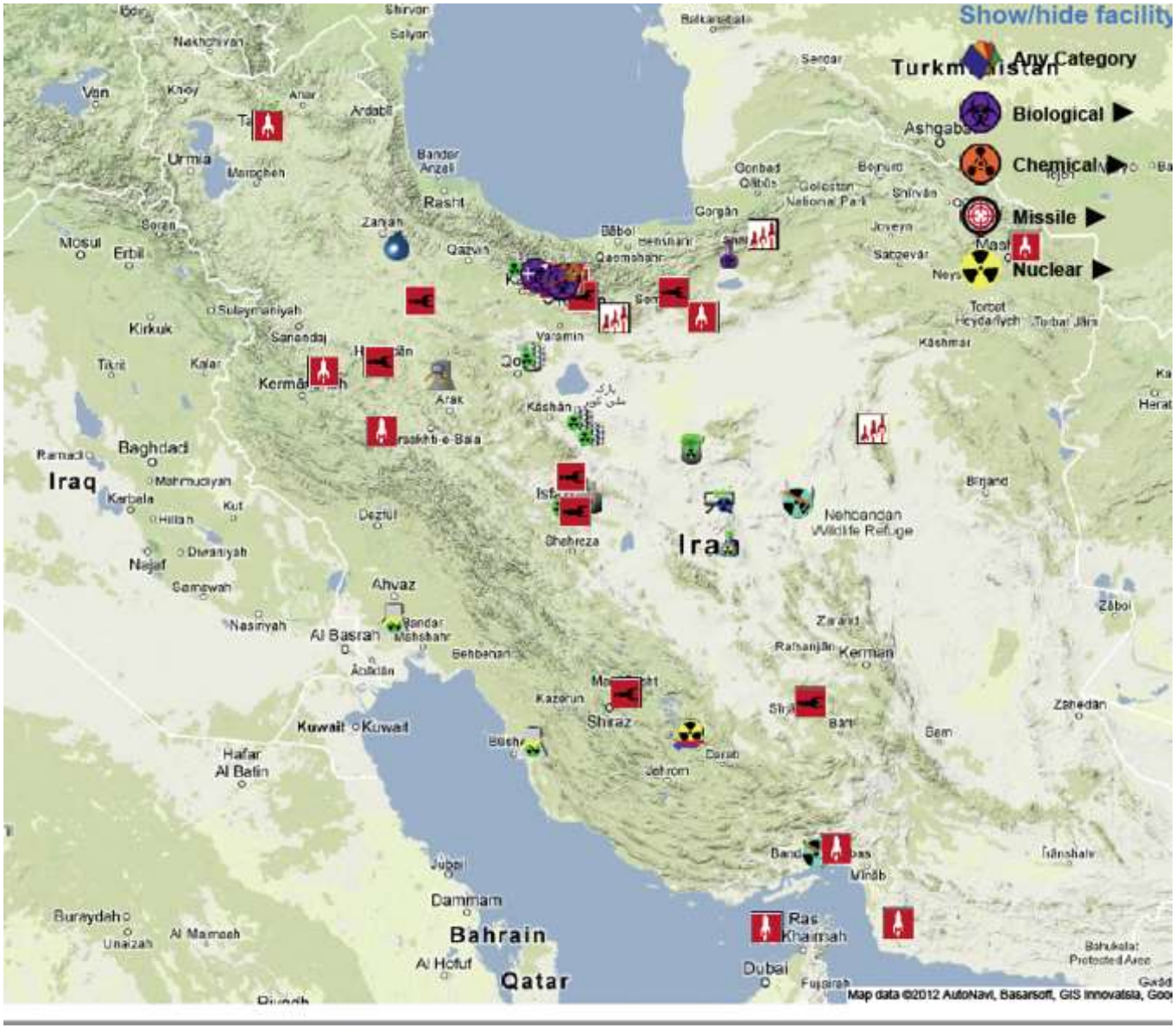
A psi of 25 is required to damage parked aircraft, with a 1000 kg TNT explosive weight the weapon lethal radius is 25 meters. For a required damage of 0.75 the number of missiles required , if the CEP of the missile is 500 meter, is 692.

A psi of 40 is required to damage a reinforced command center, with a 1000 kg TNT explosive weight the weapon lethal radius is 21 meters. For a required damage of 0.75 the number of missiles required , if the CEP of the missile is 500 meter, is 1,286.

A psi of 10 is required to damage commercial building, search radar antenna, and to inflict a 50% population fatality, with a 1000 kg TNT explosive weight, the weapon lethal radius is 40 meters. For a required damage of 0.75 the number of missiles required , if the CEP of the missile is 500 meter, is 346.

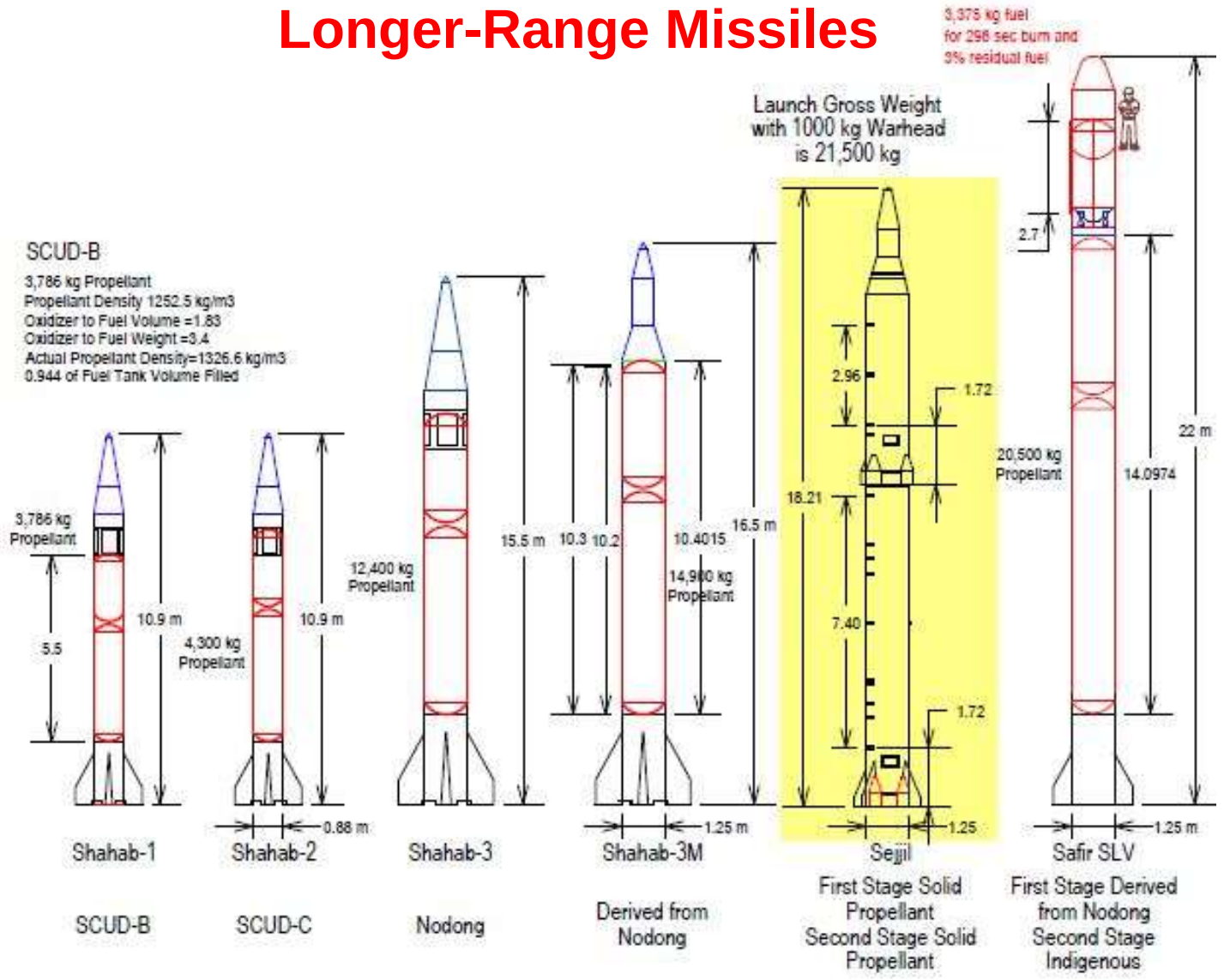
Source: Dr. Abdullah Toukan and Anthony H. Cordesman, November 2014.

Iran: Major Open Source Missile and WMD Facilities



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

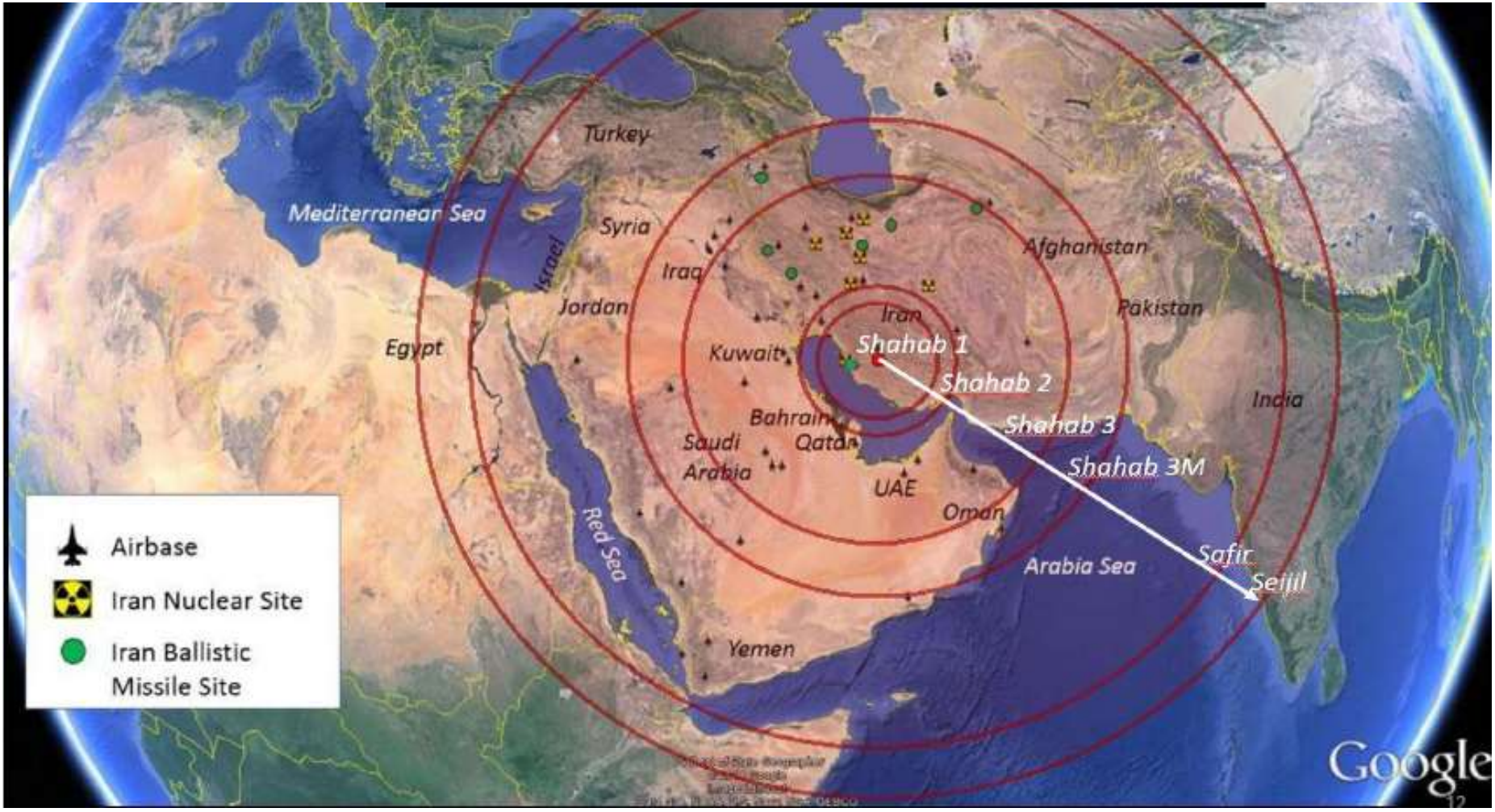
Iran's Current and Developmental Longer-Range Missiles



(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.)

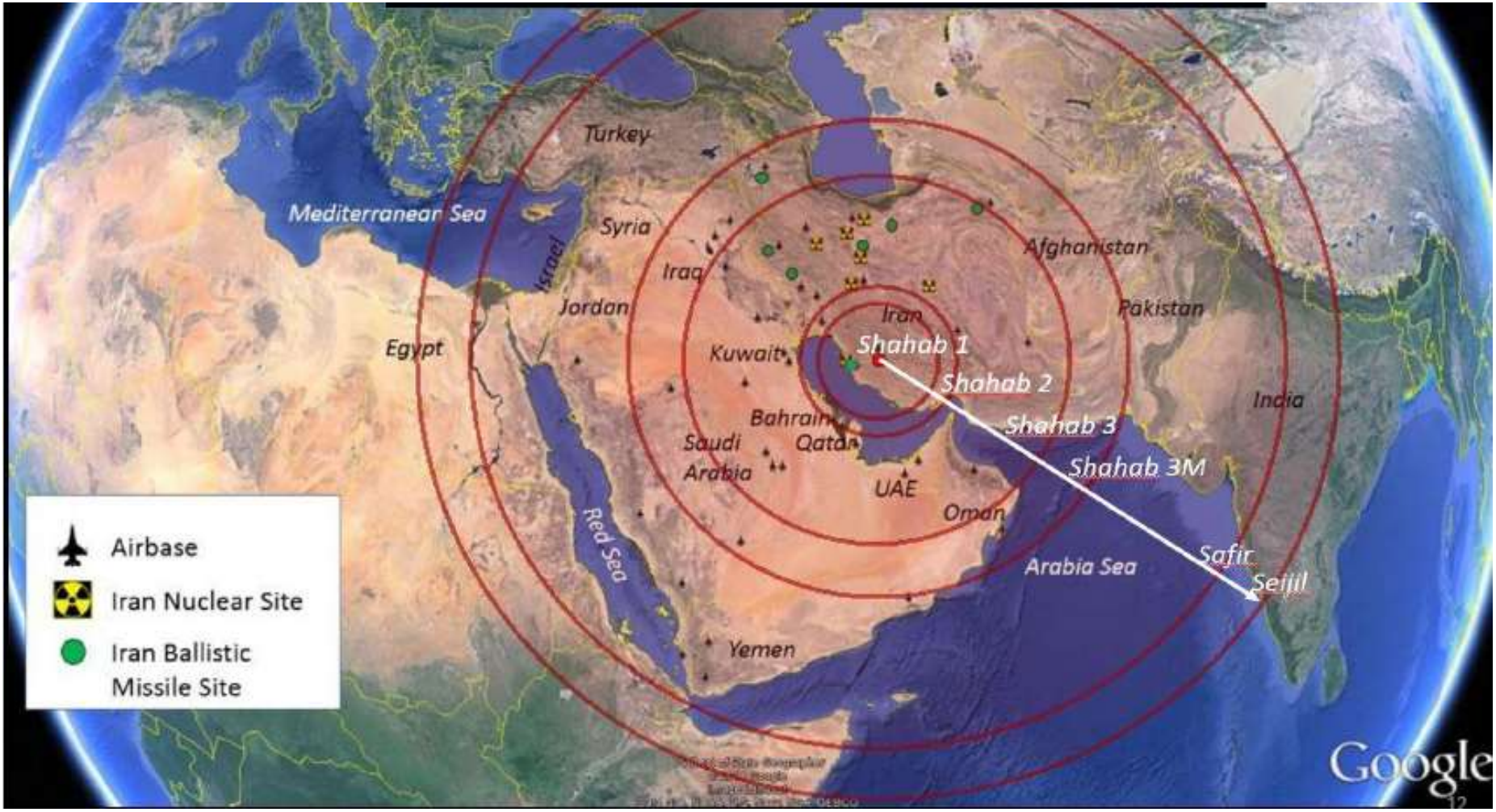
Source: Stratfor, http://www.google.com/imgres?imgurl=http://digitaljournal.com/img/1/2/2/8/5/5/i/5/7/1/o/iran_missile_map.jpg&imgrefurl=http://digitaljournal.com/image/57146&h=364&w=400&sz=148&hl=en&start=56&tbnid=nAmeBGGgErdwGM:&tbnh=90&tbnw=99&zoom=1&docid=fih86K5v8K5dAM&sa=X&ei=A947T_D9Ncbr0gHIvMjRCw&ved=0CDUQ9QEwAw&dur=235

Longer Range Missile Attack Range with 1000 Kg Payload



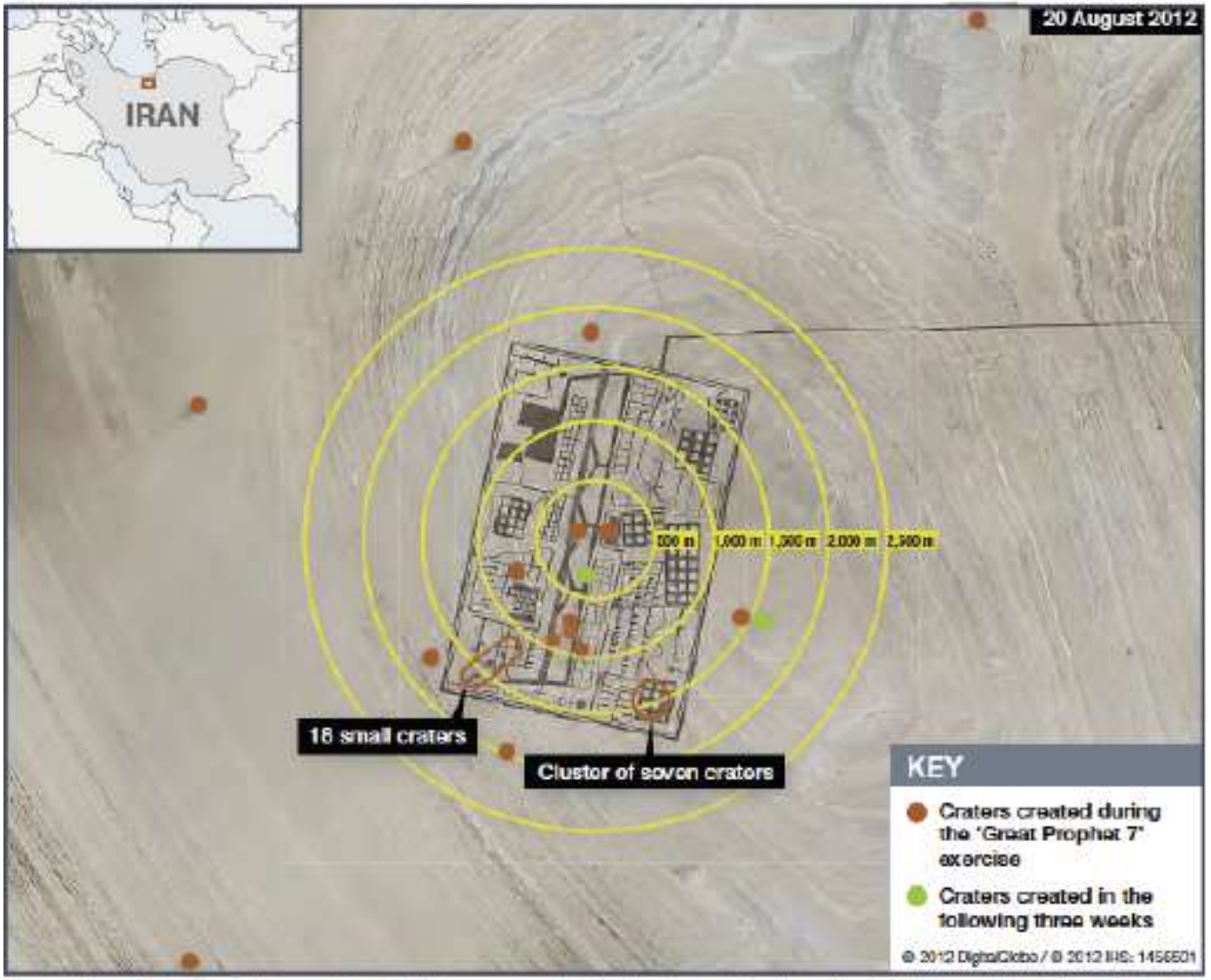
Source: Dr. Abdullah Toukan, November 2014.

Longer Range Missile Attack Range with 1000 Kg Payload



Source: Dr. Abdullah Toukan, November 2014.

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 Defense

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

Space Sensor

Defense Support Program in Boost Phase

Iranian Shahab 3 Launched against Israel

IRAQ

IRAN

KUWAIT

Midcourse & Terminal Missile Defense

Early Warning & Long Range Search & Track Capabilities against Iranian MRBMs

Arabian Gulf

BAHRAIN

QATAR

SAUDI-ARABIA

Sea-Based EW & Terminal Defense

Gulf of Oman

Air Defense

UAE

OMAN

PAC-3 THAAD

Early Warning Radar

AWACS

Components of a multi-layered integrated Ballistic Missile Defense System

Sensors

Space Tracking and Surveillance System

In Mid - Course Phase

Reentry Vehicles & Decoys

Terminal Phase

Vehicles & Decoys

Mid-Course Phase

Sea Based Radar

Sea Based Radar

Forward-Based Radar

Midcourse Radar

Boost Phase Vehicles

Sensors

Defense Support Program in Boost Phase

- Boost Phase short in time duration limiting interception opportunities.
- Missile destruction occurs before dispersal of payload.
- Debris from missile, including warheads, may fall on the launching country.

- Speed of warhead and short duration of terminal phase are challenges.
- Warheads can maneuver.

- Longer flight duration
- Exoatmospheric (above atmosphere)
- Must be able to discriminate between weapons and decoys.

- Threat most vulnerable.
- Destroy many RVs with single shot.

Ground Based Interceptor

Early Warning Radar

Ground Based Radar

THAAD "Hit to Kill" Technology Direct hit of incoming ballistic missile.

Sea Based Terminal

Patriot Advanced Capability PAC-3

U.S. Aegis Ballistic Missile Defense

Standard Missile-3

Ground Based Midcourse Defense

Multiple Kill Vehicle

Arborne Lasers

Kinetic Energy Interceptors

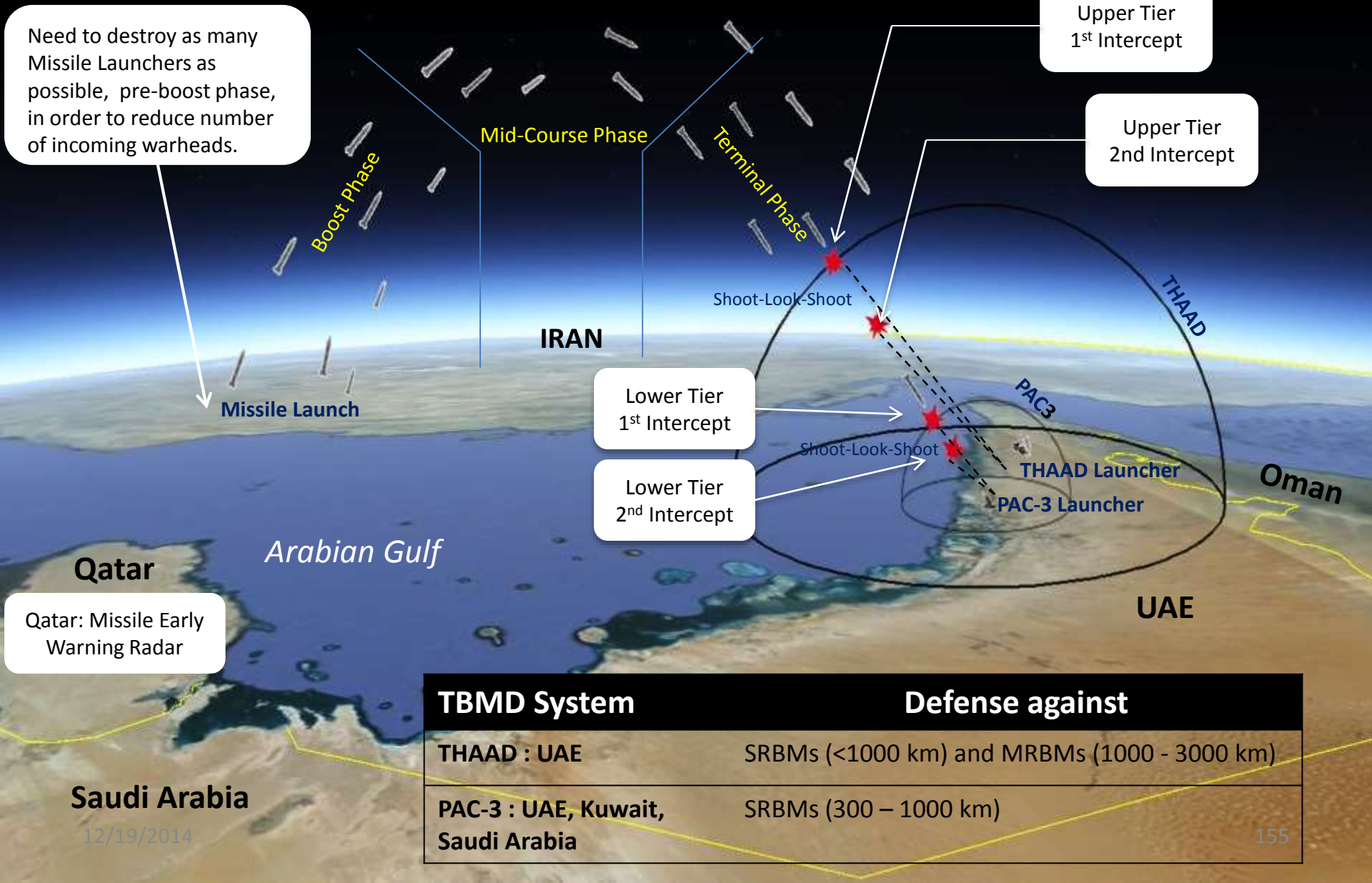
Counterforce Operations

Air Launched Concepts

C4I and

Battle Management

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)

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 engagements.

Sea Based Radar

Sea Based Radar

Aegis Ballistic Missile

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

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 its Patriot anti-missile system. • In October 2014, Saudi Arabia bought 202 PAC-3 missiles and 36 launcher modification kits to enable existing PAC-2 batteries to fire PAC-3 missiles
Qatar	• The U.S. is building a Missile Warning Facility in Qatar that would utilize an AN/TPY-2-X Band Radar. • In 2012, Qatar made a request for 11 PAC-3 MFU's, 768 PAC-3 missiles, and related equipment
Oman	• In May 2013, Oman announced a deal to acquire THAAD

Anthony Cordesman and Alexander Wilner, "Iran and the Gulf Military Balance -1" July 11, 2012
"Kingdom of Saudi Arabia (KSA) – Patriot Aid Defense system with PAC-3 Enhancement," *DCSA*, October 1, 2014,
http://www.dsca.mil/major-arms-sales/kingdom-saudi-arabia-ksa-patriot-air-defense-system-pac-3-enhancement
"Qatar – Patriot Missile System and Related Support and Equipment," *DCSA*, November 2012,
http://www.dsca.mil/sites/default/files/mas/qatar_12-58_0.pdf
"Oman to buy $2.1B Raytheon missile system," *UPI*, May 21, 2013,
http://www.upi.com/Business_News/Security-Industry/2013/05/21/Oman-to-buy-21B-Raytheon-missile-system/UPI-72381369166633/

The Potential Nuclear Threat

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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

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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
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Pakistan

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Hatf I	Ghauri I	-	-
Hatf II	Ghauri II	-	-
Hatf III	Ghauri II	-	-
M-11	-	-	-

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

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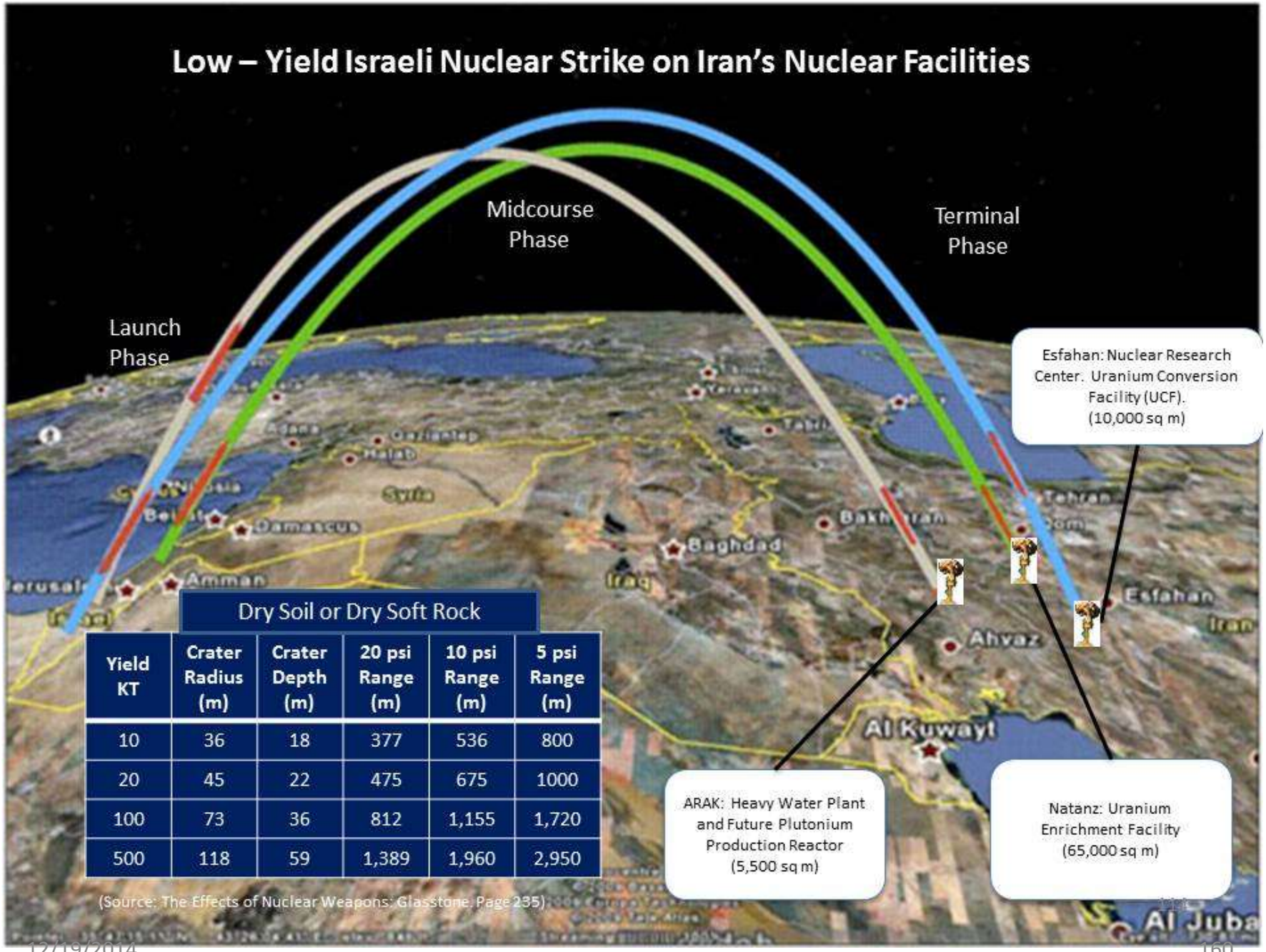
- Ballistic Missiles
- Cruise Missiles such as the Kh55 Russian land attack cruise missile, effective against Oil Platforms.

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

Source: Dr. Abdullah Toukan

Low – Yield Israeli Nuclear Strike on Iran's Nuclear Facilities



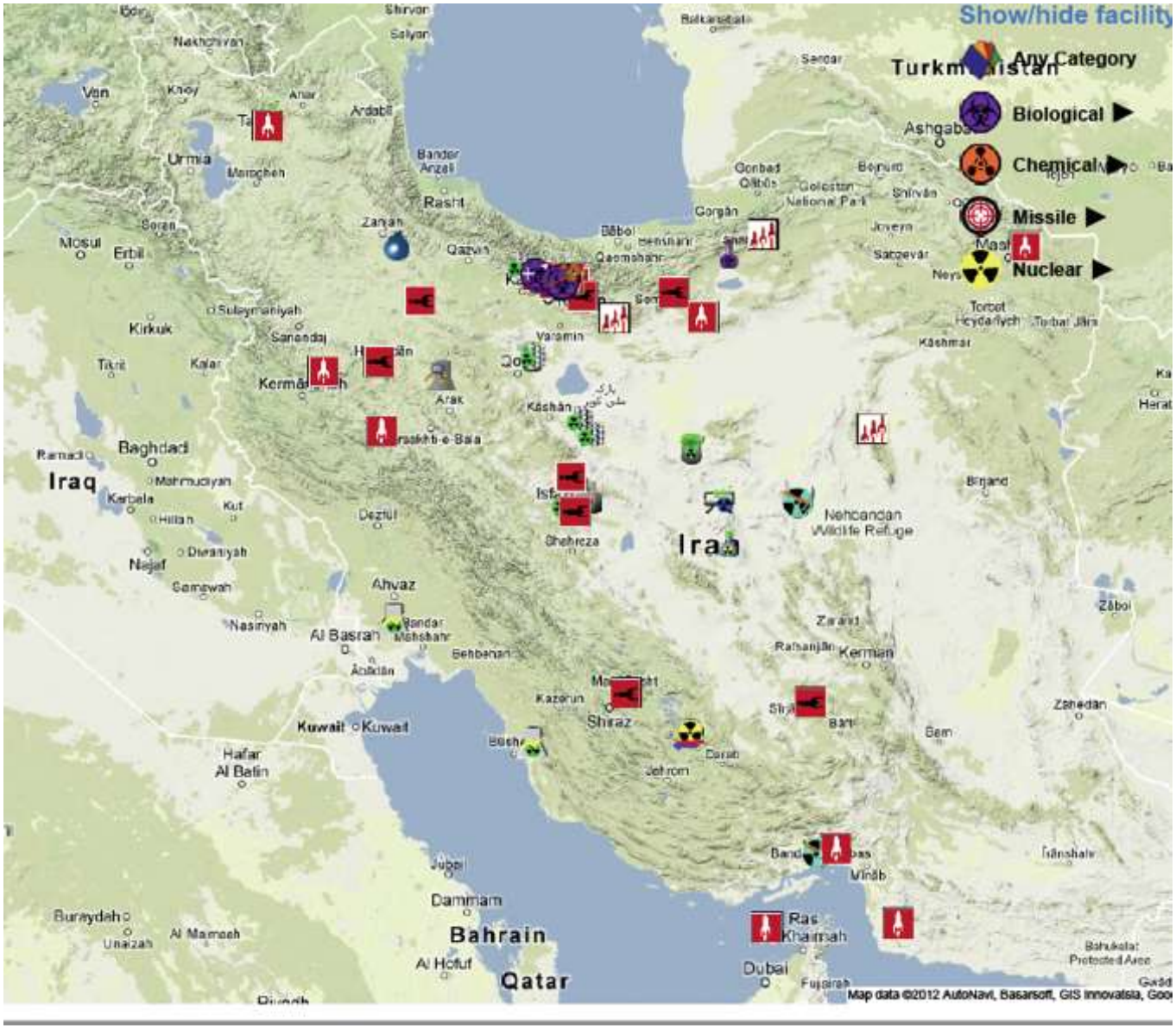
Dry Soil or Dry Soft Rock

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)


300 miles
500 km
TURKEY
CASPIAN SEA
TURKMENISTAN
MIDDLE EAST
Sites circled in red
unknown pre-mid 2002
Lashkar A' bad
Tehran
IRAQ
Arak
AFGHANISTAN
Natanz
Isfahan
IRAN
Saghand
Ardekan
MW Megawatts
Uranium processing facility
Uranium mines
Heavy-water facility
Research reactors / research facilities
Uranium enrichment facility
Light-water reactor (under construction)
KUWAIT
1000 MW
Bushehr
PAKISTAN
The Gulf
Gachin
BAHRAIN
SAUDI ARABIA
QATAR
Gulf of Oman
IISSmaps
Source: IISSmaps

Iran: Major Open Source Missile and WMD Facilities



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

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/.


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
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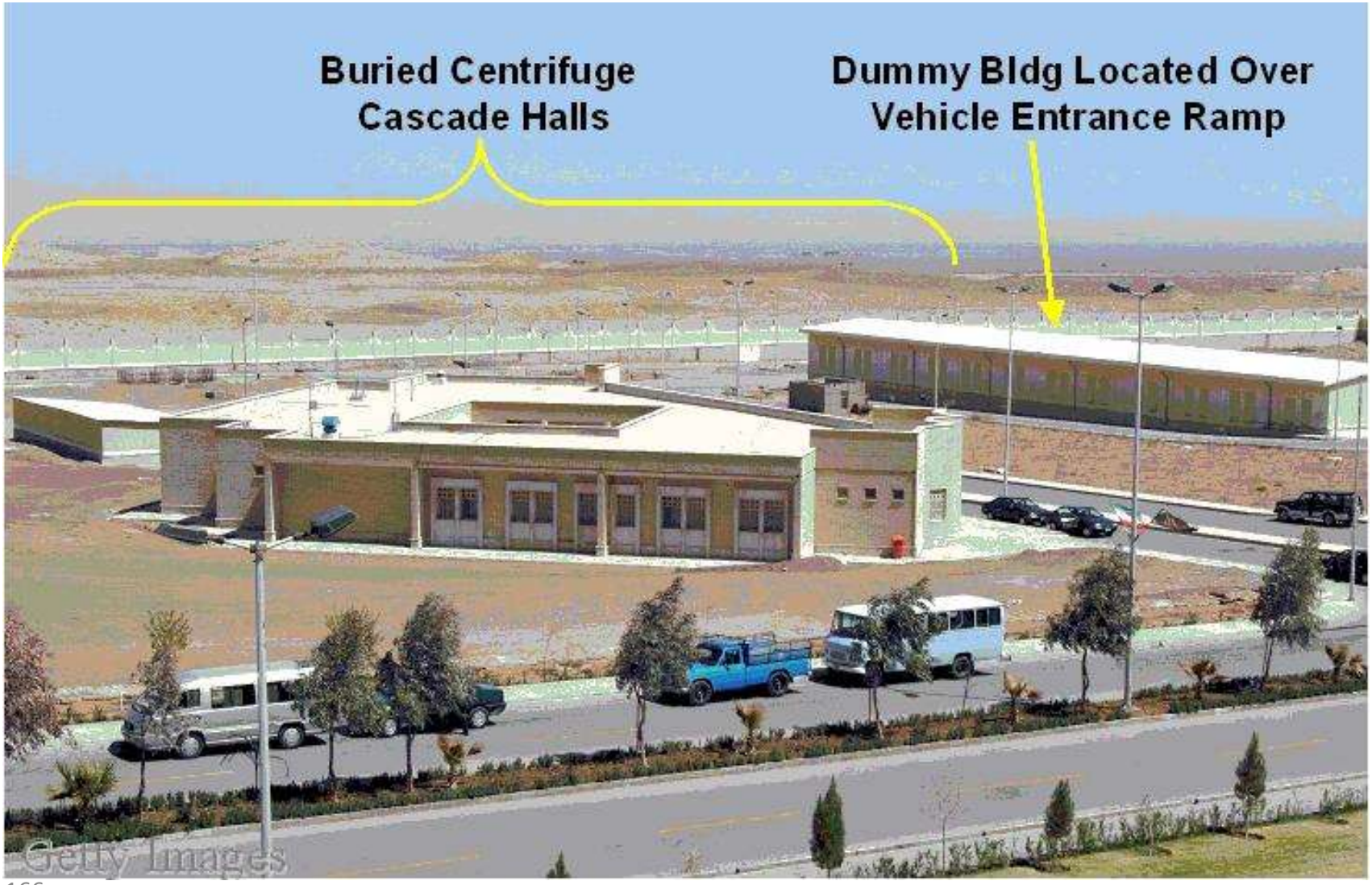
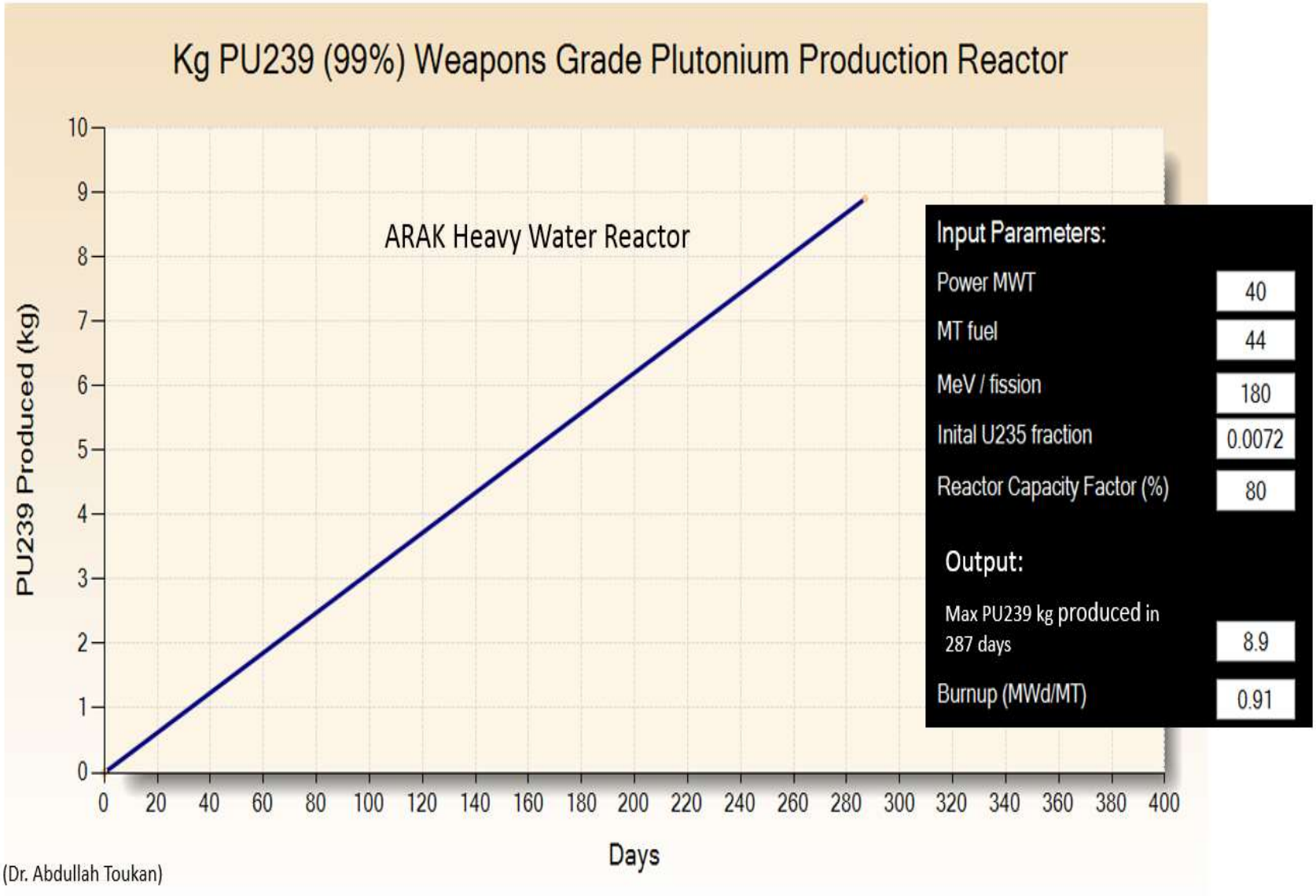
Natanz: Effective Concealment



Natanz Upgrades

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

Plutonium Threat from the Arak Reactor



(Dr. Abdullah Toukan)

Heavy Water Reactor Facility at Arak

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/

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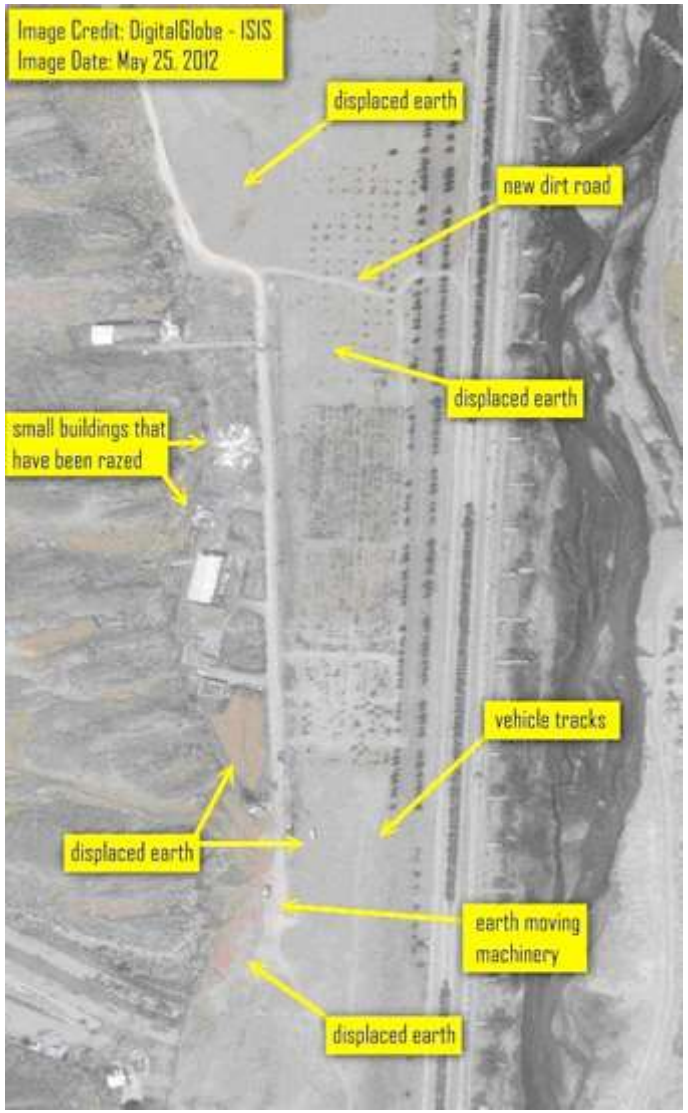
Razed Test Site (?) At Parchin



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

Nuclear Capability and Risk

Tehran: 1 Megaton

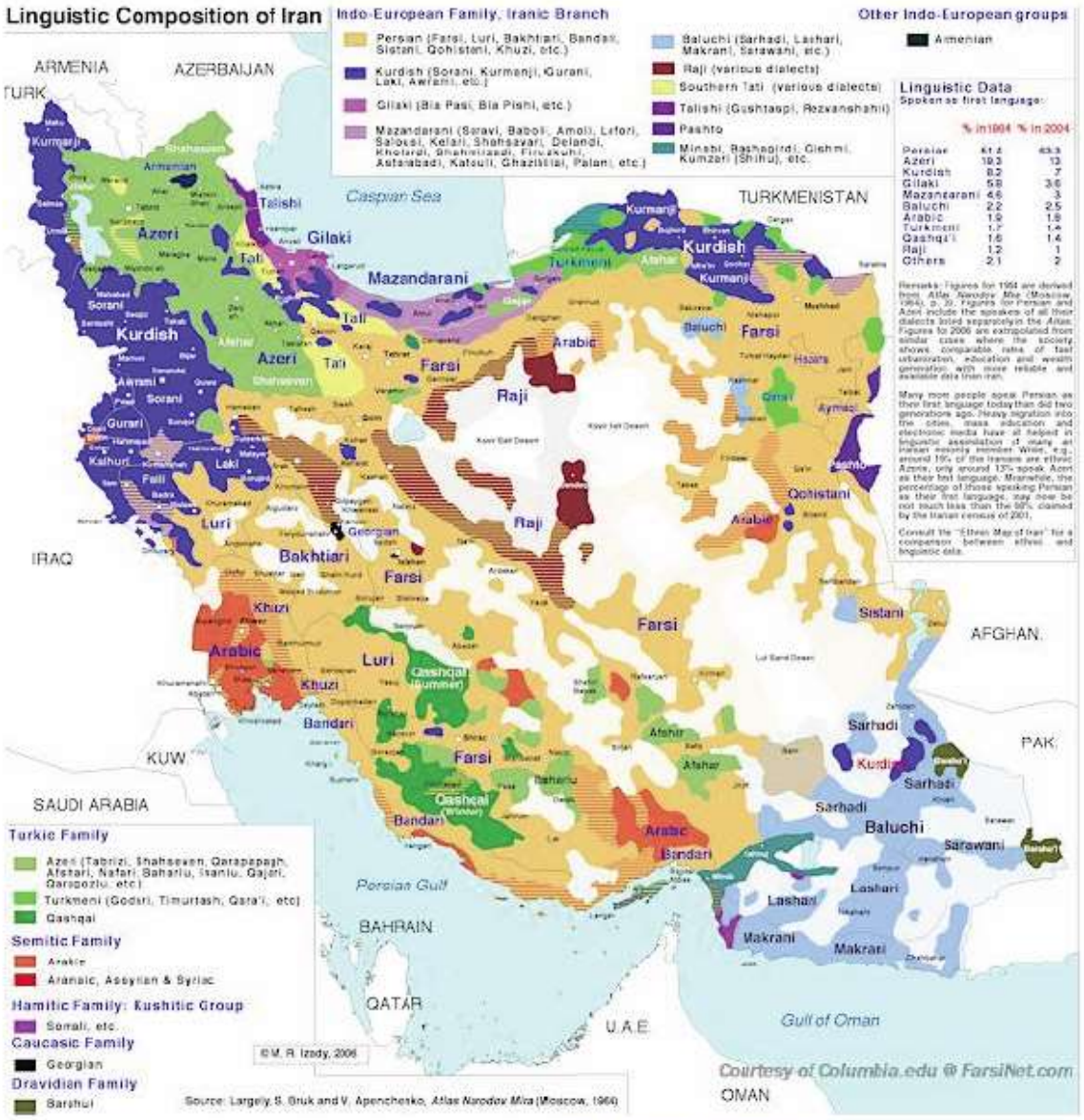
Population: 8.3 million urban,14 million wider area
Urban: 730 km^2 (280 sq mi)
Wider Area: 1,274 km^2 (492 sq mi)

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/.

US Preventive Strikes

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Key Issues

- **Trade-off with containment, extended deterrence**
- **GCC and allied Support for initial and sustained operations.**
- **Key nuclear targets or nuclear-missile suppression**
- **Intel, targeting, actual damage, BDA limits.**
- **Penetration and survivability, Stealth (B-2, F-22, F-35, ALPW, cruise, UCAV), EW, SEAD, corridor blasting, lasting suppression.**
- **Real world impact of cruise missiles, earth penetrators, precision systems.**
- **Ability to restrike and sustain suppressive restrike aftermath.**
- **Collateral damage. Cost to Iranian civilians.**
- **Iranian reaction and counterstrikes, escalation, commitment to seeking nuclear weapons.**
  - **Missile threat vs. suppression and missile defense.**
  - **Impact on allied states and global economy.**
- **Global political reactions.**

Illustrative US Strike Mission

- **B-2 bombers out of Diego Garcia, each carrying 2 GBU-57 MOP bombs.**

- **Mission can be achieved with a high success rate also maintaining a sustained strike over a couple of days.**

- **B-2 bombers escorted by F-18s from the 5th fleet stationed in the Gulf area, or F-15Es and F-16Cs from forward area air bases.**

- **United States and Western allies considered to be the only countries involved, no GCC or any Arab country involvement and especially no-Israeli direct involvement.**

- **Still though, Iran most probably will accuse Israel to be part of the Strike and will try to retaliate, either by launching a Ballistic Missile on Israel carrying conventional or WMD (chemical, biological, radiological) and activating Hezbullah to launch cross border attacks against Israel.**

- **Iran would also try to attack any U.S. military airbases that are active in the Gulf even if they are stationed in GCC countries.**

- **If Iran attacks any of the GCC countries, then they will have the right to self-defense. In addition the whole Arab Middle East will not accept an Iranian attack on any of the GCC countries.**

Source: Dr. Abdullah Toukan

US Preventive Military Strike against Iranian Nuclear Facilities and Ballistic Missile Bases

Combat Aircraft Strike Force could be F-18's off the U.S. 5th fleet, and F-15E launched from Forward Area Bases.

The Combat Aircraft can also perform all Offensive Counterair Operations : Fighter Sweep, SEAD (suppression of Enemy Air Defense), Interdiction and Escort.

B-2 Mission Payload is the B-57 A/B Mission Ordnance Penetrator (MOP).

Source: Dr. Abdullah Toukan

The New York Times, March 19, 2012: "U.S. War Games Sees Perils of Israeli Strike Against Iran"

- **A classified war simulation held this month to assess the repercussions of an Israeli attack on Iran forecasts that the strike would lead to a wider regional war, which could draw in the United States and leave hundreds of Americans dead, according to American officials.**

- **The officials said the so-called war game was not designed as a rehearsal for American military action — and they emphasized that the exercise's results were not the only possible outcome of a real-world conflict.**

- **But the game has raised fears among top American planners that it may be impossible to preclude American involvement in any escalating confrontation with Iran, the officials said. In the debate among policy makers over the consequences of any Israeli attack, that reaction may give stronger voice to those in the White House, Pentagon and intelligence community who have warned that a strike could prove perilous for the United States.**

- **The results of the war game were particularly troubling to Gen. James N. Mattis, who commands all American forces in the Middle East, Persian Gulf and Southwest Asia, according to officials who either participated in the Central Command exercise or who were briefed on the results and spoke on condition of anonymity because of its classified nature. When the exercise had concluded earlier this month, according to the officials, General Mattis told aides that an Israeli first strike would be likely to have dire consequences across the region and for United States forces there.**

- **The two-week war game, called Internal Look, played out a narrative in which the United States found it was pulled into the conflict after Iranian missiles struck a Navy warship in the Persian Gulf, killing about 200 Americans, according to officials with knowledge of the exercise. The United States then retaliated by carrying out its own strikes on Iranian nuclear facilities.**

Source: Dr. Abdullah Toukan

- **The initial Israeli attack was assessed to have set back the Iranian nuclear program by roughly a year, and the subsequent American strikes did not slow the Iranian nuclear program by more than an additional two years. However, other Pentagon planners have said that America's arsenal of long-range bombers, refueling aircraft and precision missiles could do far more damage to the Iranian nuclear program — if President Obama were to decide on a full-scale retaliation.**

- **The exercise was designed specifically to test internal military communications and coordination among battle staffs in the Pentagon; in Tampa, Fla., where the headquarters of the Central Command is located; and in the Persian Gulf in the aftermath of an Israeli strike. But the exercise was written to assess a pressing, potential, real-world situation. In the end, the war game reinforced to military officials the unpredictable and uncontrollable nature of a strike by Israel, and a counterstrike by Iran, the officials said.**

- **American and Israeli intelligence services broadly agree on the progress Iran has made to enrich uranium. But they disagree on how much time there would be to prevent Iran from building a weapon if leaders in Tehran decided to go ahead with one.**

- **With the Israelis saying publicly that the window to prevent Iran from building a nuclear bomb is closing, American officials see an Israeli attack on Iran within the next year as a possibility. They have said privately that they believe that Israel would probably give the United States little or no warning should Israeli officials make the decision to strike Iranian nuclear sites.**

- **Officials said that, under the chain of events in the war game, Iran believed that Israel and the United States were partners in any strike against Iranian nuclear sites and therefore considered American military forces in the Persian Gulf as complicit in the attack. Iranian jets chased Israeli warplanes after the attack, and Iranians launched missiles at an American warship in the Persian Gulf, viewed as an act of war that allowed an American retaliation.**

Source: Dr. Abdullah Toukan

The B-2 Bomber

Primary Function	Multi role heavy bomber
Engines:	Four GE F-118-GE-100 engines, each with a thrust of 17,300 pounds (7,847 kg)
Speed, Cruise:	High subsonic
Ceiling:	50,000 ft (15,000 meters)
Weight Takeoff, (typical):	335,500 – 350,000 pounds (152,600 – 159,000 kg)
Weight, Empty (typical):	125,000 – 160,000 pounds
Range:	6,000 nmi (9,600 km), unrefueled range for a Hi-Lo-Hi mission with 16 B61 nuclear free-fall bombs 10,000 miles with one aerial refueling.
Payload:	40,000 pounds (18,000 kg)
Crew:	Two pilots
Current Armament:	**Nuclear**: 16 B61, 16 B83 **Conventional**: 80 MK82 (500lb), 16 MK84 (2000lb), 34-36 CBU-87, 34-36 CBU-89, 34-36 CBU-97 **Precision**: 216 GBU-39 SDB (250 lb), 80 GBU-30 JDAM (500 lb), 16 GBU-32 JDAM (2000 lb), GBU-27, GBU-28, GBU-36, GBU-37, AGM-154 HSOW, 8-16 AGM-137 TSSAM, 2 MOP / DSHTW/ Big BLU

Source: Dr. Abdullah Toukan

• In July 2009, verification of equipment required to integrate the MOP on the B-2 was complete - the hardware that holds the MOP inside the weapons bay. The MOP is a GPS-guided weapon containing more than 5,300 pounds of conventional explosives inside a 20.5 ft long bomb body of hardened steel. It is designed to penetrate dirt, rock and reinforced concrete to reach enemy bunker or tunnel installations. The B-2 will be capable of carrying two MOPs, one in each weapons bay.

• The B-2 currently carries up to 40,000 pounds of conventional ordnance. For example, it can deliver 80 independently targeted 500-lb class bombs from its smart bomb rack assembly; or up to 16 2,000-lb class weapons from its rotary launcher. Integration of the MOP on the B-2 is the latest in a series of modernization programs that Northrop Grumman and its subcontractors have undertaken with the Air Force to ensure that the aircraft remains fully capable against evolving threats.

GBU-57A/B Massive Ordnance Penetrator (MOP)	Specifications
Weight, total	13,600 kg (slightly less than 30,000 pounds)
Weight, explosive	2,700 kg (6,000 lb)
Length	6m / 20.5 feet
Diameter	31.5 in diameter
Control	Short-span wings and trellis-type tail
Penetration	60 meters (200ft) through 5,000 psi reinforced concrete 40 meters (125 ft) through moderately hard rock 8 meters (25 feet) through 10,000 psi reinforced concrete
Contractors	Boeing, Northrop Grumman
Platforms	B-52, B2
Guidance	GPS aided Inertial Navigation System

Source: Dr. Abdullah Toukan

Priority Targets in Addition to Iran's Main Nuclear Nuclear Facilities

Ballistic Missiles Facilities

Missile Base	Missile Production Facility
Bakhtaran Missile Base	Fajr Industrial group
Abu Musa Island	Gostaresh Scientific Research Center
Bandar Abbas	Iran Aircraft Manufacturing Industries
Imam Ali Missile Base	Isfahan Missile Complex
Kuhestak Missile battery	Karaj Missile Development Complex
Mashad Airbase	Lavizan Technical and Engineering Complex
Semnan Space and Missile Center	Parchin Chemical Industries
Tabriz Missile Base	Qods Aeronautics Industries
	Semnan Missile Complex
	Shahid Bakeri Industrial Group
	Shiraz Missile Plant
	Sirjan Missile Plant

(Source: Dr. Abdullah Toukan and http://www.nti.org/country-profiles/iran/delivery-systems/)

U.S. Military Strike Force Allocation against Iran's Nuclear and Ballistic Facilities Offensive Counterair (OCA) Mission

Performance Criteria and Mission Parameters:

- **A damage performance criteria above 75% for each target, nuclear and missile, resulting in a delay of at least 5 to 10 years in Iran's Nuclear Program, and substantially weakening Iran's ballistic missile retaliatory capability.**
- **Two aircraft are allocated to each target to maximize the damage on First Strike.**
- **Destroying the maximum number of Missile Bases, Mobile Launchers and Production Facilities during (boost Phase) or before Launch, thereby reducing the number of incoming missiles (warheads) and also reducing the number of shots defense needs to take at each Incoming warhead.**

Iran Target	Number of Targets	Aircraft Allocated
Main Nuclear	5 Facilities	2 A/C per target resulting in 10 B-2 Bombers
Missiles Bases	8 Bases	2 A/C per base resulting in 16 Strike A/C
Missile Production	15 Facilities	2 A/C per target resulting in 30 Strike A/C
Mobile Missile Launchers	Assuming 22 Launchers in various locations	2 A/C per mobile launcher resulting in 44 A/C
TOTAL	50	10 B-2 Bombers 90 Strike Aircraft = 100

Source: Dr. Abdullah Toukan

Additional requirements to increase Mission Effectiveness

The effectiveness of OCA operations depends on the availability of certain resources. System capabilities are influenced by the situation, threats, weather, and available intelligence. The following are some of the resources used to conduct OCA:

Aircraft:

Fighter and bomber aircraft provide the bulk of the weapon systems for OCA operations. Other types of aircraft and weapon systems are often critical enablers of counterair operations (e.g., electronic attack, electronic protection, and air refueling aircraft).

Missiles:

These weapons include surface-to-surface, air-to-surface, and air-to-air missiles, as well as air-, land-, and sea-launched cruise missiles. Many of these weapons have long ranges and some have very quick reaction times. These weapon systems can eliminate or reduce the risk of harm to friendly forces by destroying enemy systems in the air and on the ground.

ISR Systems:

ISR systems and resources may be used in counterair operations to provide intelligence, surveillance, reconnaissance, deception, and other effects against enemy forces and air defense systems. These activities include the use of airborne, space-borne, and ground (e.g., human intelligence) assets.

(Source: Dr. Abdullah Toukan and Counterair Operations USAF AFDD 2-1.1 October 1, 2008)

Unmanned Aircraft Systems (UAS):

UAS may be used in counterair operations to provide ISR, deception, jamming, harassment, or destruction of enemy forces and air defense systems. These systems may be preprogrammed or remotely piloted. They provide valuable intelligence to friendly forces and may now be used to attack some targets either too dangerous or risky for manned aircraft or where manned aircraft are not present or available to respond. They may also be used to help provide persistent air presence over enemy forces in situations where this may have important psychological effects upon an adversary (as part of OCA or other operations) if synergistically tasked to help provide persistent presence over adversary forces.

Special Operations Forces (SOF):

SOF can conduct direct action missions, special reconnaissance, and provide terminal guidance for attacks against valuable enemy targets. Planners in the AOC coordinate with the special operations liaison element to coordinate the use of special operations assets in support of the counterair mission.

C2 Systems:

These systems enhance OCA operations by providing early warning, intelligence, identification, and targeting data, as well as C2 of friendly forces.

(Source: Dr. Abdullah Toukan and Counterair Operations USAF AFDD 2-1.1 October 1, 2008)

Israeli Preventive Strikes

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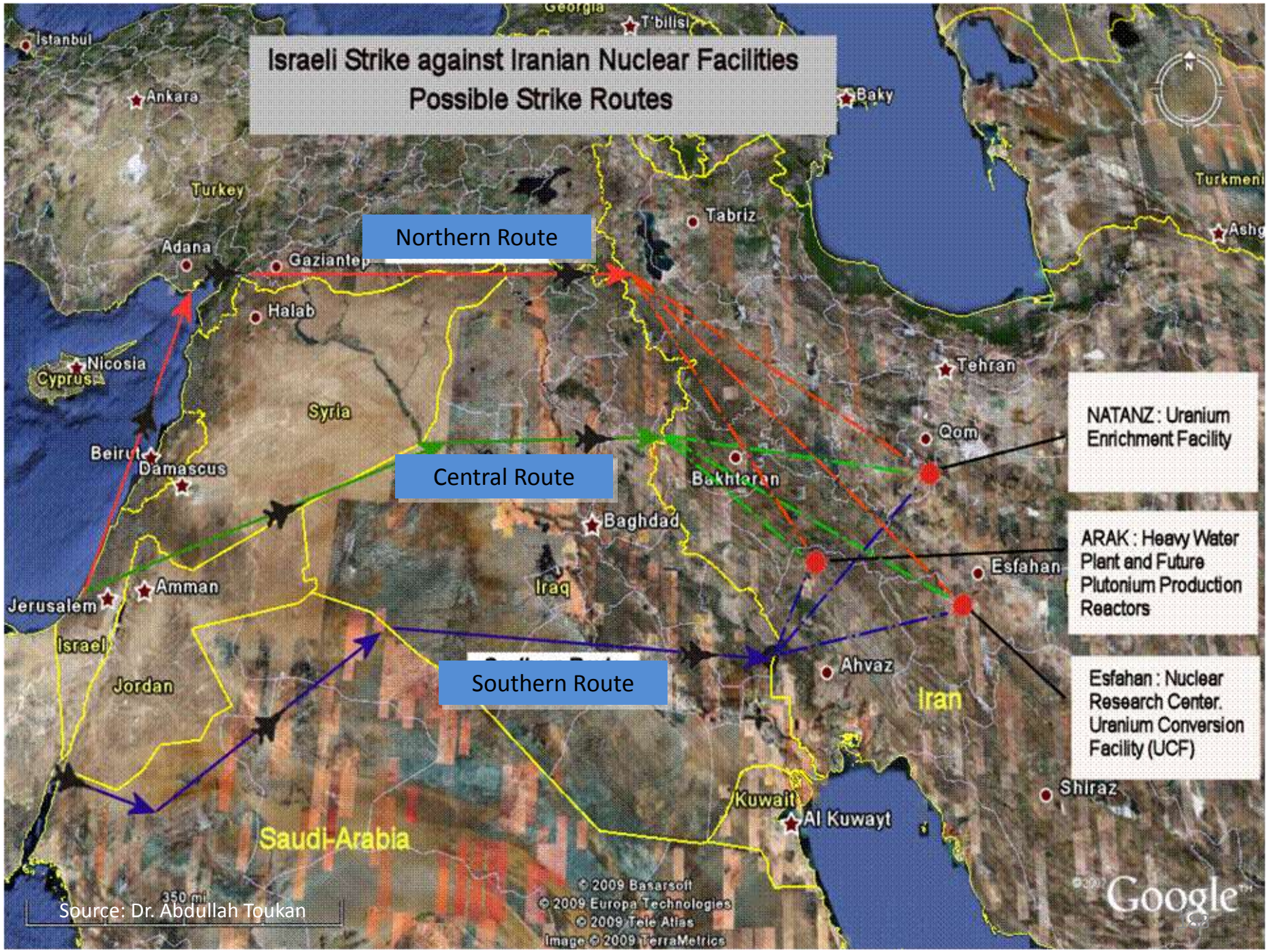
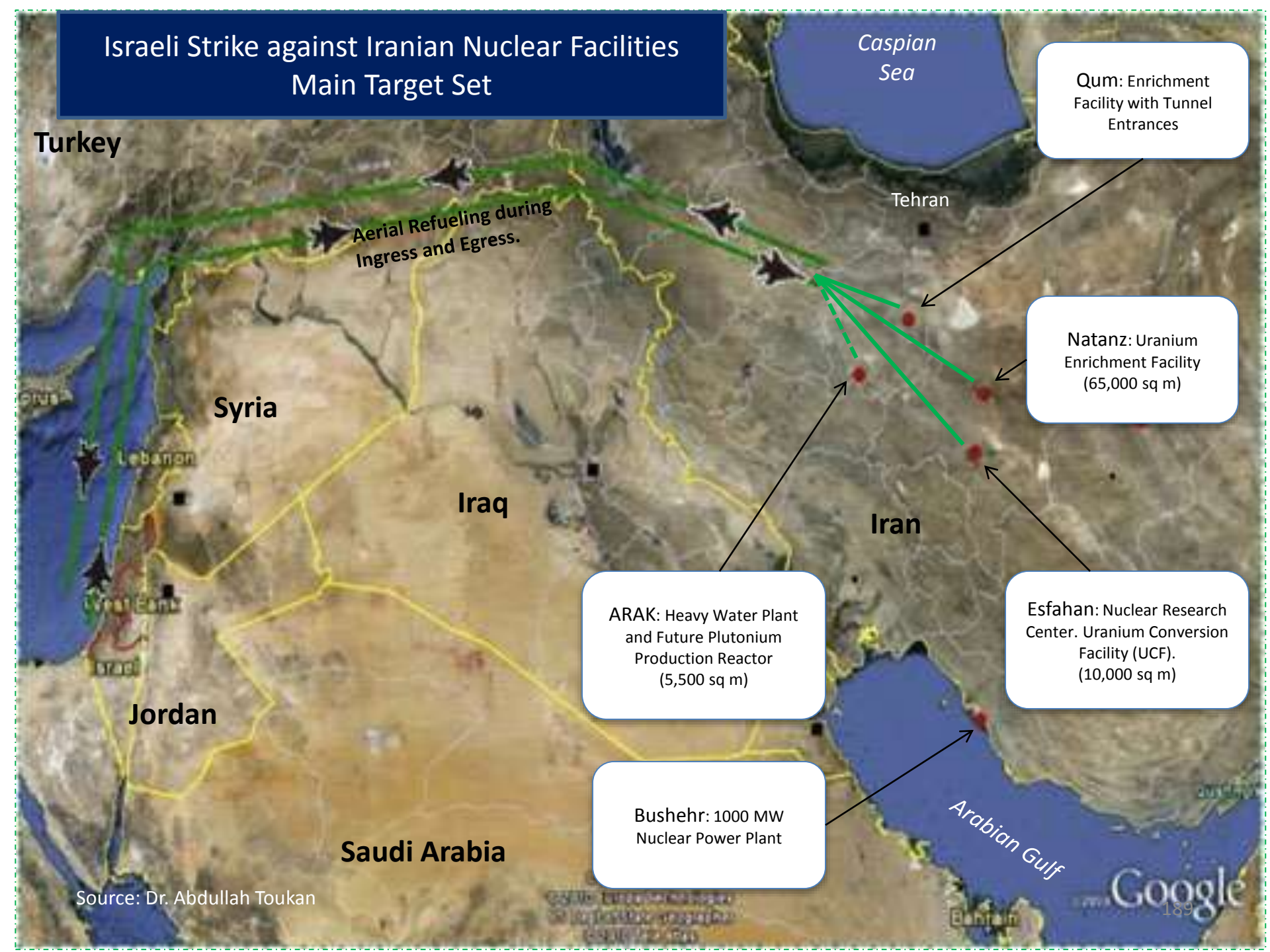
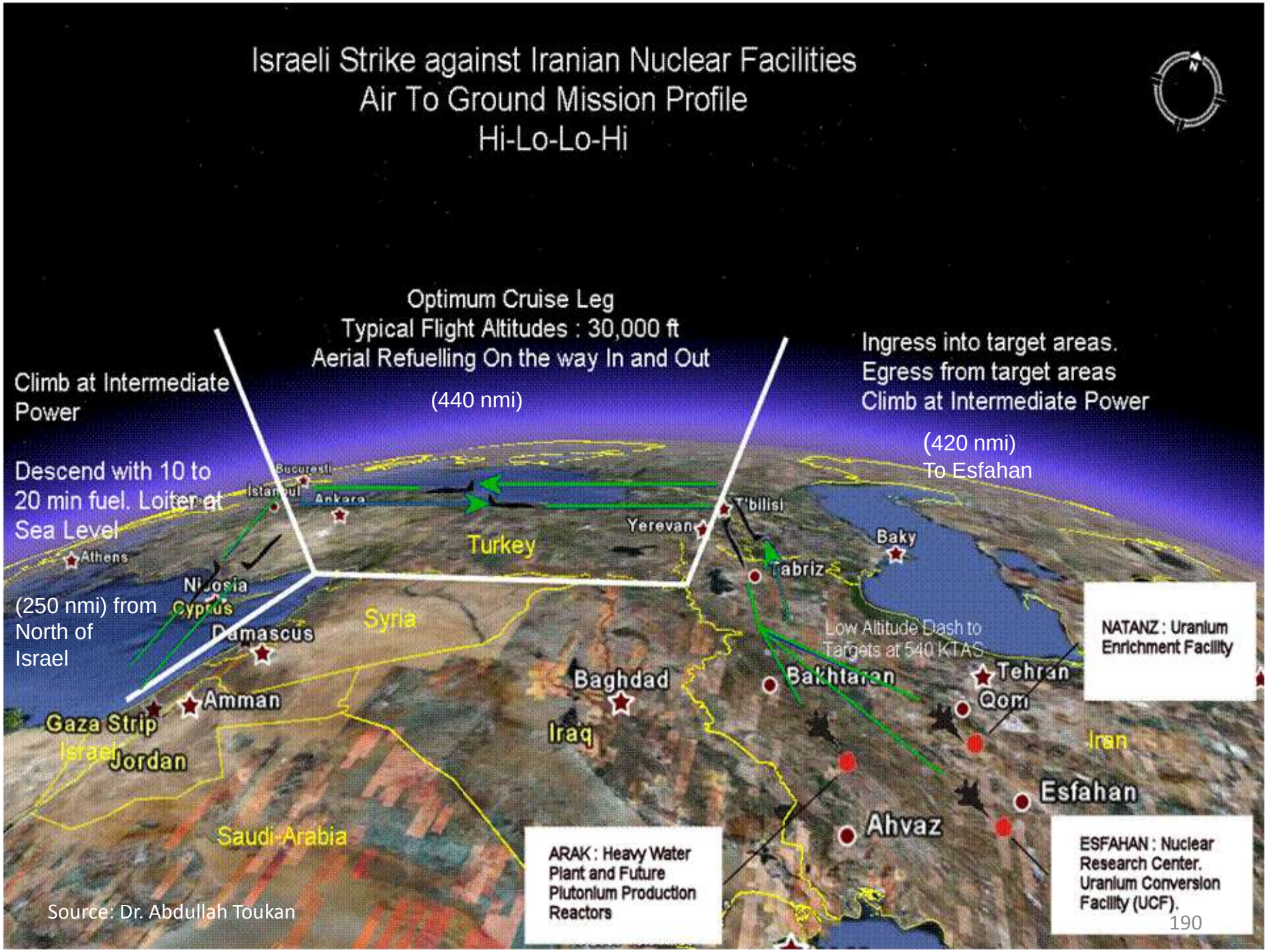
Key Issues

- **Estimate of damage can in inflict and Iranian ability to recover.**
- **Real world Israeli perceptions of intelligence, targeting capability, battle damage, strike capability, and losses.**
- **Estimate of impact on US support, potential impact as "trigger force."**
- **Estimate of arms control negotiations, US willingness to conduct preventive strikes, US-GCC containment, US extended deterrence options.**
- **Israel views of Iran risk tolerance, extent to which Israel vs. Iran's neighbors is real rationale for Iranian build up.**
- **Value in letting Iran commit resources to maximum before striking.**
- **Assessment of US, Arab, Turkish, international political reactions.**
- **Assessment of near, mid, and long-term Iranian reactions.**
- **Assessment of impact of Iranian nuclear weapons on Israeli-Iranian nuclear arms race, regional, proliferation.**

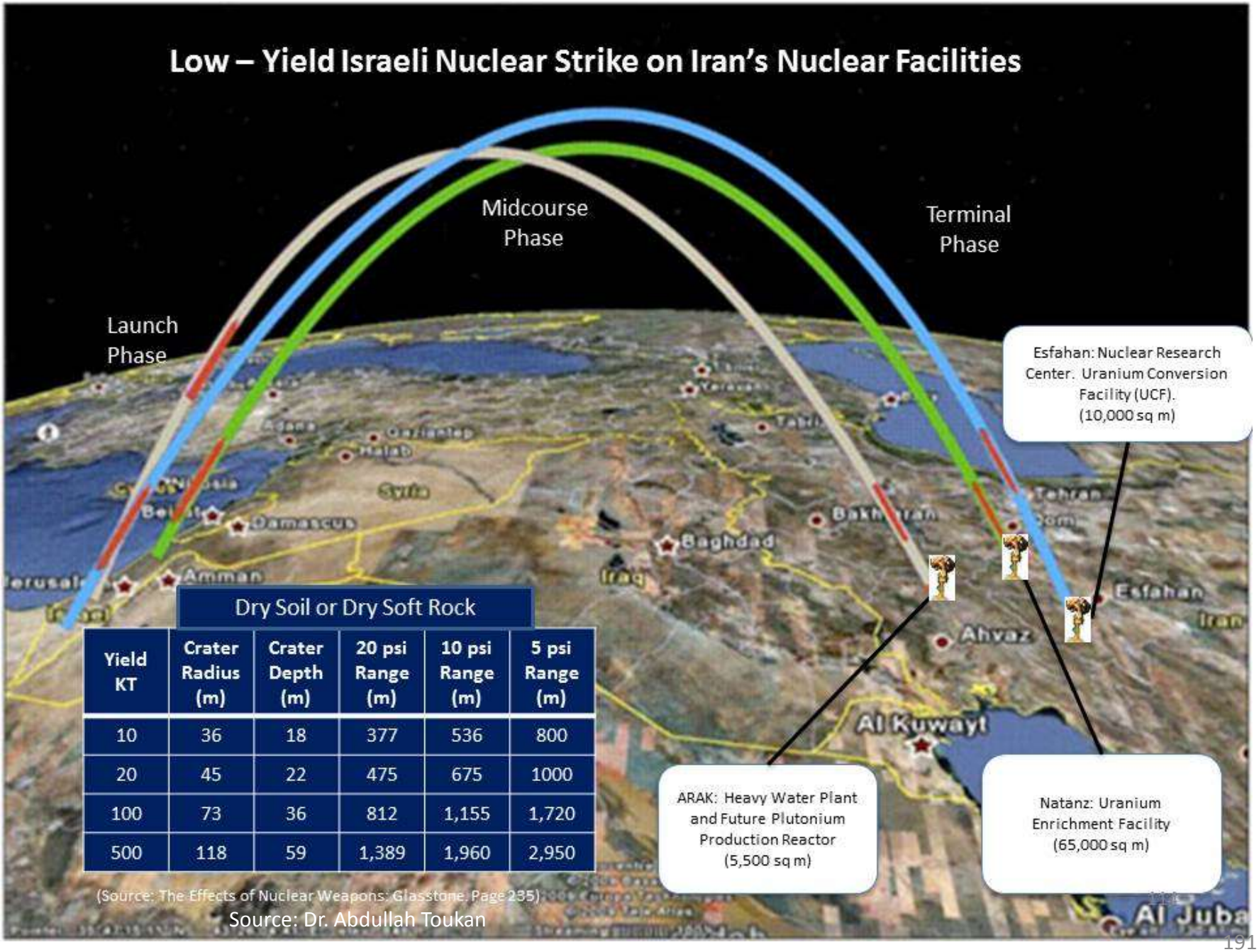


Source: Dr. Abdullah Toukan


Israeli Strike against Iranian Nuclear Facilities
Main Target Set
Caspian Sea
Turkey
Tehran
Aerial Refueling during Ingress and Egress.
Qum: Enrichment Facility with Tunnel Entrances
Natanz: Uranium Enrichment Facility (65,000 sq m)
Syria
Lebanon
Iraq
Iran
ARAK: Heavy Water Plant and Future Plutonium Production Reactor (5,500 sq m)
Esfahan: Nuclear Research Center. Uranium Conversion Facility (UCF). (10,000 sq m)
Jordan
Bushehr: 1000 MW Nuclear Power Plant
Arabian Gulf
Saudi Arabia
Source: Dr. Abdullah Toukan
Google


Israeli Strike against Iranian Nuclear Facilities
Air To Ground Mission Profile
Hi-Lo-Lo-Hi
Optimum Cruise Leg
Typical Flight Altitudes : 30,000 ft
Aerial Refuelling On the way In and Out
(440 nmi)
Climb at Intermediate Power
Descend with 10 to 20 min fuel. Loiter at Sea Level
(250 nmi) from North of Israel
Ingress into target areas.
Egress from target areas
Climb at Intermediate Power
(420 nmi)
To Esfahan
Bucuresti
Istanbul
Ankara
Turkey
Yerevan
T'bilisi
Baky
Tabriz
Athens
Nicosia
Cyprus
Syria
Damascus
Low Altitude Dash to Targets at 540 KTAS
NATANZ : Uranium Enrichment Facility
Baghdad
Bakhtaran
Tehran
Qom
Amman
Gaza Strip
Israel
Jordan
Iraq
Iran
Esfahan
Ahvaz
Saudi-Arabia
ARAK : Heavy Water Plant and Future Plutonium Production Reactors
ESFAHAN : Nuclear Research Center. Uranium Conversion Facility (UCF).
Source: Dr. Abdullah Toukan

Low – Yield Israeli Nuclear Strike on Iran's Nuclear Facilities



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)

Source: Dr. Abdullah Toukan

Low Yield Earth Penetrating Nuclear Weapons

• Another scenario is using these warheads as a substitute for conventional weapons to attack deeply buried nuclear facilities in Iran. Some believe that nuclear weapons are the only weapons that can destroy targets deep underground or in tunnels.

• The gun-type Uranium based nuclear bomb dropped on Hiroshima by the U.S. in August of 1945 was about 8,000 pounds in weight, and contained about 60 kg of weapons grade Highly Enriched Uranium (HEU), of which about 0.7 kg underwent fission producing a Yield of 12.5 ķilotons. The Plutonium implosion bomb dropped on Negasaki weighed about 10,800 pounds and contained about 6.4 kg of weapons-grade Plutonium PU-239. Producing a yield of 22 kilotons. in the subsequent years the U.S. was able to produce Plutonium-implosion nuclear bombs in the same yield range with weights down to 2,000 lbs and less.

• If Ballistic Missiles are used to carry out the mission, Israel has have a Ballistic Missile Defense System whereas Iran does not have one, such as the Russian S-300PMU2 “Favorit”, that was designed to intercept ballistic missiles as well as combat aircraft.

Source: Dr. Abdullah Toukan