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As the only sea passage from the Persian Gulf to the open sea, the Strait of Hormuz is the world's most important hydrocarbon chokepoint, accounting for almost 40 percent of global energy transport.

For decades, the Strait of Hormuz has been a flashpoint between the US-backed Gulf Cooperation Council (GCC) and the Islamic Republic of Iran. The two camps are engaged in several proxy wars in Yemen, Iraq and Syria.

While Iran has repeatedly threatened to close the Strait of Hormuz in the past, recent attacks in the adjacent waters have heightened fears of an Iranian blockade. Although the likelihood of armed conflict in the region remains low, the impact of hostilities are far too serious to ignore.

In case of conflict, the Iranian Revolutionary Guard would likely mine the Strait of Hormuz and conduct sea interdiction operations in order to disrupt commercial activities. Iranian forces would likely turn the Persian Gulf into an anti-ship engagement zone and launch out of area operations in the Arabian Sea.

An armed closure of the Hormuz Strait would cause a serious disruption of maritime shipping operations, causing energy and insurance prices to skyrocket. Seafarers in the region would run in danger of being caught in the crossfire or deliberately harassed by hostile forces.

In case of conflict, commercial operators should subscribe to high-end threat intelligence services that can provide early warning and timely risk assessments.

Ship-hardening measures and increased maritime situational awareness can also add tactical value in geopolitical high-risk areas.





Why is the Strait of Hormuz Important?

The Strait of Hormuz is the only sea passage from the enclosed Persian Gulf to the open sea. The strait separates Iran in the North from the United Arab Emirates (UAE) and the Omani exclave of Musandam in the South. With a length of 90 miles and a width of 20-30 miles the strait is relatively spacious, but shipping lanes are narrow and exposed to security risks.

The internationally recognized Traffic Separation Scheme (TSS) establishes three shipping lanes with a width of 2 miles each (one for incoming traffic, one for outgoing traffic, and one buffer lane)¹.

This tight passageway is the world's most important hydrocarbon chokepoint. According to the U.S. Navy Office of Intelligence, 15 percent of the global seaborne trade volume passes through the strait annually². This includes:

- Oil: 20.5 million barrels per day (34-38 percent of global crude exports);
- Natural gas: 3.1 million barrels per day (33 percent of the global liquefied natural gas/LNG market and 45 percent of the liquefied petroleum gas/LPG market);
- Container Trade: Over 10 million twenty-foot equivalent units (TEU), worth roughly \$230 billion (7 percent of containerized volume).

The main oil exporters in the region are the local Arab Sunni monarchies of the Gulf Cooperation Council/GCC (Bahrain, Kingdom of Saudi Arabia/KSA, Kuwait, UAE and Qatar), Iraq and Iran. All oil exports from Kuwait, Iran, Qatar and Bahrain, approximately 90% of exports from Saudi Arabia and Iraq, and 75 percent of exports from the UAE pass through the Strait of Hormuz³. Approximately 80 percent of these supplies are destined for Asian markets (China, Japan, India, South Korea and Singapore).

Deteriorating Regional Security

For decades, the Strait of Hormuz has been a flashpoint between the GCC and Iran. Most military engagements between the two camps have been conducted by proxy and are confined to mainland battlefields.

In Yemen, the KSA and UAE have been spearheading a four-year long military campaign against the Iranian-backed al-Houthi Shi'a militia, which has seized the capital and the majority of the country. While the Arab Coalition has since re-captured all of Yemen's major ports (Hodeidah, Aden, Mukalla), the Houthi militia remains a potent threat to maritime security in the Red Sea.

Using Iranian-made unmanned aerial vehicles (UAV) the Houthis have furthermore attacked Saudi pipelines and airports. Besides Yemen, proxy forces backed by the GCC and Iran are fighting each other in Syria and Iraq.

At the same time, the United States is leading a "maximum pressure" campaign against Iran, in order to force Tehran to cease its material and military support for foreign terrorist organizations and renegotiate the Iran nuclear deal. In November 2018, the Trump administration re-imposed sanctions on Iranian oil exports.

In May 2019, the White House revoked the remaining import waivers for eight countries, including China and India. In consequence, Iranian oil exports dropped from 2.5 million barrels per day to 1 million barrels per day.





The aim of the US sanctions is to drive Iran's hydrocarbon exports to zero and deprive the Iranian economy of \$50 billion in oil revenue annually.

Oil exports account for 62 percent of the Iranian government's annual income⁴.

The UAE and KSA are expected to compensate for the supply gap in the international markets. In retaliation, Tehran has threatened to close the Strait of Hormuz.

While Iran has made such threats in the past, recent military developments have added unprecedented credibility to these claims.

Citing undisclosed intelligence about an imminent Iranian attack, the U.S. has dispatched the USS Abraham Lincoln carrier strike group (CVN-72) and a B-52H bomber task force to the Middle East.

After decades of American aircraft carriers sailing through the Strait of Hormuz, the U.S. Navy did however make the decision to keep the CVN-72 in open waters for security reasons⁵.

Washington has also reviewed contingency plans that call for deploying up to 120,000 troops to the Persian Gulf, should Iran attack local forces/allies or restart its nuclear weapons program⁶.

Days after the posture review, four oil tankers (two Saudi, one Emirati and one Norwegian), which docked in the Emirati port of Fujairah just outside of the Hormuz Strait, were sabotaged by unknown perpetrators⁷.

A fourth attack was reportedly thwarted in the Saudi port of Yanbu. The UAE-led investigation has found that an unnamed "state actor" employed frogmen on fast-moving boats to breach the hull of the vessels with limpet charges.

While the U.S. government has directly accused the Iranian Revolutionary Guards Corps (IRGC), Tehran claims that the Fujairah attacks were a false-flag operation.

A week after the Fujairah incidents, two tankers in the Gulf of Oman were attacked with anti-ship weaponry (likely seaborn missiles or magnetic-mines).

The Marshall-Island-flagged "Front Altair" and Panamaflagged "Kokuka Courageous" were carrying petro-chemical cargo loaded in Emirati and Saudi ports and destined for ports in the Far East.

The attack took place 27 miles off the Iranian coast in the TSS area. The US Navy has since released a video, filmed by a P-8 maritime security aircraft, which allegedly shows an Iranian naval unit removing an unexploded limpet charge from the "Kokuka Courageous," likely in an attempt to destroy evidence8. The U.S. and the United Kingdom have formally accused Iran of staging the attack.

Fearing an Iranian blockade of the Hormuz Strait, the Saudi and Emirati coast guards and navies are working closely with the U.S. Fifth Fleet and amphibious ready groups to keep the shipping lines open.

> In the wake of the attack, the United Kingdom has also drawn up plans to deploy a theater security package, consisting of Royal Marines and warships9.

Growina Iranian Naval Threat

After the 1979 Islamic Revolution, Iran's Supreme Leader Ayatollah Khomeini issued a decree to establish a new military force in parallel with the regular service,

tasked with safeguarding the revolution.

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Since then, the Iranian Revolutionary Guards Corps (IRGC) has evolved well beyond an ideological watchdog and is now responsible for the regime's most ambitious projects (ballistic missile technology, nuclear program, unmanned aerial vehicles) and sensitive operations abroad (Syria, Iraq, Yemen, Lebanon)¹⁰.

The IRGC is also tasked with the oppression of the political opposition as well as targeted assassinations of Iranian dissidents in Europe¹¹.

Acting as a hybrid military force, the IRGC consists of five branches: The land force, navy (IRGC-N), aerospace force (IRGC-Aerospace Force), popular mobilization militia (the Basij), and external operations (al-Quds; Arabic name for "Jerusalem"). The IRGC reports directly to the Ayatollah and often bypasses governmental institutions.

^{//}www.telegraph.co.uk/news/2019/06/15/warnings-return-tanker-wars-iran-blamed-gulf-attacks/ //www.cfr.org/backgrounder/irans-revolutionary-guards //www.neveurpe.eu/article/eu-imposes-sanctions-on-iran-over-assassination-attempts/



The IRGC-N is responsible for Iran's closest and most strategic waterways, the Persian Gulf while the regular Iranian Navy (IRIN) is tasked with protecting the Gulf of Oman, the Caspian Sea, and the Arabian Sea. The IRGC-N and IRIN share responsibility over the Strait of Hormuz. The operational headquarters and nearly 90 percent of IRGC-N/IRIN bases are located on Iran's southern seaboard and offshore islands.

With its 1,100-mile coastline, controlling the Persian Gulf, the Strait of Hormuz and the Gulf of Oman has always been a pillar of Iran's security strategy. In recent years, the IRGC-N and IRIN have repeatedly rehearsed force integration for joint sea interdiction

and strait blockade operations.



The IRGC Navy sinks a mockup of a US Nimitz-class aircraft carrier during exercise Noble Prophet IX.

Iran has also developed anti-access and area denial (A2AD) capabilities and has deployed increasingly sophisticated weapons systems to offset its regional rivals.

While both Iran's growing stockpile of ballistic missiles and comprehensive network of allied militias in the region pose credible threats, Tehran's naval forces are no match for the vastly superior US military.

To compensate for this shortfall, Iran is focusing on developing robust asymmetric warfare capacities. Iran's "maritime guerilla warfare" builds on the ability to "swarm" large enemy assets and formations¹².

To this end, Iran is leveraging its expanding fleet of fast moving small boats and large number of anti-ship missiles, coastal defense artillery systems, naval mines and small diesel submarines, which can be used rapidly intercept and kinetically overwhelm adversarial targets.

IRGC-N vessels have repeatedly simulated high-speed intercepts and approaches on live targets and are regularly harassing

adversarial navies in the Strait of Hormuz.

With the recent attacks on civilian vessels, Iran is showcasing that it does not only have the geographical advantage, but also the political will to close the strait in case of conflict.

While neither Iran nor its adversaries have a direct interest to go to war, uncontrolled escalation can easily trigger a limited armed conflict.

Incidents and miscalculations can rapidly escalate in a region fraught with geopolitical tensions.





Given the rapidly deteriorating security environment in the region, the busy maritime traffic in the Strait of Hormuz and the Persian Gulf is at increasing risk. While the likelihood of an armed conflict in the region remains LOW, the impact of such an improbable development would be far too serious to ignore.

An armed closure of the Hormuz Strait can only be described as a global trade nightmare. Maritime shipping operations would be interrupted on a large scale. Energy and insurance prices would likely skyrocket.

Seafarers would run in danger of being caught in the crossfire or deliberately harassed by hostile forces, with little to no options to defend themselves.

Drawing on historical precedents and open-source intelligence on military capabilities deployed in the region, the following section envisions the worst case, namely an Iranian blockade and sea interdiction operations in the Strait of Hormuz.

In particular, this assessment shows how commercial shipping operations would be affected and which risk mitigation measures can be taken during wartime. While hypothetical by nature, this thought experiment can reduce uncertainty and provide industry stakeholders with critical early-warning indicators.

Strait Blockade and Sea Interdiction

In case of conflict, the geography of the Persian Gulf significantly favors Iran. The IRIN and IRGC-N operate more than 10 major air-naval installations and station more than 40,000 active personnel on Iran's southern coast. The IRGC-N's heavily fortified operational headquarters is located in Bandar Abbas on the northern shore of the Hormuz Strait.

The IRGC-N's Fifth Naval District is located west of the strait, while the IRIN's Second Naval District overlooks the East. The heavily fortified Qeshm, Hormuz, Larak and Hengam islands sit nestled between the three major naval conglomerates.

In the unlikely event of a strait blockade, Iran will use its coastline and offshore installations to transform the Strait of Hormuz area of operations (AO) into a "no-man's land" (or rather "no-man's sea"). The IRGC would likely mine the shipping lines at the narrowest point of the strait and engage any party attempting to re-open the strait.

Mining operations would require Iran to use all delivery assets (surface, subsurface and aerial) to secretly drop thousands of magnetic, pressure, acoustic and multipurpose mines before the enemy realizes what is happening.

The IRCC might also follow the Russian example during the Strait of Kerch blockade and seek to physically obstruct the TSS passageway with the help of large oil tankers.

Faced with a strait blockade, the US would likely seek to assemble a "coalition of the willing," consisting of the United Kingdom, France, UAE, KSA, and potentially others, to re-establish freedom of navigation.

While the coalition would likely succeed in a matter of days, the IRGC has been training for decades to make sure that such an effort will come at a great cost. Some U.S. military drills, which simulated the reopening of the Strait of Hormuz, have even ended with Iran on the winning side¹³.





In addition to the maritime area of operations, the coalition's regional allies (Israel, UAE, KSA) and forces in Iraq and northeastern Syria will also come into Iran's crosshairs. The seaports and airfields in the Persian Gulf, which host coalition capabilities, will be under constant missile threat.

The U.S. land- and naval-based aerial defense systems can be expected to counter Iran's current striking technology but might be overwhelmed by saturation strikes. This type of strike will most likely be used against high-value military targets on the sea, as Iran's main operational objective would be to cripple the coalition's air-naval power in the Persian Gulf and Gulf of Oman.

Iranian missile loaded fast attack craft (FAC), fast inshore attack craft (FIAC) and midget diesel-powered submarines would police the surface and subsurface areas in proximity to the strait.

Iran operates over 40 foreign purchased (mostly Chinese and North Korean) and domestically produced FACs, armed with C802 and Iranian build Noor and Qader anti-ship cruise missiles (ASCM). Depending on the version, Iran's ASCMs (sea- and ground-launched) can engage targets at a distance of 15 to 206 miles.

While FACs can also be fitted with torpedoes, Iran's growing fleet of midget and attack submarines

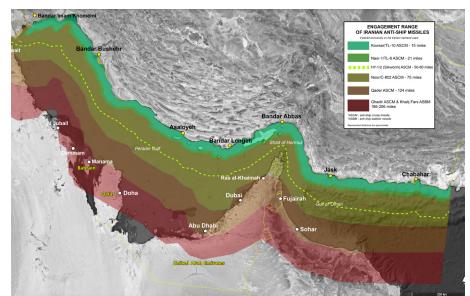
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IRANIAN DEPLOYMENTS IN THE STRAIT OF HORMUZ AREA OF OPERATIONS (HYPOTHETICAL)

represent the primary subsurface threat to maritime trade in the strait.

FIACs are the most numerous naval assets in the IRGC's inventory. Lightly armed, usually just with high-caliber machine guns and unguided rockets, they allow for maximum speed and maneuverability. Iran's latest class of FIACs, heavily inspired by the British Bladerunner-class, is claimed to be the fastest military vessels in the world. The U.S. Naval Office of Intelligence assesses that Iran's FIACs will likely be the assets used to harasses merchant ships and swarm enemy forces¹⁴.

Use of force against commercial vessels in the first hour of the operation would be key for Iran to enforce its blockade and



establish a credible deterrent against adversaries. In the meanwhile, the IRIN will preserve the few Iranian corvettes, frigates and destroyers for possible ship-to-ship confrontations later on.

In synchrony with the strait blockade, the IRGC would likely re-deploy its advanced Russian-made S-300PMU2 air defense systems to close the airspace over the Strait of Hormuz.

The S-300PMU2 can engage six aerial targets simultaneously, while tracking twelve others in a maximum range of 200 km. US-led Coalition in rapidly re-opening the shipping line.



According to our geospatial intelligence (GEOINT), Iran currently operates one long-range S-200 surface-to-air missile (SAM) system, one medium-range HQ-2 and one short-range MIM-23 Hawk in Bandar Abbas on the northern shore of the Strait of Hormuz.

While largely obsolete against advanced U.S. tactical aircraft and standoff missiles, these SAMs can threaten commercial airliners and heavy-lift aircraft. If activated, these systems could severely disrupt civil aviation in the region.

While Iran would fortify its air defenses and naval order of battle, coastal land platforms would also be put on high alert.



Anti-ship missile (AShM) launchers installed on Qeshm island and the surrounding archipelago as well as on the mainland's seashore will reinforce Iran's ship-killing capabilities.

While some AShM batteries would require forward deployment from mainland locations, our GEOINT shows that Iran has various underground bunker networks in place that potentially already host such capabilities. Land-based AShMs are truck mounted and therefore highly mobile. Using shoot-and-scoot tactics, land-based AShMs can engage enemy vessels and retreat to fortified bunkers or change positions in a matter of minutes.

Apart from transforming the Persian Gulf, the Strait of Hormuz and the Gulf of Oman into a massive engagement zone, Iran might also engage in out of area operations.

The IRIN, for example, might lay mines in the Arabian Sea and Indian Ocean, where the U.S. carrier strike groups would likely be located.

Overall, Iran would seek to limit the coalition's air superiority and delay minesweeping operations to maintain

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the strait blockade. As both sides would likely seek to avoid large scale war, emphasis would be placed on surgical operations. The coalition would likely focus on standoff air and sea cruise missile attacks on IRGC vessels, while Iran would leverage the dense commercial traffic trapped inside the Persian Gulf.



Threats to Maritime Trade

Reduction or full obstruction of commercial operations. If Iran imposes a blockade, international shipments through the Strait of Hormuz would be reduced or completely obstructed. Civil aviation would also be diverted from the region and major airports closed.

This will likely result in:

- · Surging energy prices and insurance premiums;
- financial losses for all commercial parties (importer, exporter and distributor) due to delays, cancelations and cargo loss; and
- an increasingly uncertain business environment.

The Habshan-Fujairah pipeline from the UAE to Oman as well as the East-West Saudi pipeline could replace part of the seaborne crude oil transport in the Strait of Hormuz. "An armed conflict in the Strait of

However, the two major pipelines can only account for 3.5 million barrels of oil per day (compared to the 20 million barrels transiting the Strait of Hormuz daily).

Iran has proven that it is capable and willing to stage (or let proxies stage) unmanned aerial strikes against Saudi pipelines.

Forbes estimates that a 10 percent cut in global oil supply would trigger a price increase of 250 percent¹⁵. With current oil prices at \$52 per barrel this would result in a \$130 price hike, catapulting oil to \$182 per barrel. Some pessimistic analysts predict that oil could easily spike to \$250 per barrel¹⁶.

While in case of a strait blockade the U.S. and other countries would likely release their strategic oil reserves on the market, these reserves are limited, and the market is already strained due to the lack of supplies from Venezuela and Libya.

The impact on the international oil and gas markets will ultimately depend on factors such as the extent of the blockade (full/partial), the duration of hostilities, and potential damage to production and export facilities in the Persian Gulf.

Overall, the Strauss Center estimates that Iran only needs to block 4 to 6 million barrels of oil per day for several weeks to throw the global oil markets into panic¹⁷.

To reach this number, it would be enough to prevent the passage of two or three Very Large Crude Carriers/ VLCCs (each of which can charter around 2 million barrels of oil).

While some oil supplies can be diverted via land-routes, the existing pipeline capacity can only replace a fraction of maritime transports.

The pipeline infrastructure in the KSA and UAE (including oil terminals) is furthermore critically exposed to UAV attacks from Yemen, as seen in the past.

An armed conflict in the Strait of Hormuz would also make itself felt in the insurance market, as charters would be

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required to purchase war risk premiums. Following the U.S. invasion of Iraq in 2003, insurance premiums for the Persian Gulf area spiked by 3.5 percent¹⁸.

During the Iran-Iraq tanker war, the insurance market was highly volatile, with premiums temporarily skyrocketing after successful attacks on merchant vessels.

Insurance claims reached the considerable mark of \$2 billion by the end of the war, half of which were underwritten by Lloyds of London.

It is safe to assume that an outright military blockade of the world's most important energy transit point would cause premiums to surge by at least 5 percent.

Estimates indicate that even a 2 percent increase in insurance premiums would have significant consequences for shipping enterprises.

A VLCC chartering \$100 million worth of oil, for example, would have to pay an additional \$2 million. The increased insurance costs would lead to an additional \$1-increase in oil prices¹⁹.

Just one week after the attacks in the Gulf of Oman, the maritime security industry has already seen a 12 percent rise in the requests for armed personnel.

^{6 -} https://www.businessinsider.com/oil-price-250-a-barrel-iran-closes-strait-of-hormoz-2 7 - https://www.strausscenter.org/hormuz/frequently-asked-questions.html

^{17 -} https://www.strausscenter.org/normuz/frequentiy-asked-ques 18 - https://www.strausscenter.org/hormuz/insurance-market.htm



Industry experts expect to see the number of private contractors on board cargo vessels rise by more than 25 percent²⁰. The fare for armed protection will likely increase, as the threat posed by the IRGC is significantly greater than the threat of piracy attacks.

Beyond the increased costs for security measures, maritime shipping companies would also face thousands of additional dollars in operating costs per day.

If the Strait of Hormuz is blocked, vessels would be forced to anchor in the international shipping lane or conduct a port call in a safe location, requiring them to burn extra fuel for an indefinite amount of time.

Harassment or attack of seafarers. During a strait blockade and sea interdiction operation, commercial operators and their personnel will be at high risk.

Seafarers of the conflict parties (e.g. tankers shipping Saudi or Emirati oil) will be at a particularly high risk of being boarded and attacked. Iran has targeted commercial vessels in the past. During the war with Iraq in the 1980s, Iran attacked hundreds of tankers carrying Iraqi, Kuwaiti, Saudi and Emirati oil as part of an economic warfare campaign.

Even dock-trapped commercial vessels in the region are still within reach of Iranian anti-ship missiles or sabotage operations.

In contrast, actors allied or associated with Iran, such as Chinese, Russian and possibly Qatari vessels, will receive preferable treatment. Vessels smuggling black market Iranian oil will be allowed to pass through the strait. Collateral Damage. Seafarers will also face a high risk of accidental attacks during a military crisis in the Strait of Hormuz and adjacent waters.

Rudimental anti-ship missiles and torpedoes such as the ones operated by Iran have poor targeting technology and cannot change course.

With unsophisticated search and track technology, Iran could misidentify commercial ships as enemy targets and attack them.

Commercial vessels might accidentally hit a mine (acoustic, magnetic, pressure). This is a periodic occurrence even today, given the high number of unrecovered mines dating from the Iran-Iraq war.

Spillover. As conflicts rarely remain contained in just one geographical area, adjacent waters might turn into subtheaters of the conflict.

The entire Persian Gulf would become a high-risk area.

Out of area operations of the Iranian navies might extend the mine threat to the Arabian Sea and Indian Ocean.

An Iranian seizure of the Strait of Hormuz might encourage its allied forces in Yemen, the al-Houthi militia, to intensify attacks on the maritime traffic in the Red Sea and Bab el-Mandeb strait.

ARX SOLUTIONS

Commercial operators should subscribe to high-end threat intelligence services that can provide early warning and timely risk assessments, when the security environment is rapidly deteriorating. Avoiding active battlegrounds is imperative for safeguarding distribution assets, cargo and human life.

Should avoidance be impossible, ships can take passive countermeasures to mitigate risk and losses. Towed radar deflecting decoys, for example, have been successfully used by commercial operators to evade active-radar guided missiles during the Iraq-Iran war. Ship hardening measures, such as anti-boarding barriers can deter and ultimately stop hostile forces from seizing a vessel. Seafarers should remain alert and constantly surveil the waters within visual range for possible threats or suspicious approaches.

Vessels should keep in close communications with military authorities, such as the UK Maritime Trade Operations (MTO) and the US Fifth Fleet when active in the high-risk area and issue distress calls as soon they come under attack. Seafarers should also take advantage of the Voluntary Reporting Area (VRA) and provide their position for improved maritime situational awareness. In case of a conflict, oil tankers could potentially receive military escorts.

