Iran's Ballistic Missile Program

Updated: June 2023

UNITED AGAINST NUCLEAR IRAN

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Iran's Ballistic Missile Program

Since the signing of the Joint Comprehensive Plan of Action (JCPOA) nuclear deal, Tehran's ballistic missile program continues to pose a serious threat to the United States, its allies, and its strategic interests in the Middle East. Iran has test-fired more than 30 nuclear-capable ballistic missiles since July 2015, despite a U.N. Security Council resolution, approved along with the nuclear accord, which explicitly calls on Iran to refrain from such activity. Iran has shown no signs of slowing the development of its ballistic missile program, which is inextricably intertwined with its nuclear program. In fact, long-range ballistic missiles have historically always been developed in unison a nuclear weapons program. Iran has invested heavily in its missile and space programs and is making every effort to make them more efficient and operational.

Nature of Iran's Ballistic Missile Program

Iran has been developing ballistic missile capabilities based on Russian, North Korean, and Chinese technology or weapons systems since the early 1980s. During its prolonged war against Iraq in the 1980s, Iran reportedly launched more than 600 ballistic missiles. According to the 2016 Worldwide Threat Assessment of the U.S. Intelligence Community, Iran's ballistic missiles are inherently capable of delivering weapons of mass destruction. The U.S. government has also noted that "Iran has the largest and most diverse ballistic missile arsenal in the Middle East." According to an April 2021 report by the International Institute for Strategic Studies, "Iran has between six and eight liquid-fuel ballistic missiles and up to 12 solid-fuel systems, depending on how different variants of systems are counted. It is estimated to have up to 100 road-mobile launchers for short-range ballistic missiles (SRBMs), perhaps 50 launchers for medium-range ballistic missiles (MRBMs), and well over 1,000 associated missiles."

A November 2019 U.S. Defense Intelligence Agency (DIA) report entitled "Iran Military Power" found that Iran's ballistic missile program is an important plank of Iran's hybrid approach to warfare that helps it overcome shortcomings in its conventional forces, as it is militarily outspent by its adversaries and hampered in its procurement efforts by international sanctions. According to the DIA report, "Lacking a modern air force, Iran has embraced ballistic missiles as a long-range strike capability to dissuade its adversaries in the region—particularly the United States, Israel, and Saudi Arabia—from attacking Iran. Iran can launch salvos of missiles against large area targets, such as military bases and population centers, throughout the region to inflict damage, complicate adversary military operations, and weaken enemy morale."

Ballistic missiles, along with partnerships with regional proxy militias and terrorist organizations, and increasing investments in cyber and drone warfare capabilities, provide Iran a cost-effective means of deterring its enemies and attaining leverage over other regional players. Increasingly precise ballistic missiles give Iran a potent tool to threaten or attack enemies massing military forces in surrounding environs, such as Iraq and Syria. Iran has also sought to destroy simulated enemy ships at sea in military exercises, signaling a danger to the U.S. naval presence in the region. Because of their utility in both punishing and deterring adversaries, Iran continues to invest in improving its ballistic missile arsenal's range, accuracy, and lethality in defiance of U.N. Security Council Resolution 2231.

Iran's Ballistic Missiles and Iran's Nuclear Program

Ballistic missiles are a critical component of all nuclear weapons-having countries' arsenals. A deliverable nuclear weapon requires three components: enriched fissile material (uranium in Iran's case), a delivery

vehicle (usually some sort of missile—whether fired from land, sea or air), and a warhead that integrates the two. For this reason, ballistic missiles cannot be separated from the nuclear issue because they are the primary launch platform for any nuclear, chemical or biological warhead. Therefore, all countries that have developed or sought nuclear weapons also developed long-range ballistic missiles. It is clear that the only reason for Iran to have advanced ballistic missiles is to deliver a nuclear bomb, "no other weapon justifies the cost of developing a missile."

Speaking to the Senate Select Committee on Intelligence in 2011, Director of National Intelligence James Clapper made clear that "ballistic missiles would be Iran's likely preferred method of delivering nuclear weapons..." The Nuclear Threat Initiative has concluded that "Tehran indisputably possess formidable weapons delivery capability, and its ongoing missile program poses serious challenges to regional stability." According to the International Atomic Energy Agency (IAEA), in the early 2000s, when Iran was known to have conducted nuclear weapon design and weaponization work, Iran studied how to integrate a nuclear payload into the reentry vehicle of a Shahab-3 ballistic missile.

North Korean Assistance

Iran's nuclear and ballistic missile program has long depended on external assistance from other states, particularly North Korea (formally known as the Democratic People's Republic of Korea, or DPRK). The DPRK has been instrumental in the development of Iran's ballistic missile program, with Iran-DPRK missile cooperation dating back to the 1980s.

Iran first began acquiring ballistic missiles from the DPRK in the late 1980s and early 1990s, when it was purchasing 300km-range Scud-Bs (Shahab-1) and 500km-range Scud-Cs (Shahab-2). In 1993, the U.S. intelligence community warned that Iran, "one of North Korea's best customers for ballistic missiles and related technology..."

A February 2010 American intelligence cable from February 2010 concluded Iran had obtained from North Korea a cache of 19 advanced BM-25 missiles, which possess a range of up to 2,000 miles. According to reports, the BM-25 "could carry a nuclear warhead," giving Iran "for the first time…the capacity to strike at capitals in Western Europe or easily reach Moscow."

Iran and the DPRK signed a "Civilian Scientific and Technological Cooperation Agreement" in September 2012. The accord provides a means for both countries to dodge U.N. and U.S. sanctions on "missile proliferation activities." Under the agreement, "when one side masters or acquires a key missile-related technology, the other now institutionally benefits."

Since the JCPOA, Iran has test-launched several ballistic missiles that are variants of the North Korean Nodong and BM-25, showing that Iran continues to improve upon and advance missiles based on technology initially provided by North Korea.

Technology and knowledge flow both ways between Iran and the DPRK. Many recent North Korean ballistic missile tests have featured precision technology developed by Iran. According to Israeli defense analyst Tal Inbar, "Iran purchased North Korea's technical know-how on ballistic missile production, upgraded the DPRK missiles' forward section, and distributed these advancements back to North Korea. The similarities between North Korean missiles launched during recent tests and Iranian technology suggest that Iran is a possible contributor to North Korea's nuclear buildup, rather than a mere

transactional partner."

For additional information, see the UANI report, "Partners in Proliferation: Nuclear and Ballistic Missile Trade Between North Korea and Iran."

Chinese Assistance

China's support for Iran's ballistic missile program may reach back to the beginning of Iran's ballistic missile program in the mid-1980s. In fact, during the Iran-Iraq War (1980-1988), China was one of the few countries that provided Iran with lethal aid and military equipment. Iran began to import solid-propellant production equipment and technology from China in the 1990s. At this time, Iran did not import complete solid-propellant missiles, but it was able to procure sensitive materials for domestic production.

More recently, China has continued to provide Iran with materials it needs to develop ballistic missiles indigenously, violating U.N. Security Council Resolution 2231, which requires U.N. Security Council approval of Iran's imports of materials that could contribute to the development of ballistic missiles. UNSCR 2231 expires in October 2023. In 2017, Chinese tech firms sold U.S.-designated Iranian company Shiraz Electronics Industries millions of dollars-worth of satellite positioning, navigation, and timing equipment. In 2021, Iran was granted further access to Chinese satellite navigation systems for military purposes. In March 2022, the U.S. Department of the Treasury revealed that Iran procured machines to process nitrile butadiene rubber and an inert gas jet milling system used for making solid propellant from Chinese suppliers.

In June 2023, the U.S. Department of the Treasury designated a procurement network of individuals and entities in China, Hong Kong, and Iran, which facilitated transactions on behalf of key players in Iran's military industrial base, including subsidiaries of the Ministry of Defense and Armed Forces Logistics (MODAFL). These actors, including Parchin Chemicals Industries (PCI), Aerospace Industries Organization (AIO), Iran Electronics Industries (IEI), and P.B. Sadr, allegedly imported sensitive materials from China, such as centrifuges and associated equipment and services; dual-use, nonferrous metals; and electronics, modules for radars, gyroscopes, and accelerometers. Iran's Defense Attaché in Beijing, Davoud Damghani, coordinated the transactions, and thus he was also designated pursuant to E.O. 13382.

Iran's Ballistic Missiles and the JCPOA

The terms of the JCPOA and the accompanying U.N. resolution maintain limitations on Iran's ballistic missile program. The extension of the arms embargo and missile ban came in U.N. Security Council Resolution 2231 that was unanimously adopted on July 20, 2015.

The resolution endorses the nuclear deal and implements certain aspects of the agreement, but it contains much weaker language than the language in six previous Security Council resolutions that it replaced. According to the text of the resolution, Iran is "called upon not to undertake any activity related to ballistic missiles designed to be capable of delivering nuclear weapons, including launches using such ballistic missile technology." The previous U.N. resolutions had stated that "Iran shall not undertake any activity related to ballistic missiles capable of delivering nuclear weapons."

The softening in the language degrades the ban on ballistic missile testing and related activities from a legal obligation to a non-legally binding appeal. Further, the new resolution refers to missiles "designed to

be capable of delivering nuclear weapons," rather than "capable" of such delivery. Iran rigorously lobbied for the revised phrasing since it now simply contends that its missiles are not "designed" for such capability. This is diplomatic chicanery on Iran's part, as eight of its 13 operational ballistic missile systems meet the international standard for determining the inherent capability of delivering a nuclear weapon, as they can deliver a 500 kg payload 300 km or more. Furthermore, the restrictions on ballistic missile-related activity sunset eight years after the adoption of UNSCR 2231, meaning that on October 18, 2023, Iran will be free to advance its ballistic missile program and will be legally able to acquire equipment from other countries that facilitate the development of nuclear-capable ballistic missiles.

Multiple Tests Since the JCPOA

Since the Iran nuclear agreement was signed, the Islamic Republic has increased the frequency of its ballistic missile testing, test-launching more than 30 ballistic missiles.

On August 22, 2015, Iran claimed to have test-fired the Fateh 313, a precision-guided ballistic missile with a range of 310 miles.

On October 10, 2015, Iran test-fired "a new guided long-range ballistic missile" named "Emad." The missile is an improvement from Iran's Shahab-3 missiles because it can reportedly be guided toward its target. Then on October 14, "Iranian state television broadcast unprecedented footage…of a deep underground tunnel packed with missiles and launcher units."

Evidence of another missile test emerged on December 7 when Fox News reported that on November 21, Iran carried out a medium-range ballistic missile test. The missile, known as a Ghadr-110, has a range of 1,800 – 2,000 km and is capable of carrying a nuclear warhead.

On March 8, 2016, Iran announced that short, medium, and long-range precision guided missiles were fired from several sites. Pictures of the launches were broadcast, and reports said the armaments used had ranges of 300 kilometers, 500 km, 800 km, and 2,000 km. The missiles, capable of striking Israel and U.S. bases in the Middle East, had a statement in Hebrew inscribed on them reading "Israel must be wiped off the Earth."

On May 9, 2016, Iran announced that it tested another two ballistic missiles with ranges of 1,250 miles. On July 11, 2016, days before the one-year anniversary of the signing of the nuclear agreement, the Islamic Republic attempted to launch a new type of ballistic missile using North Korean technology. The test was reportedly the first time Iran tried to launch a version of the North Korean BM-25 Musudan ballistic missile, which has a maximum range of nearly 2,500 miles.

On September 25, 2016, Iran's Defense Ministry released a video of the regime's latest ballistic missile, Zolfaghar, being launched and hitting a target. The missile runs on solid fuel and can reportedly hit targets with pin-point accuracy at a range of 750 kilometers. According to Tasnim News Agency, the missile, which is capable of evading jamming signals in electronic warfare, will come into service by March 2017.

On January 29, 2017, Iran reportedly conducted a ballistic missile test outside Semnan, firing its medium-range Khorramshahr missile 600 miles.

On March 6, 2017, U.S. defense officials claimed that Iran test-fired a pair of Fateh-110 short-range ballistic

missiles. One of the missiles reportedly successfully destroyed a floating barge approximately 155 miles away.

Since the Trump administration withdrew the United States from the JCPOA over the objections of the European Union, Russia, and China, Iran has had every incentive to rein in its ballistic missile pursuits and other destabilizing activities so that its would-be business partners could justify continued trade and investment with Tehran. Instead, Iran has further accelerated its ballistic missile tests, launching at least seven medium-range and five short-range ballistic missiles in 2018. Notably, Iran carried out a "significant" medium-range ballistic missile test on December 1, 2018, believed to be of a Khorramshahr capable of striking southeastern Europe.

In February 2019, Iran unveiled a new ballistic missile called Dezful at an "underground" missile production facility, a longer-range upgrade to its existing Zolfaghar missiles.

In April 2019, Israeli Ambassador to the U.N. Danny Danon alleged that Iran had carried out a test launch of "a new and destructive variant of the Shahab-3 ballistic missile" on February 23. According to Danon, the tested missile was capable of delivering a nuclear payload, as it had a range greater than 3,000 km and a payload capacity above 500 kg. This test was later confirmed in an April 2019 social media post. The UK, France, and Germany wrote a letter to U.N. Secretary General Antonio Guterres in December 2019 condemning the launch, noting that the Shahab-3 variant used was equipped with a "maneuverable reentry vehicle" and that, "The Shahab-3 booster used in the test is a Missile Technology Control Regime category-1 system and as such is technically capable of delivering a nuclear weapon." In July 2019, Iran reportedly test-fired a medium-range Shahab-3 missile, that flew nearly 1000 km, according to U.S. officials.

In July 2020, the IRGC launched at least two ballistic missiles from covered, underground positions believed to be housed in a desert plateau in central Iran as part of a military drill. Gen. Amir Ali Hajizadeh, the head of the IRGC's aerospace division, noted this was the first time Iran had launched missiles from underground. The ballistic missile fire resulted in U.S. troops stationed in the United Arab Emirates and Qatar being placed on alert and temporarily taking cover.

In August 2020, Iran unveiled a new solid-fuel surface-to-surface ballistic missile, the "Martyr Hajj Qassem," named in honor of former Quds Force commander Qassem Soleimani. The missile reportedly has a range of 1,400 km and has precision-guidance capabilities, underscoring advances made in Iran's indigenous missile production industry.

In November 2020, the IRGC unveiled a new missile launch system capable of firing several missiles consecutively. The introduction of the new system was a further indication of indigenous advances made in Iran's ballistic missile program. IRGC commander Hossein Salami taunted Iran's adversaries at the introduction of the launch system, warning, "Our missiles make our enemies shiver and force them into retreat.… And if need be, this fearsome program will impose our political will upon them." The hostile rhetoric and public displays of advances in Iran's ballistic missile could be seen as part of its strategy of increasing its provocative behaviors to gain leverage to pressure the U.S. to provide sanctions relief and rejoin the JCPOA.

In January 2021, the IRGC launched ballistic missiles of "various classes" during a military exercise, including a missile that reportedly—according to the IRGC—traveled 1,800 km. and hit a target in the

Indian Ocean meant to simulate a hostile enemy ship. The development shows that Iran has continued to advance the accuracy of its missiles over long distances. However, according to an assessment by the International Institute for Strategic Studies (IISS), it was not clear whether the target was actually struck. According to the IISS, it is unlikely Iran's medium-range rockets have attained precision-guidance capabilities, as "the principles, techniques and subsystems needed for effective maneuverability during atmospheric reentry—a necessity for medium-range missiles like the Emad—are very different from those employed on shorter-range missiles" which do not leave the Earth's atmosphere. The IISS assessed that Iran would not be able to launch precision-guided medium-range missiles until 2024, although collaboration with actors such as Russia or China could help shorten the timeline.

In March 2021, Iranian state television broadcasted images and film footage of an IRGC base used to house rows and rows of cruise and ballistic missiles, as well as "electronic warfare" equipment. The broadcast referred to the base as a "missile city." IRGC commander Hossein Salami boasted during the segment, "What we see today is a small section of the great and expansive missile capability of Revolutionary Guards' naval forces."

In May 2021, researchers at the International Institute for Strategic Studies (IISS) found through their analysis of open-source satellite imagery that Iran has been constructing a new missile base near the town of Haji Abad in the southern Hormozgan province abutting the Persian Gulf. IISS researchers said that Iran had constructed seven silos on the side of a steep mountain for missile storage at a particular slant in order to optimize precision targeting capabilities. The location of the base would be ideal for targeting military bases and other strategic assets in Saudi Arabia and Bahrain. According to IISS Research Associate for Defense and Military Analysis Joseph Dempsey the missile base is believed to be Iran's "first hardened launch site intended specifically for solid-fuel ballistic missiles."

In December 2021, Iran fired multiple ballistic missiles—according to some counts 16—at the close of five days of military exercises. The IRGC concluded the exercise by simulating a strike on Israel's Dimona nuclear facility. Iran said that the missiles which were used—Emad, Ghadr, Sejjil, Zelzal, Dezful, and Zolfaghar—can reach Israel. The United Kingdom condemned the launches, finding that they were "a clear breach of U.N. Security Council Resolution 2231…."

In May 2023, Iran unveiled its latest version of the liquid-fueled Khorramshahr ballistic missile called the Khorramshahr-4. The missile can be deployed on a truck-mounted launcher and, according to Iranian officials, can deliver a 1,500-kilogram payload at a range of 2,000 kilometers. The missile, also known as the Kheibar in reference to a Jewish fortress conquered by Muslims in the 7th century, was displayed next to a miniature model of the Temple Mount in Israel. The missile's range puts Israel, and U.S., and its allied partners within striking distance from Iranian territory. Iran's defense minister, Mohammad Reza Ashtiani, added that the Khorramshar-4 is able to "evade radar detection and penetrate enemy air defense systems." Reports were unclear as to why the missile was denoted as the fourth of its kind, given that only two other variants of the missile are publicly known.

The Khorramshahr-4's range and payload capacity far surpasses the limits of the Missile Technology Control Regime (MTCR), which defines nuclear-capable missiles as those which can carry a 500-kilogram payload to a range of 300-kilometers. Iran has thus clearly violated the spirit and intent of U.N. Security Council Resolution 2231, whose missile restrictions will expire in October 2023. Iran's test-launching of the Khorramshahr-4, shortly after unveiling it, led France to accuse Iran of violating the resolution. As Iran accumulates a stockpile of uranium enriched to 60% and continues to engage in destabilizing activities in

the region, the unveiling and testing of this missile further underscore how the regime has become increasingly emboldened and willing to escalate tensions.

The West's Views of Missile Tests as a UN Violation

On October 16, 2015, U.S. Ambassador to the U.N. Samantha Power said Iran's October 10, 2015 ballistic missile test was "a clear violation" of U.N. sanctions given that the missile launched was "inherently capable of delivering a nuclear weapon." A confidential report by a U.N. panel of experts subsequently confirmed that Iran had violated a U.N. Security Council resolution. On March 30, 2016, the U.S. and the EU allies said in a joint letter that the recent missile tests by Iran were "in defiance of" the U.N. Security Council resolution that endorsed the JCPOA.

Commenting on Iran's continued ballistic missile testing, Undersecretary of State for Political Affairs Thomas Shannon said, "from our point of view, U.N. Security Council Resolution 2231 prohibits Iran from launching ballistic missiles." Shannon continued, "I believe that Iran violated the intent of 2231."
For his part, President Obama said on April 1, 2016 at the Nuclear Security Summit in Washington, "Iran, by testing ballistic missiles, was undermining the 'spirit' of the nuclear deal." U.N. Chief Ban Ki-moon said in a July 2016 report on the JCPOA, "Iran's ballistic missile launches are inconsistent with the spirit of a nuclear deal…I call upon the Islamic Republic of Iran to refrain from conducting such launches, given that they have the potential to increase tensions in the region."

The Trump Administration continued the Obama Administration's policy of considering Iran's test-launches of nuclear-capable ballistic missiles as violating UNSCR 2231. Following Iran's significant test-launch of a medium-range ballistic missile on December 1, 2018, Secretary of State Mike Pompeo issued a statement that, "The Iranian regime has just test-fired a medium range ballistic missile that is capable of carrying multiple warheads. The missile has a range that allows it to strike parts of Europe and anywhere in the Middle East. This test violates U.N. Security Council resolution 2231 that bans Iran from undertaking "any activity related to ballistic missiles designed to be capable of delivering nuclear weapons, including launches using such ballistic missile technology . . .We condemn these activities, and call upon Iran to cease immediately all activities related to ballistic missiles designed to be capable of delivering nuclear weapons."

On December 5, 2019, the E3 (UK, Germany, France) circulated a letter to U.N. Secretary General Antonio Guterres that offered their most forceful condemnation of Iran's advancement of its ballistic missile program to date. In the letter, the countries wrote, "France, Germany and the United Kingdom assert once again our firm conclusion that Iran's development of nuclear-capable ballistic missiles and related technologies is inconsistent" with the ballistic missile provisions in UNSCR 2231.

Iran's Position on Ballistic Missile Development and Test Launches

Despite the implementation of the JCPOA, Iran has continued to pursue its ballistic missile program and Supreme Leader Ayatollah Ali Khamenei has said that the U.S. cannot "do a damn thing" about it. This underscores the importance Tehran attaches to its missile arsenal. Iran made clear in accepting the JCPOA that it would not halt its ballistic missile development. In March 2016, Khamenei stated that missile power is key to the country's security and strength: "those who believe only diplomacy is the key to Iran's future are acting out of 'ignorance or treason.'" Iran's foreign minister, Mohammad Javad Zarif, added that Iran's missile program and defense capabilities are "not negotiable."

Following the Trump administration's withdrawal from the JCPOA, Iranian political and military leaders have upheld Iran's official position of not yielding and not negotiating on its ballistic missile program, creating a major impediment to attaining a viable, comprehensive agreement that addresses the JCPOA's deficiencies. At the February 2019 Munich Security Conference, Zarif gave an impassioned defense of Iran's missile program, invoking Saddam Hussein's chemical weapons attacks on Iranians to insist that Iran would never give up the defensive protection of its ballistic missiles. Zarif's performative indignation was particularly rich given Iran's role in the development of Syria's chemical weapon program and its efforts to obfuscate the Assad regime's use of chemical weapons in the Syrian Civil War, to say nothing of the documents unearthed by Israeli intelligence showing that Iran had actively explored fitting nuclear warheads onto ballistic missiles and detonation mechanisms.

In defending its ongoing advancement of its ballistic missile program, Iran has frequently noted that its missile work doesn't violate UNSCR 2231's weakened provisions. FM Zarif responded to the E3's December 2019 letter condemning its ballistic missile activities by noting on his Twitter account that, "(U.S. State Department Special Representative for Iran) Brian Hook has given our E3 #JCPOA partners a timely reminder, openly admitting that missile testing is NOT prohibited in Security Council Resolution 2231." In September 2018, Hook had castigated UNSCR 2231 as it "contained diluted language that came as welcome news to the Iranians, who lobbied hard for it. As the resolution now states, Iran is simply 'called upon not to undertake any activity related to ballistic missiles designed to be capable of delivering nuclear weapons.'" Zarif essentially weaponized the Trump Administration's criticism of UNSCR 2231 in this instance to justify Iran's malign behavior.

The ascension to power of hardline president Ebrahim Raisi has only hardened Iran's resolve to retain its ballistic missile program. The Biden Administration has signaled its desire for both Iran and the U.S. to return to compliance with the JCPOA as a stepping stone to a "longer and stronger" deal and eventually, comprehensive negotiations aimed at resolving other longstanding issues to potentially include Iran's missile program, regional destabilization, and human rights abuses. Negotiations have stalled since Raisi's installation, as Tehran has demanded maximal concessions upfront in advance of restoring compliance, and articulated redlines on any negotiations beyond the scope of the original JCPOA. In his first news conference as president-elect in August 2021, Raisi insisted that regional issues and ballistic missiles were "non-negotiable." In advance of the United Nations General Assembly in September 2021, Iran's foreign minister, Hossein Amir Abdollahian, declared in a New York Times interview that, "We will not have a so-called 'longer and stronger' deal."

Regional Threat

Iranian Threats to U.S. Assets in the Gulf & Middle East

Iran has threatened U.S. assets in the Gulf region on multiple occasions. On May 10, 2016, the IRGC commander warned his "forces would drown American warships should they pose the slightest territorial threat to the country, wherever the Americans look in the Persian Gulf, they will see us. The IRGC has underground facilities housing surface-to-sea missiles and vessels." In July 2020, the IRGC navy commander again warned that Iran has "missile-launching floating cities which we will display whenever our leaders see fit." He further threatened that the region will not know peace while the U.S. maintains a military presence, and warned, "if the Americans make one mistake, we will chase them to the Gulf of Mexico." Commander of the IRGC Aerospace Force Brigadier General Amir Ali Hajizadeh has also

threatened that "all U.S. military bases in the Middle East are within the range of the IRGC's missiles." There are key U.S. military installations in the region including a large naval base in Bahrain.

The nature of the Iranian ballistic missile threat to U.S. military personnel and interests in the Middle East was driven home in the aftermath of the U.S. airstrike that killed IRGC Quds Force commander Qassem Soleimani on January 3, 2020. Iranian leaders vowed "harsh retaliation" for the attack, and followed up on this threat by firing a salvo of over a dozen ballistic missiles at two Iraqi airbases housing U.S. troops in the early morning hours of January 8. According to a U.S. official, ten missiles struck the Ain al-Assad base, one struck a base in Irbil, and four fell short of their targets. Iran reportedly used Fateh-313 solid fuel short range ballistic missiles to attack Ain al-Assad, and Qiam-1 liquid fuel short range ballistic missiles for the Irbil attack. The attack was the fourth Iranian ballistic missile attack outside its borders in recent years, and the first to intentionally target U.S. personnel.

The use of ballistic missiles enabled Iran to utilize a long-range strike capability despite the deficiencies of its conventional air force. The attack highlighted the propagandistic and deterrent role of ballistic missiles within Iran's hybrid warfare strategy. Iran's Supreme Leader claimed to have delivered a "slap in the face" to the U.S. and pledged further retaliation, while Iranian state media erroneously claimed that 80 "American terrorists" were killed in the strikes, which actually killed zero.

The triumphalist claims about high casualties, intended for domestic consumption, allowed Iran's leadership to appear to have stood up to the U.S., while indicators such as their prior notification given to Iraqi officials, indicate they actually sought to minimize casualties to avoid further escalation. The attack was meant to underscore to the U.S. that Iran is willing and able to carry out further ballistic missile attacks and escalate further, however, if the U.S. chooses to respond.

Iran's Arab Neighbors

Iran's arsenal of ballistic missiles poses a threat to its Arab neighbors in the Persian Gulf. According to the Heritage Foundation, "Iran's ballistic missiles pose a major threat to U.S. bases and allies from Turkey, Israel, and Egypt in the west, to Saudi Arabia and the other Gulf States to the south, to Afghanistan and Pakistan to the east."

Iran has escalated its threats against Arab neighbors in the Persian Gulf since the JCPOA was negotiated. The confined geography of the Gulf, in combination with Iran's massive arsenal of short- and medium-range ballistic missiles, presents a unique set of defense challenges. Iran's short-range ballistic missiles and rockets can reach their target in six minutes or less, leaving little time to detect, track, and intercept them.

Douglas Barrie, a military aerospace expert at the International Institute for Strategic Studies (IISS), said the Gulf states are deeply concerned by Iran's missiles. "If you're sitting in London perhaps it doesn't seem too rational, but if you're sitting in Bahrain or Saudi Arabia then it looks very rational indeed," he said. In reaction to this missile threat, the Gulf states are investing billions of dollars in advanced missile defense systems designed to protect their cities against attacks from Iran. From Kuwait in the Gulf's northern waters to the United Arab Emirates on the Strait of Hormuz, five GCC countries are installing or upgrading US-supplied missile defenses.

Launches Targeting Iraq and Syria

Since June 2017, Iran has offensively launched ballistic missile salvos against ISIS and Kurdish separatist groups operating in Syria and Iraq on three separate occasions. The launches marked the first Iranian use of ballistic missiles outside its borders since the 1980-1988 Iran-Iraq War. Beyond their immediate objectives, the missile strikes served as a pointed reminder that Iran is capable of striking U.S., Israeli, and Gulf Arab interests in the Middle East.

In June 2017, Iran fired a salvo of six ballistic missiles from western Iran into eastern Syria's Deir Ezzor province, targeting an ISIS command base. The missiles were reportedly at least five medium-range Zolfaghars and at least one short-range Qiam-1. Iran declared the missile attacks were in retaliation for an alleged ISIS terrorist attack at Iran's parliament and a Tehran shrine earlier that month. IRGC aerospace force commander Ali Hajizadeh declared, "Firing these missiles from 600 or 700 kilometers away onto a small building… demonstrates Iran's capacity and intelligence capabilities."

In September 2018, Iran reportedly fired a salvo of seven short-range Fateh-110 ballistic missiles at an Iraqi base of an Iranian Kurdish separatist movement. The attack killed at least 11. The IRGC issued a statement following the attack saying, "In a successful operation, the Guards' aerospace unit, along with the army's drone unit ... targeted a criminal group's meeting and a terrorist training center with seven short-range surface-to-surface missiles."

In October 2018, Iran again launched a salvo of at least six Zolfaghar and Qiam-1 ballistic missiles at ISIS militants operating near the eastern Syrian city of Boukamal. Iran followed up the missile attack with bombing runs by seven armed drones dropping unguided munitions. Iran proclaimed the attacks to be retaliation for a September terrorist attack at an IRGC parade in Ahvaz province, which Iran has blamed on the U.S., Israel, Saudi Arabia, and the United Arab Emirates, but was ultimately claimed by ISIS.
The missile and drone attack represented a serious escalation, as they landed within 3 miles of U.S., coalition, and Syrian Democratic Forces personnel that were clearing ISIS from the area. Iran did not follow deconfliction protocol ahead of the attack, endangering civil and military air traffic over the Iraqi airspace that the missiles passed through. Following the attack, Iran's former Supreme National Security Council Secretary Ali Shamkhani taunted the U.S., saying, "(National Security Adviser) John Bolton said we should take you seriously; [Amir Ali] Hajizadeh, commander of the Aerospace Forces, took you seriously and landed a rocket within three miles of you. … What are your forces and ISIS militants doing within three miles of each other?"

Iran staged the attack largely for propaganda purposes. Iranian state television was present at the launch, and a reporter declared as the missiles were launched, "This is the roaring of missiles belonging to the Revolutionary Guard of the Islamic Revolution. In a few minutes, the world of arrogance—especially America, the (Israeli) Zionist regime and the Al Saud—will hear the sound of Iran's repeated blows." Iranian state television also aired footage showing that one of the missiles was emblazoned with the slogan, "Death to America, Death to Israel, Death to Al Saud," casting further light on who the missiles intended targeted audience was.

Ballistic Missile Proliferation

The proliferation of ballistic missile technologies to Iran's proxy militias and terrorist groups around the Middle East is another threat posed by Iran's ballistic missile program. Iran's provision of ballistic missiles gives its proxy forces powerful weapons, significantly amplifying the threat they are able to pose. Iran has influence over the operations of these groups, but not always full operational control. Iran's willingness to

provide these weapons to unaccountable, substate actors shows that its ballistic missile posture is becoming increasingly offensive and less risk-averse—although Iran wishes to retain deniability for itself—carrying a significant risk of further regional destabilization.

Addressing a U.N. Security Council meeting on Iran in December 2018, U.S. Secretary of State Mike Pompeo asserted, "We have hard evidence that Iran is providing missiles, training, and support to the Houthis, and the Iranian-Houthi missile force is fully engaged…. Iran is also transferring ballistic missile systems to Shia militias in Iraq." In July, November, and December 2017, Houthi rebel forces in Yemen allegedly fired short-range Qiam-1 ballistic missiles at targets in Saudi Arabia. In each instance, components in the debris indicated that the ballistic missiles were produced by both Iran's Shahid Bagheri Industrial Group (SBIG) and Shahid Hemat Industrial Group (SHIG) between 2002 and 2010. In December 2017, U.S. Ambassador to the U.N. Nikki Haley staged a press conference where she displayed debris from the July and November attacks with insignia from the Iranian defense firms and other unique designs exclusive to Iranian ballistic missiles.

A month later, the U.N. Panel of Experts on Yemen corroborated Haley's allegations, finding that the missile components were "almost certainly" of Iranian-origin and consistent with Iran's Qiam-1 missile, and that furthermore, the missiles were transferred to the Houthis following the imposition of a targeted arms embargo that went into effect in June 2015. Despite these findings, the Houthis have escalated their continued ballistic missile attacks targeting Saudi transportation and energy infrastructure.

In August 2018, Reuters reported that Iran is transferring ballistic missiles to Shia proxy militias in Iraq and is helping them acquire a domestic production capability as well. U.S. intelligence officials confirmed these efforts in December 2019, and asserted that the Iranian effort to build up a hidden short-range ballistic missile arsenal in Iraq is ongoing.

Israel struck Iranian weapons and missile depots in Iraq at least seven times during 2019, highlighting Iran's willingness to subvert Iraq's sovereignty and security for its own nefarious ends. The provision of short-range ballistic missiles to Iran-backed militias in Iraq enhances Iran's ability to target Israel, as Jerusalem is within the missiles' 600 km range from Baghdad.

The transfer of ballistic missiles to Iraqi proxy militias additionally magnifies the threat to U.S. personnel and energy interests in Iraq, which the militias have previously targeted with less sophisticated rockets. Additionally, they create an added layer of confusion and plausible deniability of the origin of potential ballistic missile strikes against Iranian adversaries in the region, which can undermine efforts to legitimize retaliatory strikes. The proliferation of potential launch sites can also overwhelm the missile defense systems of the U.S. and its allies, particularly during a wartime scenario in which missiles could be incoming from Yemen, Iraq, and Iran all at once.

Israel

According to the Heritage Foundation, Israel is most at risk from an Iranian attack. Iran's GPS-guided missiles "can degrade the [Israeli military's] ground capabilities…can paralyze Israel's war economy, and inflict massive casualties." Iranian state TV has gone so far as running a documentary showing Iran's drones and missiles bombing multiple targets in Israel as well as the USS Abraham Lincoln "in a hypothetical retaliation for an Israeli or American strike on Iran."

Iran even inscribed the words "Israel must be wiped off the Earth" on Iranian missiles tested in March 2016. Iranian Major General Rahim Safavi has also threatened Israeli cities with destruction, saying that "the Zionists and the US are aware of the power of Iran and Hezbollah, and they know that over 80,000 (Iranian) missiles are ready to rain down on Tel Aviv and Haifa." In addition, Brigadier General Amir Ali Hajizadeh warned that, "the Zionist regime is our biggest target…we do not need missiles with a range of over 2,000 kilometers. The longest range required for [Iran's] missiles is the [Israeli] occupied lands." Moreover, all of Israel can be hit with the thousands of shorter-range rockets that Iran has supplied to Hezbollah in Lebanon and Hamas and Palestinian Islamic Jihad in Gaza. On July 1, 2016, General Hossein Salami, Commander of the IRGC, said, "more than 100,000 missiles are ready to fly from Lebanon…tens of thousands of destructive long-range missiles are ready across the Islamic regions to hit Israel in case of any more wrong move by the Zionists."

In February 2022, Iran unveiled a new surface-to-surface Kheibar Shekan missile, which is a reference to an ancient Jewish oasis in the Arabian Peninsula's Hijaz region that was overrun by Muslim warriors in the 7th century. The missile's range is 1450 kilometers and is propelled by solid fuel.

In June 2023, IRGC Aerospace Commander Amir Ali Hajizadeh unveiled what was purported to be a hypersonic ballistic missile with a range of 1,400 km. The new missile, known as the Fattah, is purportedly capable of traveling 15 times faster than the speed of sound, which, if true, would make it difficult for air defenses to shoot down. Furthermore, the Fattah appeared to be equipped with a moveable nozzle, capable of altering the missiles' flight path in mid-flight, increasing the difficulty of interception. Though unveiled to the public, the missile has not been test launched against a target. Hajizadeh noted that the engine had been tested on stand. After the missile was unveiled, a banner featuring the missile was unfurled in Tehran, with the ominous caption "400 seconds … to Tel Aviv." The unveiling of the hypersonic technology spurred speculation that Russia may have transferred hypersonic technology to Iran in exchange for its provision of lethal drones for use in Ukraine. But no hard evidence has emerged in public to date.

Threat to the American Homeland and Europe

In addition to the regional threat, there is an emerging global threat posed by Iran's missile program. The former Under Secretary of State for Arms Control and International Security, Robert Joseph, fears that "medium and longer range missiles, particularly ICBM-class missiles under development, could hold American and European cities hostage in the future."

Former Director of the Defense Intelligence Agency, Lieutenant General Michael T. Flynn, indicated that the next generation of missiles would include ICBMs capable of attacking the American homeland. According to aeronautics expert Tal Inbar, "a new Iranian long-range missile could potentially hit cities in eastern Europe and southern Europe and cover a large portion of North Africa."

Iran's medium-range ballistic missiles can already reach Europe and therefore provides the underlying rationale for the European Phased Adaptive Approach (EPAA), which is designed to deal with the threat posed by Iranian short- and intermediate-range ballistic missiles to U.S. assets, personnel, and allies in Europe. Deputy Secretary of Defense Robert Work has said, "The United States promises to protect its NATO allies from the threat of Iranian ballistic missiles as long as Tehran continues to develop such capabilities." The U.S. has long justified plans for missile interceptor bases in Romania and Poland as a necessary safeguard against Iran.

Iran's Space Launch Capability and ICBMs

In addition to its missile program, Iran is actively developing a space launch capability, directly connected to its development of an ICBM. As former DIA Director Lt. Gen. Flynn explains, Iran's space vehicles provide "Tehran with the means and motivation to develop longer-range missiles, including intercontinental ballistic missiles (ICBMs)." According to the 2019 Worldwide Threat Assessment of the U.S. Intelligence Community, "Iran's work on a space launch vehicle (SLV)—including on its Simorgh—shortens the timeline to an ICBM because SLVs and ICBMs use similar technologies."

On April 22, 2016, Iran reportedly attempted to launch a new long-range rocket to place a satellite into orbit. The new rocket, known as the Simorgh space launch vehicle, represents a key step in the development of Iran's long-range ballistic missile program. Iran has successfully launched four satellites (2009, 2011, 2012, and 2015) which also use similar technologies required for an ICBM-class missile. On July 27, 2017, Iran tested the Simorgh again. Iran sought to portray the Simorgh launches as successes, but analysts believe that neither test resulted in launching a satellite into orbit.

In January and February 2019, Iran attempted two additional space vehicle test launches intended to place satellites into orbit, both of which failed. In a statement condemning the launches, U.S. Department of State Deputy Spokesman Robert Palladino noted, "Space launch vehicles use technologies that are virtually identical and interchangeable with those used in ballistic missiles, including in Intercontinental Ballistic Missiles (ICBMs). This attempted launch furthers Iran's ability to eventually build such a weapon that threatens our allies."

In August 2019, satellite imagery showed increased activity at Iran's Imam Khomeini Space Center, indicating that Iran was preparing to launch another satellite into space. On August 29, satellite imagery showed there had been an unexplained explosion apparently of a space launch vehicle (SLV) still on a launch pad at the site. The explosion marked Iran's third unsuccessful effort to launch an SLV in 2019, raising questions over foreign sabotage.

Throughout early 2020, Iran's Minister of Information and Communications Technology (ICT) promoted the launch of the 113 kilogram Zafar (or "victory") satellite, which he said would "head toward an orbit of 530 kilometers from Earth." Most concerning was Tehran's announcement that the Simorgh would be used to launch the satellite. As the Center for Strategic and International Studies has found, the Simorgh "uses engines from Iran's Shahab-3 medium-range ballistic missile" and is "thought to use a similar second stage motor and launch vehicle shroud." The timing of this launch was important—an attempt to generate Iranian nationalism ahead of the February 11 anniversary of Iran's Islamic Revolution and the parliamentary elections on February 21, 2020. As a result, on February 9, 2020, Iran attempted to launch the Zafar communications satellite into space. An Iranian defense official reported the satellite launch was successful but failed to reach orbit.

A few months later, amid the coronavirus pandemic, the IRGC claimed the successful launch of the Noor (or "light") satellite on April 22, 2020—which Iranian media described as the first military satellite ever launched by Iran, and that it had reached an orbit of 265 miles above Earth's surface. This satellite launch was timed to coincide with the anniversary of the IRGC. While it was likely geared to divert attention away from the regime's botched response to the coronavirus outbreak, it also was a message to the international community—that Iran will continue its malign behavior even amid a global health crisis.

Notably, former President Rouhani did not mention the satellite in 40 minutes of remarks before his Cabinet on the launch day. While some observers speculated he may not have known of the IRGC's launch as it doesn't report to him, his minister of information and communications technology acknowledged touring "the last stage of producing the Ghased three-stage, solid-propellant launcher and the Noor satellite" only weeks earlier. Such a revelation is evidence of coordination with the Rouhani government. The regime also has other planned launches for 2020-21, including the Nahid-1 telecommunications satellite. There are also plans to complete space projects, including an orbital transmission system, Pars 1 sensing satellite, and Nahid-2 telecommunications satellite.

On February 1, 2021, Iran announced it had recently successfully carried out a below-orbit test-launch of the Zuljanah, a rocket capable of carrying a satellite into orbit. The Zuljanah can carry a satellite weighing up to 220kg (485 pounds) for 500km (310 miles). A spokesman for the space division of Iran's defense ministry indicated that Iran plans on placing operational satellites in orbit after it completes a series of test-launches of the Zuljanah.

In December 2021, Iran's Defense Ministry spokesman announced that "the Simorgh satellite launch carrier carried three research cargos into space. The research goals foreseen for this launch have been achieved." But later, it emerged that the launch failed to put the three payloads into orbit. Nevertheless, the operation was important given the knowledge and experience Iran acquired from the launch of the Simorgh satellite launch vehicle. World powers have previously declared such launches using the Simorgh violated the provisions of U.N. Security Council Resolution 2231, and France accused Iran in the December 2021 launch of a clear breach as well. This episode represented an attempt by Iran's Space Agency to improve its capabilities after a series of setbacks. Space has emerged as a priority for Iran's new President Ebrahim Raisi, as under his administration, Iran's Supreme Council of Space met for the first time in 11 years. This demonstrates the priority his presidency attaches to these space advancements.

On March 2, 2022, news outlets circulated open-source imagery which suggested Iran likely suffered another failed satellite launch at the Imam Khomeini Spaceport in Semnan Province. Burn marks were visible. The U.S. military's Space Command indicated it did not detect a launch in the preceding days, and Iranian media was unusually silent about the incident.

Only days later, on March 8, 2022, the IRGC announced it launched a second military satellite into orbit—the Noor 2. It claimed the Noor 2 was orbiting at an altitude of 500 kilometers and that the three-stage Qased carrier launched the satellite. The Qased also delivered the first military satellite that the IRGC launched in April 2020. On the heels of the launch, the IRGC Aerospace Force's Space Commander Ali Jafarabadi boasted that "we will launch a series of Noor satellites in the coming years. The space program of the country, of which we are a part, is to stabilize various scientific, research, and defense satellites in low-earth orbit and then reach orbit of 36,000 kilometers above land." These kinds of launches remain of particular concern to the U.S. government and its allies and partners as, according to the Worldwide Threat Assessment of 2022, "Iran's work on a space launch vehicle (SLV)—including its Simorgh—shortens the timeline to an ICBM because SLVs and ICBMs use similar technologies, if it decided to develop one."

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With Iran continuing to perfect its ballistic technology and extend its missile range, the serious threat to the U.S. homeland and our NATO and Middle Eastern allies of an Iran armed with nuclear-tipped ballistic missiles remains. Coupled with Iran's ongoing illegal procurement of nuclear and missile-related

equipment, global and regional fears of Iran's aggression and nuclear ambitions have been reinforced. While there is an ongoing dispute whether Iran is directly violating UNSCR 2231 with its ballistic missile tests, the fact remains that such missiles would be Iran's only viable method for launching nuclear weapons. Iran's continued ballistic missile development is inconsistent with Iran's declaration under the JCPOA it will not seek a nuclear weapons capability.

The surrounding nations feel sufficiently threatened that they have pursued costly missile defense systems to protect themselves. The U.S. must ensure that it can defend its assets and personnel in the region, as well as those of its allies, against the multi-layered aerial threat posed by Iran and its proxies' rockets, increasingly precise cruise and ballistic missiles, and drones. The multi-layered Iranian threat necessitates that all U.S. bases and units in the region, Israel, and the Gulf states deploy permanent, day and night, all-weather, 360-degree multi-layered air and missile defenses to defend against short and long-range threats. The U.S. should seek to collaborate with Israel on new missile defense innovations and ensure that as new technologies emerge, they are shared with other regional partners as well.

Additionally, the U.S. should maintain and expand sanctions already in place targeting Iran's ballistic missile program in order to pressure the Iranian regime and disrupt its efforts to develop and advance ballistic missiles. The central entities engaged in the production and development of Iran's ballistic missiles are the Shahid Hemmat Industrial Group, which manufactures liquid-fuel ballistic missiles, and the Shahid Bagheri Industrial Group, which manufactures solid-fuel ballistic missiles. Both entities have been under U.S. and international sanctions since the early 2000s for their ballistic missile proliferation activities, as well as many of their known subsidiaries and individuals who have abetted their programs.

Troublingly, in October 2021, the Biden Treasury Department's Office of Foreign Assets Control (OFAC) announced that it was lifting sanctions on Mammut Industrial Group and its subsidiary, Mammut Diesel. Both entities had been sanctioned by the Trump Administration in September 2020 for being "key producers and suppliers of military-grade, dual-use goods for Iran's missile programs." Specifically, the entities were alleged to have supported the Shahid Hemmat Industrial Group's production of ballistic missile equipment. The delisting followed the removal of sanctions in July 2021 on three Iranians who were major shareholders and executives of the Mammut Industrial Group. The Biden Administration has denied that the removal of these sanctions was indicative of a broader shift in Iran sanctions policy or was in any way linked to inducements to getting Tehran to return to stalled nuclear negotiations. However, the administration also did not confirm that the delisted entities had verifiably ceased their sanctionable behavior. The Biden Administration should be fully transparent about what led to the sanctions delisting, as any action to reduce pressure on Tehran absent meaningful behavioral change sends the signal that Iran can extract concessions from the U.S. through intransigence.

Finally, the U.S. must advocate for the extension of the Iranian ballistic missile development restrictions contained in U.N. Security Council Resolution 2231, which would keep barriers in place against Iran legally acquiring ballistic missile components and related equipment from eager sellers. Although Iran has systematically flouted the provisions of the resolution by continuing to advance its ballistic missile program and carrying out repeat test-launches, the resolution has utility in preventing other countries from openly abetting Iran's ballistic missile program. The U.S. should wage a full-scale diplomatic offensive ahead of the October 2023 expiration to secure the extension of 2231's ballistic missile provisions.