Iranian Space Launch Capabilities Fact Sheet

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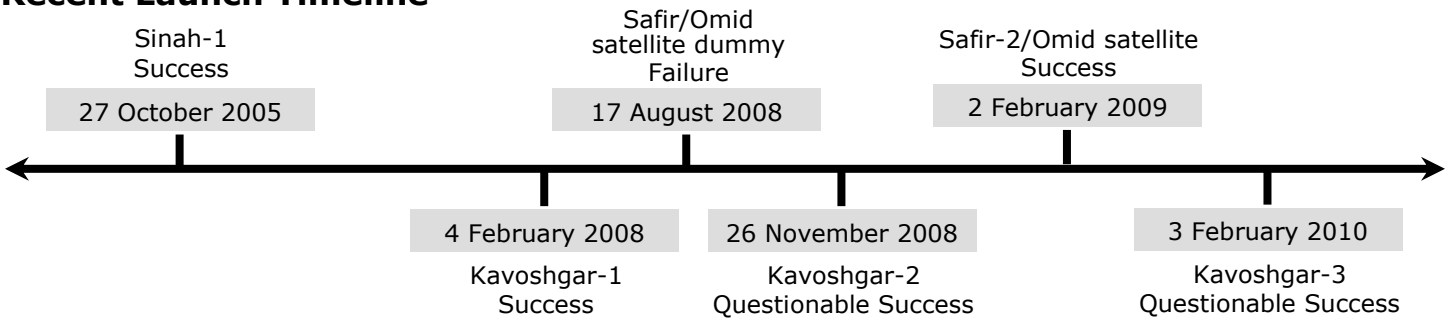
Introduction

With the success of a domestically-built and -launched satellite in February 2009, the Islamic Republic of Iran (Iran) became the first Islamic nation and the ninth[1] nation overall to launch its own payload into orbit. Since then, Iran has expanded its activities in space: reporting that it has committed significant funds to its space program, announcing new satellite and rocket plans,[2] and promising to put a man in orbit by 2025.[3] Iran's space program is a collaboration between research organizations, the government, industry, and universities and may have been developed with foreign assistance.[4] Iran asserts that its space program is entirely based on civilian and research goals, whether they be communications or environmental monitoring, but Ahmadinejhad also says "the scientific arena is where we [Iran] should defeat [Western] domination."[5] While Iran assures its space program is a peaceful one, some worry about its true intentions since many space capabilities are inherently dual-use in nature. In particular, most space launch technologies are applicable to long-range ballistic missile development.

After its first successful satellite launch, Iran offered help to any Muslim country who wanted to establish its own space program,[6] creating proliferation concerns among analysts. Iran's space program is thought to be both an attempt to gain international prestige and a technological demonstration of potential ballistic missile capabilities. This Secure World Foundation Fact Sheet will give an overview of Iran's space launch capabilities including launch sites, vehicles, and satellites.

Recent Launch Timeline



Iran's Space Program and Technical Capabilities

Launch Sites

Currently, Iran has four known launch sites, though it does not always use them or reveal which site it has used in any particular launch:

- Emamshahr in northeastern Iran.[7]
- Semnan, part of the Iranian Space Research Center,[8] also in northeastern Iran (site of Safir-2/ Omid launch).
- Qom in western Iran.[9]
- The newest launch site is six and a half miles northeast of Semnan and is thought to have been built with help from the North Koreans for the recently announced Simorgh launch vehicle.[10]

Launch Vehicles

- Safir, "Ambassador."[11] Safir is a two-stage launch vehicle[12] based roughly on the North Korean Taepo Dong-1,[13] measuring 22 meters in length, 1.25 meters in diameter, and about 26,000 kilograms in weight.[14] [15] It cannot carry more than a 100 kilogram payload.[16] Safir-1 was test-launched carrying a dummy satellite on Aug. 17, 2008, and while Iran claimed it was a success, outside analysts stated it failed shortly after liftoff and never reached its intended position.[17] On a later flight, the Safir-2 successfully carried the Omid satellite into space on Feb. 3, 2009, and placed it into a low Earth orbit.[18] The Safir series is also thought to be based on Iran's Shahab ballistic missile series,[19] with its first stage being "almost indistinguishable from the Shahab-3."[20]

- Kavoshgar, "Explorer." Believed to be liquid-fuel propelled, this is a sounding rocket and thus not officially intended to be a satellite carrier.[21] After the rocket reaches about 100 kilometers in height, the payload then separates and returns to Earth with a parachute.[22] The Kavoshgar is similar in design to the Shahab-4, a missile based on Soviet Scud missile technology.[23] Three Kavoshgars have been launched. Kavoshgar-1 was successfully launched on Feb. 4, 2008.[24] The performance of Kavoshgar-2, launched on Nov. 26, 2008, received conflicting coverage between state and other media sources and led many to question its success.[25] Kavoshgar-3 was launched on Feb. 2, 2010[26] carrying turtles, worms, and a rat. Its performance was also questionable as the Iranian government failed to provide any solid proof of its success. The launch of Kavoshgar-3 was treated like a military display, creating even more suspicion about Iran's peaceful intentions. The rocket was launched not from one of Iran's designated space launch sites, but from the back of a military truck used to launch a similar military rocket.[27] Defense Minister General Ahmad Vahidi oversaw the launch,[28] prompting the following newspaper commentary, "'Iran will not tolerate any unpeaceful use [of space] by any country,' Defense Minister General Vahidi trumpeted as he stood in his military uniform."[29] While Iran states the Kavoshgar-3 launch was meant to be for experimental research, many doubted its scientific value.[30]

- Simorgh, "Phoenix."[31] At 27 meters long, 85 tons, and with liquid fuel propulsion system capable of a thrust up to 143 tons, Iranian officials state that Simorgh will be able to carry 100 kilograms up to an altitude of 500 kilometers. Simorgh was announced by Ahmadinejhad as part of the National Day of Space Technology on Feb. 3, 2010.[32] According to Iranian reports, it will be able to handle heavier payloads than the Safir and thus deliver the Mesbah-2 and other new satellites into space.[33] In the event of difficulties with the Simorgh, Vice President of Iran's Aerospace Systems Industries Seyyed Mehdi Musavi-Badjani stated that Iran might use foreign launch vehicles to deliver these satellites into space.[34]

Satellites

- Sinah. At 160 kilograms, Sinah was launched on Oct. 27, 2005, by Russia. Though it is the first Iranian commercial satellite, it was built in and launched by Russia.[35]

- Zohreh, "Venus." Plans for the geosynchronous orbit (GEO) satellite Zohreh have been in the works since the 1970s, but have run into various obstacles along the way including international pressure and U.S. export control regulations. In early 2005, Iran signed a deal

with Russia to continue its development.[36] Zohreh is intended to meet "certain television and telecommunication needs" in Iran.[37]

- Omid, "Hope."[38] Omid is a 40 centimeter cube weighing 20-27 kilograms.[39] It was intended to circle the earth in low Earth orbit and is Iran's first indigenously-built and -launched satellite.[40] Iran states that the Aug. 17, 2008, launch of the Safir-1, carrying the dummy Omid satellite, was successful, but the international community largely agrees that it was not.[41] Directly after the launch, Iranian officials at first stated that the Safir-1 successfully delivered the Omid satellite into space. An anonymous report from an Iranian official corrected that earlier claim, stating that the Safir-1 was only carrying a dummy satellite, not the real Omid.[42] Additionally, the footage released by the Iranian press appears to have been spliced from an earlier Kavoshgar launch.[43] On Feb. 3, 2009, the Safir-2 successfully delivered the Omid satellite into orbit[44] with an inclination of 55.5 degrees, a perigee of 246 km, an apogee of 377 km, and a period of 90.76 minutes.[45] It remained in low Earth orbit till Apr. 24, 2009.[46] Omid was reportedly equipped with telemetry and Geographic Information System technology, used as a telecommunications satellite, and collected data to aid Iranians in building their own operational satellite.[47]

- Mesbah, "Lantern."[48] Mesbah is a cube of about 50 centimeters on one side, weighing around 60-75 kilograms,[49] and intended to orbit at an altitude of 900 kilometers for three years.[50] Mesbah-1 was built in Italy and originally intended to be launched by the Russians at the same time as Sinah-1.[51] Russians report that the satellite never arrived for launch. After the Italians refused to help Iran with the launch, the Mesbah-1 disappeared from the public's and media's eye. Iran stated it collaborated with Russia and Italy on the Sinah-1 and Mesbah-1 satellites, but both Russia and Italy denied this, saying that Iran simply purchased the satellites from them.[52] In July 2009, with no explanation, Russia refused to launch any more Iranian satellites.[53] Iranians state they have built a Mesbah-2 based on the original Italian design, which they intend to launch themselves. Mesbah-2 reportedly weighs around 65 kilograms. Iran reports it will launch the Mesbah-2 itself in March 2011 on the recently-announced Iranian Simorgh rocket.[54] Like Mesbah-1, Mesbah-2 is intended to serve as a telecommunications satellite.[55]

- Tolu, "Sunrise." Tolu was unveiled by Ahmadinejhad as part of the National Day of Space Technology on Feb. 3, 2010.[56] It will be Iran's first remote-sensing satellite. On May 25, 2010, the Vice President of Iran's Aerospace Systems Industries Seyyed Mehdi Musavi-Badjani announced that Tolu would be launched using the Simorgh launch vehicle in March 2011.[57]

- Navid-e-Elm-o-Sanat, "Herald of Science and Industry." Navid-e-Elm-o-Sanat was also unveiled by Ahmadinejhad as part of the National Day of Space Technology on Feb. 3, 2010.[58] It is intended to serve as a research satellite for Iranian universities.[59]

- Rasad, "Observation." Rasad-1 will be launched during Iran's Government Week (Aug. 28 to Sep. 3, 2010)[60] on the back of a domestically-built carrier according to Reza Taqipur, Iran's Minister of Communication and Technology.[61] No further information is currently known about this satellite.

Footnotes

1. USSR/Russia, United States, France, Japan, China, United Kingdom, India, Israel, Iran. Some sources cite eight countries because the United Kingdom no longer maintains its own launch capability.
2. Dareini, Ali Akbar. "Iran launches new research rocket into space." *Associated Press Worldstream,* Feb. 3, 2010.
3. "Iran to Send Larger Satellites into Space." *Fars News*, Aug. 22, 2010.
   There are conflicting reports on when Iran will be able to send an astronaut into space. Original plans stated by 2020. This estimate was revised to 2025. Within this article, the date is revised to 2024, with implementation plans being ahead of schedule for 2019.
4. Forden, Geoffrey. "Secret Iranian Missile Memos." *ArmsControlWonk.com*. <http://www.armscontrolwonk.com/2458/secret-iranian-missile-memos> Sep. 14, 2009
5. "Iran shoots rat into space." *Iran Times International*, Feb. 12, 2010.

Footnotes, continued

6. "Iran ready to transfer space technology to Muslim states – official." *BBC Monitoring Middle East,* Aug. 18, 2008.
7. Wade, Mark. "Iran." *Astronautix*. <http://www.astronautix.com/country/iran.htm> March 10, 2010.
8. Inbar, Tal. "Iranian Space Program – Global Aspects." Paper presented to the International Astronautical Congress in Daejeon, Republic of Korea, Oct. 12-16, 2009. Pp. 2.
9. Wade, ibid.
10. "New Iran rocket launch site shows N. Korea links: Jane's." *Agence-France Presse*, March 5, 2010.
11. Celerier, Pierre. "Iran says it has sent another rocket into space." *Agence-France Presse,* Nov. 26, 2008.
12. Crail, Peter. "Iran Makes First Successful Space Launch." *Arms Control Today,* March 2009.
13. Daragahi, ibid.
14. Postol, Theodore. "Technical Addendum to the Joint Threat Assessment on the Iran's Nuclear and Missile Potential: A Technical Assessment of Iran's Ballistic Missile Program." Pp. 49. <http://docs.ewi.info/JTA_TA_Program.pdf> June 3, 2010.
15. "Iran ready to transfer space technology…," ibid.
16. Daragahi, ibid.
17. Mikkelsen, Randall. "Iran satellite launch a failure: U.S. official." *Reuters.com* Aug. 19, 2008. <http://www.reuters.com/article/idUSN1935578420080819>.
18. Daragahi, ibid.
19. Crail, ibid. Kaminis, Markos N. "Iran's New Hope – Space, the Next Frontier." *Wall Street Greek*, Feb. 12, 2009.
20. Inbar, 3.
21. "Iran shoots rat into space," ibid.
22. Inbar, 7.
23. Cohen, Ariel. "Sword and Shields: Iran's ICBM threat." *UPI,* Sep. 29, 2008. Inbar, 3.
24. Dareini, ibid.
25. Celerier, ibid.
26. "President implies Iran launched rocket yesterday." *BBC Monitoring Middle East,* Feb. 3, 2010.
27. "Iran shoots rat into space," ibid.
28. Dareini, ibid.
29. "Iran shoots rat into space," ibid.
30. "Iran rocket launch puts West on high alert," ibid.
31. "Iran shoots rat into space," ibid.
32. "Iran to Send…," ibid.
33. Dareini, ibid.
34. "Iranian official says three satellites to be launched by March 2011." *BBC Monitoring Middle East*, May 25, 2010.
35. Cohen, ibid.
36. Inbar, 5.
37. "Iranian official says…," ibid.
38. Karimi, Nasser. "Iran claims first launch of its own satellite." *The Associated Press,* Feb. 3. 2009.
39. Shiga, David. "Just how advanced is Iran's space programme?" *New Scientist,* Feb. 4, 2009.
40. Karimi, ibid.
41. Daragahi, ibid.
42. Ghazi, Siavosh. "Iran launches home-built satellite rocket." *Agence France Presse,* Aug. 17, 2008.
43. Brugge, Norbert. "Iran's first space launch vehicle "Safir IRILV." Feb. 9, 2010 <http://www.b14643.de/Spacerockets_1/Diverse/Safir-IRILV/Safir.htm>.
44. Daragahi, ibid.
45. Inbar, 6.
46. Space-Track.org.
47. Daragahi, ibid.
48. "Iran plans new satellite launch." *UPI,* Dec. 1, 2009.
49. Inbar, 4.
50. "Russia won't launch aging Mesbah satellite." *Iran Times International,* Oct. 9, 2009.
51. Dareini, ibid.
52. "Russia won't launch aging Mesbah satellite," ibid.
53. "Iran shoots rat into space," ibid.
54. "Iran plans new satellite launch," ibid.
55. "Iranian official says…," ibid.
56. "Iran shoots rat into space," ibid.
57. "Iranian official says…," ibid.
58. "Iran shoots rat into space," ibid.
59. "Iranian official says…," ibid.
60. "Iran to launch new satellite in September 2010." *BBC Monitoring Middle East*, Jul. 7, 2010.
61. "Iran plans new satellite launch in late August: minister." *Agence France Presse*, Jul. 7, 2010.