COMMUN XI
HISTORICAL CRISIS COMMITTEE

THE UNOOSA CRISIS OF 2050

Background Guide

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Letter from the Crisis Heads

Dear Delegates,

Welcome to COMMUN XI and to the UNOOSA Crisis Committee on the creation of the first human colony on Mars. We, Gideon Borisy and Alyssa Beach, will be your crisis committee heads. While you guide debate, make decisions, and represent nations or private companies, we will be working behind the scenes to manage the crisis and respond to your actions.

Because this committee includes very different interests and opinions, we encourage delegates to listen carefully, think creatively, and practice compromise. These skills are especially important to understanding any complicated issues and are a key part of Model UN. To help everyone come prepared, **position papers are required in order to be eligible for awards.**

This is a **crisis committee,** which means events will change quickly. You will submit both public and private directives, and we will communicate your actions through crisis updates, which show the situation developing in real time. Unlike a General Assembly committee, the world will respond (often dramatically) to what you as a group do.

All events before the start of the committee are considered canon, meaning they have already happened. Any events that occur after the committee begins will be decided entirely by your actions. You may research current space programs and international space law, but debate and position papers should reflect the situation as it exists at the start of the committee.

We hope you participate actively, take risks, send many crisis notes, and—most importantly—enjoy the experience. If you have any questions or concerns, please do not hesitate to contact us.

Sincerely,

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Introduction to the Crisis

This committee takes place in the not-so-distant future, in the year 2050, during a time when humanity is beginning to expand beyond Earth. After decades of environmental damage, global warming has taken a serious toll on Earth's resources, pushing nations to look beyond their once-perfect homeworld for new energy and potential habitat opportunities. In response, the United Nations Office for Outer Space Affairs (UNOOSA) has called this emergency committee as governments and private companies race to establish a permanent presence on Mars. International space law has not fully kept up with these changes, and it will be your job to decide how Mars should be governed, how resources should be used, and how to handle unexpected challenges, including the discovery of life on Mars.

Important Notes

Here are some helpful things to keep in mind when doing research for this committee:

First, this committee is a **fictional** scenario taking place in the near future and **is not** based on real events. This being said, the stances and capabilities of your countries/companies will largely be identical to what they are in the present, so researching these should give you a good idea of your position. Additionally, if you can't find anything on space colonization

specifically, try researching your country/company's space program more broadly, as well as their opinions on space exploration and their presence in space.

Secondly, this committee will be focusing on the political side of Mars colonization and not the scientific side, so no understanding of the technology that would be used is required (although you are welcome to research it if you wish!). Furthermore, as this is the future, not all of the technology might exist in the present, but we will assume that it is developed.

Definitions

1. Deuterium-Rich Water

Water with unusually high concentrations of deuterium, a hydrogen isotope essential for nuclear fusion. On Mars, these deposits represent a strategic energy resource with major economic and geopolitical implications.

2. Nuclear Fusion

A high-output energy process using isotopes like deuterium. Fusion power is viewed as a long-term solution to 2050's Earth energy shortages.

3. Dormant Microbial Life

Microscopic life forms discovered in subsurface Martian ice, capable of surviving extreme conditions. Their existence marks one of the biggest scientific discoveries in human history.

History and Context

The Space Age

The first step towards technology capable of exiting Earth's stratosphere was made by Nazi Germany. They were able to utilize long-range V-2 missiles, the same ones that caused massive damage to London and the rest of Europe, to fly farther and higher than ever before. Shortly after World War 2 was over, both the Soviet Union and the United States formed their own missile programs, the beginnings of space-bound technology. In the mid-20th century, space exploration was almost entirely controlled by national governments, especially during the Cold War-fueled rivalry between the United States and the Soviet Union. Space became a powerful symbol of technological and ideological strength, with each extraterrestrial achievement serving as proof of national power. The launch of Sputnik 1 by the Soviet Union in 1957 marked the beginning of the space age and sparked widespread competition amongst rival nations, particularly the United States.

In response, governments invested massive resources into space exploration. National agencies like NASA and the Kosmicheskaya programma SSSR (Soviet Space Program) were closely tied to military interests, and major milestones were viewed primarily as political victories rather than steps toward long-term settlement.

Because spaceflight required enormous funding, specialized expertise, and government infrastructure, private companies had little role in early exploration. Governments maintained a near-total monopoly over access to space, and space was not seen as a place for colonization or economic activity.

At the same time, fears that space could become militarized led to international cooperation aimed at preventing conflict and colonization.

Space Treaties

Since the start of the Space Age, several international treaties have been created to outline the exploration and usage of space. However, none of these agreements were written with the reality of space colonization in mind. Most were created during a time when space exploration was limited, expensive, and controlled entirely by governments.

The foundation of space law is **the Outer Space Treaty** (officially titled The Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies), signed by the United Nations in 1967. It established the core principles that still guide space activity today. The treaty was created to prevent conflict in space, especially during the Cold War, and to ensure that space would not become another area of territorial competition.

The Outer Space Treaty outlines several key statements that are directly relevant to this committee:

1. **Exploration and Use of Space for the Benefit of All Humanity:**
    a. The exploration and use of outer space, including Mars and other celestial bodies, shall be carried out for the benefit of all countries and for the interests of all humanity.
    b. Outer space shall be free for exploration and use by all States without discrimination of any kind.

c. Scientific investigations in outer space shall be conducted for the mutual benefit of all countries and shall be shared as widely as possible.

In accordance with these principles, states are encouraged to conduct joint missions, share research data, and cooperate in scientific projects. For example, the ISS (International Space Station) operates under these principles, with experiments and findings shared among participating nations

2. **Prohibition of National Sovereignty or Territorial Claims:**
    a. Outer space, including the Moon and other celestial bodies, is not subject to national appropriation by claim of sovereignty, use, occupation, or by any other means.
    b. No state shall place its flag, base, or installations on any celestial body with the intention of asserting ownership.

Under this principle, any colony on Mars must **not be considered the territory of any single state or entity.** Resources and land must remain accessible according to international law.

3. **Prevention of Militarization in Space:**
    a. Use of space shall follow international law, and no weapons of mass destruction may be put into orbit around Earth or any celestial bodies.
    b. Additionally, no military bases, weapons, equipment, or personnel are allowed, unless they are strictly for peaceful and/or scientific purposes.

While this prevents space from becoming a battlefield, the treaty does not provide detailed rules for security or protection in permanent colonies, leaving questions about private security forces, defense technology, and emergency measures unanswered.

4. **Government Responsibility for National and Private Activities:**
    a. Governments bear responsibility for national activities in outer space, whether such activities are carried out by governmental agencies or by private actors.
    b. Private actors must get their government's authorization and subsequent supervision before proceeding with actions in space

    In practice, this means that private companies operating bases on Mars cannot act independently; their governments are accountable for any damage, accidents, or violations.

Because the treaty was written in a time before any private organization had even attempted to go to space, it is very restrictive on what corporations can do and grants their governments complete control over their actions, something which could prove problematic for their interests. Despite criticisms of the treaty being unfair and outdated from many modern companies, the Outer Space Treaty still provides the fundamental framework of how countries interact beyond Earth.

In 1979, the United Nations attempted to address some of these issues through **the Moon Agreement.** This treaty declared the Moon and any other celestial bodies to be the "common heritage of mankind" and sought to prevent any nation or entity from exploiting space resources for its own benefit. Whilst it mainly referred to the Moon, the Moon Agreement encompassed all

other celestial bodies as well. All exploration and utilization was to follow international law and to be used exclusively for peaceful purposes. Specifically, the Moon was not to be used as a hostile object, and no weapons were to be placed in orbit or on its surface. Scientific investigation was to be carried out freely, and the right to discovery was not to be infringed upon by competing nations. Activities regarding discovery were to be shared with the UN as well as the scientific community, a clause which caused conflict.

The agreement was unpopular among major spacefaring nations, who feared it would discourage investment and innovation. The clauses regarding fair use were reasonable, but many nations took issue with the demands for transparency that they saw as violating their sovereignty. As a result, very few countries signed it, and thus it has had little real impact on space activity.

Finally, in 2020, the United States released **the Artemis Accords**, a set of non-binding agreements intended to guide modern space exploration. The Accords promote transparency, cooperation, and the sharing of scientific data, and most importantly, they introduce the idea of "safety zones" around space operations to prevent interference. Supporters argue that these zones are necessary for safety and research, while critics claim they simply act as unofficial territorial claims that favor powerful nations and private companies. Unlike earlier treaties, the Artemis Accords are more accepting of resource utilization, making them especially controversial among countries that believe space should remain fully shared.

Together, these agreements reveal a central problem facing the international community: space law has not kept pace with space reality. As humanity prepares to establish a permanent presence on Mars, existing treaties offer some principles, but few clear answers.

The Private Sector

Another important factor is the rise of the private industry in space exploration. When humans first gained the ability to reach space, limited technology, extreme expenses, and high risk made it so that only a few countries (and certainly not companies) could reach space. The beginnings of involvement by private companies was through government contracts.

In the United States, NASA used technology from private companies previously involved in aerospace. Many components of the Apollo Missions launched by NASA were from companies, mainly the likes of Boeing, North American Aviation, and Grumman. By the 1970s, American companies were able to purchase satellites for commercial use via contracts with NASA. Throughout this time period, the US Government controlled the private sector of space exploration for the Western World.

In the late 70s and early 80s the European Space Agency developed Ariane, their first ELV (Expendable Launch Vehicle). By 1984, Ariane was taken over by a company known as Arianespace. Up until 1982, there had been no successful launch by a private enterprise in the United States. The first successful launch was Space Services' prototype Conestoga rocket. There were many hoops the company had to jump through to gain permission from the government for their launch and by 1982, President Ronald Reagan issued a decision that the involvement of private companies in space exploration was a national goal. By the 21st century, space tourism and goals of private expansion have become a hot topic. Following President Reagan's example, many subsequent decisions and bills have been passed to allow for commercial space exploration by non-government entities. Already wealthy entrepreneurs can pour billions of dollars either self-funding or investing in another's company, allowing more money to flow into the corporate space industry.

This success of private industries has not expanded to all countries, however. Countries such as Russia that were huge players in the space game years prior have struggled to open the industry. Following the dissolution of the Soviet Union, massive budget cuts gutted the country's state space programs. Despite Russian encouragement for private industries to involve themselves, most of their recent space involvement has remained anchored to its strong government. Roscosmos, Russia's State Space Corporation, has established its dominance and only allowed non-governmental organizations to participate as sub-contractors.

Missions to Mars Timeline

20th Century

- **1960s-1970s —** Multiple early Mars missions are attempted by NASA and the Soviet space program. Many fail, but Mariner 9 becomes the first spacecraft to orbit Mars in 1971, mapping its surface.
- **1976 —** NASA's Viking 1 and Viking 2 successfully land on Mars, sending back the first detailed surface data and images of Martian soil and atmosphere.

Late 20th and Early 21st Century

- **1997 —** NASA's Mars Pathfinder mission lands with the Sojourner rover, exploring Martian rocks and soil with rover technology for the first time.
- **2001-2005 —** Orbiters such as Mars Odyssey and Mars Reconnaissance Orbiter (MRO) arrive, providing global maps and detailed photos indicative of water-related geology.
- **2004-2010 —** NASA's Spirit and Opportunity rovers explore vast regions of Mars, finding strong evidence that liquid water once flowed on the surface.

- **2008 —** The Phoenix lander confirms the presence of water ice just below the Martian north pole.

2010s — Advanced Science and Habitability

- **2012 —** NASA's Curiosity rover continues to explore Gale Crater, investigating Mars's past habitability and climate history.
- **2013 —** India's Mangalyaan mission successfully enters Martian orbit, marking a major achievement for a smaller national space program.
- **2020-2021 —** NASA's Mars 2020 mission successfully lands the Perseverance rover in Jezero Crater with the Ingenuity helicopter pioneering powered flight on another planet.

2030s — Expansion Beyond Earth

- **2032 —** A permanent, internationally supported Moon base is completed. It becomes a testing ground for long-term habitation and deep-space infrastructure.
- **2034 —** A new generation of autonomous probes and sub-surface drilling robots is deployed to Mars, focusing on ancient craters filled with deuterium-rich polar ice.
- **2035 —** A small, multinational crew becomes the first humans to set foot on Mars. Their mission is strictly exploratory and temporary. While no life is directly encountered, data confirms that unusual chemical activity deep beneath several basins is from **dormant bacteria.**

Current Situation

The year is 2050, and the world is holding its breath. As the UNOOSA assembles to decide the fate of the first colony on a foreign planet, no one knows what this moment will ultimately mean for humanity.

Just over a decade earlier, robotic missions confirmed the existence of dormant bacterial life embedded in subsurface ice near several Martian craters. This discovery marked the first confirmed evidence of life beyond Earth and immediately sparked global debate over planetary protection, ethics, and humanity's responsibility to preserve extraterrestrial ecosystems. Certain regions of Mars were designated as biologically sensitive, but no binding international rules were agreed upon regarding enforcement.

As scientific study continued, further surveys of these same crater regions revealed something else of immense importance: **deuterium-rich water** ice and unusually high concentrations of valuable minerals beneath the Martian surface. These resources are critical for implementing nuclear fusion for the first time, taking a large step away from the Earth's dwindling resources.

Governments and private corporations now argue that a permanent presence on Mars is necessary to regulate access, ensure safety, and prevent uncontrolled exploitation. Others warn that beyond the facade of organization and control, colonization risks environmental damage, political inequality, and the destruction of humanity's first encounter with alien life. Existing space treaties offer guiding principles but provide few clear answers about mining, settlement, or authority on another planet.

With infrastructure already planned, polarizing interests, and no consensus on governance, the United Nations Office for Outer Space Affairs has convened this emergency session. The decisions here will determine who controls Mars's resources, how its life is protected, and whether Mars becomes a shared human frontier.

Roles

Countries

United States of America

The United States is the world's leading space power, with deep government-corporate integration in outer space infrastructure and transport. It supports continued settlement on Mars and views resource extraction as necessary for sustaining both Earth and off-world populations. While the U.S. formally reaffirms the OST's prohibition on sovereignty, it argues that extracting and owning resources does not technically constitute territory. The U.S prioritizes governance that favors innovation, cautious of any authority that would place Mars under centralized UN control.

Russia

Russia is a skeptical but invested nation, wary of Western dominance and unchecked capitalist expansion. It strongly supports strict interpretations of existing space treaties, particularly those opposing appropriation and privatization. Russia argues that Mars colonization must remain under state authority and international supervision, rather than corporate management. It is especially concerned that safety zones and settlements may function as de facto territorial claims. Russia favors a centralized governance framework that limits individualized action.

China

China enters the crisis as a highly capable but cautious power. It supports Mars colonization under strong state control and emphasizes sovereignty-like authority through "safe zones" and long-term presence. China favors resource extraction but insists it be regulated through international agreements that prevent private monopolies, especially by U.S-based companies.

United Kingdom

The United Kingdom participates in the crisis as a longstanding advocate of international space law and cooperation. The UK emphasizes the importance of legal clarity, transparency and the consistent application of existing treaties to emerging Martian activity. The UK supports strengthening UNOOSA's coordinating role to ensure conflict prevention and unity between Earth-based and off-world governance.

Japan

Japan frames the Mars landings primarily around a focus on safety, scientific research, and environmental protection. Japan emphasizes careful, phased development of Mars, with international scientists checking safety to ensure minimal risk to human life and potential extraterrestrial ecosystems. Japan supports international scientific collaboration and the establishment of strict operational standards for settlement, transport, and resource extraction.

France

France supports the development of binding international mechanisms to regulate Mars settlement and resource activity. Emphasizing multilateral cooperation and institutional authority,

it views strong international oversight as essential for ensuring long-term stability beyond our home planet. Whether through the UN or some outside treaty, France believes that every stakeholder should have a say—not just the wealthiest ones.

India

India sees deuterium-rich water as a resource with the potential to benefit humanity if shared through cooperative research initiatives. The discovery of microbial life reinforces India's concern that unchecked exploitation of a new frontier could undermine global trust. India supports governance structures that prevent exclusionary control over Martian assets.

Germany

Germany enters the crisis focused on regulation, sustainability, and long-term consequences. It recognizes the importance of deuterium-rich resources while emphasizing environmental standards and oversight mechanisms. The presence of life on Mars elevates concerns about irreversible ecological damage. Germany wants strict rules for mining, including environmental protections and penalties for breaking them, emphasizing containment, and accountability.

Italy

Italy views Mars as an opportunity to reinforce norms of peaceful cooperation in space. Access to deuterium-rich water is framed as acceptable when aligned with collective, unanimous decision-making. The confirmation of microbial life strengthens Italy's emphasis on scientific

responsibility. Italy will push for any new settlement or mining to only happen after all countries reach consensus.

United Arab Emirates (UAE)

The UAE views Mars as a platform for technological leadership and international prestige. Deuterium-rich water is considered essential for sustaining settlements and advancing energy innovation. While the existence of microbial life is factored into planning, the UAE supports flexible governance that prioritizes rapid development over all other concerns.

Companies

SpaceX

SpaceX is the primary provider of Mars transport and surface infrastructure, having led the missions that enabled the first human presence on the planet. Although formally operating under U.S. authorization, SpaceX advocates for broad freedom to extract and use Martian resources, arguing that self-sufficiency is necessary for colonist survival. The company supports some international coordination for safety and life-protection standards but opposes any strict UN regulation, which it views as outdated and hindering innovation. SpaceX sees Mars as a frontier for human expansion and extraction, favoring governance models that prioritize operational control.

Blue Origin

Blue Origin is focused on large-scale permanent infrastructure beyond Earth. The company views deuterium-rich water as essential for sustaining orbital logistics,[1] surface power systems, and refueling hubs that support continuous settlement. It treats the discovery of microbial life as a factor requiring mitigation rather than a limitation on expansion. Blue Origin supports governance that enables long-term industrial presence and stable access to Martian resources.

Axiom Space

Axiom Space approaches Mars as the next phase of its commercial space station and habitat operations. Deuterium-rich water is viewed primarily as a life-support and energy-stabilizing resource for modular settlements. The existence of microbial life strengthens Axiom's interest in clearly defined research, separate from habitation zones. Axiom favors rules that prioritize operational freedom and clarity for privately managed habitats.

Virgin Galactic

Virgin Galactic's interest in Mars centers on human presence, public visibility, and prestige. Deuterium-rich water is not a core economic target but is recognized as necessary for sustaining extended stays. The discovery of microbial life raises concerns regarding public perception around the legitimacy of potential interplanetary colonization. Virgin Galactic favors visible international oversight to maintain public confidence in Martian operations.

AstroForge

[1] This means in-space infrastructure that can help repair, maintain, refuel, or steer satellites and other extraterrestrial machines.

AstroForge enters the crisis with a focus on resource extraction and off-world materials processing. It views deuterium-rich water and associated subsurface mineral deposits as central to Mars's economic value. The presence of microbial life complicates site selection but does not alter the company's extraction priorities. AstroForge seeks narrowly defined mining licenses and legal protections for resource operations.

Relativity Space

Relativity Space approaches Mars as a site for manufacturing and rapid construction using local materials. Deuterium-rich water is critical for fuel production and autonomous fabrication systems. The discovery of microbial life factors only into engineering constraints and Relativity Systems looks to favor experimentation and scalable, immediate development.

United Launch Alliance

ULA prioritizes launch reliability, interplanetary transport safety, and mission assurance. The company is less concerned with who governs Mars than with how reliably people and materials get there. Scientific uncertainty increases the importance of standardized rules. ULA supports governance that reduces operational risk, avoiding ideological positions of settlement.

Space Pioneer

Space Pioneer, a Chinese corporation, enters the crisis as an extension of state-led industrial ambition. Mars represents strategic depth and long-term ambitions, not just an immediate source of profit. Scientific concerns are considered within national development goals rather than international ethics debates. The company favors coordinated planning tied to

government objectives, skeptical of fragmented, individualistic authority of the type proposed by other corporations.

Redwire

Redwire focuses on Mars as a site for advanced manufacturing and research integration. Not as concerned with the philosophy, policy, or ethics of exploiting Mars, Redwire instead aspires to create robust and creative technical systems—infrastructure for midspace fueling, for example—for humanity's future in the cosmos.. Environmental discoveries increase demand for precision, and Redwire advocates for technical standards over political oversight.

Bibliography

Federal Aviation Administration. “The Commercial Space Industry: Past, Present, and Future.” Federal Aviation Administration Office of Communications, accessed 2024. https://www.faa.gov/sites/faa.gov/files/about/history/milestones/Commercial_Space_Industry.pdf

Moltz, James Clay. “Private Space Activities and the Future of Space Governance.” RAND Corporation, 2019. https://www.rand.org/content/dam/rand/pubs/external_publications/EP60000/EP67235/RAND_EP67235.pdf.

United Nations. “Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies.” United Nations Office for Outer Space Affairs, January 27, 1967. https://www.unoosa.org/oosa/en/ourwork/spacelaw/treaties/introouterspacetreaty.html.

United Nations. “Agreement Governing the Activities of States on the Moon and Other Celestial Bodies.” United Nations Office for Outer Space Affairs, December 5, 1979. https://www.unoosa.org/oosa/en/ourwork/spacelaw/treaties/moon-agreement.html.

National Aeronautics and Space Administration. “The Artemis Accords.” NASA, October 13, 2020. https://www.nasa.gov/organizations/oiir/artemis-accords/

United Nations Office for Outer Space Affairs. “United Nations Office for Outer Space Affairs: Mandate and Responsibilities.” United Nations. https://www.unoosa.org/oosa/en/aboutus/index.html.

National Aeronautics and Space Administration. “Mars Exploration Program: Missions and Scientific Discoveries.” NASA. https://mars.nasa.gov/.

National Aeronautics and Space Administration. “International Space Station Overview.” NASA. https://www.nasa.gov/mission_pages/station/main/index.html.

National Aeronautics and Space Administration. “Planetary Protection Policy.” NASA Office of Safety and Mission Assurance. https://planetaryprotection.nasa.gov/.

European Space Agency. “Ariane Launchers and the History of European Commercial Spaceflight.” European Space Agency. https://www.esa.int/Enabling_Support/Space_Transportation/Ariane.

Indian Space Research Organisation. “Mars Orbiter Mission (Mangalyaan).” ISRO. https://www.isro.gov.in/ISRO_EN/FAQ_MarsOrbiterMission.html

National Aeronautics and Space Administration. “NASA Strategic Plan and Commercial Partnerships.” NASA. https://www.nasa.gov/collaborating-with-nasa/strategic-partnerships/.

China National Space Administration. “China’s Space Activities.” CNSA. . https://www.cnsa.gov.cn/english/ (Wonky English section of official agency site).

UK Space Agency. “UK Space Policy and International Cooperation.” United Kingdom Government. https://www.gov.uk/government/organisations/uk-space-agency.

Japan Aerospace Exploration Agency. “JAXA: Space Exploration and International Collaboration.” JAXA. https://global.jaxa.jp/.

Centre National d’Études Spatiales. “France’s Space Policy and International Programs.” CNES. https://www.esa.int/Enabling_Support/Space_Engineering_Technology/Centre_National_D_Etudes_Spatiales_CNES.

German Aerospace Center (DLR). “German Space Agency at DLR.” DLR. Accessed 2026. https://www.dlr.de/en/dlr/german-space-agency-at-dlr.

Agenzia Spaziale Italiana (ASI). “About the Agency.” ASI. Accessed 2026. https://www.asi.it/en/the-agency/.

United Arab Emirates Space Agency. “National Space Strategy.” UAE Space Agency. https://space.gov.ae/.

SpaceX. “Human Spaceflight and Mars Architecture.” SpaceX. https://www.spacex.com/human-spaceflight/mars/.

Blue Origin. “Sustainable Lunar and Planetary Infrastructure.” Blue Origin. https://www.blueorigin.com/.

Axiom Space. “Commercial Habitats and Deep Space Expansion.” Axiom Space. https://www.axiomspace.com/.

Virgin Galactic. “Human Spaceflight and Commercial Space Tourism.” Virgin Galactic. https://www.virgingalactic.com/.

AstroForge. “Asteroid Mining and In-Space Resource Utilization.” AstroForge. https://www.astroforge.io/.

Relativity Space. “Additive Manufacturing and Off-World Construction.” Relativity Space. https://www.relativityspace.com/.

United Launch Alliance. “Launch Reliability and Deep Space Transport.” United Launch Alliance. https://www.ulalaunch.com/.

Space Pioneer. “China’s Commercial Launch and Deep Space Ambitions.” Space Pioneer (Tianbing Technology). https://www.spacepioneer.cn/.

Redwire. “In-Space Manufacturing and Advanced Infrastructure.” Redwire Space. https://redwirespace.com/.