

WHO WE ARE:

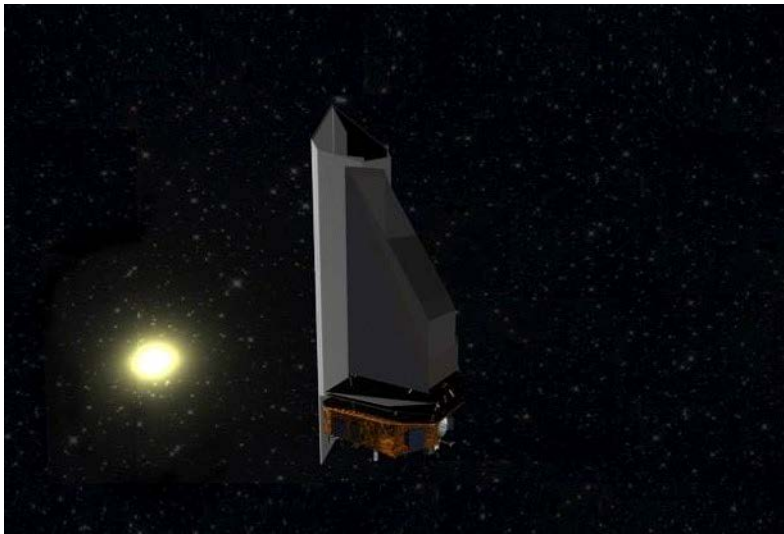
- Private U.S. citizens who advocate at our own expense for a bold and well-reasoned space agenda worthy of the U.S.

NON-PROFIT SUPPORTING ORGANIZATIONS:

- National Space Society
- Space Frontier Foundation
- Foundation for the Future
- The Lifeboat Foundation
- The Mars Foundation
- The Mars Society
- The Moon Society
- Space Development Foundation
- Space Development Network
- Space Development Steering Committee
- Space for Humanity
- Space Renaissance USA
- Space Tourism Society
- Students for the Exploration and Development of Space
- Waypaver Foundation

1. Reducing the cost of access to space.
2. Stimulating and accelerating the growth of space industries and commerce.
3. Making the development and settlement of space a clearly defined part of why we are sending humans into space.

1. Support planetary defense by fully funding the NEO Surveyor Mission, a space based telescope optimized for detecting near Earth asteroids.
2. Support commercial development of Low Earth Orbit by fully funding the LEO Commercialization Program including Commercial LEO Destinations (CLD).
3. Keep developing and demonstrating Space Solar Power.
4. Support the Strategic Space Commodities Reserve.



Near Earth Object Surveyor Mission (NEOSM) Telescope (Source: NASA)



Chelyabinsk Meteor (Source: NASA)

- In 2013 an asteroid struck near Chelyabinsk, Russia, damaging buildings, collapsing roofs, shattering windows, and hospitalizing hundreds of people.
- About a million asteroids larger than the Chelyabinsk object (~60 ft) cross Earth's orbit. If we do nothing, roughly 20,000 of these objects are expected to eventually hit Earth.
- Potential effects range from city killers to regional devastation to mass extinction.
- The next major impact could be millennia or more in the future or just a few weeks from now.
- Humanity has the technical capacity to discover, track and deflect the vast majority of dangerous objects at modest cost.
- Detection of a potential hazard is the essential first step in planetary defense.
- Once an object targeting Earth is found, funding deflection will be easy.
- The National Academies of Sciences, Engineering, and Medicine recommends a dedicated infrared space based telescope for this task. NEOSM is such a telescope.
- Public opinion polls consistently find that planetary defense is the most, or nearly the most, valued NASA activity.

Why is NEOSM the next critical step in protecting our planet?

- Current NASA and international efforts to find dangerous Near Earth Objects (NEOs) using primarily ground-based instruments have inherent limitations:
 - Cannot see near the Sun, near the Moon, during daylight, or through clouds.
 - The best frequencies for detection (infrared) are absorbed by the atmosphere.
- An excellent addition to the search would be JPL/University of Arizona's Near Earth Object Surveyor Mission (NEOSM), a space-based infrared 0.5 meter telescope
 - NEOSM will be located at the Earth-Sun L1 point, allowing it to detect most football-field sized objects or larger, those capable of regional devastation, well before they are near Earth impact.
 - Total procurement cost, including launch, is approximately \$800 million. Roughly \$216M of this will be effectively lost if funding for NEOSM is interrupted before completing PDR (Preliminary Design Review), likely causing an exit of the most experienced staff.
- Objectives
 - Find 2/3 of all objects larger than 140 meters within five years.
 - Find >90% of all objects larger than 140 meters within 10 years.
- **Request: Will you support full funding NEOSM (\$170M) and the rest of planetary defense (\$56M) for FY 2023?**
 - **Note:**
 - **NASA's proposed FY2023 budget cuts NEOSM to \$39.9M and delays launch to at least 2028.**
 - **NASA's proposed budget delays this vital telescope for many years as the already assembled team is in place and nearing PDR. The proposed cut would be disastrous and wasteful.**

Commercial LEO Development - CLD



Orbital Reef (Source: Blue Origin)



Starlab (Source: Nanoracks)



Axiom Station (Source: Axiom)



HALO (Source: Northrop)

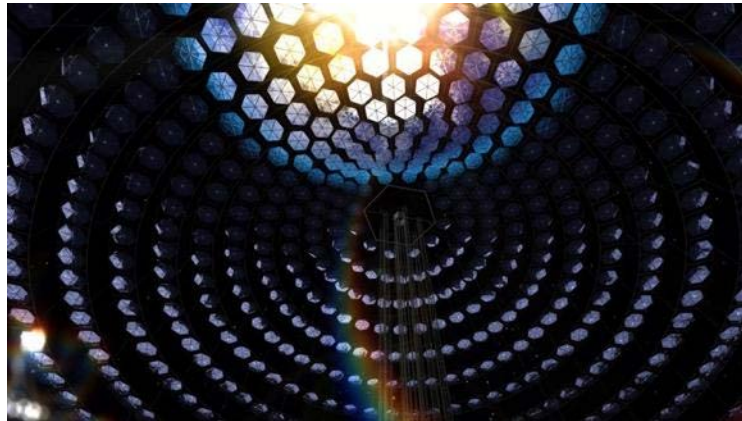
- We have had a sustained human presence in Low Earth Orbit (LEO) with the International Space Station (ISS) since 2000. The ISS has a limited lifetime and is scheduled to be decommissioned in 2030. To support NASA needs, maintain the ISS national laboratory, and to continue to grow the LEO economy we need a gapless transition away from the ISS.
- Commercial companies are developing their own platforms that NASA will use post-ISS. Current funding from NASA compensates the companies for adhering to NASA's process and reporting requirements. No NASA funds are currently intended for actual station construction.
- These stations will be partially supported by government purchase of space-produced goods and services. Guaranteed markets with fixed prices helps companies raise capital for product development. All expect to become independent stations with a diverse customer base.
- A robust commercial ecosystem in LEO can satisfy the government's need for a LEO facility at a far lower cost than ownership.
- Commercial LEO stations can provide a greater range of services to international partners than the ISS can currently support.

- The Commercial LEO Development Program supports:
 - Commercial development/transition of LEO facilities and transportation from NASA to commercial partners. This has already begun.
 - Development of Commercial LEO Destinations (CLD) and capabilities for use by NASA and the private sector to enable a seamless ISS transition.
 - Stimulation of the growth of commercial activities in LEO such as biotech manufacturing (artificial retinas, artificial hearts, cartilage, etc) and advanced materials (high quality fiber optics and single-crystal semiconductor wafers).
- Request:
 - Support the FY2023 CLD request by the administration of \$224.3M
 - Support \$691.9M as requested over FY2023-2025 for CLD stations
 - An additional \$500-600M or more over FY2024-2030 to purchase CLD products

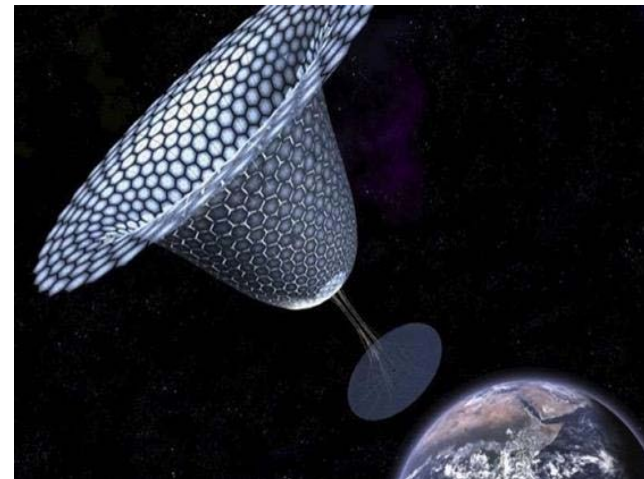
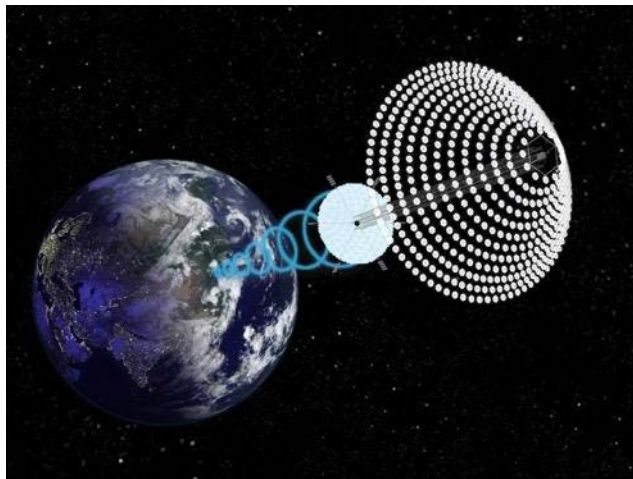
The Russian invasion of Ukraine has created a significant risk that Russia will withdraw from the ISS, prematurely ending a program of immense value, and risking uncontrolled re-entry of the entire station.

- **Congress should direct NASA to develop a contingency plan within 90 days to continue ISS operations in case Russia withdraws any time between now and 2024.**
 - **Congress should provide emergency funding to replace all essential Russian functions by 2024.**
- **Congress should provide additional emergency funds to accelerate the Commercial LEO Destination (CLD) program so that multiple commercial space stations become operational as soon as possible.**

Space Solar Power (SSP)



SSP uses mirrors that reflect onto panels that take in sunlight on one side and put out microwaves on the other (Source: John Mankins)



- SSP refers to gathering the Sun's energy in space and beaming it to Earth.
 - Supplies large quantities of reliable, predictable, carbon free base load energy.
 - Integrates well with ground solar and wind.
 - Exports energy to global markets.
- In the past SSP could not compete with ground production. However:
 - Launch cost is a large fraction of SSP expense. It has dropped substantially (from \$20,000/kg to \$1,400/kg) in the last 10 years, and new vehicles in flight test today may reduce these costs a great deal more.
 - Manufacturing space hardware is an even larger expense. Hyper modular designs consisting of large numbers of identical modules amenable to mass production have been demonstrated by fleets of identical communication satellites to reduce hardware cost by as much as 99%.
- Much of the needed technology has been developed, but significant technical and financial risks remain. Much of this risk could be retired by sub-scale SSP demonstration plants built as public/private partnerships.
- See materials at space.nss.org/space-solar-power-resource-page

- A partial sample of SSP momentum:
 - Japan's Basic Space Law Development added a demonstration of SSP microwave wireless power transmission from low Earth orbit (LEO) to Earth by 2025.
 - UK delivered a [September 2021 report](#) finding that SSP can be price competitive while making a significant contribution to achieving carbon Net Zero by 2050.
 - Beyond Earth Institute published a very positive [August 2021 report](#) and a draft Space Policy Directive placing SSP at the heart of a government-wide initiative
 - Progressive Policy Institute published [a very favorable report](#) in August 2021.
- The energy market is so large that those developing successful SSP will dominate cislunar space. China has a vigorous SSP program.

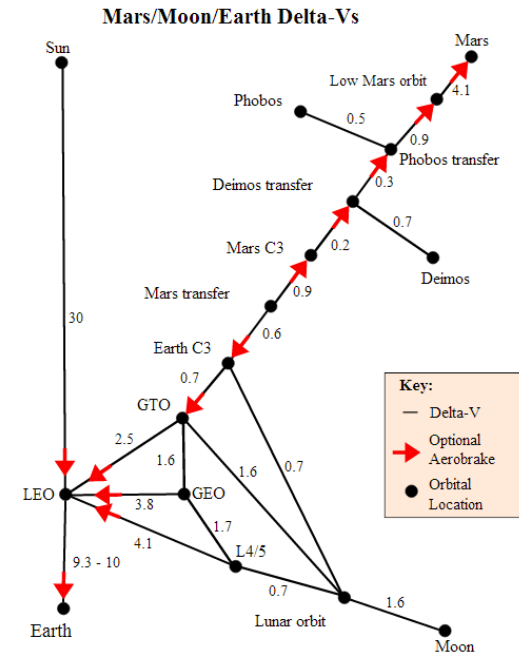
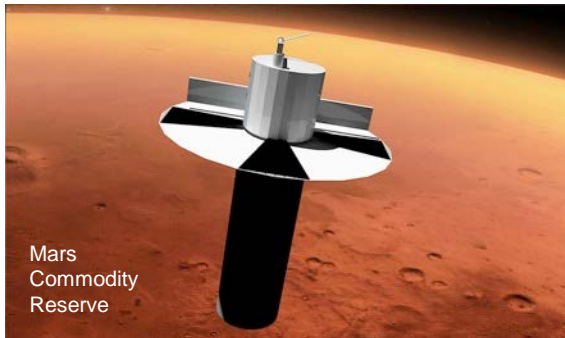
Request: Will you support (FY2023)

- **\$2M to the DoC office of Space Commerce to propose a program along the lines of NSS' [A Public/Private COTS-Type Program to Develop Space Solar Power](#)?**
- **DoD's Space Rapid Capabilities Office at \$80M (PE 1206857SF) with at least \$60M for SSPIDR for global energy distribution from space?**
- **DoD's Operational Energy Capability Improvement Fund at \$74M (PE 0604055D8Z) with at least \$24M for power beaming and advanced photovoltaics tech. development?**
- **DoD's OECIF – Non S&T (PE 0604555D8Z) at \$28M with at least \$8M for power beaming and advanced photovoltaics prototyping and transition?**

Strategic Space Commodities Reserve

Citizens' Space Agenda

In order to incentivize the commercial development of the Earth/Moon system, the U.S. Government should create a commodities purchase program for delivery to key locations in the Earth/Moon/Mars system.



N.B. Not all possible routes are shown. Delta-Vs are in km/s and are approximate

- Commodities are chemical precursors containing Carbon, Hydrogen, Oxygen, Nitrogen, Phosphorus, Sulfur, and Sodium (CHONPSS) which can be used to create air, water, fuel, fertilizer, and most organic compounds.
- The price paid is a combination of the base mass and a transportation component. Example: if a kilogram of water to the ISS costs \$2,000/kg and the base calculated cost of 1kg transported from the Moon to Earth is \$2,000/kg, then the price paid at ISS for 1kg of lunar water is \$4,000.
- **No money is paid unless and until the commodity is delivered.** Initial amounts will be small enough to fit into existing program's reprogramming authority. See FAA launch indemnification laws for triggering legislative events.
- Commodity depots at each node are provided commercially and are financed through Government loan guarantees with revenue coming from storage fees for non-Government purchased commodities and other services.

Benefits

- Government acts as an aggressively neutral market maker.
- Immediate appropriations are not required.
- Payment only on delivery makes it difficult to game through political means.
- Government is buying an asset that can increase in value.
- Is purely agnostic as to how the commodity is derived or where it came from. Space logistics companies can rely on a market and futures contracts can monetize and match producers and consumers.

Will you support:

- **\$2M in funding the Office of Space Commerce in the Department of Commerce to develop an enabling plan for the creation and operation of the Reserve?**