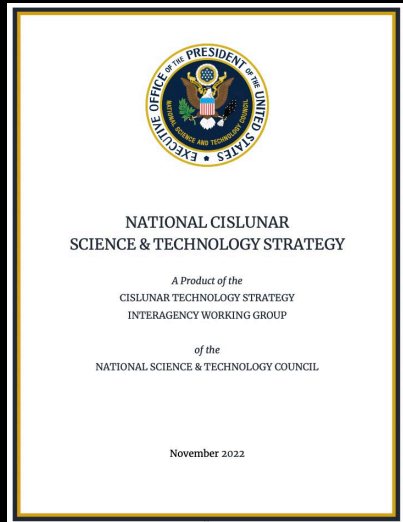
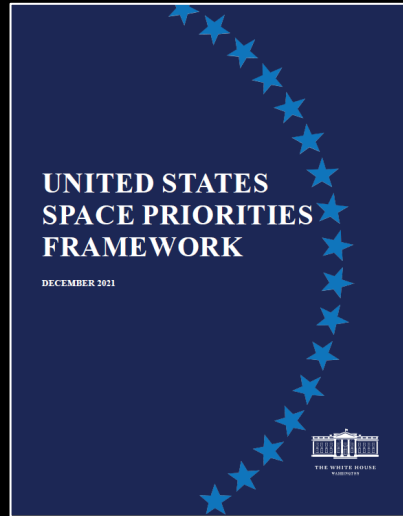


Towards an Interoperable Cislunar Future

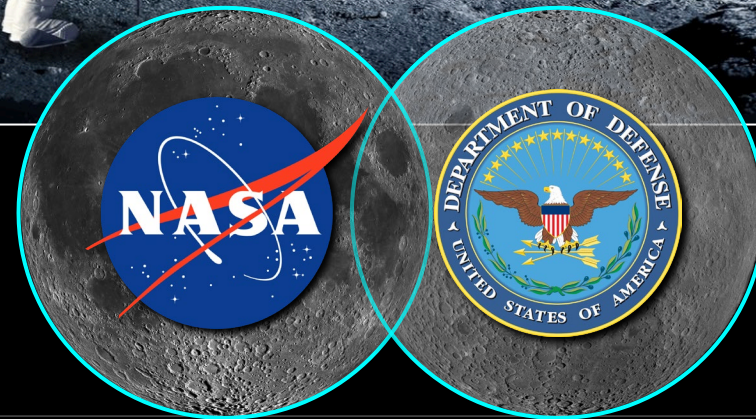
2023 GSAW

Wesley Fuhrman, PhD
Lunar Surface Innovation Initiative Lead
Johns Hopkins Applied Physics Laboratory

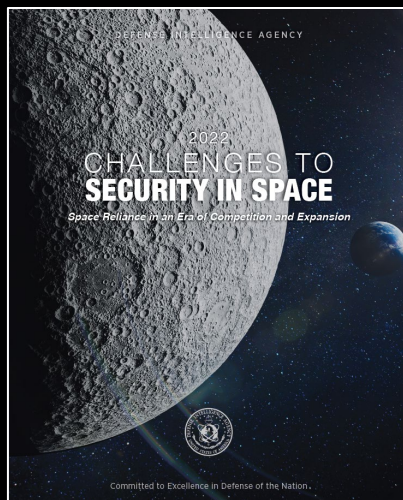
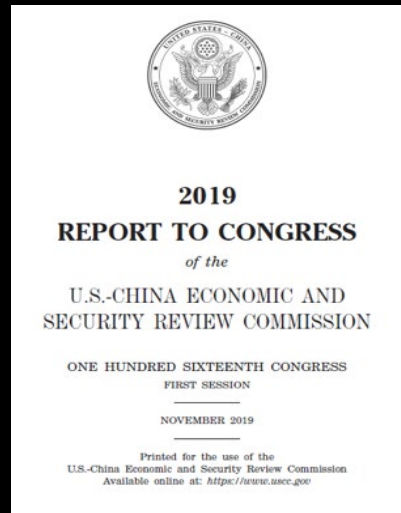
Whole of nation importance of Cislunar Space



“...the United States will lead the return of humans to the Moon for long-term exploration and utilization, followed by human missions to Mars and other destinations.”



The Cislunar Threat

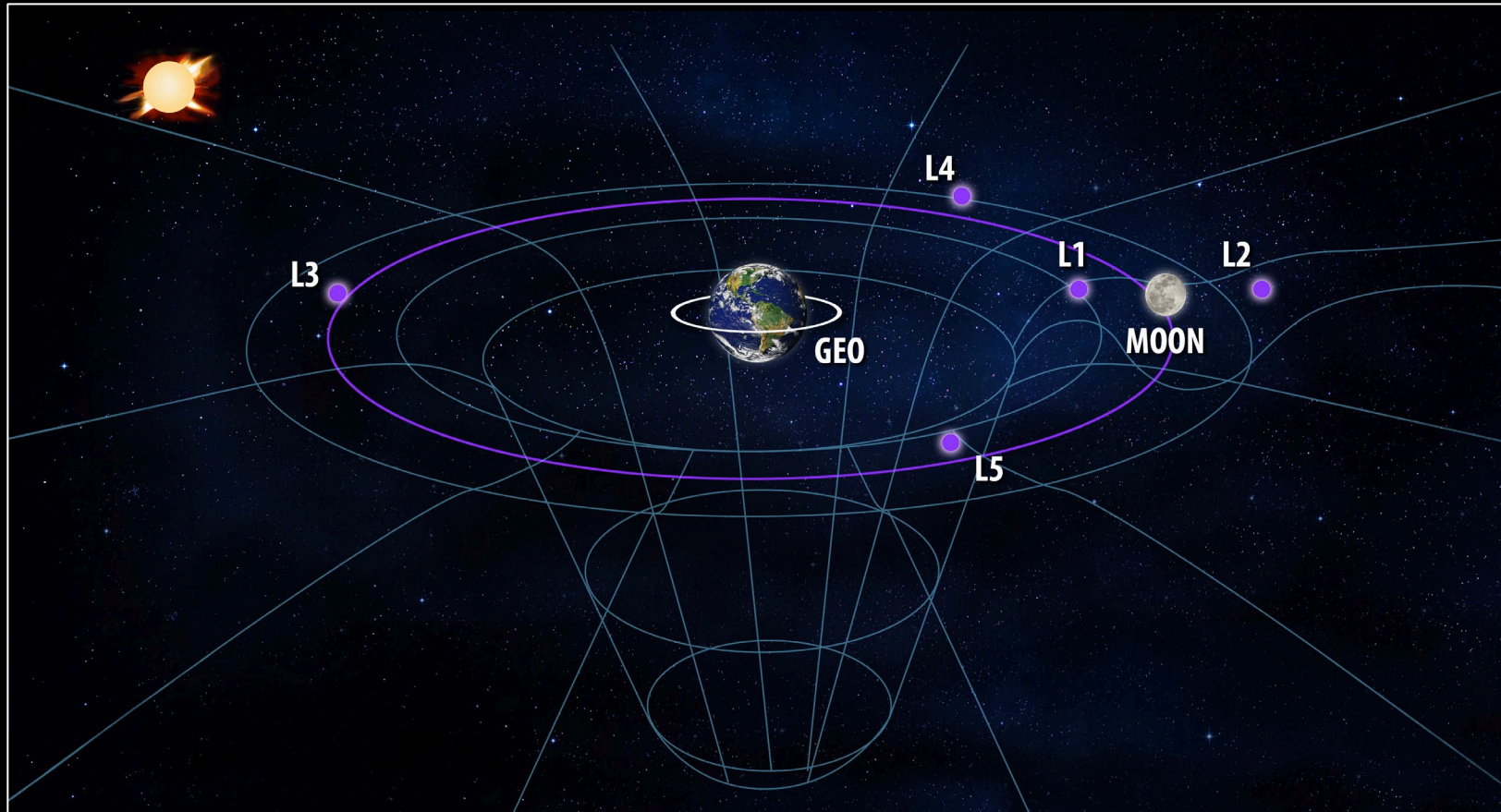


“...the goal of China’s space program is not merely exploration, but rather ‘**industrial and economic dominance of the cislunar system.**’”



LunaSociety.org

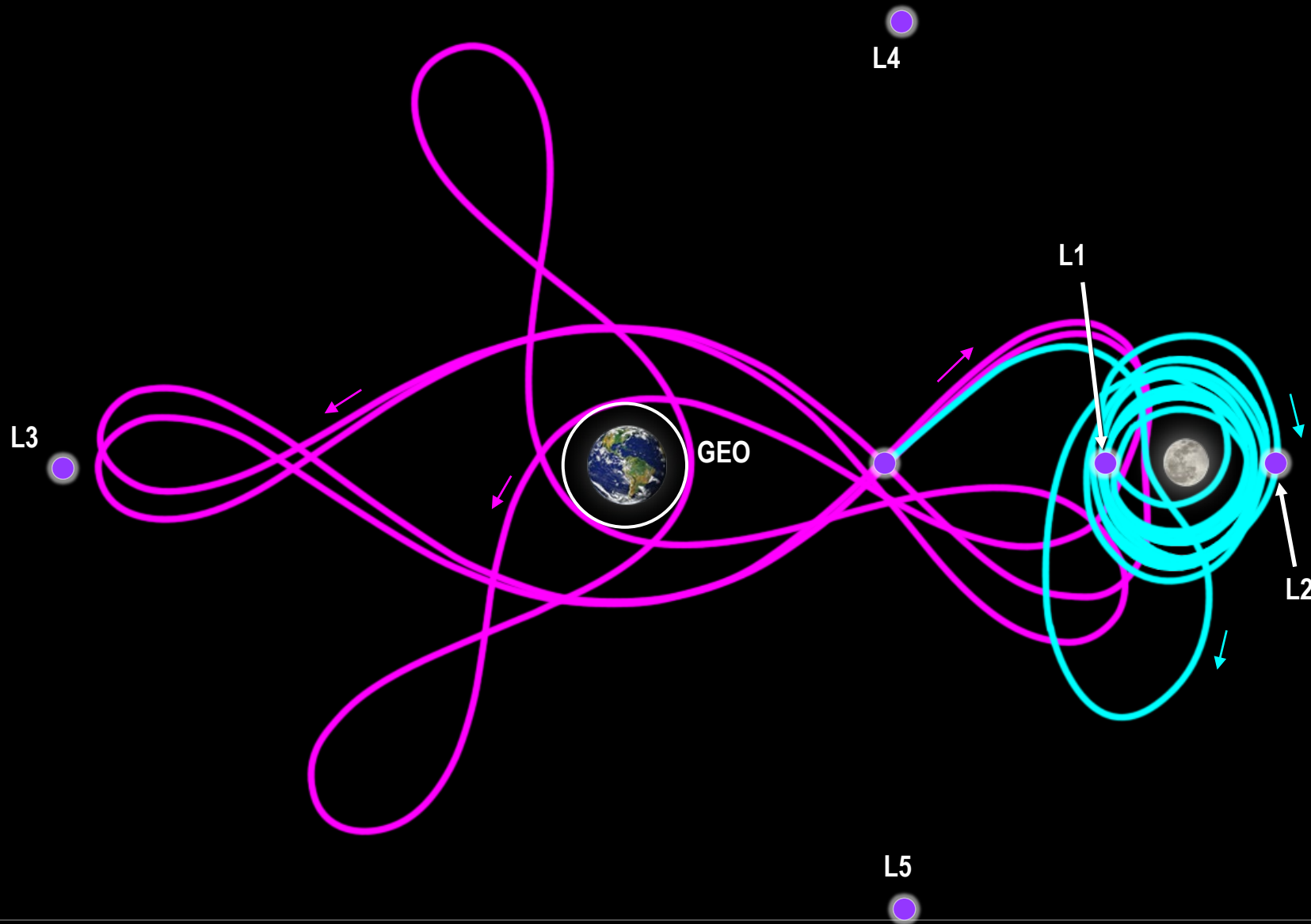
Cislunar Space Domain Awareness Is Hard



- More than 1000× larger than space within GEO
- Low energy required to transfer between orbits
- Complex orbits

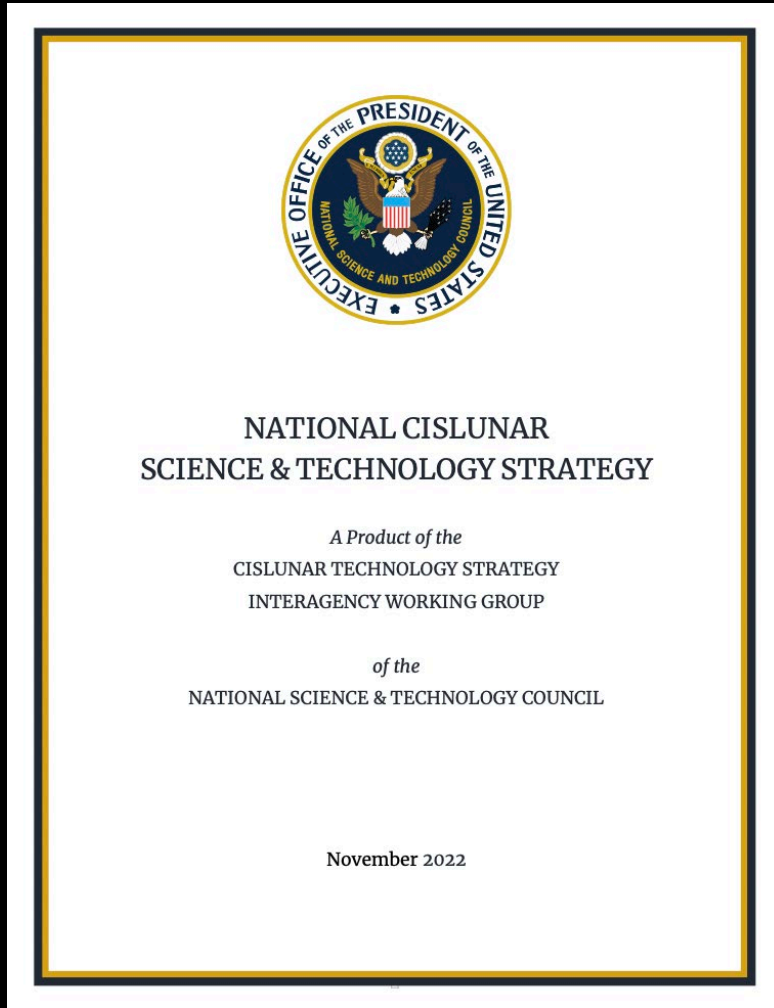


Intricate Cislunar Orbits complicate SDA



First National Cislunar Science & Technology Strategy

Released during 2022 Cislunar Security Conference



- 1) Support **research and development** to enable long-term growth in cislunar space
- 2) Expand **international S&T cooperation** in cislunar space
- 3) Extend U.S. **space situational awareness capabilities** into cislunar space
- 4) Implement cislunar **communications and PNT capabilities with scalable and interoperable approaches**

- Consider the Moon & cislunar space as a proving grounds for many things
 - Technologies needed for deeper, longer exploration/operations
 - Sustainment of a unity of purpose and objectives
 - Acquisition strategies and partnerships
- Coordinated digital engineering with standards and benchmarking
 - International “lunar” year and basis coordinate system
 - Not just “TLEs” – more sophisticated, integrated M&S needed
 - Models that are evolvable as we operate in this domain
- Proactive SDA, Comms and PNT
 - Identification + navigation beacons
 - Spectrum management
- Interoperability needs to be pursued in a coordinated, integrated fashion, driven by architectural decomposition started early. Many players are “moving out” already.

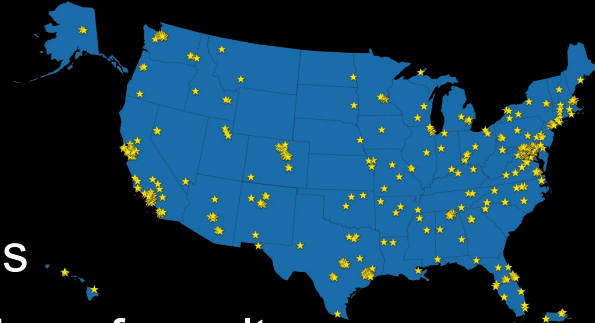
Lunar Surface Innovation Consortium (LSIC)



The Consortium is a nationwide alliance of academia, industry, non-profits and other government agencies with a vested interest in establishing a sustained presence on the Moon.

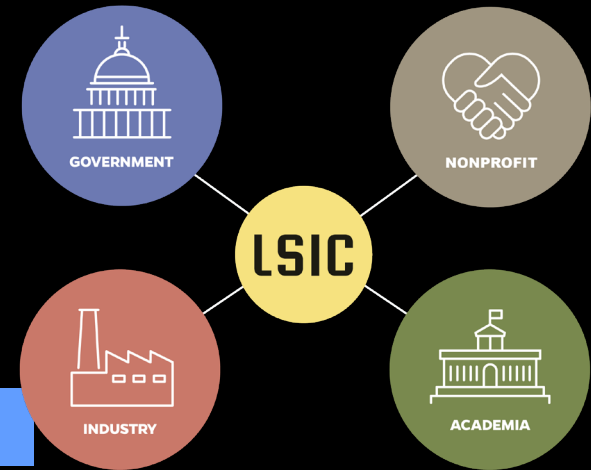
Consortium Objectives:

- Identify lunar surface technology needs
- Make recommendations for addressing key lunar surface gaps
- Provide a central resource for gathering information and sharing of results



Focus Group Objectives:

- Establish collaborative relationships among members
- Build community and develop talent
- Compile member input and report outcomes and recommendations



Bi-annual meetings, with monthly virtual Focus Group for regular interaction.

Please visit lsic.jhuapl.edu for additional information on the Consortium