

**The LunarCube Initiative.** R.T.Cox<sup>1</sup>, P.E. Clark<sup>2</sup>, A. Vasant<sup>1</sup>

<sup>1</sup>Flexure Engineering (Russell.Cox@FlexureEngineering.com), <sup>2</sup>Catholic University of America.

**Introduction:** Cislunar space, from low Earth orbit to the Lunar far side halo orbit (LL2), is a uniquely accessible environment for planetary scientists and explorers. Cislunar space is a unique environment providing physical analogs for many extreme conditions from Mercury to Pluto. Cislunar space is the gravitational gateway for all destinations in the solar system.

Because of this, Cislunar space will be the staging and training ground for the human expansion into the solar system in the 21<sup>st</sup> century.

The LunarCubes Initiative is a collection of events and collaborative teams (initially sponsored by The Select Investor and Flexure Engineering) intended to vector interest, investment and activity to Cislunar space to enable and accelerate the exploration and settlement of the solar system in coming decades.

**The Lunar Workshops:** The Lunar Workshops are comprised of three annual workshops:

- International Workshop on LunarCubes (LCW) – LCW 3 will be held November 13-15, 2013 in Mountain View CA.
- International Workshop on Lunar Superconductor Applications (LSA) – LSA 4 will be held Spring 2014 in Cocoa Beach FL.
- International Workshop on Scientific Opportunities in Cislunar Space (SOCS) – SOCS 1 will be held March 16, 2014 in Houston TX.

**The Lunar Challenges:** Starting in 2014 each workshop will be augmented with a technical challenge competition. For each challenge the prize purse will be raised through crowd sourcing, such as KickStarter. The operations budget will be raised through sponsorships and the events will be coordinated with the annual workshop for each of the three challenges. Challenge goals will be defined by workshop participants. Smaller competitions will begin in 2014 with our target goals for 2016 as follows :

- LCW Challenge 2016 - \$1 Million Prize
- LSA Challenge 2016 - \$500,000 Prize
- SOCS Challenge 2016 - \$250,000 Prize

Each challenge will have three parts :

- Technical Challenge : First or best wins
- Team Competition : Top three teams win
- Business Plan Completion : Team business plans will be reviewed, judged and possibly funded by a pool of qualified investors.

**The LunarCubes Exploration Architectures:** In the context of the workshops and challenges, The Select Investor and Flexure Engineering will spearhead the creation of study groups or collaborative teams to explore three LunarCubes Exploration Architectures:

- Astrobotic Lunar Lander
  - Orbital Deployed LunarCubes
  - Surface Deployed LunarCubes
  - Rover Mounted LunarCubes
- ULA - MULE LunarCubes Platform
  - Ion Drive ( Moon, Mars, Venus )
  - ESPA Ring Spacecraft Bus
  - Swarm of 10's of LunarCubes
- Sierra Lobo CryoCubes
  - Passively Cooled to < 100K
  - LEO to Cislunar missions
  - Test bed for low temperature technologies : ULT\ULP\HTS

(The companies mentioned above are simply current leaders, these architectures will be implemented by many private and national organizations)

**The Lunar Geophysical Year 2017 to 2018:** From July 1957 to December 1958 : in order to better understand the Earth's environment from the surface to deep space, The International Geophysical Year (IGY) was carried out by the International Council of Scientific Unions. This event saw the discovery of the Van Allen Belts and the launch of Sputnik 1. To honor the 60<sup>th</sup> anniversary and to promote excitement in and understanding of space research we are proposing an International Lunar Geophysical Year from July 2017 to December 2018. The ILGY will promote additional missions to Cislunar space and provide a venue to explore and address the geopolitical and global economic issues around Cislunar exploration and exploitation. The ILGY will have three focus areas:

- Cislunar Missions ( in Space 2017 to 2018 )
- Cislunar Science ( Lunar, Terrestrial and Planetary Analogs )
- Global Communities : Science, Political, and Public