

# Space Studies Institute:

Space Manufacturing 14: Critical Technologies for Space Settlement

*The ILO as Property Rights Agent*

29 - 31 October 2010 – Silicon Valley, California, USA



# **International Lunar Observatory As Property Rights Agent**

**Steve Durst, Charles Bohannon, Joseph Sulla**

**ILOA / Space Age Publishing Company  
Hawai`i and California, USA**



- **Galactic /  
Inter-Stellar**
- **Earth - Moon /  
Multi-World**
- **Hawaiian**
- **Multi-Functional**

# ILO – 3 Missions



- **ILO-1 Polar Mission**  
(NET 2013)
- **ILO-X Precursor Mission**  
(NLT 2013)
- **ILO Human Service Mission**

# **Multi-Functional**

**The ILO is a Multi-Functional ...**

- **Astrophysics / Moon / Earth Observatory**
- **Power Station**
- **Communications Center**
- **Site Characterizer**
- **Property Rights Agent**
- **Virtual Dynamic Nexus Website**
- **Hawai`i Astronomy Booster**
- **Toehold for Human Lunar Buildout**

# **Primary and Secondary ILO Mission Objectives:**

- **First Light Galaxy Imaging**
- **Initial landing site observation, local surveillance**
- **Earth observations: albedo, geocorona, etc.**
- **Search for Earth-like planets**
- **Search for Extra-Terrestrial Intelligence (SETI)**
- **Analyze interstellar molecules to determine origin of Solar System**
- **VLF observation**
- **Observe signs of life on Mars, Europa, Titan, etc.**
- **Search for dangerous NEOs**
- **Sun-Earth observations, solar storm warnings**
- **More**



# ILO Galaxy First Light Imaging



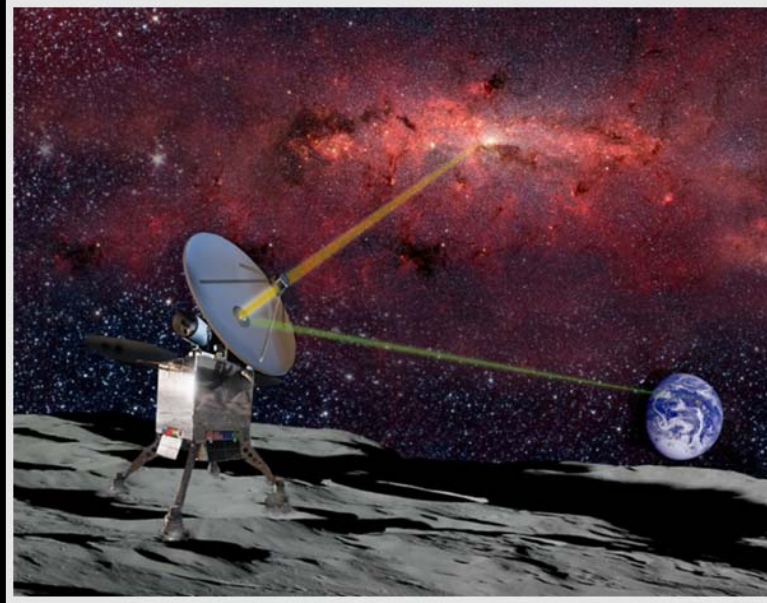


**We are here**

# **Why Galaxy Education, Consciousness & Awareness is Important for the 21st Century:**

- **Education – for primary, secondary higher, and highest education: Knowledge, understanding of humanity's place in the Universe – our Milky Way Galaxy occupies a mid-position domain between Solar System finiteness and Cosmos infinity**
- **Astrophysics / Astronomy – Galaxy studies internationally are of increasing interest and value; study of our local stellar neighborhood for familiarity; center / central 10 parsecs with supermassive black hole is most dynamic region of Milky Way**
- **History of Human Civilization / Archaeoastronomy**
- **NASA, World Space Agencies – 21st Century Program and Policy Development Advance through Galaxy understanding**
- **Galacticity – may be as important for the 21st Century, as is Relativity to 20th**





ILO Imaging Galaxy Center



EarthRise Photo : 1968 / Apollo 8

# ***Galaxy Forum Architecture***

## ***21st Century Education***

- **Hawai'i, USA: Kona, Waimea, Hilo, Oahu, Hapuna**
- **Silicon Valley, California, USA**
- **Kansas, USA**
- **Vancouver, Canada**
- **Beijing, China**
- **Bangalore, India**
- **Prague, Europe / Czech Republic**
- **Tokyo, Japan (4 December 2010)**

# Lunar Commercial Communications:

*The International Lunar Observatory requires communications capacity to transmit astrophysical data to satisfy its primary mission. Bandwidth not utilized for astrophysical data transmission can be made available on a commercial basis.*

## Commercial Usage of Additional Bandwidth

Pre-sold Bandwidth	Bandwidth Available Upon Emplacement (May be pre-sold when launch date set)		Future Need
<p><b><u>Space Calendar Broadcast</u></b></p> <p>This Space Calendar will be transmitted from the Moon. Advertisers will pay a premium rate for transmission of their ads from the lunar surface.</p>	<p><b><u>Internet Search Engine Giants</u></b></p> <p>Search engine giants, such as Google and Yahoo, as well as other internet businesses, will be able to purchase bandwidth and use it to provide special services from the lunar surface, which might include local imagery. Interactive games may be developed which actually take place on the Moon.</p>	<p><b><u>Specialty Advertising Opportunities</u></b></p> <p>Large corporations will be able to use a Moon email system to capture the attention and interest of consumers for products which may relate to any of the numerous associations modern culture attributes to Luna.</p>	<p><b><u>In Situ Communications and Monitoring Capabilities for Robotic Project Operators</u></b></p> <p>As the wave of robotic and mining/excavation missions arrive on the lunar surface, they will do so with the knowledge that communications and surface monitoring capabilities in the region of Malapert Mountain and Shackleton Crater will be in place and available for purchase.</p>

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[EDIT]

Space Settlement Technologies Focus of SSI Conference

On October 29-31, space scientists and advocates will meet in Silicon Valley for Space Studies Institute's (SSI) 'Space Manufacturing 14: Critical Technologies for Space Settlement' conference at NASA Ames and the Sheraton Sunnyvale Hotel. This year's event is a revival of a classic series of Space Manufacturing conferences held in Princeton NJ from 1974 – 2001, and will attempt to reinvigorate research and collaboration in the international space community. Limited to 200 participants, the event will focus on pioneering humanity's expansion into the solar system and feature a range of topics on space solar power, advancing cislunar propulsion technologies, mining methods for asteroid utilization and robotics for space exploration and development. Taber MacCallum, William "Red" Whittaker and Brad Blair are among some of the chairs for the 7 sessions. On Oct 29, NASA Ames Director Pete Worden (inset) will moderate a panel discussion on 'Moon, Mars, Asteroids: Where to Go First for Resources?' Panel experts include XCOR Aerospace CEO Jeff Greason, University of Maryland Astronomy Professor Mike A'Hearn, Asteroid Enterprises Ltd President Mark Sonter, SSI Professor John Lewis (CR), Penguin Automated Systems Professor Greg Balden and Lunar and Planetary Institute Scientist Paul Spudis. Other presentations include 'The ILO as Property Rights Agent' by International Lunar Observatory Association Director Steve Durst and 'Synthetic Genomics' by biologist Craig Venter. Founded in 1977 by Gerard O'Neill (TR), the SSI maintains its commitment to advance space settlement and industrialization. Pictured: SSI Vice President Lee Valentine (BR). (Credit: SSI, NASA, XCOR, AAS, aecom.com, futurhi.net)















Read

LUNAR ENTERPRISE DAILY

"Tomorrow's News Today"

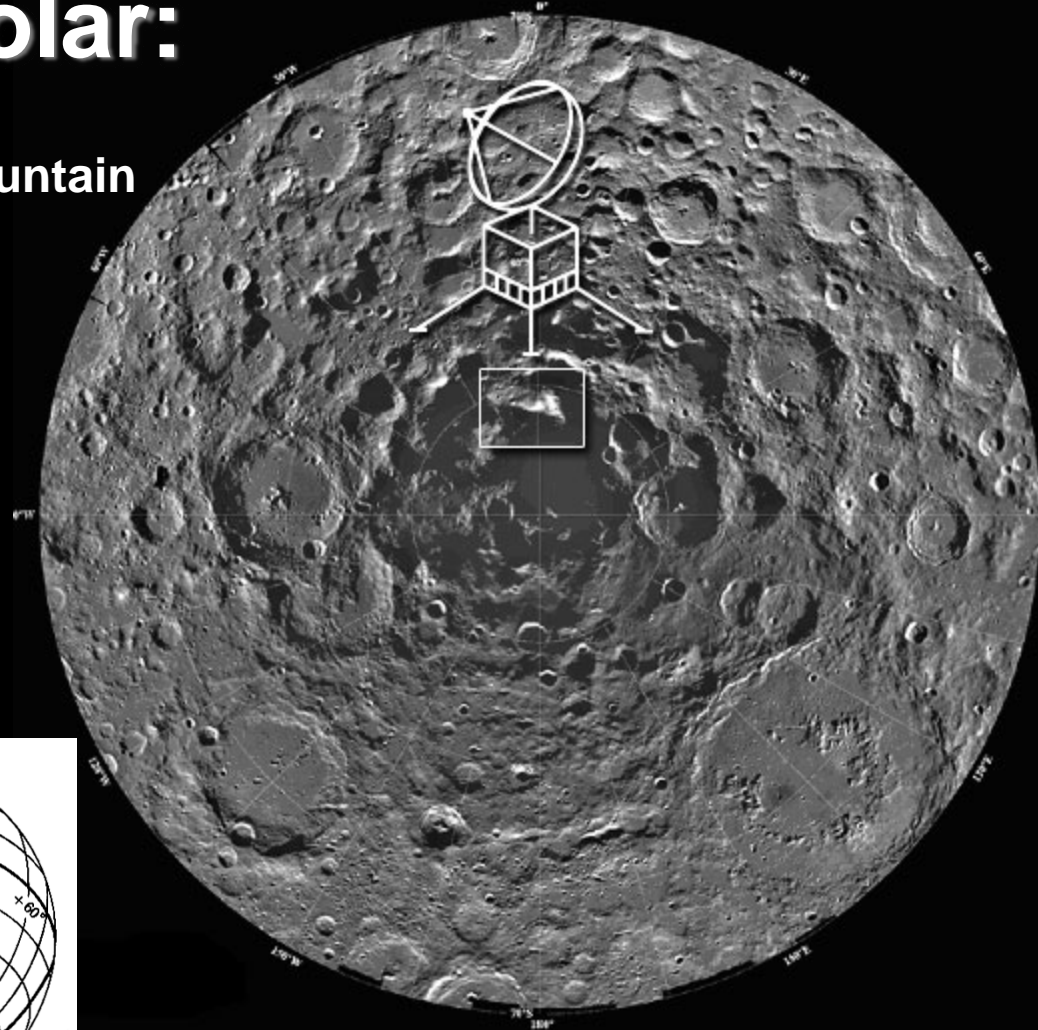
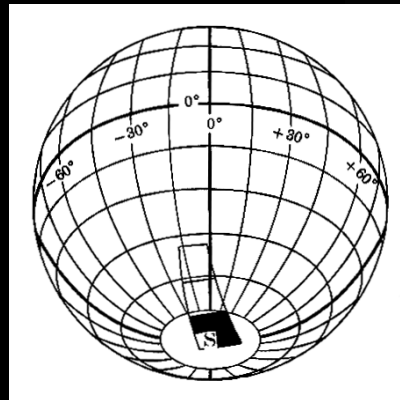
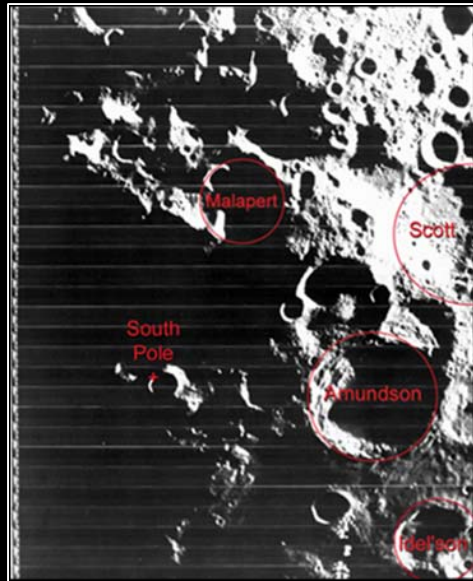
Space Calendar is launching to the Moon and aiming for the Stars!



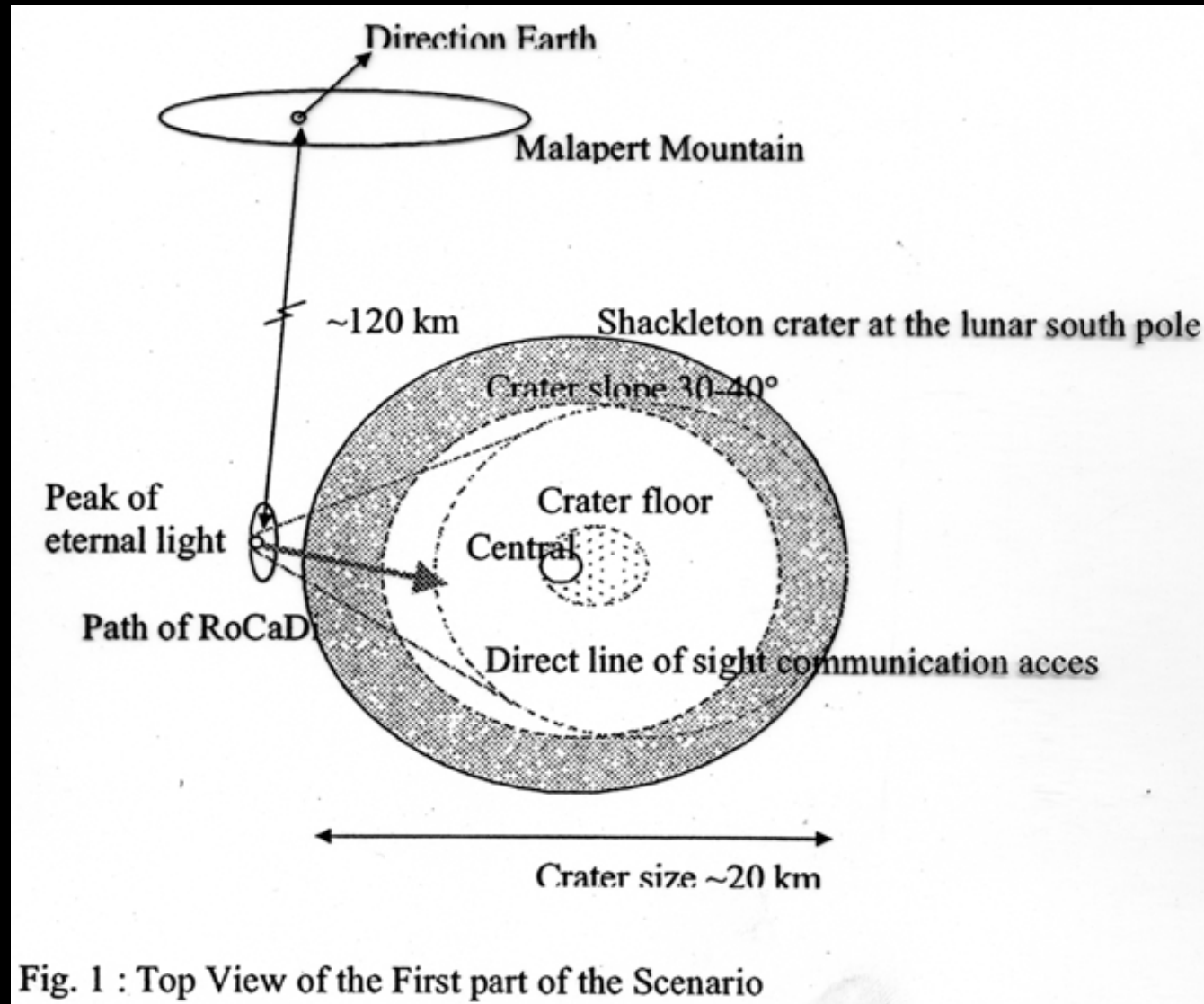
# International Lunar Observatory (ILO)

## ILO-1 Polar:

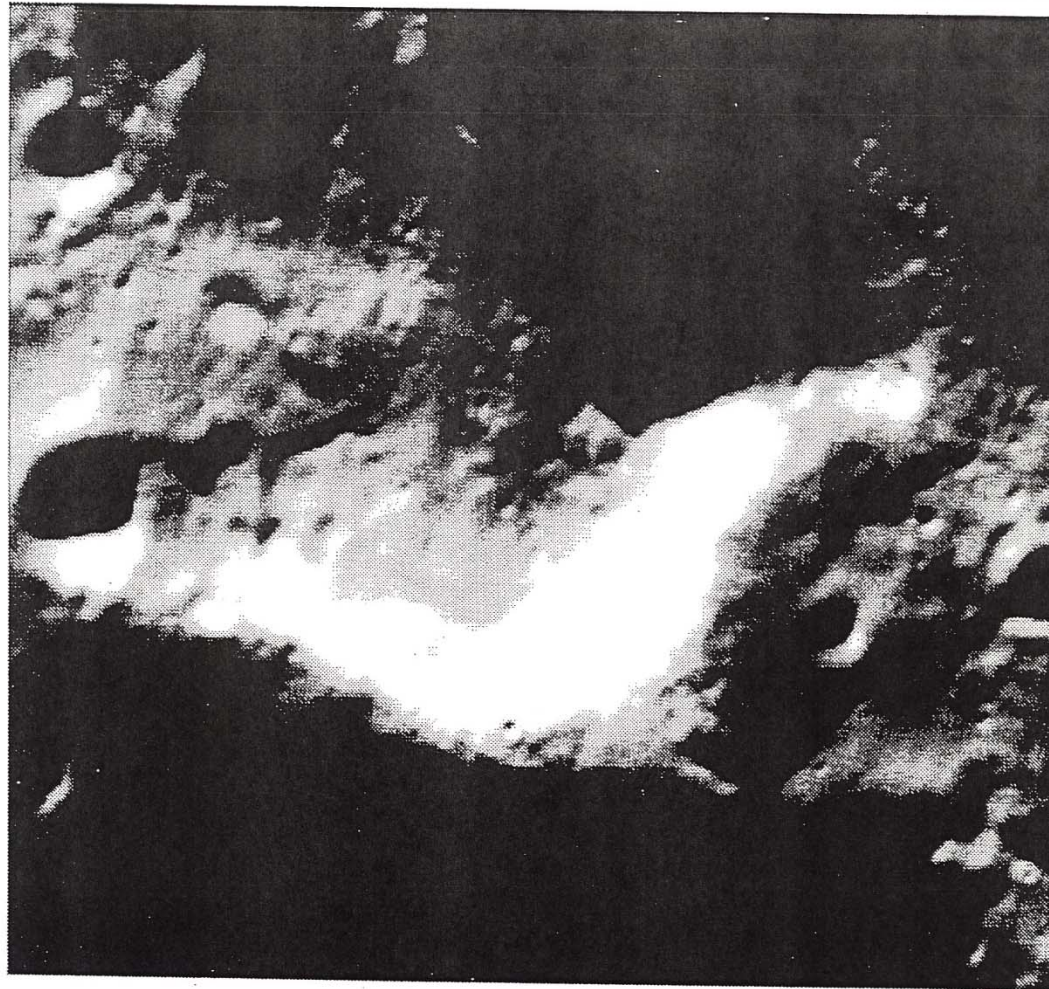
- ILO to be Located at 'Malapert' Mountain
- 'Electrification' of the Moon



# Shackleton / Malapert Mountain Crater Location



## Lunar Orbiter 4 Close-up of Malapert Mountain



# Lunar South Pole – Kaguya



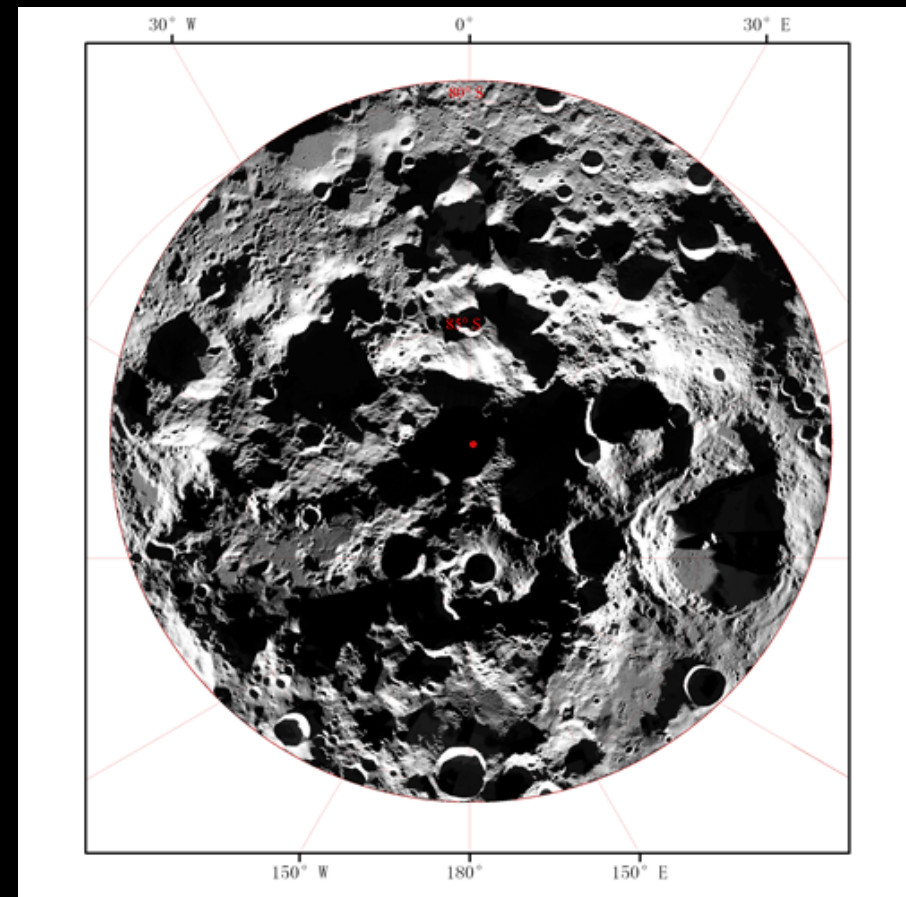
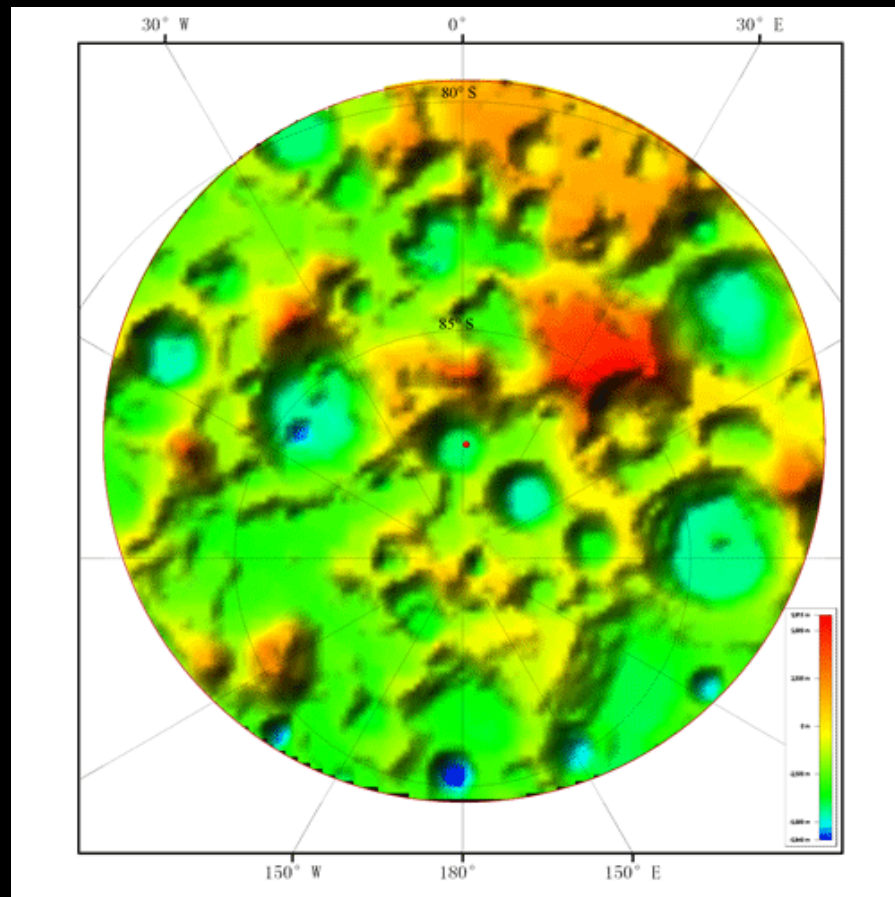
Mons Malapert

Shackleton Crater

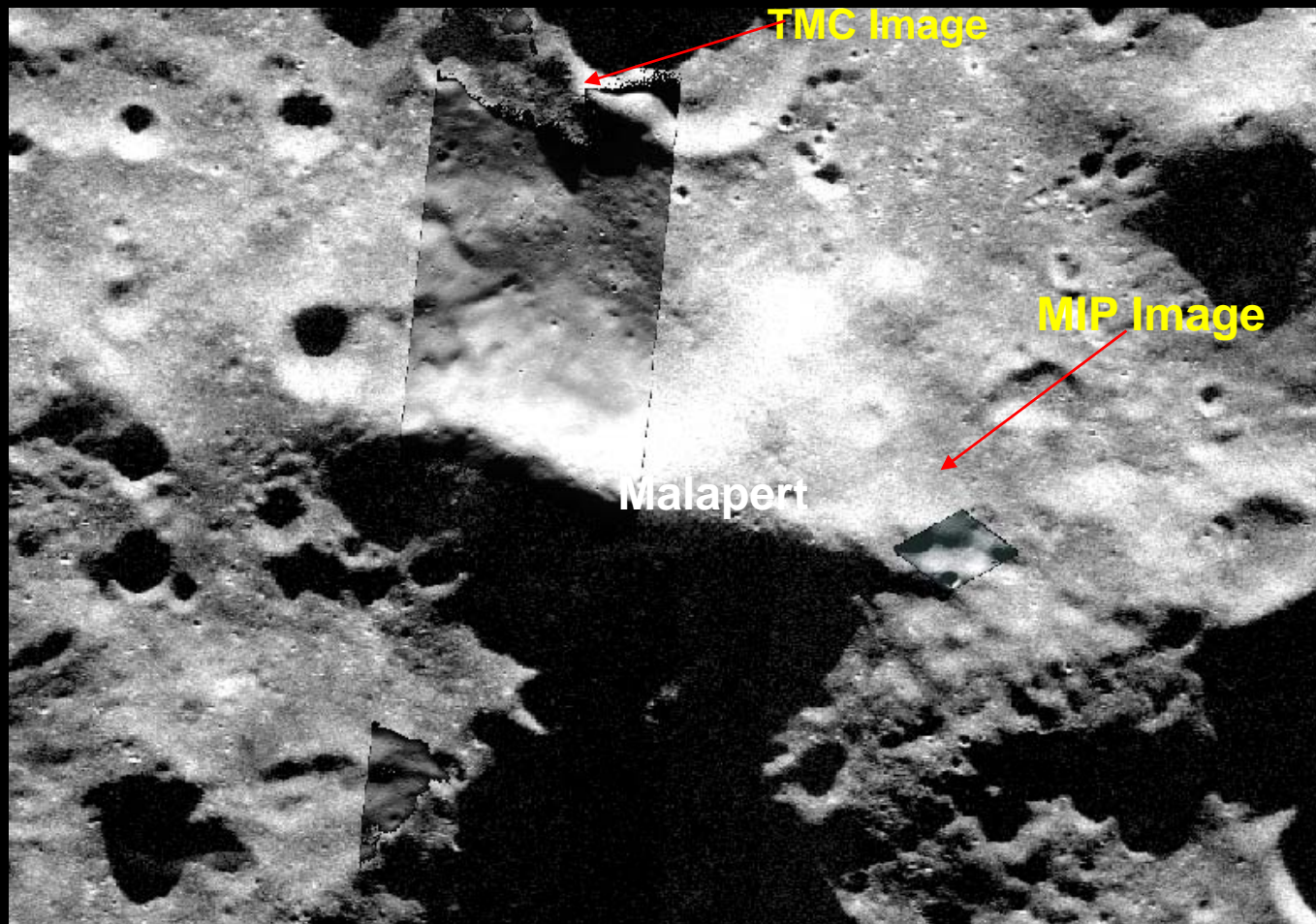
© JAXA/NHK



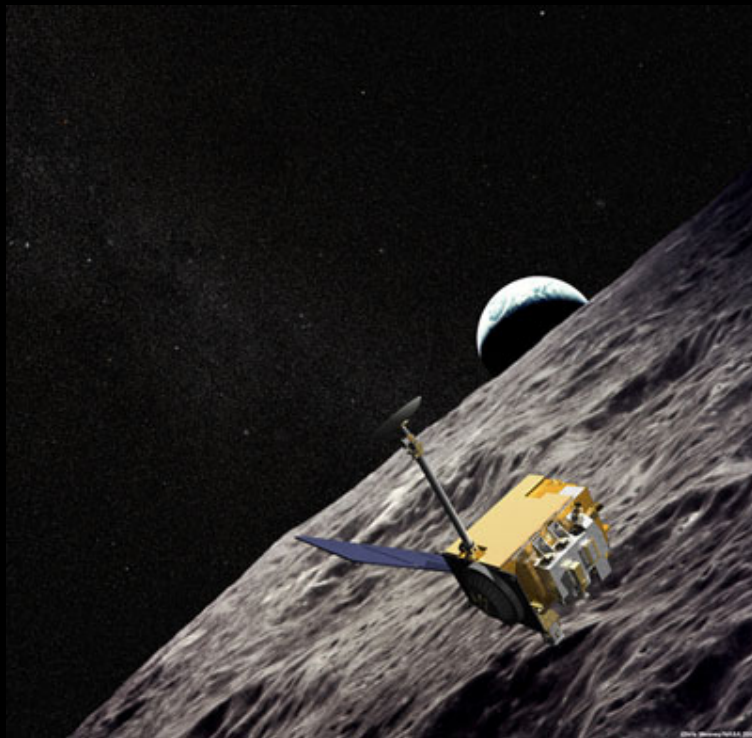
# Lunar South Pole – Chang'e-1



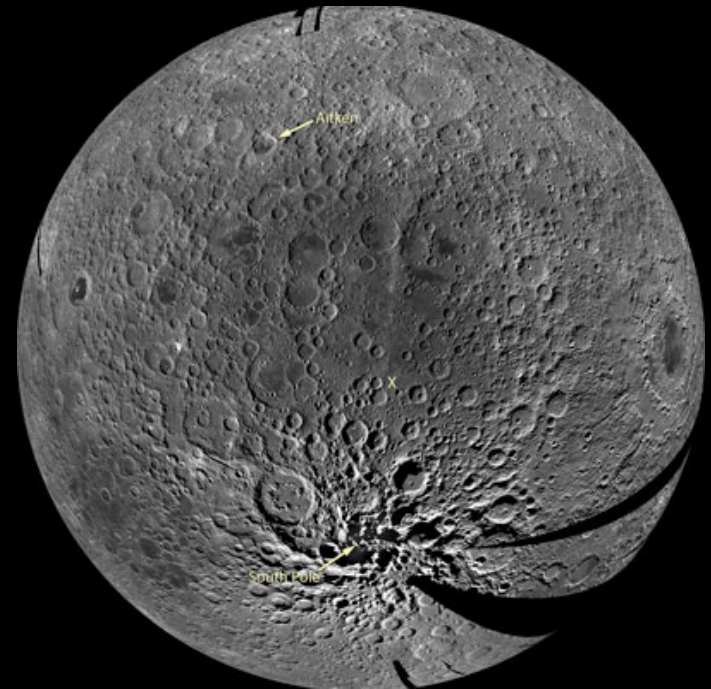
# Lunar South Pole – Chandrayaan-1



# Lunar South Pole – USA Lunar Reconnaissance Orbiter (LRO)



**LRO – artist's conception**



**South Pole with Aitken Basin**  
*via LROC Wide angle camera - 50km*

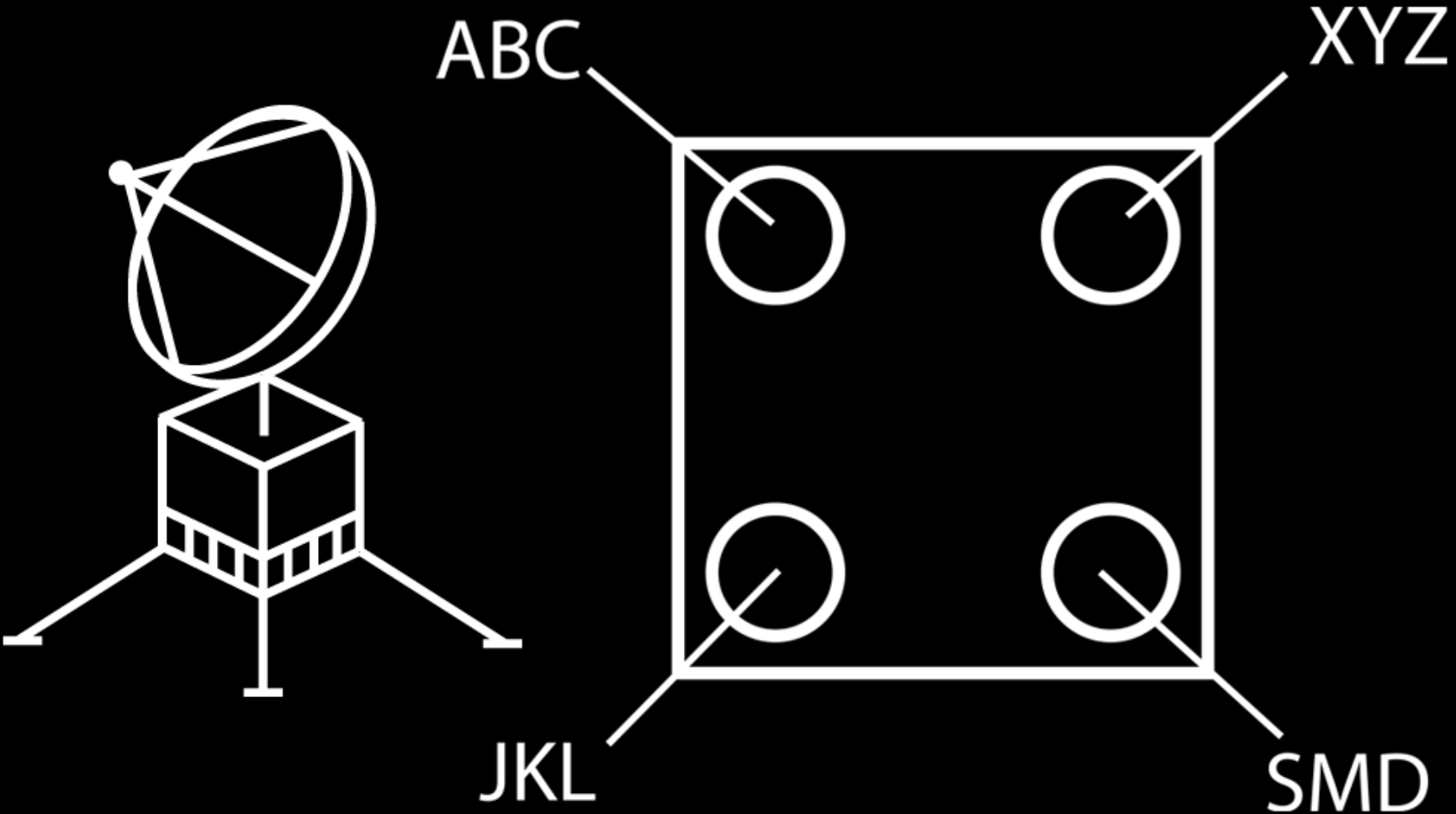


# **Lunar South Pole GIS Landing Site Data Set**

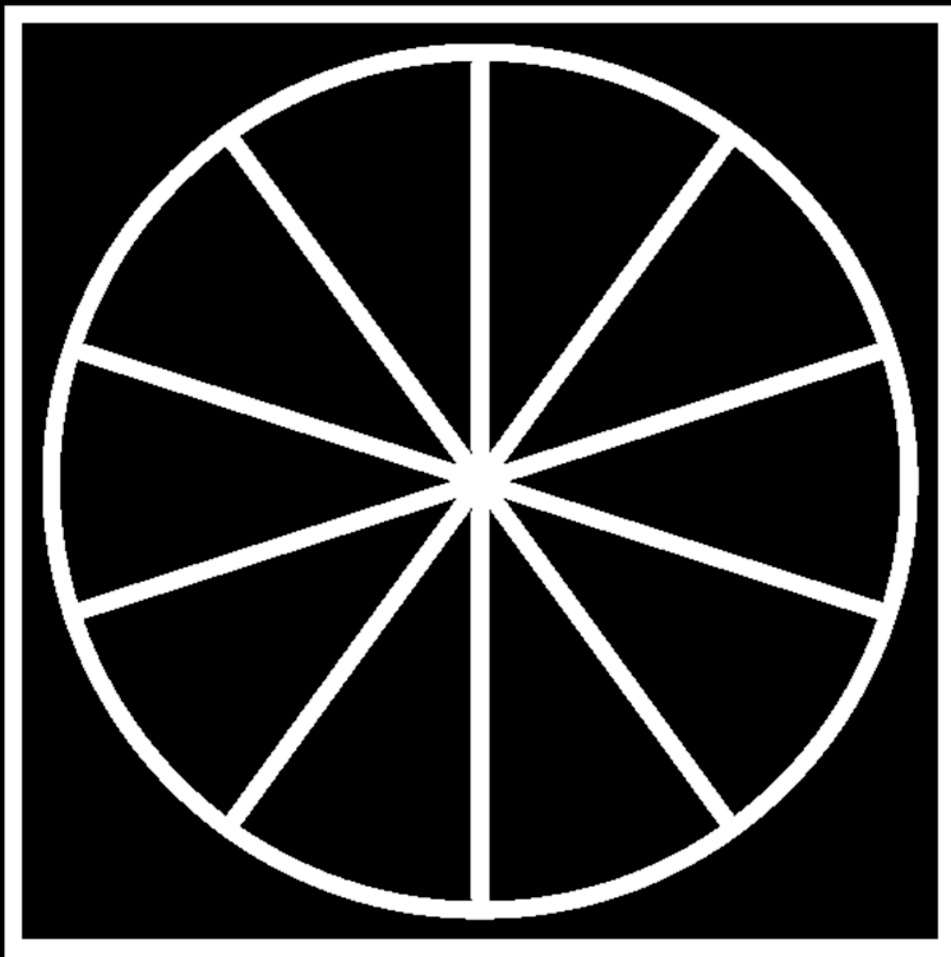
- Reconcile lunar data from the orbiters of USA (LRO, Prospector and Clementine), China (Chang-e 1), India (Chandrayaan-1), Japan (Kaguya / SELENE), Europe (SMART-1) and other ground-based data including Arecibo.
- Engaged on Hawaii Island, USA by the ILOA, Canada France Hawaii Telescope, University of Hawaii at Hilo and independent GIS experts.
- Identify promising areas for an ideal landing site for the NET 2012 South Polar Moon ILO-1 mission



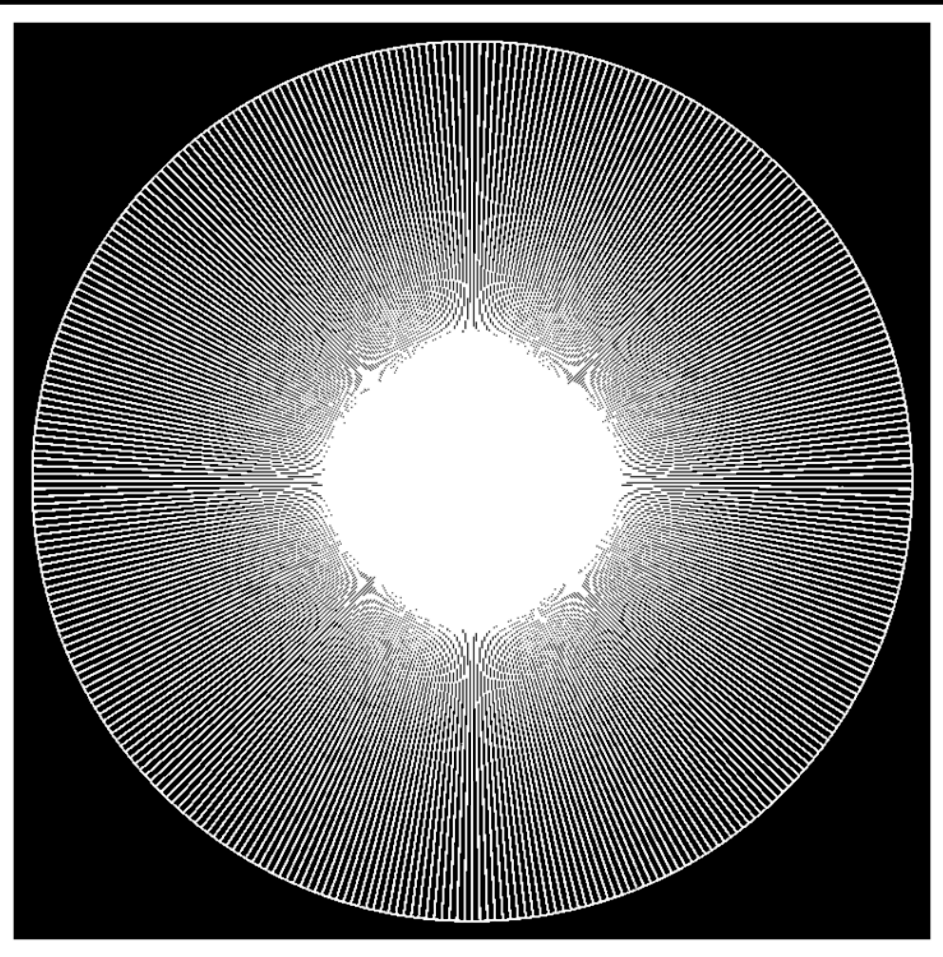
# ILO as Property Rights Agent



# ILO Property Rights – ILO Landing Legs



**10 Parts**



**360 Parts**

# **The ILO As Property Rights Agent**

- \* Individual Property / Land Ownership a Fundamental Human Right, At Least for American / Western Civilization**
- Individual Claim of Lunar / Multi-World Acreage Has Same Justification and Rationale as Individual Claim of Right to Vote**
- \* Lunar Acreage as Meeting Point, Synergy For SpaceAge Freedom and Equality, Liberty and Justice**
- \* About 10 billion acres on Moon with about 6.8 billion individuals on Earth; popular option may be 50% individual acreage donation to common-wealth**
- \* Global, International, USA Organizations Challenged to Address Moon, Multi-World, Space Property Rights / Acreage Claims: LEDA, SSI, SFF, NSS, PLS, AAS, AIAA, UN-OOSA, IAF / IAA / IISL, etc**

# **International Lunar Observatory (ILO)**

## **ILO-X Precursor:**

- **US\$30M Google Lunar X Prize / NASA \$30.1M**
- **Intek Advanced Communications, Odyssey Moon / MDA**
- **ILO 2 Kg Technology Demonstrator Payload**
- **Equatorial Mission**
- **Galaxy First Light Imaging, Lunar / Earth Observation**
- **Communications / Broadcasting**





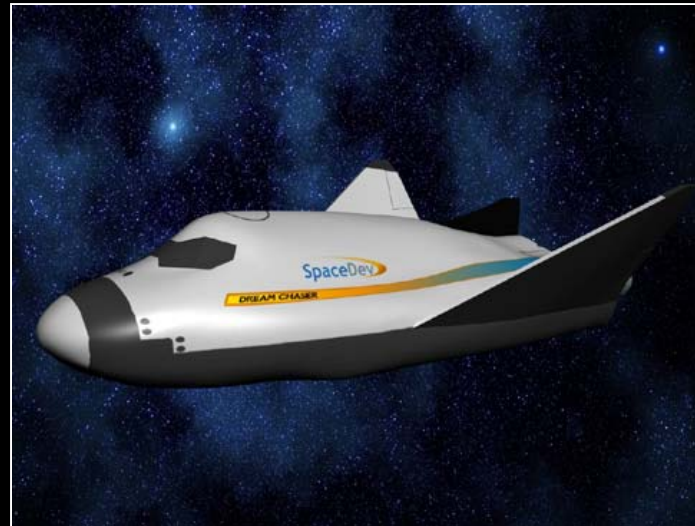
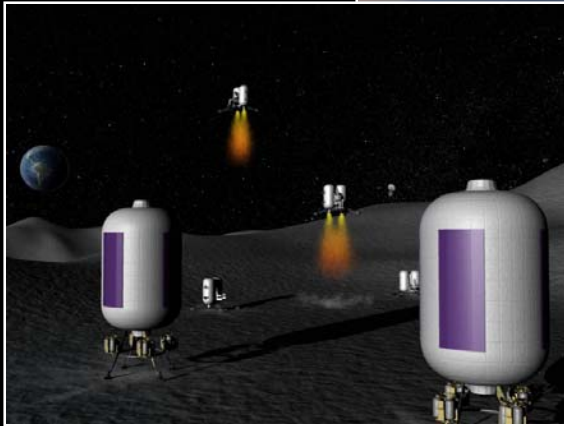
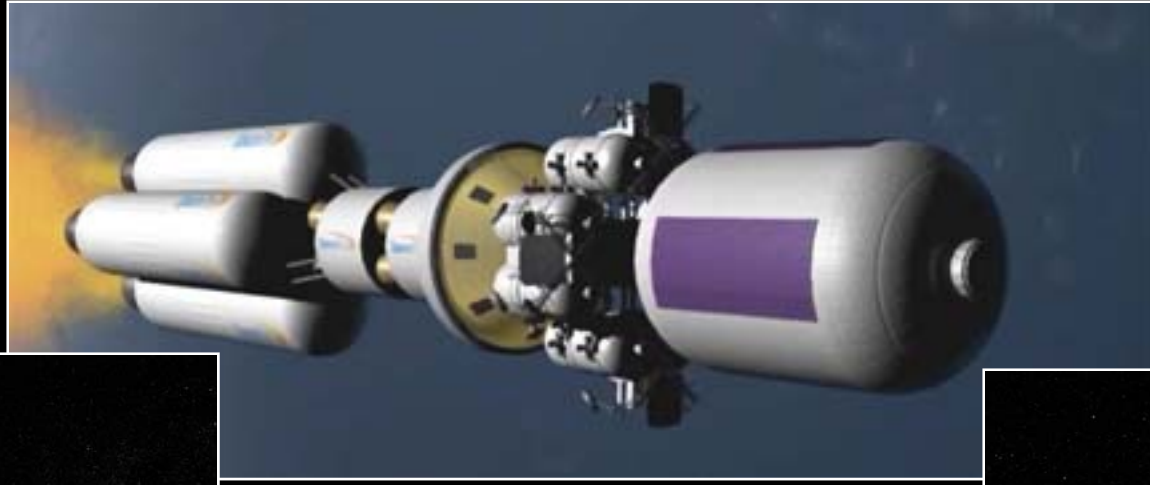
# ILO-X 'Moon Express' Rapid Development Program



- **PHASE 1: Prototype unit with hyperspectral**
- **PHASE 2: Prototype system and Global demo**

*References to Stanford University are for discussion purposes only*

# Human Service Mission



SpaceDev Inc – Dream Chaser, ALOHA Chair

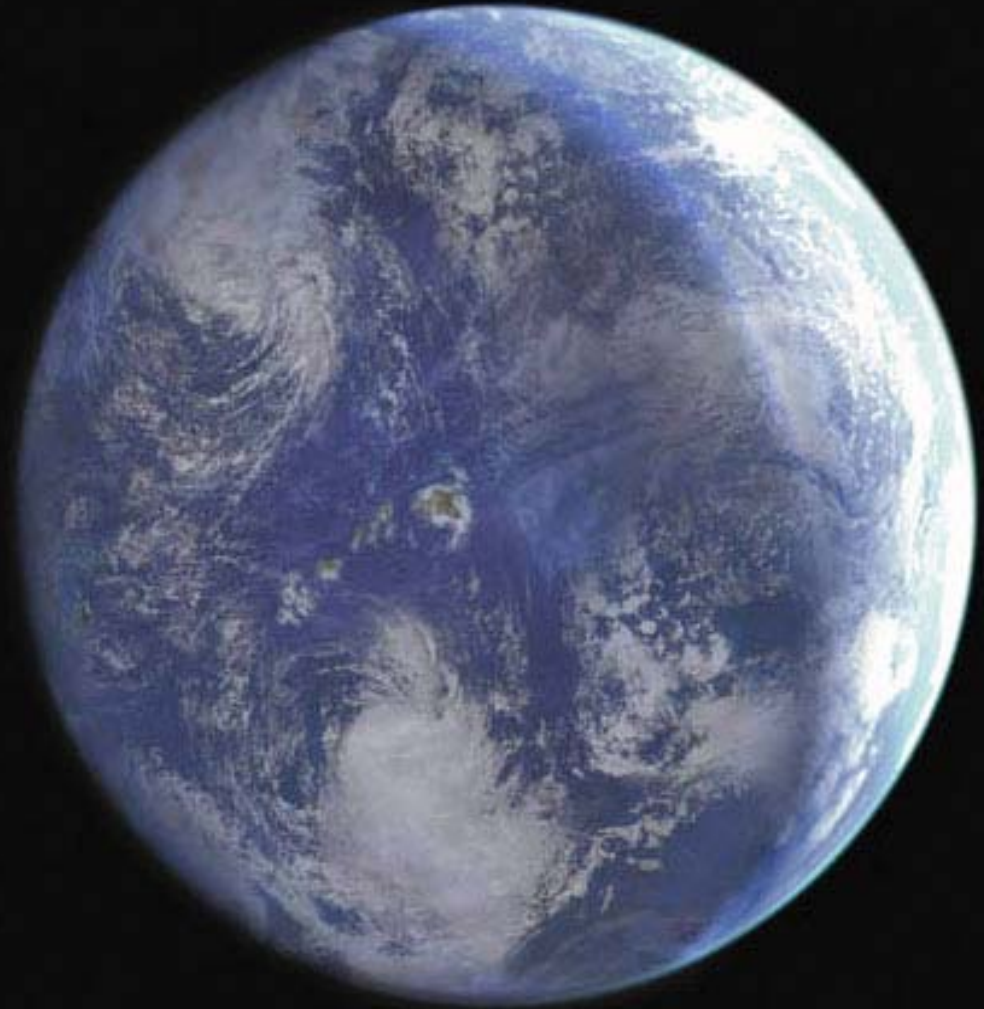
# **International Lunar Observatory Association**

## **ILOA / ILO Assets ...**

- **2 MDA studies (2009-2010)**
- **6 SpaceDev Studies 2003-2008 (ILO / Human Service Mission)**
- **Intek ILO-X Rapid Development currently in progress**
- **Master / Business Plan**
- **Galaxy Forum Architecture 2010-2011**
- **MoUs with CFHT, NAOC / International Partnerships**
- **AMIE Camera, Cisco Systems Router**
- **ILOA Updates / Website / Office**
- **Lunar Commercial Communications Workshops**
- **Non-Profit 501(c)3 Status**
- **Board of Directors, Exec. Committee with Operating Reserves**

# International Lunar Observatory Association

- ILOA to be Based in Hawai`i
- Center of Pacific Hemisphere
- Global Support Centers
- Maintain Hawai`i Preeminence in Astrophysics for Next 100 Years





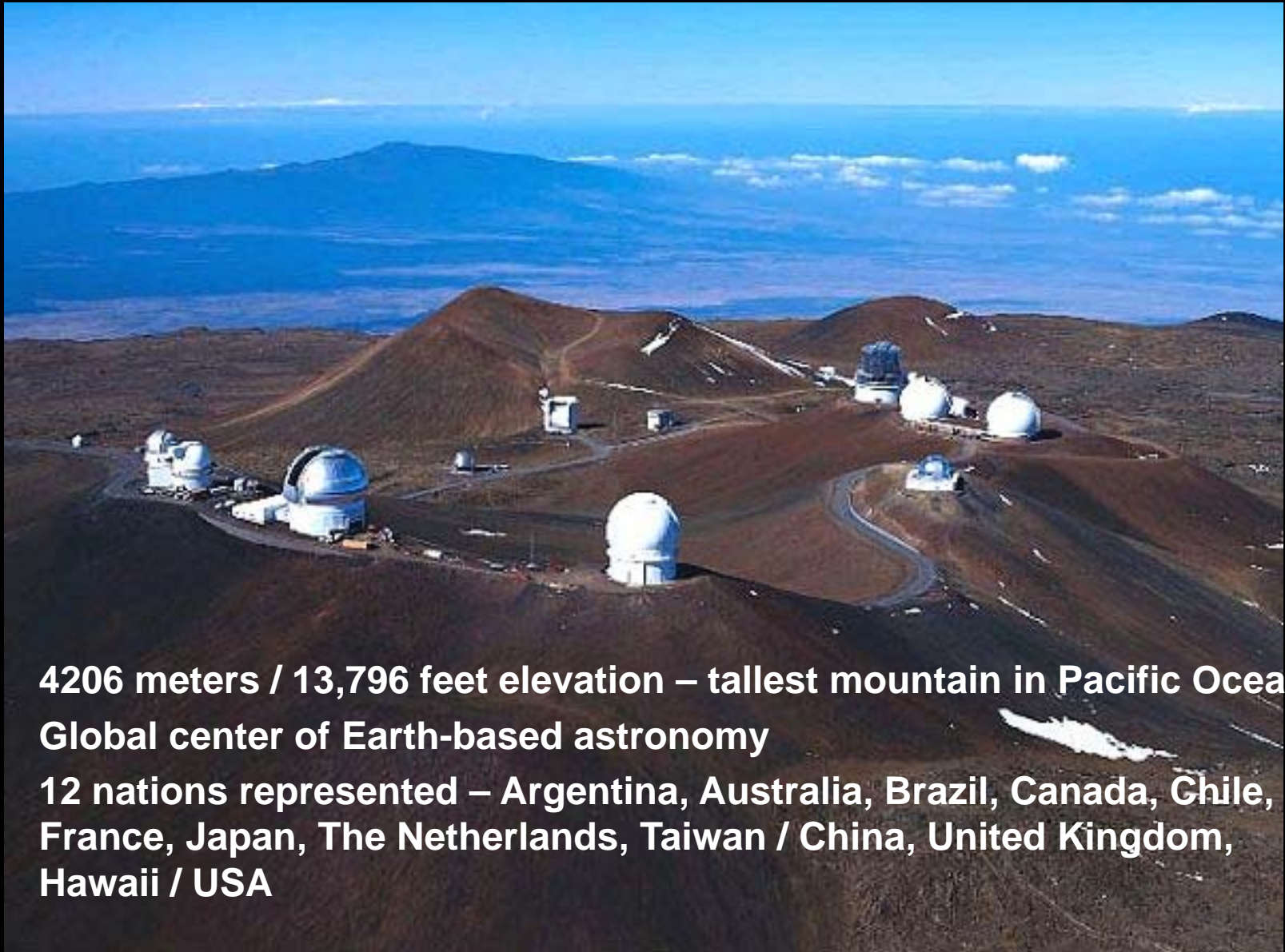
# **Why Is Hawai`i Important to Space Exploration?**

## **Geographic Advantages:**

- **Center of Pacific Hemisphere**
- **Southern-most site in USA / equatorial proximity**
- **Mid-Pacific islands bi-directional launch capacity (equatorial or polar)**
- **Mauna Kea – highest point in Pacific**

**And Aloha!**

# Mauna Kea Summit Observatories



- 4206 meters / 13,796 feet elevation – tallest mountain in Pacific Ocean
- Global center of Earth-based astronomy
- 12 nations represented – Argentina, Australia, Brazil, Canada, Chile, France, Japan, The Netherlands, Taiwan / China, United Kingdom, Hawaii / USA

# ILOA Institutional Membership

- **Observation**: In-situ lunar characterization; Stars, Moon, Earth; Science, Research, Development
- **Communication**: uplink / downlink nodes for surface and Earth line-of-sight relay
- **Education**: supports Galaxy Forum 21<sup>st</sup> Century architecture
- Open to: Space and government agencies, Aerospace and NewSpace companies, private individuals, science and astronomy institutes, universities
- Enterprise: establish 21<sup>st</sup> Century permanent lunar presence

# *ALOHA!*

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