The International Lunar Decade (ILD) 2020-2030

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WHAT

The Heritage of the International Lunar Decade
• IGY was sponsored by the International Council of Scientific Unions (ICSU), whose members include COSPAR and other international scientific organizations, as well as the National Academy of Sciences.

• ICSU formed a global secretariat to coordinate IGY activities undertaken by the 67 countries involved.
IGY’s Sputnik satellite kickstarted a competitive space age

• The emphasis on research also focused superpower competition on peaceful objectives.

• IGY’s space race inspired President Kennedy to challenge the U.S. and the world in 1961 to reach the Moon before the end of the decade.

• The IGY also seeded launch of the communications satellite industry in the early 1960's.
ILD inspired by IGY

Source – Planetary Society presentation on ILD to UN COPUOS February 2007
The IGY was an open framework for international cooperation in research to better understand the Earth as a physical system.

- Tens of thousands of scientists in 67 countries proposed research projects through their national research agencies.
- The IGY framework fostered standardization of research methods and tools and led to open international data stores.
- Projects initiated through the IGY continued, some to the present (the timeframe was not a constraining factor).
The IGY was one of the most successful scientific campaigns of the 20th Century:

- A voluntary peaceful collaboration across cold war divisions to study the Earth as a whole.
- Formation of UN Committee on the Peaceful Uses of Outer Space
- Follow-on 1967 Antarctic Treaty / Outer Space Treaty
- First artificial satellite: Sputnik
- Discovery of Van Allen Radiation Belts
- Permanent Human Presence at Geographic South Pole
- Many International Antarctic Bases in peaceful scientific collaboration in studying Antarctica established on the 7th Continent down to the present
- A revolution in understanding the Earth’s heat engine and climate system
SO WHAT?
Multiple attempts to enable a permanent return to the Moon have failed.

- 1972: President Nixon – Cancellation of plan for permanent Moon bases using Apollo technology.


ILD History: 2006-7

- Planetary Society presentation to COSPAR in Beijing. Lunar Declaration, endorsement, and call for scientific organizations to participate in ILD.

- Secure World Foundation financial support.

- Presentation to UN COPUOS.

- Discussions with NASA and other space agencies.
Global lunar program not realized

- Major change in U.S. space policy – 2011 (Moon removed as a destination and stepping stone to Mars).
- But some positive results were achieved.
Lunar Return Early Results

- Roadmap of lunar missions agreed to within ILEWG: Smart-1, Chang'E, Selene, Chandrayaan I, LRO, L-CROSS, LADEE, GRAIL, Globe.
  
  http://docslide.us/download/link/report-from-the-beijing-assembly

- Formation of ISECG by space agencies to fulfill recommendation within ILD proposal to establish a Global Space Exploration Strategy.
  

- Promoting use of standardized telecommunications, navigation, and VLBI support for future orbiter, lander and rover missions.
Toward a Global Space Exploration Program: A Stepping Stone Approach

Committee On Space Research (COSPAR)

COSPAR Panel on Exploration (PEX)

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Rededication to the ILD Vision

“The Next Giant Leap Conference: Leveraging Lunar Assets for “Sustainable Pathways to Space”
November 9-14, 2014 – State of Hawaii

• International Lunar Decade Declaration.
• Formation of ILD Working Group.
• National Space Society 2015 ILD Declaration in Toronto, Canada.
• ILD Working Group Presentations at numerous conferences – IAC, COSPAR, COPUOS, EGU, EPSC, ILEWG, ISDC, LEAG.
2016 – The quest for a global space exploration program continued

Report on COSPAR/ISECG Workshop on Scientific Perspectives for the Global Exploration Roadmap

COSPAR/ISECG Workshop on the Scientific Perspectives for the Global Exploration Roadmap

Co-organized by the COSPAR Panel on Exploration (PEX) and the ISECG Science Working Group (SWG)
2018 – Global Exploration Roadmap

- The Moon as a stepping stone to Mars
A myriad of programs are being proposed to advance lunar exploration and development from 2020 to 2030.

The ILD framework will broaden the range and scope of initiatives.
Program Examples

- Moon Village
- Far side base
- Deep Space Gateway
- Japan Moon Base
- Russia Moon Base
- China Moon Base

- Lunar landers – NASA, Blue Moon, Astrobotic, Moon Express,
- Plans for lunar power utility
- Hague Space Resources Governance Working Group
- ILEWG
- ISECG
- Lunar Water
- Lunar Cubes
- LEAG
• Myriad lunar activities are planned for 2020-2030.

• With growing interest and commitment, coupled with lower costs, many more will emerge.

• An ILD framework is needed to foster the development of governance, common policies, standardization, and shared infrastructure.

• An ILD can expand participation, and COSPAR can coordinate scientific efforts across borders, disciplines and specializations.
The ILD Goal

- To expand the framework for international cooperation that will enable a permanent return to the Moon over the 2020-2030 decade with increased voluntary collaboration.

- Many G-20 countries and other smaller economies with the economic resources to participate are not part of the ISECG framework.
• The Trump Administration endorses a U.S. return to the Moon and modifies NASA’s Journey to Mars to endorse a Moon First Path to Mars strategy.

• ESA’s Director General endorses a Moon Village strategy promoting international collaboration to enable a human return to (and sustainable presence on) the lunar surface.

• There are parallel visions for a return to the Moon in China, India, Japan and Russia.
NOW WHAT?
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- A COSPAR Declaration of an ILD can provide expanded opportunities to develop scientific talent, expand new knowledge, and apply science to practical problems for peaceful and sustainable development, both on Earth and Space - resulting in a permanent presence on the Moon by the end of the 2020-2030 decade.
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- An ILD championed by COSPAR and the ICS is a way to insure the importance of scientific interests in an expanded cislunar economy, where large international agencies and commercial organizations will contribute important resources, but where scientific organizations and smaller international agencies will also play a strong role.
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- COSPAR and the ICS can expand a broad multidisciplinary and voluntary multinational campaign to develop a Moon First Path to Mars for human permanence beyond the Earth, thereby repeating the great success of the IGY in creating both a highly productive scientific campaign and a more effective strategy for expanding and diversifying international collaboration in cis-lunar space and on the lunar surface.

(https://www.researchgate.net/publication/321439337)
A permanent return to the Moon calls for and enables major expansion of research across many fields:

- Far side observatories across wide light spectrum range.
- Major expansion of research into origins and formation of the Solar System using geophysical records preserved in lunar materials.
- Energy systems research - particularly power beaming.
- Materials research to support ISRU.
- Increased need and opportunities for biomedical research in micro and fractional gravity environments.
- Ecological research / engineering for large-scale closed-cycle ecosystems.
- Social science research to understand social systems of increasingly large groups of people living beyond Earth.
- Development of an Earth-Moon economy, and economics of outer space resources and their use.
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An ILD may involve "stepping stone" projects:

- A lunar gateway station.
- Cislunar communications, positioning and navigation, and power infrastructure.
- A Lunar Surface Moon Village.
- A program of lunar sortie and precursor missions.
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- A Moon Village must include a lunar research park.
- An ILD must include lunar observatories for heliophysics and radio astronomy.
- An ILD should also include a Lunar Survey Agency to investigate lunar resources and both their economic potential, open access and uniform mapping and data standards.
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• An ILD must engage educational institutions and young people in the many scientific and technological challenges of a new lunar frontier, as well as the prospects of human exploration and a permanent presence on Mars.
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- An ILD provides an opportunity to fashion new collaborative agreements which can build on the successful legal models of the International Space Station, the Antarctic Treaty, AirPort and Seaport Authorities, and the Foundation of the U.N. Declaration of Human Rights.
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- An ILD presents an opportunity to develop scientific facilities and institutions on our closest celestial neighbor to enable a sustainable human presence beyond low-Earth orbit as well as an economy based on the use of local resources.
An ILD framework can launch an Age of Space Resources

The Sustainable Development Requirements of the Earth must be met with the use of space-based energy and materials
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• An ILD must also embrace applications of lunar resources to address the problems of humanity on Earth.

• An ILD can support a sustainable development framework for humans on Earth by applying technological solutions for sustainability in space to the requirements of the Earth’s population and environment.
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• Expanding the econo-sphere of the Earth to include the Moon and cis-lunar space will require the scientific talents and interests of the global scientific community, as well as many voluntary international contributions - as was the case with the successful model IGY, with 67 countries making substantial contributions.
Jeff Bezos ISDC 2018:

“You cannot make a giant space company in your dorm room. Not today. And the reason is that the heavy lifting infrastructure isn’t in place.”

Lunar exploration today is the arena of major governments and billionaires. The ILD framework also opens multiple opportunities for small countries, start-ups, and universities.
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- But an ILD must also engage educational institutions and young people in the many scientific and technological challenges of a new lunar frontier, as well as the prospects of human exploration (and permanent presence) on Mars.
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• Thus an ILD would provide an outstanding opportunity to develop new infrastructure collectively serving scientific, national, and commercial interests and requirements.
Current Challenges

- No agreement on policies for ISRU
- Lack of infrastructure –
  - LEO, cislunar space, lunar surface
  - Communications, navigation, energy
- High transportation costs – to/from Moon
- Markets do not exist for lunar materials
ILD vision elements exist

- ISEC GER includes return to Moon as stepping stone to Mars
- U.S. affirms goal of permanent return to Moon
- Permanent Moon base in space plans of U.S., China, Russia, India, ESA, Japan, and other nations
- Moon Village Association addressing many themes of ILD
- Strong and increasing private sector involvement

Need ILD framework

- International cooperation to assure permanent return to Moon by 2030
- Address standards, infrastructure to lower cost & risk for all players
- Coordinate mission roadmaps to assure permanent return success
- Achieve agreement on policies governing ISRU, lunar materials
- Build popular interest globally with worldwide ILD campaign
ILD Implementation Steps

I. Endorsement with COSPAR ILD Declaration.

II. Sponsorship by International Council for Science.

III. COSPAR working as a coordinating mechanism with ICS member organizations to encourage voluntary projects that will supplement the efforts of the ISECG GER.
• In 2018, ICSU merged with the International Social Science Council to form the International Council for Science.

• The International Council for Science spans all research topics that would be involved in permanent return to the Moon, including physical, biological, and social sciences.

• ICSU (International Council for Science) would be the ideal global sponsor for an ILD.
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Thank you!