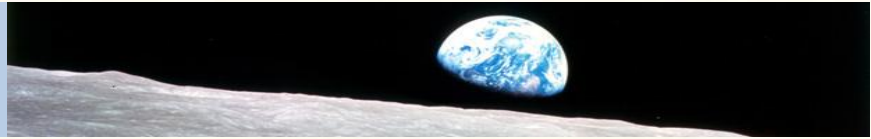


Outer Space and Economic Security

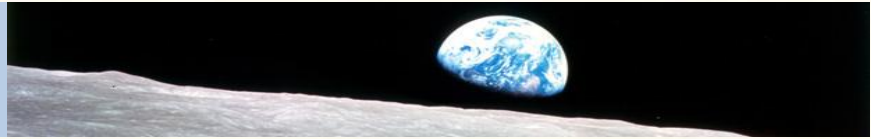
Prof. Henry R. Hertzfeld
Director, Space Policy Institute

28 September 2018
ESPI Autumn Conference
Vienna, Austria



Defining Economic Security

- **All nations have different structures to handle economics and defense with different policy priorities**



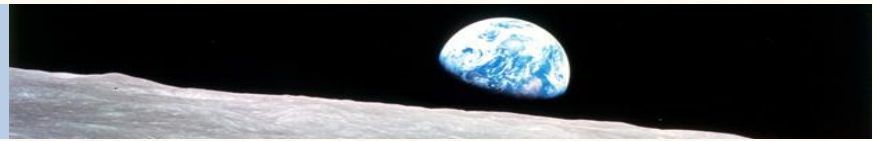
Defining Space Economic Security

Is it:

- **The guaranteed use and stability of valuable assets in space supporting non-military users?**

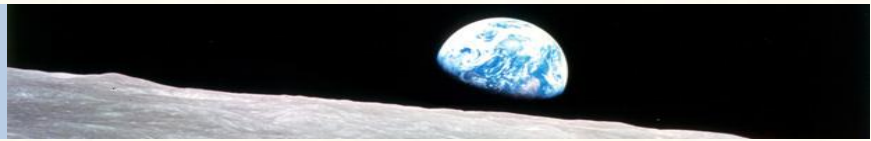
or, is it:

- **Economic stability, growth, and better standards of living through the use of space applications on Earth?**
- **Not easy since there are many different perspectives**
 - **A nation's internationally focus may be on defense/security, while**
 - **Its national focus may be on stability and economic growth**



Dual Use

- **Everything in space has dual uses terrestrially; government (military and civil) and private parties (business and consumers)**
- **Space assets are usually owned by one or the other according to their main function(s)**
- **Their customers/beneficiaries are not easily separated into categories**
- **But, in the future, even assets in space may be re-purposed, switching categories**
- **The implication is that economic security in space may become indistinguishable from military security and vice vs.**



National Security in the United States

- **The U.S. Constitution**

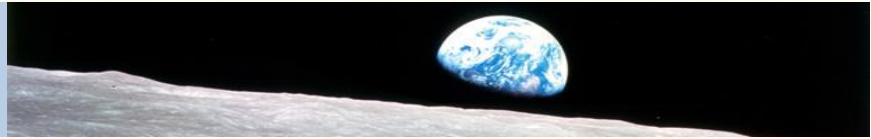
- We the people of the United States, in order to form a more perfect union, establish justice, insure domestic tranquility, provide for the common defense, promote the general welfare, and secure the blessings of liberty to ourselves and our posterity, do ordain and establish this Constitution for the United States of America.

- **Defense has become the highest priority**

- **Economic policy is secondary, however often elevated for elections—the importance of jobs and votes**

- **Space is rarely given any specific public attention**

- Its importance is secondary and less visible than many other issues



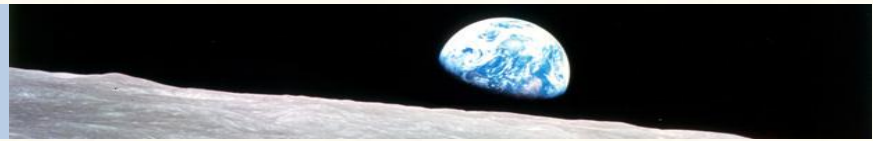
Different Perspectives

Europe

1. Economy
2. National Security

United States

1. National Security
2. Economy



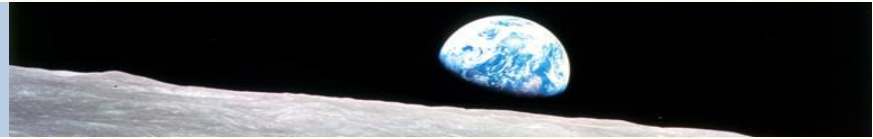
Important Economic Shifts

Before 2000

- Most commercial and many government uses of space were in R&D stage
- Military and defense dependent on space
 - Information
 - Position, navigation, timing
 - Trend began in early 1990s
- Space was not particularly crowded; debris was a recognized issue by not a pressing one
- International space law not challenged by private sector opportunities and plans

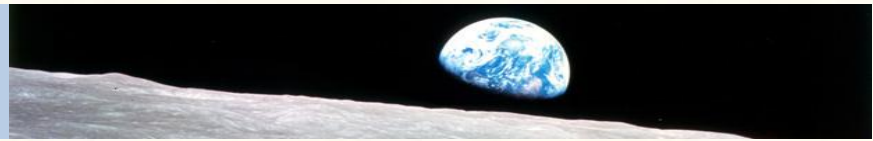
Today

- Industrialized economies have a growing dependent on space
- Space is essential to the efficiency, productivity, and operations of critical infrastructure (water, electricity, etc.)
- Crowding of space and possibility of space sustainability being threatened
- Lack of resilience: no real measure of risk
- Legal lacunae and uncertainty in dealing with these changes



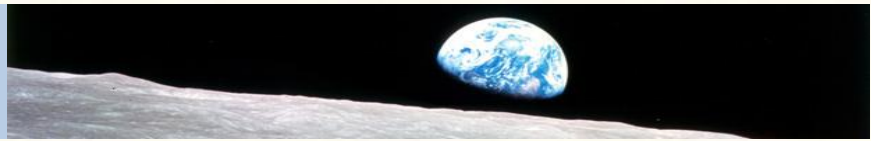
Evolution of Thinking About Space Economics

Economic Models	Actual Market	Space Economic Activity
<p>Measuring returns to Research & Development</p>	<p>Government demand and supply for space exploration</p>	<ul style="list-style-type: none"> • 1960s: Primarily R&D: jobs created; multipliers, spin-offs • 1970s: NASA and ESA: added productivity and macro justifications to counter budget cuts
<p>Returns to R&D + Measuring effect of government incentives and outlays for private activities and purchases</p>	<p>Supply side more diversified but</p>	<ul style="list-style-type: none"> • 1970s: Telecommunications: private but regulated and controlled by government agencies
<p>Measuring sales and use of space applications in economic infrastructure; start of large private investments in launch vehicles and niche markets—still dependent on government demand.</p>	<p>government space remains leading funder and indicator</p>	<ul style="list-style-type: none"> • 1980s: Beginning of government incentives-- buying private services (Mainly in remote sensing and then launch vehicles)
<p>Integration into economy; space information and “big data,” efficiency and productivity of private operations; venture capital and investment potential; possible economic activity in space itself</p>	<p>Speculative private activity based on potential markets</p>	<ul style="list-style-type: none"> • 1990s: Telecom services and DTV; GPS potential • 2000s: “Tourism,” defense applications dependent on space • 2010s: Private companies with launch and developing operations capabilities on-orbit



The Changing International Space Environment: 1960 to 2018

- **Globalization of networks (industrial, financial, information)**
 - Affects commercial space in both supply and demand
- **Technological capabilities have spread to many nations**
 - U.S. is no longer the only highly capable space-faring nation
- **Governments are one of many purchasers**
- **Worldwide consolidation of space firms**
- **Growing regulatory environment--national interests**
 - For security, and non-proliferation purposes
 - For safety, environmental, and economic protection



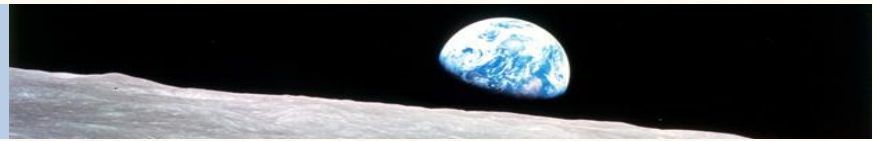
Globalization and Space

- **On the supply side dual-use space capabilities have:**
 - Created worldwide instant communications
 - Enabled images for location-specific purposes
 - Provided PNT related services globally
- **All of which lead to a reinforcing pattern of greater globalization**
- **But, the trend toward globalization has seen major interruptions**
 - 2 World Wars, a worldwide depression, national isolationism
- **There are new threats to the trend of the past decades**
 - Brexit; trade wars; privacy and anti-trust policies
 - Russia, N. Korea, Iran, and others
 - Climate and environmental changes
 - Population growth and migration



U.S. Policy: Commercial Space

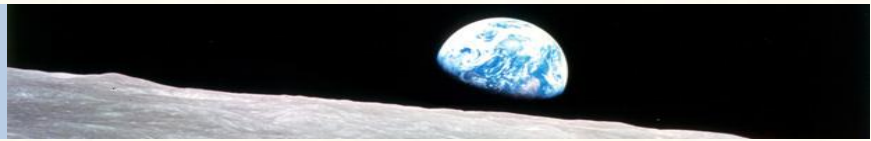
- **Official government policy on commercial space**
 - Presidential Decisions and Memos on Space Policy
 - Presidential Decisions and Memos on Telecommunications
 - Policy as reflected in space legislation & regulations
 - Other governmental actions and regulations affecting commercial space (budgets, anti-trust, trade, competitiveness, R&D, etc.)
- **U.S. commercial space policy is complex, cannot be separated from non-space economic policy, and sometimes produces unintended results that may contradict “official space policies.”**



Trends in Government Policy

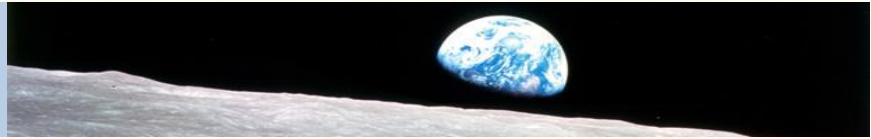
(Eisenhower to Present: 1957 to 2007)

- **Early policies reflect Cold War era: security, U.S. leadership and dominance in technology**
 - **These still remain as formal U.S. space policy**
- **No commercial policy; mainly side references to economic growth and spin-offs**
- **In 1980s, commercial space policy became formally part of U.S. policy**



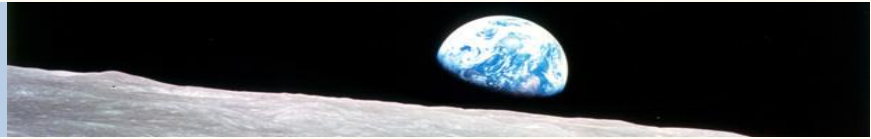
U.S. Policies Over Time

- **Telecommunications Policies**
- **Deregulation policies of the 1960s forward**
- **Privatization and commercialization policies of 1980s and 90s**
- **Consolidation of defense suppliers in the 1990s**
- **GPS guarantees of free signal in mid-1990s**
- **Remote Sensing and launch licensing of the 1990s**
- **Private sub-orbital legislation of 2004**
- **Private ownership of resources obtained in space of 2015**
- **Expanded commercial permissiveness in current proposals**



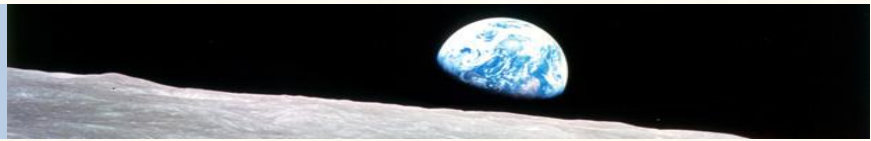
International Space

- **Growth of foreign capabilities and commercial space endeavors**
 - Europe: Ariane, Spotimage, Galileo
 - Russia: Commercial launch vehicles; Glonass
 - China: Human Space, launch vehicles
 - Others: Japan, India
 - Emergence of developing world in space
- **Consolidation to compete with U.S.**
 - Corporate
 - Regional agreements



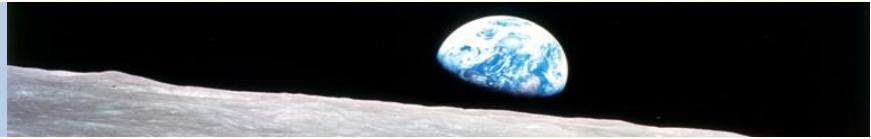
Inconsistencies

- **Emphasis on stimulating private investment in space ventures**
 - Partnerships
 - Removing regulatory barriers
 - Changing methods of government contracting
- **But, other policies tell a different picture**
 - Export controls of all types (liberalized, but still stringent)
 - CFIUS (regulations on foreign investments strengthened in 2018)
 - Trade wars; immigration, visas, etc.



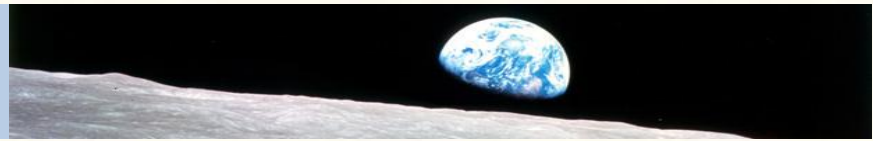
Unintended Effects of Space Policies

- **Unintended effects of U.S. space policies on economic activities**
 - **Symphonie (U.S. refusal to launch a telecommunications satellite that could compete with Intelsat (1964 through 1973))**
 - **One factor which stimulated a commercial Ariane**
 - **Shuttle decision (no new R&D for ELVs)**
 - **Stimulated competitors to be optimized for geosynchronous telecommunications orbits**
 - **Closed competition for defense/security launch services**
 - **Launch price effects**
 - **Restrictive remote sensing licensing (1992 to present)**
 - **Lost U.S. business opportunities**



Unintended Effects of Economic and Related U.S. Policies

- **Export controls**
 - Stimulated “ITAR-free” product lines abroad
- **Patriot Act and Immigration Policies**
 - Visa and other restrictions that results in talented professionals to use their skills outside of the United States
- **CIFUS**
 - Financial transactions affecting foreign investment in U.S. more difficult
- **Export-Import Bank**
 - Changes made incentives for U.S. companies more difficult

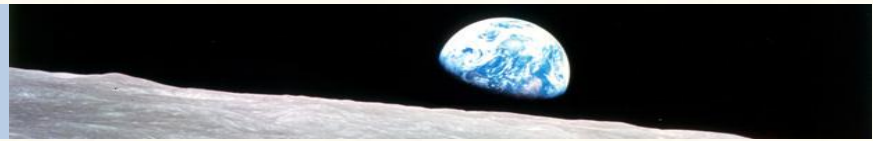


National Priorities

- **National Security policy outranks all other policies in the United States**
 - **Economic policy necessarily involves national security, but national security policy may overlook many economic impacts**
- **Commercial space policy will not be the driver of space security in the U.S.**

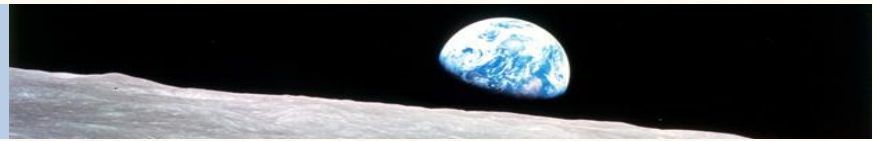
In Contrast:

- **Most other nations are very explicit that economic policy drives space policy, budgets, and programs.**



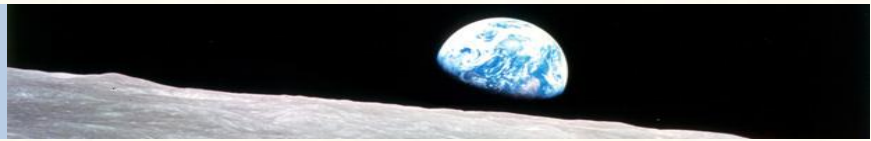
Summary

- **Space is not a purely competitive industry**
 - High barriers to entry
 - Access is limited and controlled
 - Legally governments required to oversee private activities in space
 - Risk of space operations are high
 - Government(s) are still the major customers
- **Space is global; requires international coordination and cooperation.**



Summary

- **Economic factors**
 - **Profit motive--investment only with sufficient ROI**
 - ROI can include government revenues
 - If global market opportunity is denied, there will be fewer commercial investments
 - **If increased risk of loss of assets from *either* domestic or foreign security initiatives, there will also be fewer commercial investments**



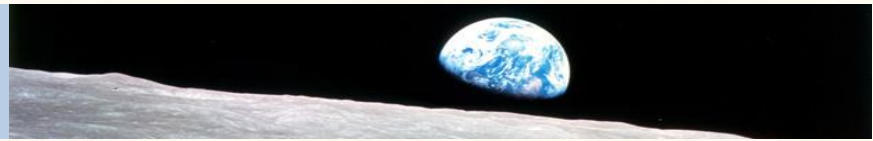
Space Policy and Private Assets

Do national objectives require space business investment?

Are foreign commercial space assets essential to a nation's domestic security?

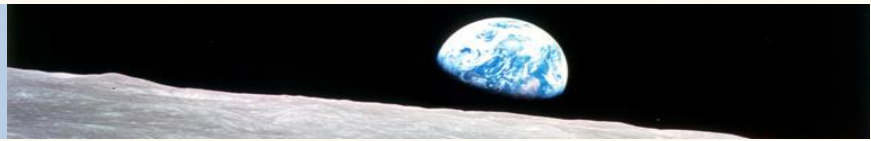
If so, an unanswered policy question:

What factors will determine whether private space assets will be protected/defended by a government?



Summary

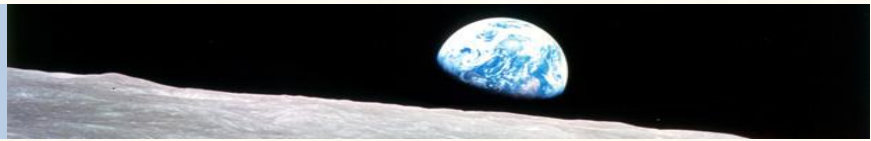
- **Economic dominance of U.S. in space, if lost, is unlikely to be easily or quickly recovered**
 - Future policy needs to reflect this possible reality and recognize importance of international cooperation and competition
- **Limited options for the future**
 - Treat commercial space as “just another commodity”
 - Ignores the dual-use nature of most space applications
 - Dominance and control through military actions
 - Will encourage counter measures by others with uncertain outcomes and increase commercial risk factors
 - Stimulate renewed economic competitiveness in U.S.
 - May not be consistent with export restrictions and other U.S. policies related to free trade and competitiveness



Is There A Solution?

Security through Commercial Strength

- **Encourage R&D in areas likely to advance commercial space**
 - An “offence” rather than a “defense” for future commercial products
- **Produce the best products to encourage worldwide purchase of goods and services**
 - Leadership through best practices and market dominance
- **Eliminate regulatory disincentives without violating treaty provisions and without jeopardizing security or public safety**



Conclusion

Economic security is an element of national security and national security is essential for economic security;

No nation can or should ignore this extremely close dependence.

The use of outer space has entered the realm of being essential for both.