New Extraction Frontiers

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Agenda

1. What is a frontier?
2. Construction of the frontier
3. Deep Sea Mining
4. Lunar Mining
5. Conclusions
6. Discussion

What is a Frontier?

- In all cases, frontiers are not permanent spaces but instead are conjured by specific interest groups in order to be conquered (Klinger 2017)
- ‘Commodity frontiers’ as the locus where extraction geographically expands, colonizing new land in search for raw materials (Conde and Walter 2014)
- “The post-frontier as the host of new regulatory technologies, practices and institutions that nominally close, yet more accurately characterize and restructure, contemporary resource frontiers” (Larsen 2015)

Frontiers of Extraction: Geographies

Geographies

- Inner Mongolia
- The Amazon
- The Arctic
- Deep Sea
- The Moon

The discourse of the ‘empty’ frontier is challenged by the competing valuations that these spaces hold

There is the desire to both isolate the reality of the extraction while at the same time utilizing the space to gain or hold territorial claims.

Frontiers of Extraction: Methods

- Different techniques
  - Fracking
  - Deep sea
  - Data mining
- Mining in the digital age
  - Big data in the exploration phase
  - Sensors and autonomous vehicles in mining
  - Blockchain in supply chains

Frontiers of Extraction: New Commodities

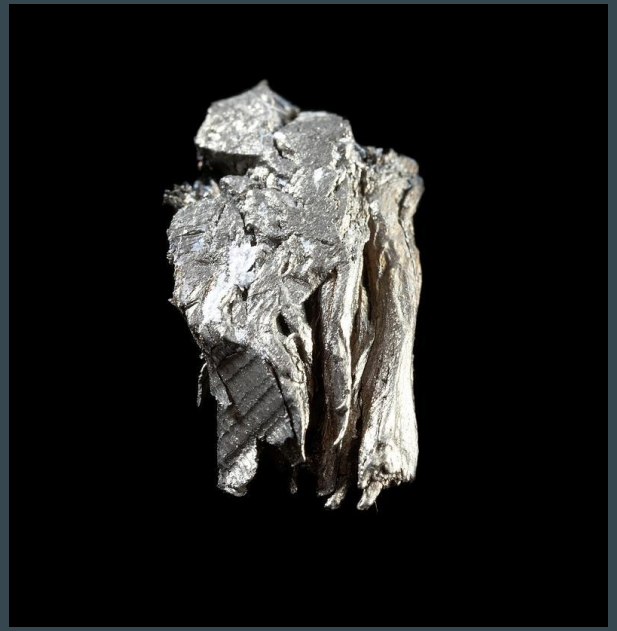
- Rare earths
- Data
- Games and gamification
  - Gold farming
- Crypto
  - mining for bitcoins
- Gig economy

As new needs arise, substances are turned into commodities for extraction

Rare Earths and the Frontier

An example of the construction of a ‘frontier’

The myth of the ‘rare’ earth as a discursive tool driving mining interests into protected spaces. The construction of rare earths as a security interest and of geostrategic importance for states.



Picture: Dysprosium

Interests behind the frontier of rare earths

1. Mining as a way of claiming historically contested and geostrategic spaces
2. The drive towards the frontier is pushed by the dual need to isolate the associated hazards and maintain strategic control over rare earths
3.

Construction of the Frontier

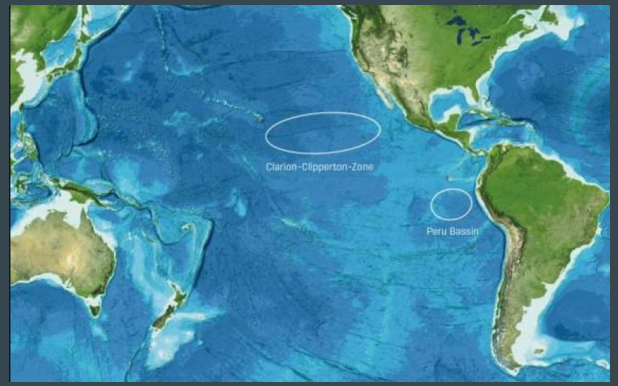
- The frontier, not as a permanent space but shaped by discourses motivated by specific interests
- The security geopolitics extend beyond the contested land itself to encompass the supply chain of the materials
- Control is sought and exerted over the territory through the politicisation of the resource
- The Moon and the Deep Sea as two discursively framed ‘empty’ spaces which forestall territorial claims


DEEP SEA MINING

Deep Sea Mining: Overview

- Extraction of minerals from under the seabed
- 500 meters below sea level (low temperatures and extreme pressure)
- Minerals are found in “polymetallic nodules” composed of nickel, cobalt, copper, and manganese
    - used in cell phones, computers, electric cars, and solar & wind power
- Mineral reserves are estimated to be worth as much as $16 trillion

Deep Sea Mining: Location

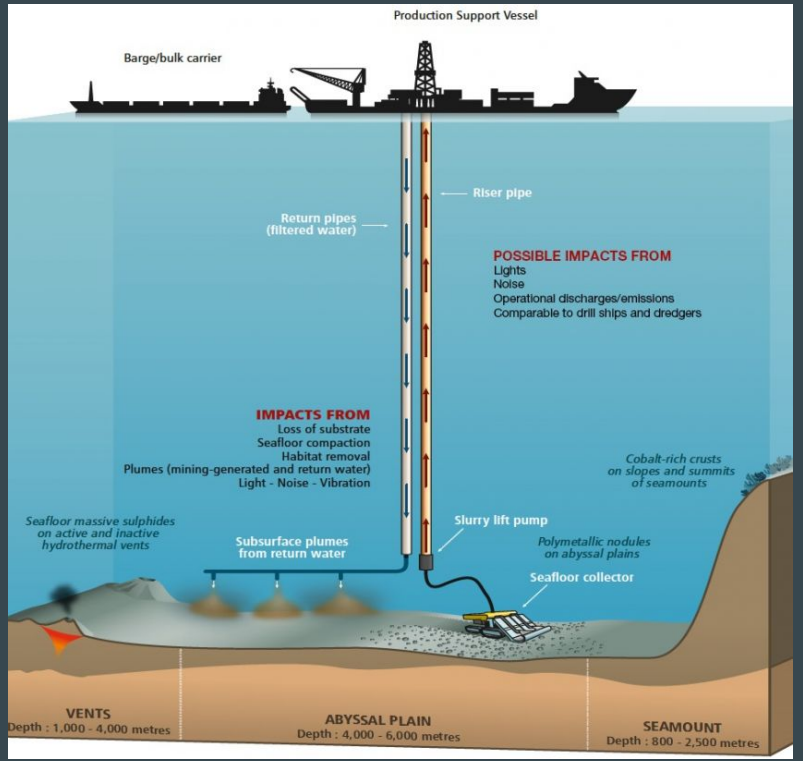


- Three main types of mining terrain:
    1) **Abyssal plains**
    2) Seamount environment--metal-rich crust
    3) Molybdenum Vents (on volcanic ridges)
- The Clarion Clipperton Zone (CCZ) is the primary target area
    - Stretches from Hawaii to Baja, CA
    - Supposedly more cobalt, manganese, and nickel than all land deposit

NOTE: No deep sea mining has occurred thus far

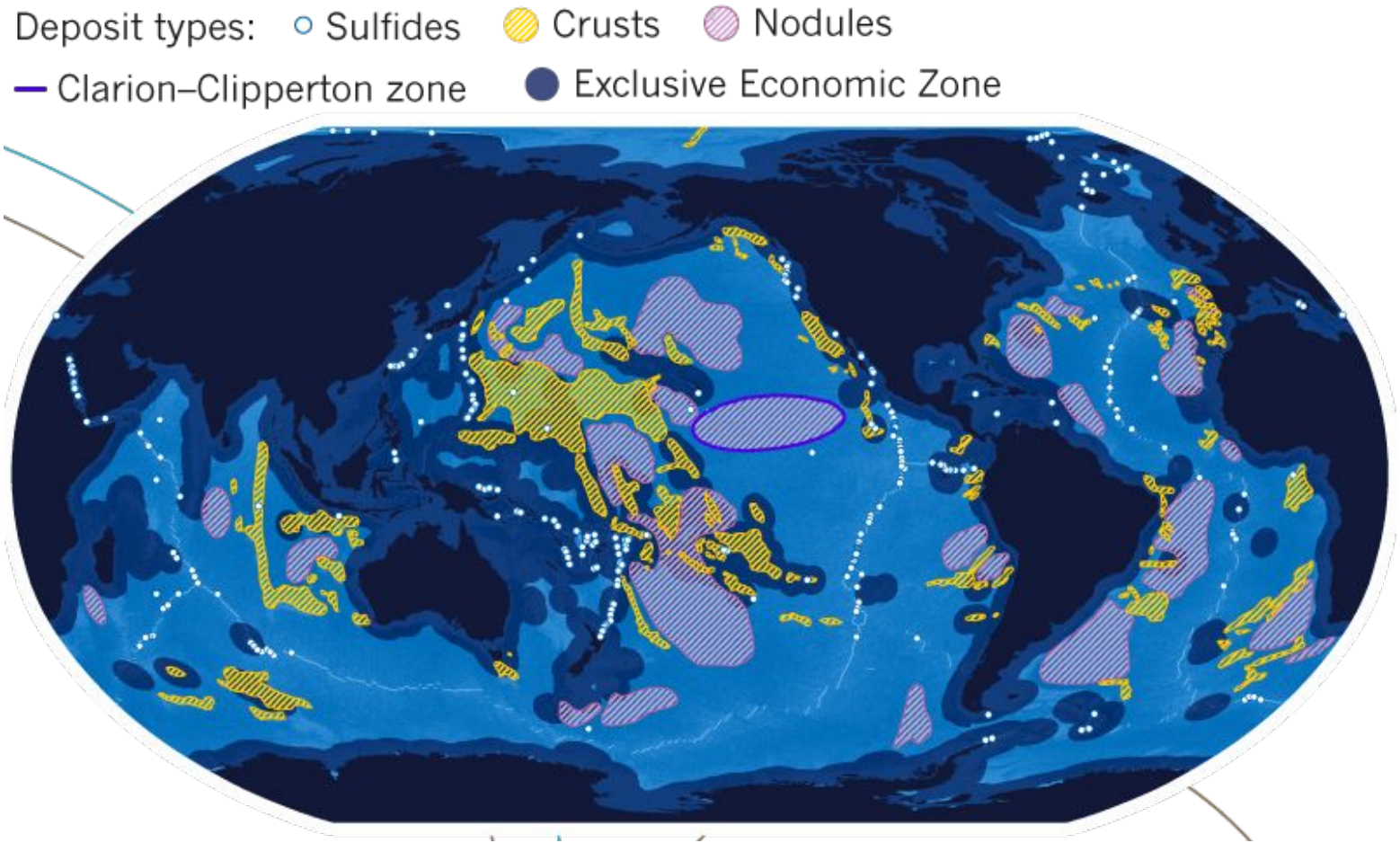
Deep Sea Mining: Process

- Ships on the surface eject collector vehicles which dive below to the seabed, vacuuming the top four inches of “soil”
- Nodules stirred to the surface and pumped via pipe back to the ship → **collector plumes** (clouds of sediment)
- Nodules are kept while unwanted sediment is discarded and pumped back into the ocean → **discharge plumes**



Deep Sea Mining: Governance Structure

- International Seabed Authority (ISA) established in 1994 under the UN Convention of the Law of the Sea (UNCLOS)
- 168 member UN Body to promote and regulate seabed mining outside Exclusive Economic Zones (EEZs)
- Time and area-specific contracts are issued to member nations and sponsored corporations
- ISA is pushing to publish an official mining code by July 2020
- DSM within EEZs is governed by national rules/frameworks


Deposit types:
Sulfides
Crusts
Nodules
Clarion–Clipperton zone
Exclusive Economic Zone

Deep Sea Mining: Governance Challenges

- “ISA is both poacher and gamekeeper”
- Reports are vague and missing details → lack of transparency
- ISA has never turned down a licence application, granting exploration rights in areas with “high ecological significance”
- Corporations can speak at ISA meetings and write reports/applications

Deep Sea Mining: Environmental Concerns

- ISA has granted licenses in key biodiversity areas
  - Eg: 10,000 square kilometres of the Mid-Atlantic Ridge, which is adjacent to a unique hydrothermal field and World Heritage Site
- Plumes harm/kill sea life, disrupt carbon stores, and damage fisheries
  - Scope and magnitude difficult to measure
  - Fears of “epic extinctions”
- Preliminary data is extremely scarce → hard to run baseline tests
- Impact testing is optional and therefore rare

Deep Sea Mining: Geopolitical Concerns

- U.S. is ineligible for permits because it refused to sign UNCLOS
- China far ahead with its technology and permit accumulation
  - Furthers existing economic and political security tensions
  - Disputed over the South China Sea
- Some governments in the Pacific Island nations have suggested a 10-year moratorium on deep sea mining (like PNG)
- Falling into colonial structures → only certain countries possess the technological capabilities

Deep Sea Mining: Industry Arguments

- Increased demands of our high-tech economy
- Essential to the green economy and more environmentally-friendly and responsible than other extraction methods
    - Cobalt mined primarily in the DRC → child labour, environmental damage, corruption, violence
- The technology already exists
- Untouched and unoccupied land
    - Perpetuating the false construction of new frontiers

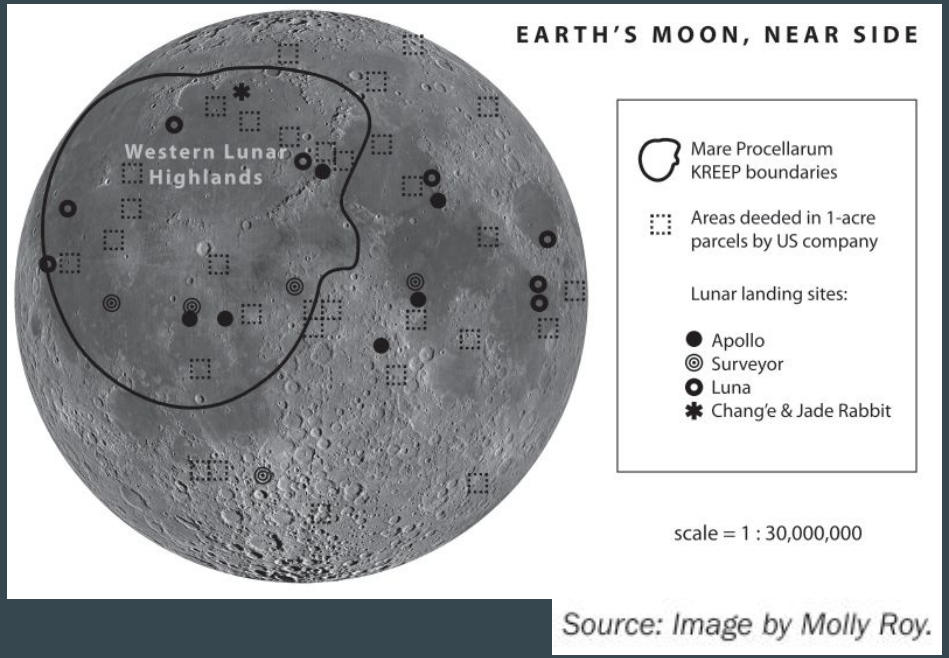
Deep Sea Mining: Future Exploration

- ISA granted 29 exploration licenses--16 for the CCZ
- Total area covers 1.3m sq km (500,000 sq miles)
- Project Examples:
  - ***Papua New Guinea:*** Nautilus Minerals was supposed to mine gold and copper but was delayed because of insufficient funding and a 10-year moratorium from the PM of PNG
  - ***Global Sea Mineral Resources:*** plans to open commercial deep-sea mine by 2027
  - ***BlueNodles:*** European partnership coalition developing a "highly-automated and technologically sustainable deep sea mining system"

Lunar Mining

Formation of Rare Earth Mineral (REMs) Deposits on the Moon

- Collision of Mars-sized object with Earth
- Debris trapped in orbit
- Consolidation into Moon



Restrictions to Lunar Mining

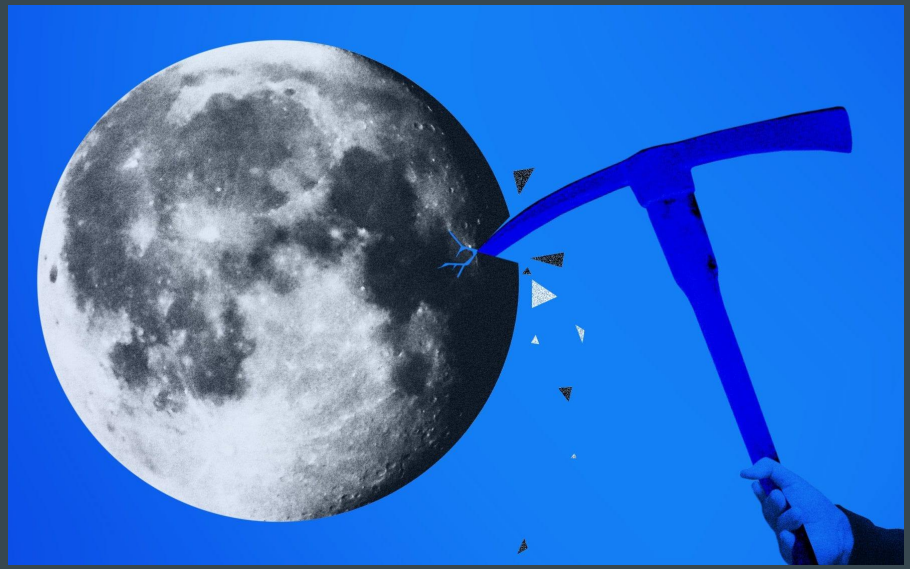
- Infrastructure Needed: Reusable rockets, lunar base, storage and processing facilities, 3D printing.
- Harsh Conditions: Temperature, Radiation.
- Advanced Machinery (robots) to to minimize human exposure.

Weak Regulatory Framework

- 1967 UN Treaty “OST”: Backdrop of Cold War
- “common heritage of all mankind [sic]” *and prohibits assertion of national sovereignty* “by means of use or occupation, or by any other means” (UN 1967, Article II)
- UN (1979) Moon treaty: Non-Space-Faring Countries
- “All space vehicles, equipment, facilities, stations and installations on the Moon shall be open to other States Parties. “ (UN 1979, Article XV.1)

Prospective Gains

- Future aspect of Lunar Mining
- Potentiality as common Driver for Explorations (*First Oil*, Weszkalnys): Mobilization of investment.
- Moon as Closest Celestial Body



Source: https://www.telegraph.co.uk/technology/2019/05/15/lunar-goldrush-can-mining-moon-become-big-business

Geopolitical Importance

- Strategic Location
- Monopolization of REM's
- Chinese Achievements in Space Exploration

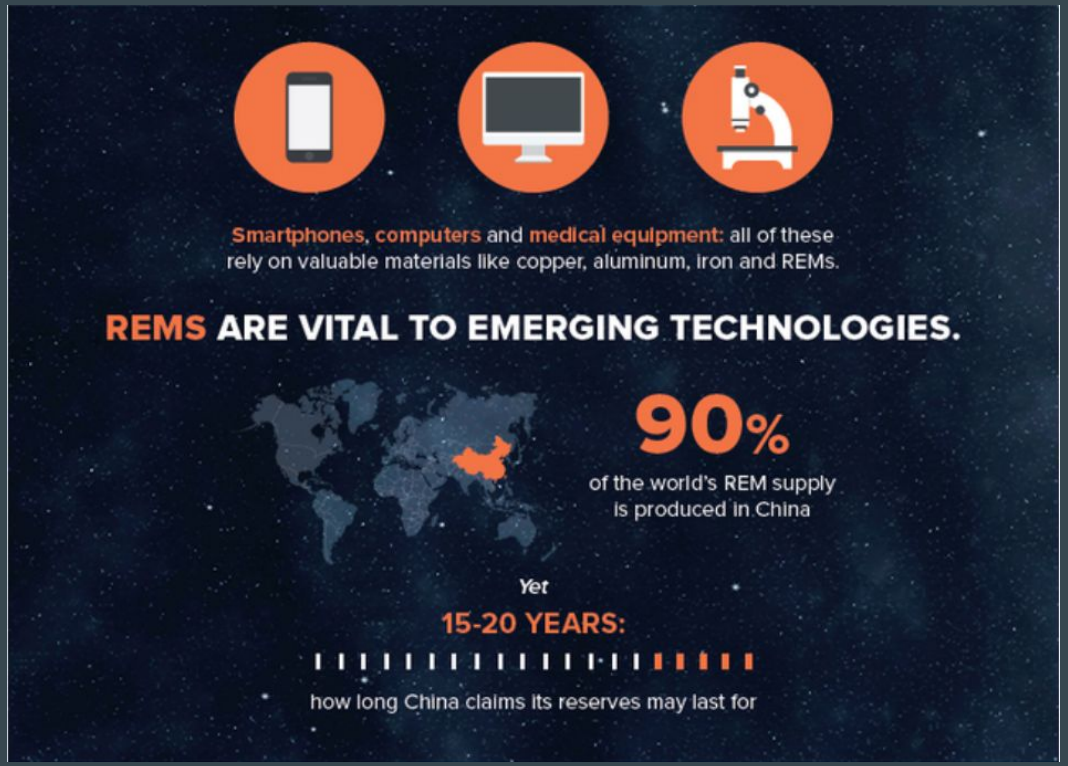
Picture: Mike Pence announcing Space Force

Scarcity Narrative

Geological fact of REMs on the Moon.

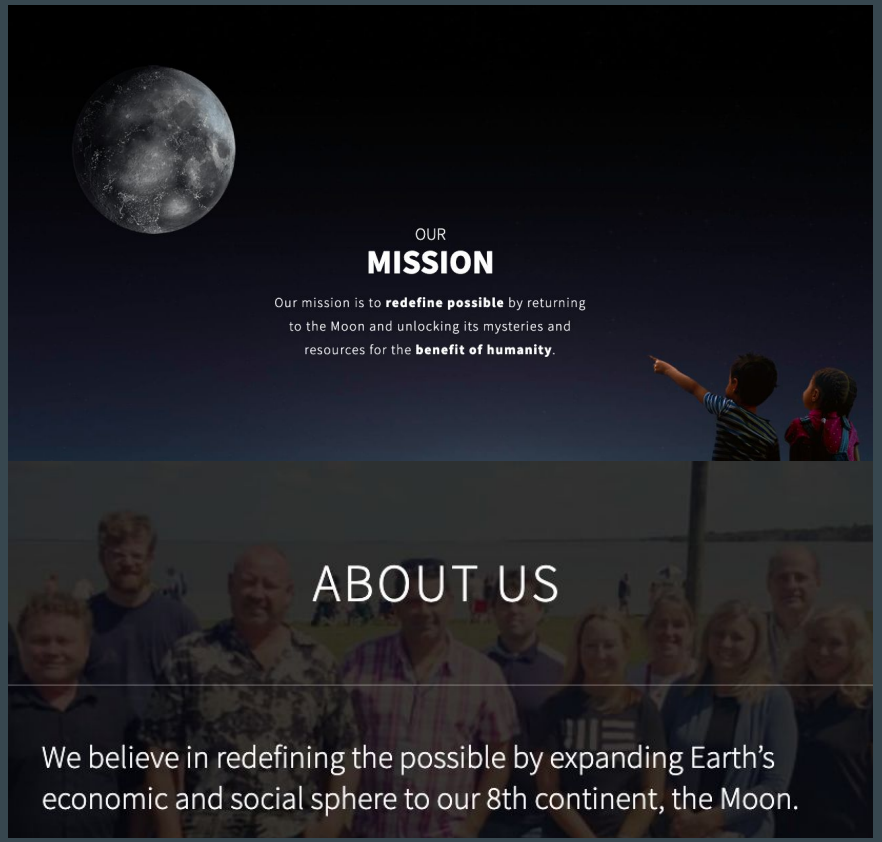
2010 Embargo and Crisis:

- Temporary disruption of REM shipments.
- Rise of REM prices.
- Surge in Supply.



“Positive Colonization”

- Empty Space free for taking
- Principle of “first rights”
- Move of “dirtiest” mining enterprises Off-Earth to alleviate pressure on Earth
- No people but meanings as laws, shared perceptions and narratives, impact on ecosystems



Source: moonexpress.com

Interpretations of Lunar Legal Frameworks

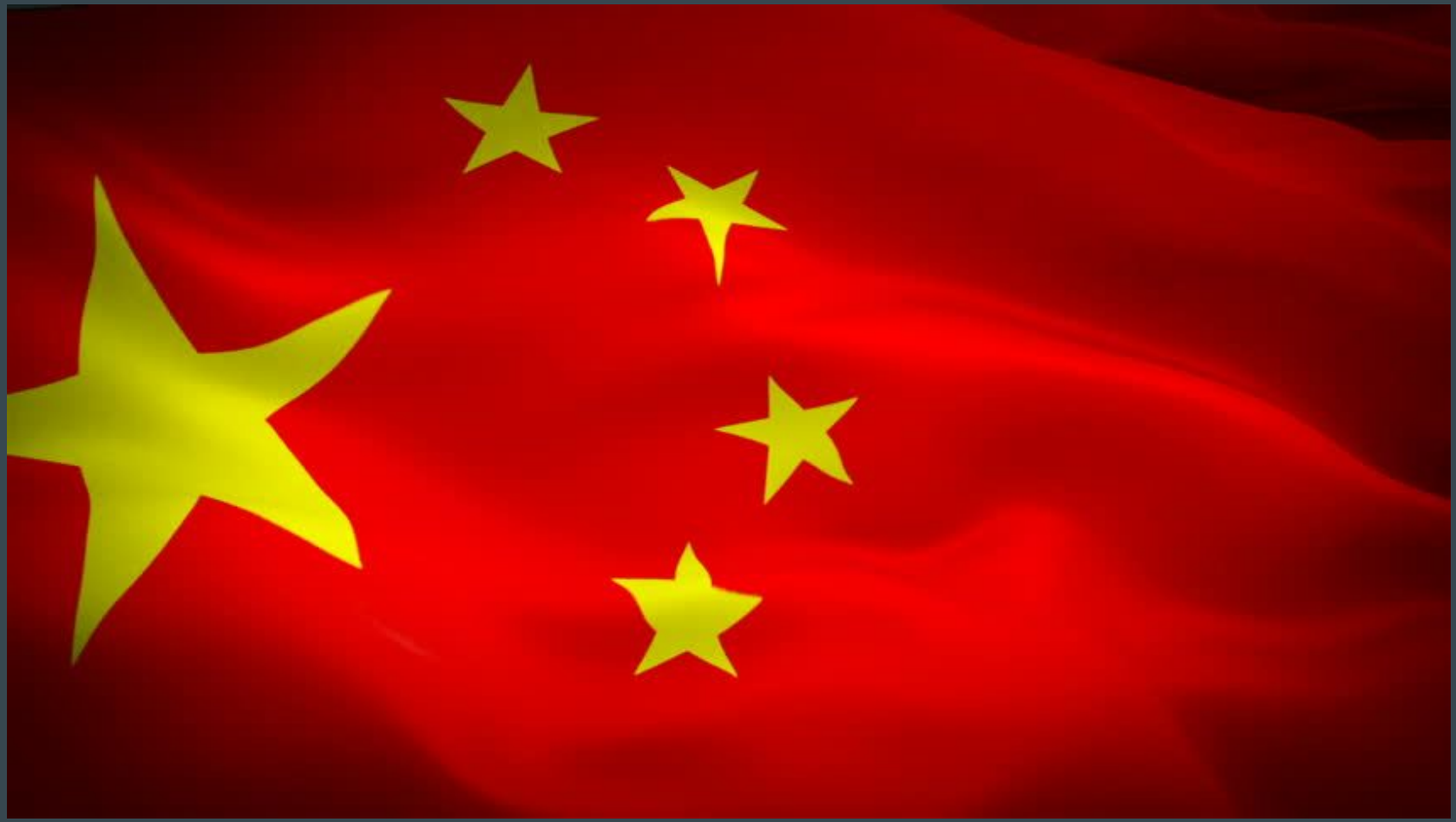
1. States can explore and develop new technologies for the good of all mankind but not lay claim or sovereignty to any of the resources

2. Limits on national sovereignty do not apply to private enterprise.

3. Private appropriation must be backed by the state in any case, so private appropriation is state appropriation after all and therefore prohibited (Carswell 2002).

Google Lunar X Prize

- Originally a $20 million dollar prize given by NASA to stimulate private sector engagement.
- In 2006 funding is cut and the prize is taken over by Google and XPrize foundation.
- Offered $30 million dollars to the first private corporation to land a robot on the moon
- Eric Schmidt, executive chairman of Google: “The pursuit of resources drove the discovery of America and opened the West. The same drivers still hold true for opening the space frontier” (Planetary Resources 2012).



China National Space Agency (CNSA)

"Space exploration is the cause of humankind not just the "patent" of a certain country. China will share the achievements of its lunar exploration with the whole world and use them to benefit humanity...all data...will be open to the whole world. China's lunar exploration provides an opportunity for countries dedicated to peaceful use of outer space to advance space technology together." *(Xiong 2013)*

Jade Rabbit Mission (2013)

- Gather data and provide basis from which to develop new technology for future missions - map soil composition of moon
- Agreement to share all knowledge and data with European Space programs
- US 2011 Wolfe Amendment prohibited NASA from collaborating with China in any capacity

Yutu 2 Mission (2019)

- Mission to the dark side of the moon
- Determine composition of the far side of moon, measure the chemical composition of lunar rocks and soils
- Monitor surface temperature over the duration of the mission
- First collaboration with the US since 2011 congressional ban, agreeing to share both data, satellite information for future missions

U.S. Initiatives

- Commercial Space Launch Competitiveness Act (2015)
  - “Engage in commercial exploration and exploitation of space resources” (including water and minerals but not extraterrestrial life)
  - Allow US industries to "engage in the commercial exploration and exploitation of space resources", but it asserts that "the United States does not [by this Act] assert sovereignty or exclusive rights or jurisdiction over, or the ownership of, any celestial body”"
- Lunar CATALYST- Lunar Cargo Transportation and Landing by Soft Touchdown (2013)
  - Initiative to encourage development of lunar robots able to traverse the moon

National Aeronautic and Space Administration (NASA) - Artemis Program 2019

- Plan to send first woman to moon

- $30 Billion budget
- From NASA Website:
  - Demonstrate new technologies, capabilities, and business approaches needed for future exploration including Mars
  - Establish American leadership and a strategic presence on the Moon while expanding our U.S. global economic impact
  - Broaden our commercial and international partnerships
  - Inspire a new generation and encourage careers in STEM
- Long term goal of getting to Mars

Moon Express (MoonEx)

“The Moon has only been reached by government superpowers, but new advances in technology are bringing the Moon within reach of everyone. Soon we can all set sail as explorers to Earth’s 8th continent, seeking new knowledge, opportunity and adventure.

We are blazing a trail to the Moon to seek and harvest these resources to support a new space renaissance, where economic trade between countries will eventually become trade between worlds.”

- Planned moon landing in 2020, expressed goal of mining
- Part of CATALYST Initiative
- NASA contract from 2010 worth 10 million US dollars, use all NASA facilities for launches and research

SpaceX

- $12 billion dollar contract with NASA
- Expressed goal of developing industry in space as well as commercial space travel
- Starship program- reusable rockets

Summary

- Lunar and deep sea mining are similar in that they relatively unexplored, requiring advanced technologies to mine them while also posing attractive opportunities for expansionist aims.
- Both are contested spaces, as both private enterprises and states compete and collaborate for rights to extract resources and jurisdiction over localities.

Conclusions: Reproduction of Colonial Inequalities

- Similar language being used to that of the colonizers
  - new world, untapped wealth, economic incentives
- Many nations to do not have capability to mine deep sea or explore space
  - Similar to oil phenomenon
  - Rich/developed nations will become richer as they benefit from a monopoly on rare earth resources
  - Income gap and inequalities between nations will widen
- Might compare the Dutch East India Co. or British with private corporations like SpaceX or MoonEx

Opportunity for International Cooperation and Changing economy

- Idea that space and the resources housed their are for the benefit of all humanity
- Collaboration between states (China sharing knowledge and data) and with private sector will create new norms of cooperation
- Provide a potential opportunity to shift economy as trade no longer operates on a country by country basis

Discussion Questions

1. Should we mine the moon? The deep sea?
2. Is deep sea and lunar mining inevitable?
3. Does the absence of a human population within these frontiers make colonizing these spaces more ethical?