



10th JOINT MEETING



**SPACE RESOURCES
ROUNDTABLE**



Colorado School of Mines
June 11-14, 2019

SRR-PTMSS Technical Committee



Leslie Gertsch (MST)



Louise Procktor (LPI)



Dale Boucher (Deltion)



Angel Abbud-Madrid (CSM)

CSM Conference Organization & Logistics

Melody Francisco, Becca Guillen, and Jennifer Graser

Session Chairs & students

SRR I ... 1999



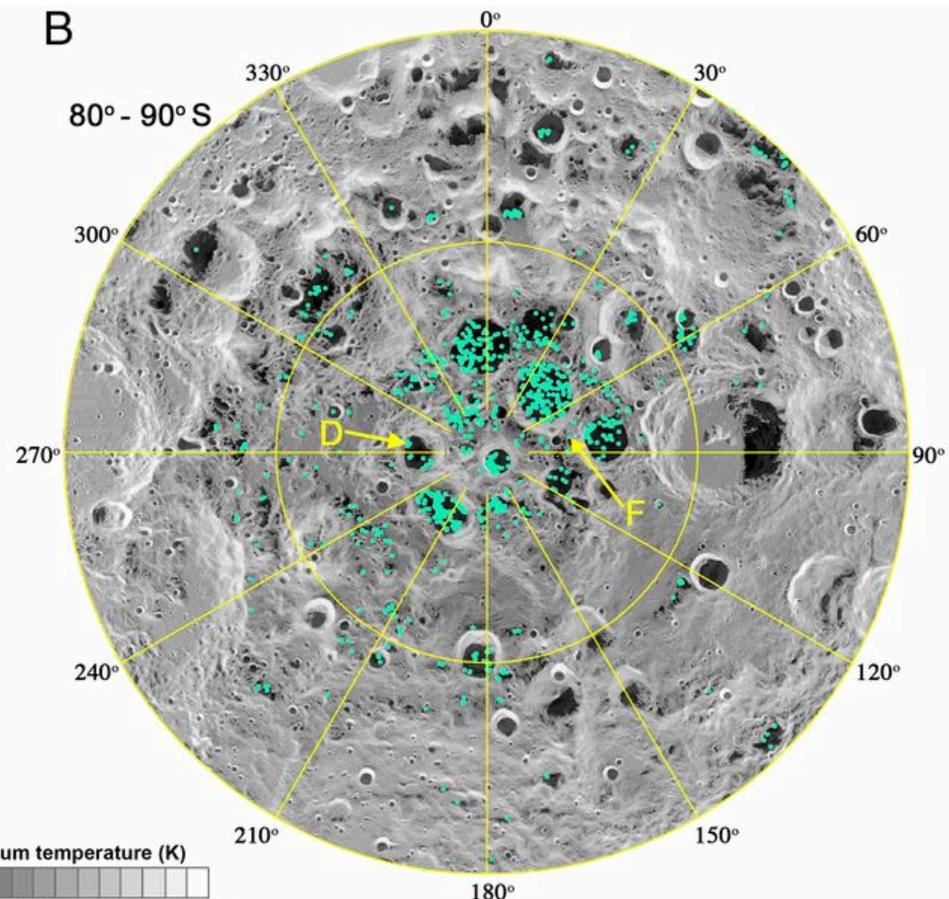
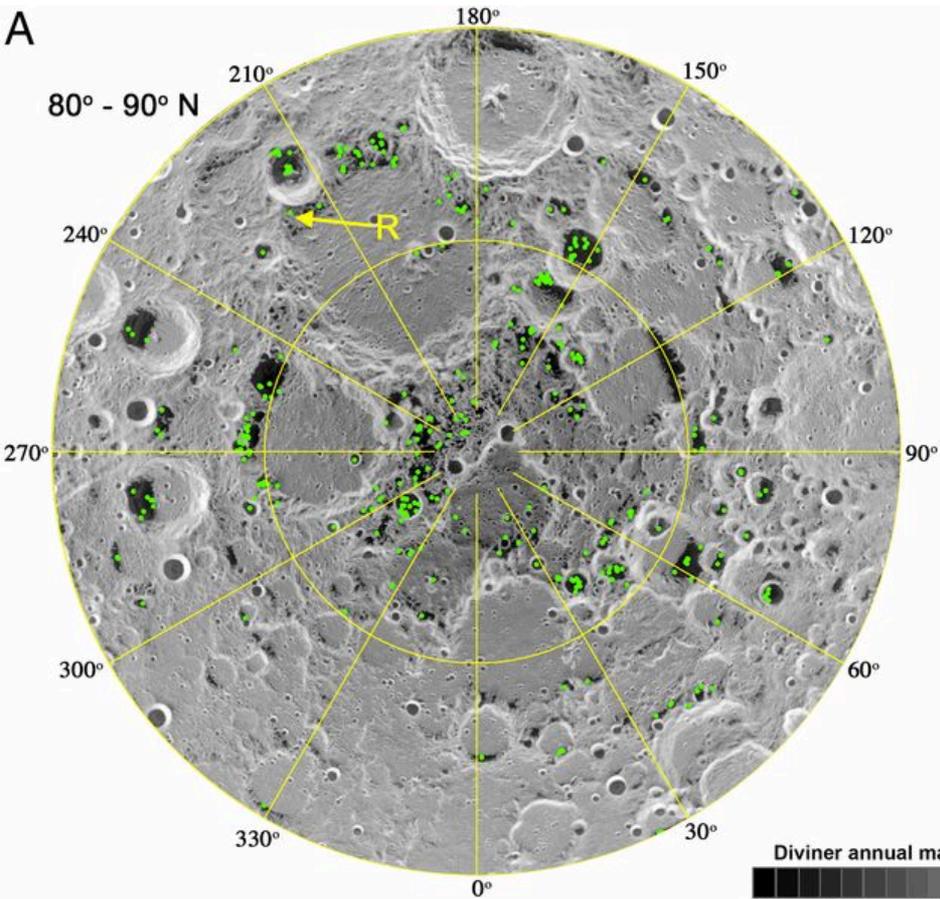
**Needed to develop space
resources industry:**

**A recoverable resource,
technology to recover it,
and a customer.**

SRR XX ... 2019



**Developments in space
resources since last year ...**



Li, et al

● Ice exposures constrained by M³, LOLA, and Diviner

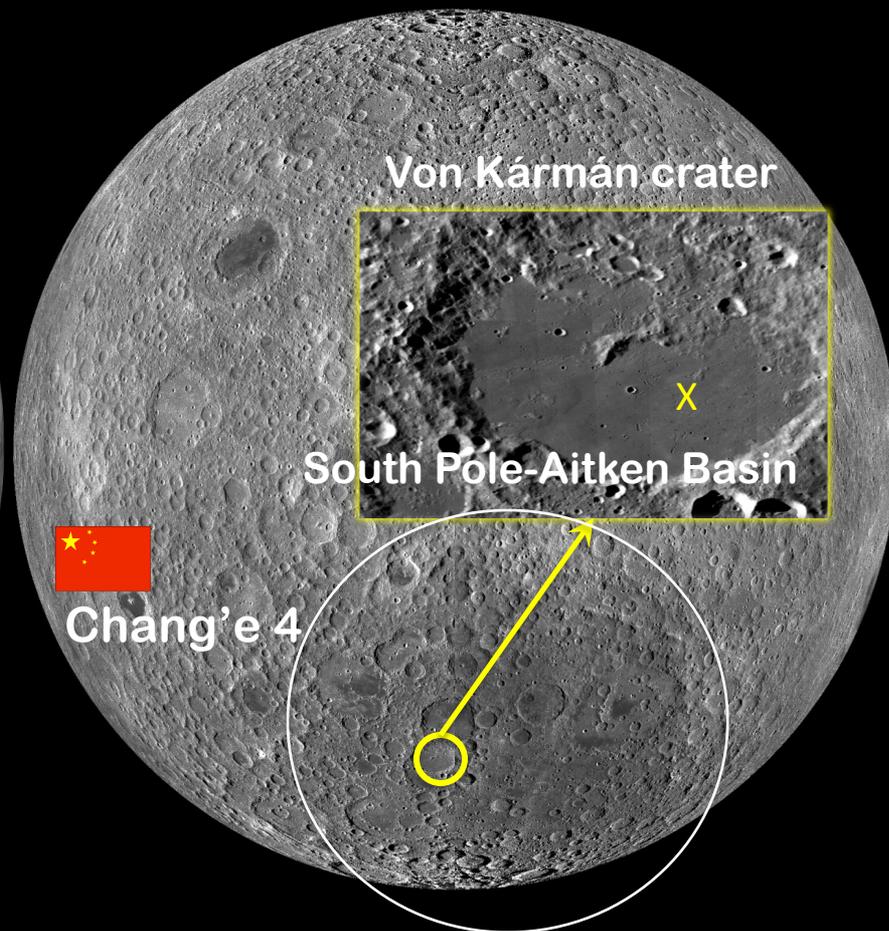
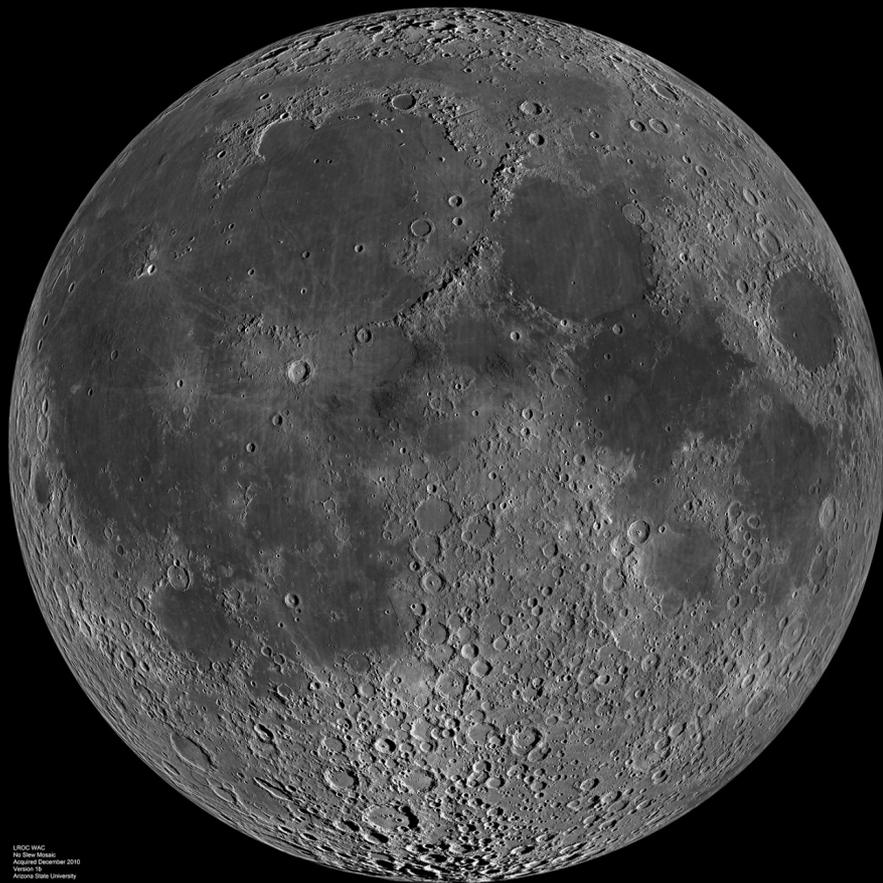
● Ice exposures constrained by M³, LOLA, Diviner, and LAMP

Li, et al (2018)

Near Side

Moon activities:

Far Side

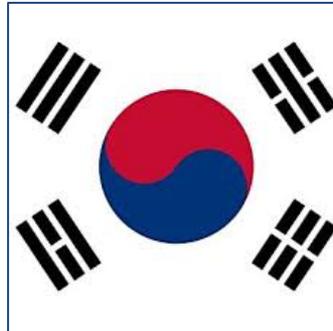
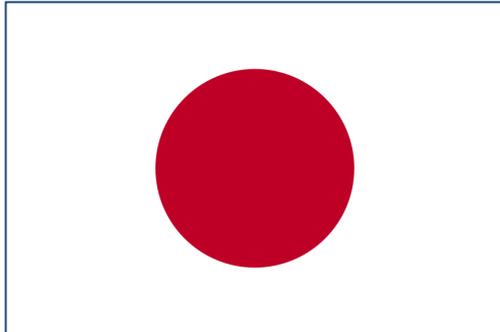


Von Kármán crater

South Pole-Aitken Basin



Chang'e 4

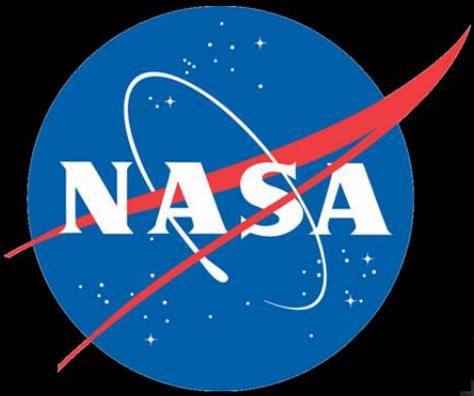




EXPLORE MOON *to* MARS

WHAT'S DIFFERENT?

We're Going Forward to the Moon to Stay



Commercial Lunar Payload Services (*CLPS*)

DRAPER



New American Exploration Partnerships

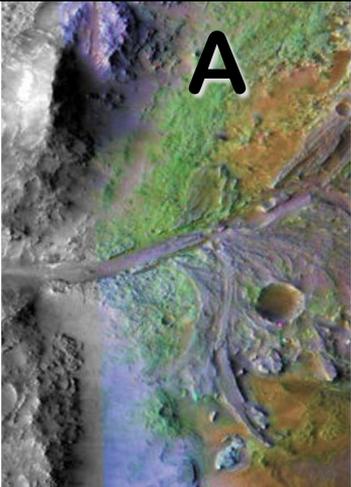
EXPLORE MOONtoMARS



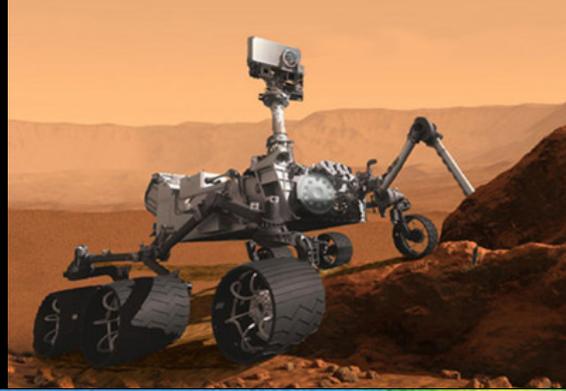
ORBITBeyond



Mars activities:

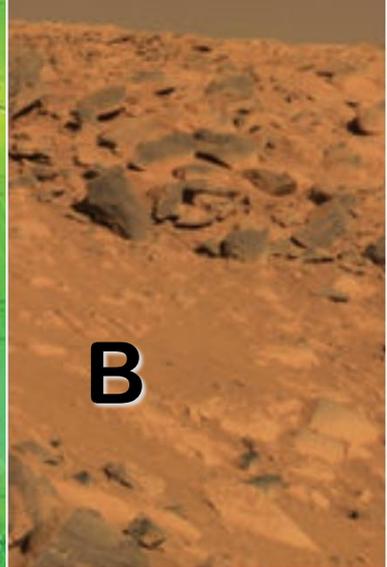
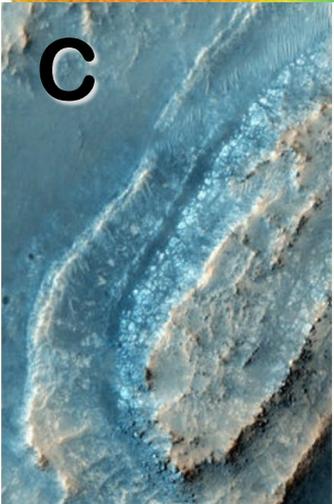


Mars 2020



Jezero Crater

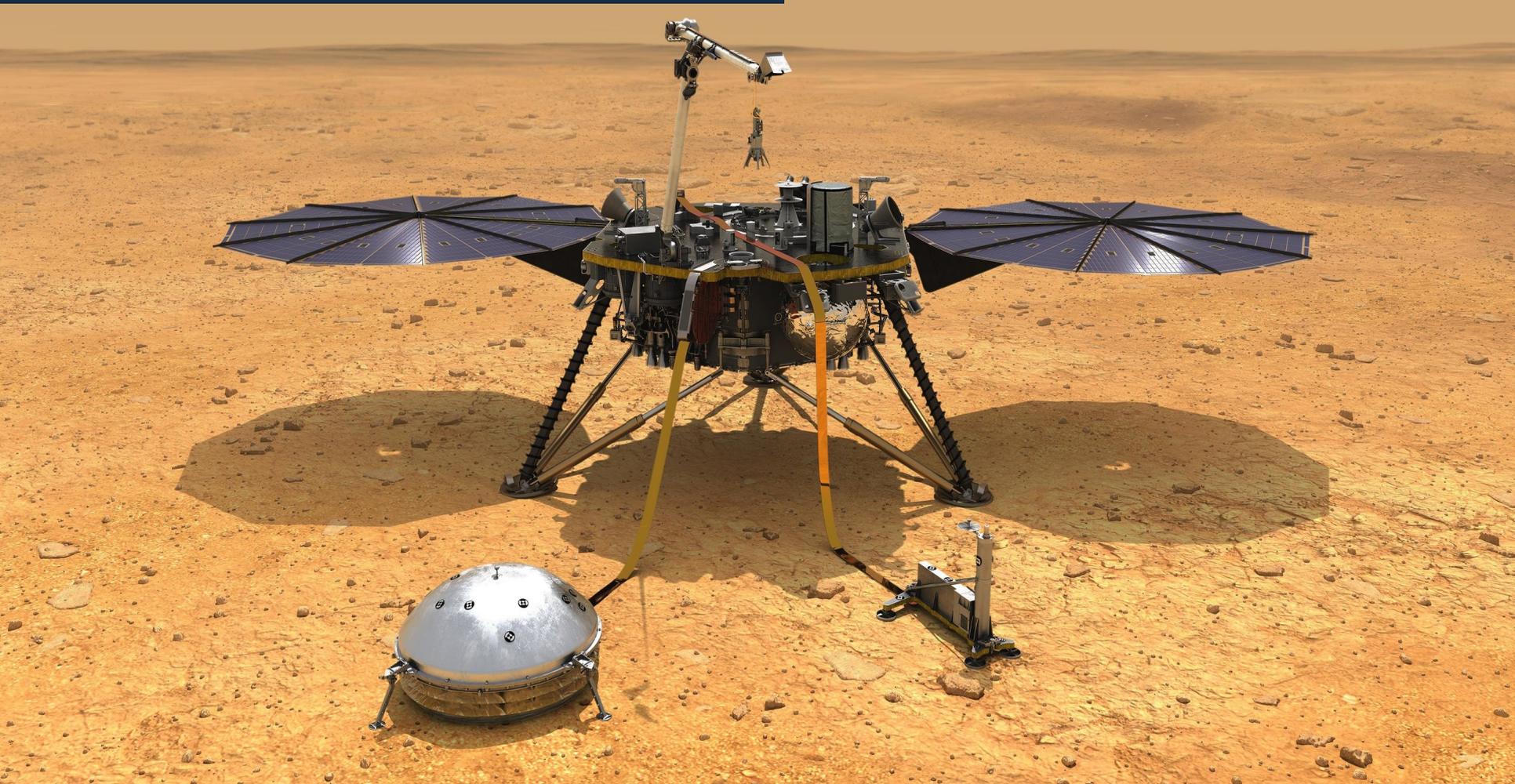
NE Syrtis



Columbia Hills



MARS InSight Mission



Asteroid activities:



Bennu

OSIRIS-REx

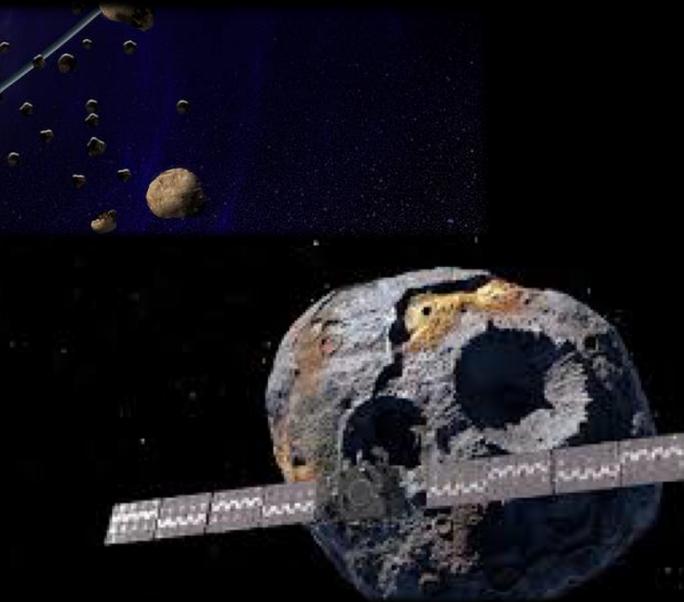


Hayabusa-2

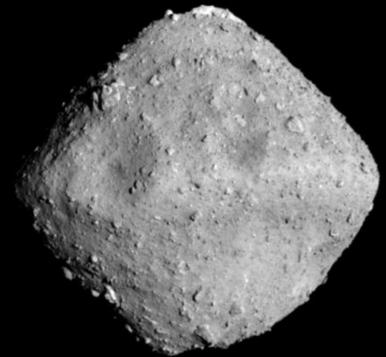
Ryugu



Lucy

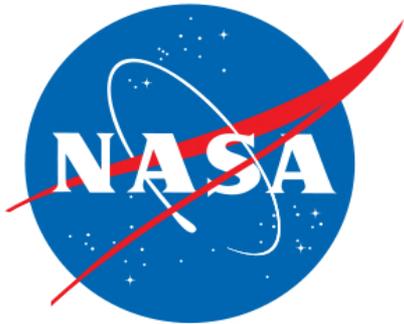


Psyche





USA activities:

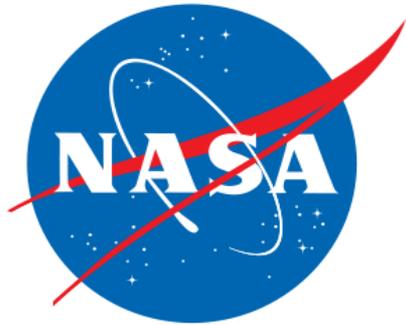




[Space.com](#) > [Tech](#)

The US Geological Survey Is Getting Serious About Space Resources and Mining

By Leonard David, Space.com's Space Insider Columnist | September 4, 2018 07:00am ET



That Moon Colony Will Be a Reality Sooner Than You Think

By Wilbur Ross

Mr. Ross is the secretary of commerce.



International activities:

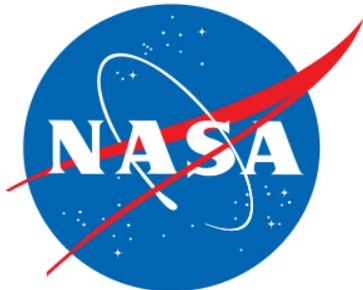


United Arab Emirates

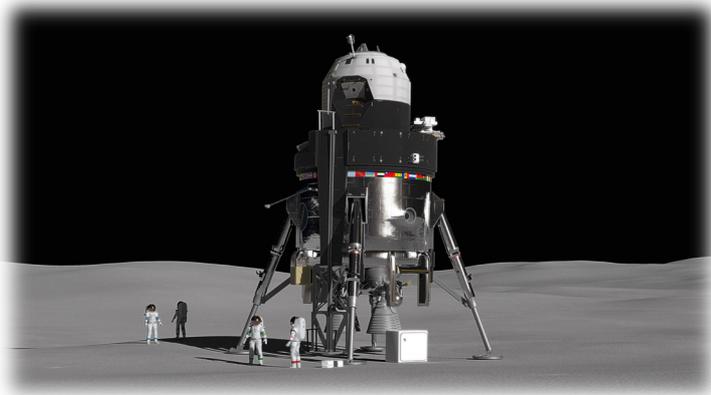
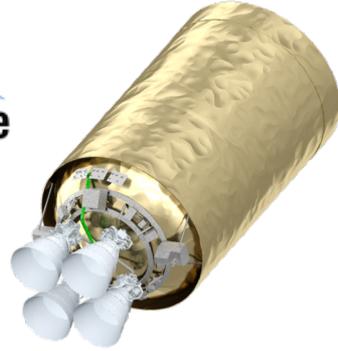
وكالة الإمارات للفضاء
UAE SPACE AGENCY



Australian
Space Agency



Private sector activities:



SPACEX

Elon Musk: In Seven Years, SpaceX Could Land Humans on Mars

The entrepreneur's updated plan calls for a giant rocket that could send humans to Mars—and possibly the moon—by 2024.



Jeff Bezos Unveils Blue Origin's Vision for Space, and a Moon Lander



Policy, outreach, and legal activities:



The Hague International Space Resources Governance Working Group



AIRBUS

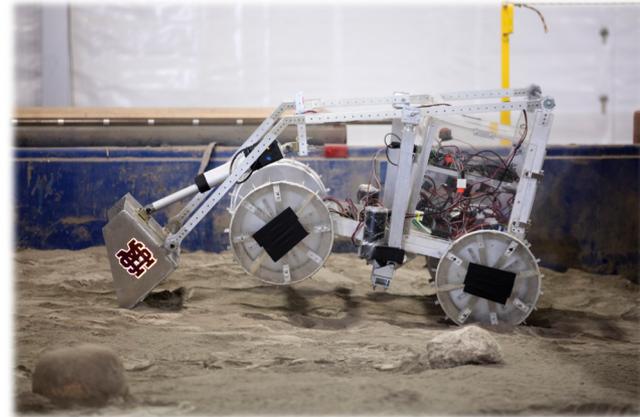
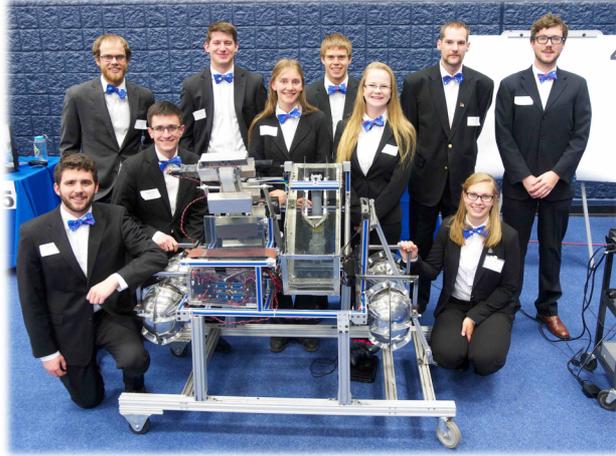


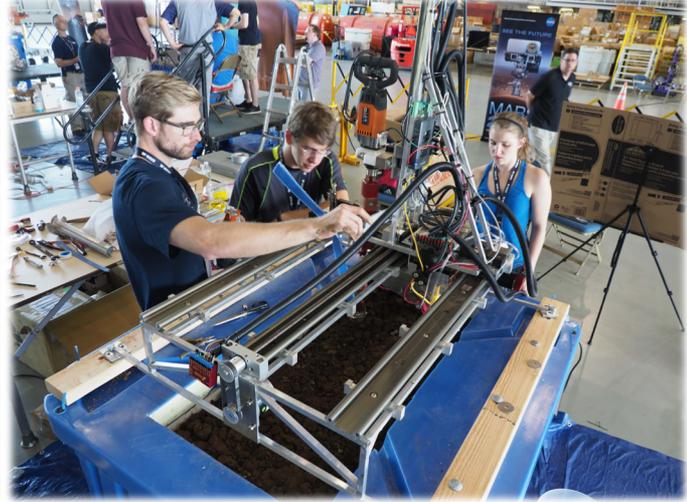
**DRAFT BUILDING BLOCKS
FOR THE DEVELOPMENT
OF AN INTERNATIONAL FRAMEWORK
ON SPACE RESOURCE ACTIVITIES**

September 2017



University activities:

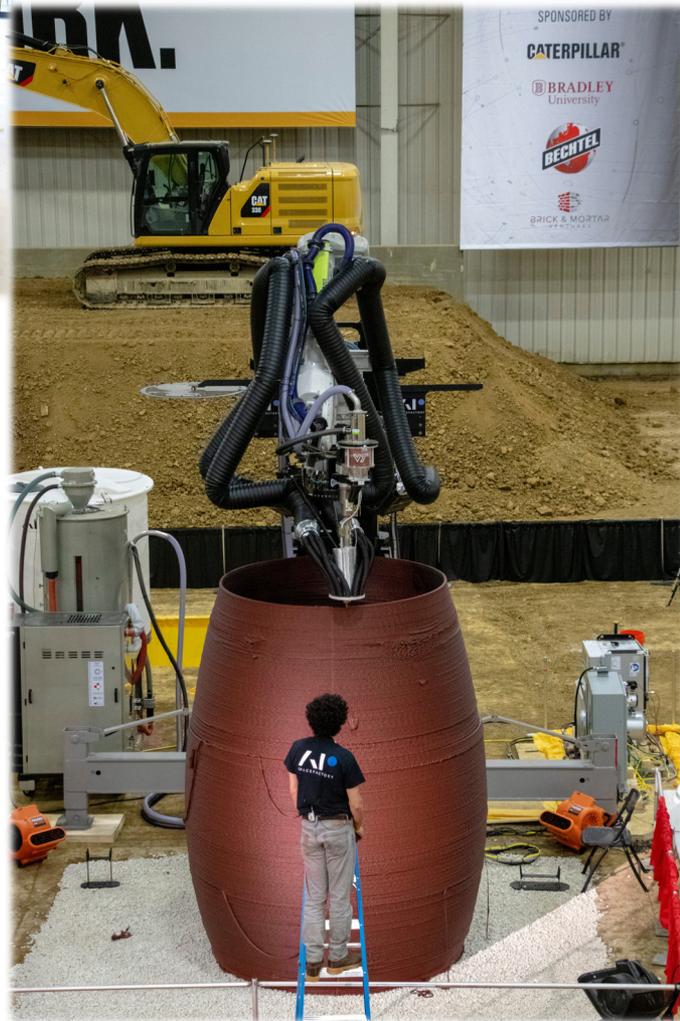




Design, build + create
in this \$2.25M challenge.
Open now for registration.

[Click here
for rules,
info and
registration.](#)

3D Printed Habitat CHALLENGE





SPACE RESOURCES PROGRAM

COLORADO SCHOOL OF MINES



First program in the world educating scientists, engineers, economists, entrepreneurs, and policy makers in the field of space resources

DEGREE OFFERINGS (Launched Fall 2018)

- Post-baccalaureate Certificates
- Master of Science Non-Thesis
- Ph.D.

SPRS501 **SPACE RESOURCES FUNDAMENTALS**

[START HERE](#)

[GETTING HELP](#)



SPRS502 **SPACE SYSTEMS ENGINEERING**

[START HERE](#)

WEEK ONE

We will cover everything you need to know about space resources. We will also identify its uses and explore resources utilization plans.



WEEK ONE

Review general course information, get to know your classmates and be introduced to systems engineering and space systems.



WEEK TWO

Explore the Needs Analysis phase of the system development lifecycle.

WEEK THREE
Exj
Exj
De
sys
cyc



WEEK ONE

SPRS503 **SPACE RESOURCES SEMINAR**



SPRS598 **ECONOMICS OF SPACE RESOURCES**

[→ START HERE](#)

[▶ ZOOM LINK](#)

[📖 STUDENT RESOURCES](#)

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SPRS591 **SPACE RESOURCES DESIGN PROJECT I**

[START HERE](#)

[GETTING HELP](#)



MODULE ONE

In this module we will review concepts in space resources and systems engineering and introduce the design problem.

MODULE TWO

In this module groups will begin the design process by developing mission/system concepts.

MODULE THREE

In this module groups will develop requirements for their mission/system design.

MODULE FOUR

In this module groups will complete a preliminary design review of their mission/system design.

- * Fully online program
- * Worldwide reach
- * Asynchronous/Synchronous



SPACE RESOURCES PROGRAM

COLORADO SCHOOL OF MINES



- Professions:
 - Scientists & engineers
 - Economists
 - Policy analysts
 - Entrepreneurs
 - Investors
 - Lawyers
- * 45 students (30 more in Fall)
- * From 4 continents
- * From 12 countries
- * From 3 Space agencies
- * Industries:
 - Aerospace
 - Mining, metals, oil & gas
 - Chemical, mechanical
 - Computer science

Sponsors





10th JOINT MEETING



**SPACE RESOURCES
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