National Aeronautics and Space Administration

Ames

Discovery Innovations Solutions

NASA Ames' Robotic Exploration of the Moon and Beyond

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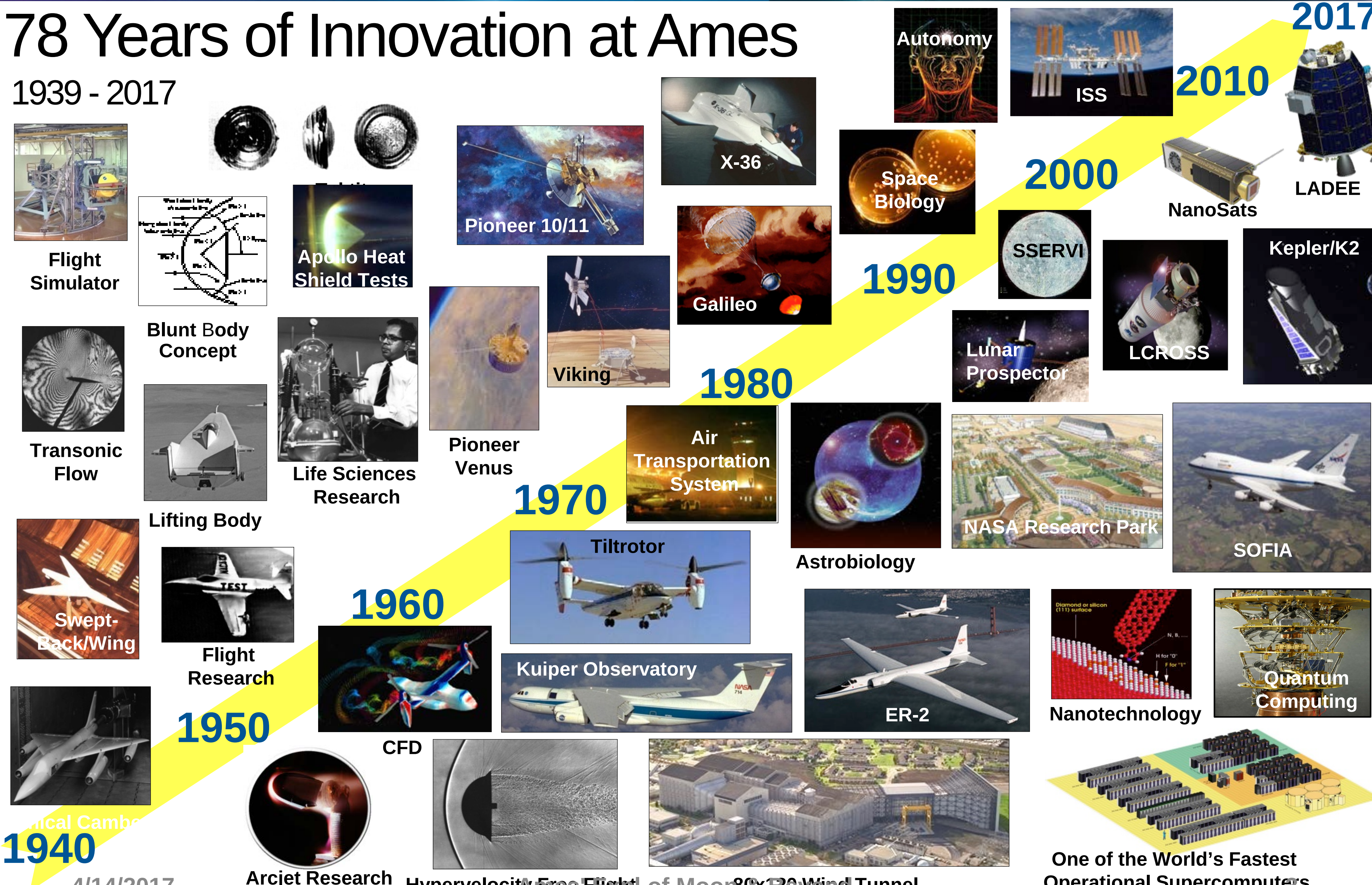
NASA Ames Research Center – Silicon Valley

- **Founded 1939, 2nd oldest NASA center**
- **2500 employees**
  w/ another **1200** students in summers
- **$900M+ yearly budget**

- **Science**
  - Space, Earth, Biological Sciences
  - Astrobiology, Lunar Science
- **Cost-Effective Space Missions**
  - Lunar Exploration
  - Small Spacecraft and Nanosatellites
- **Exploration Systems**
  - Autonomy, and Supercomputing
  - Entry Systems
- **Aeronautics & Aviation**
  - NextGen Air Traffic Management
  - Aviation Safety
- **Innovative & Entrepreneurial Collaborations**
  - NASA Research Park & 90 partners

78 Years of Innovation at Ames

1939 - 2017



Kepler / K2 Mission

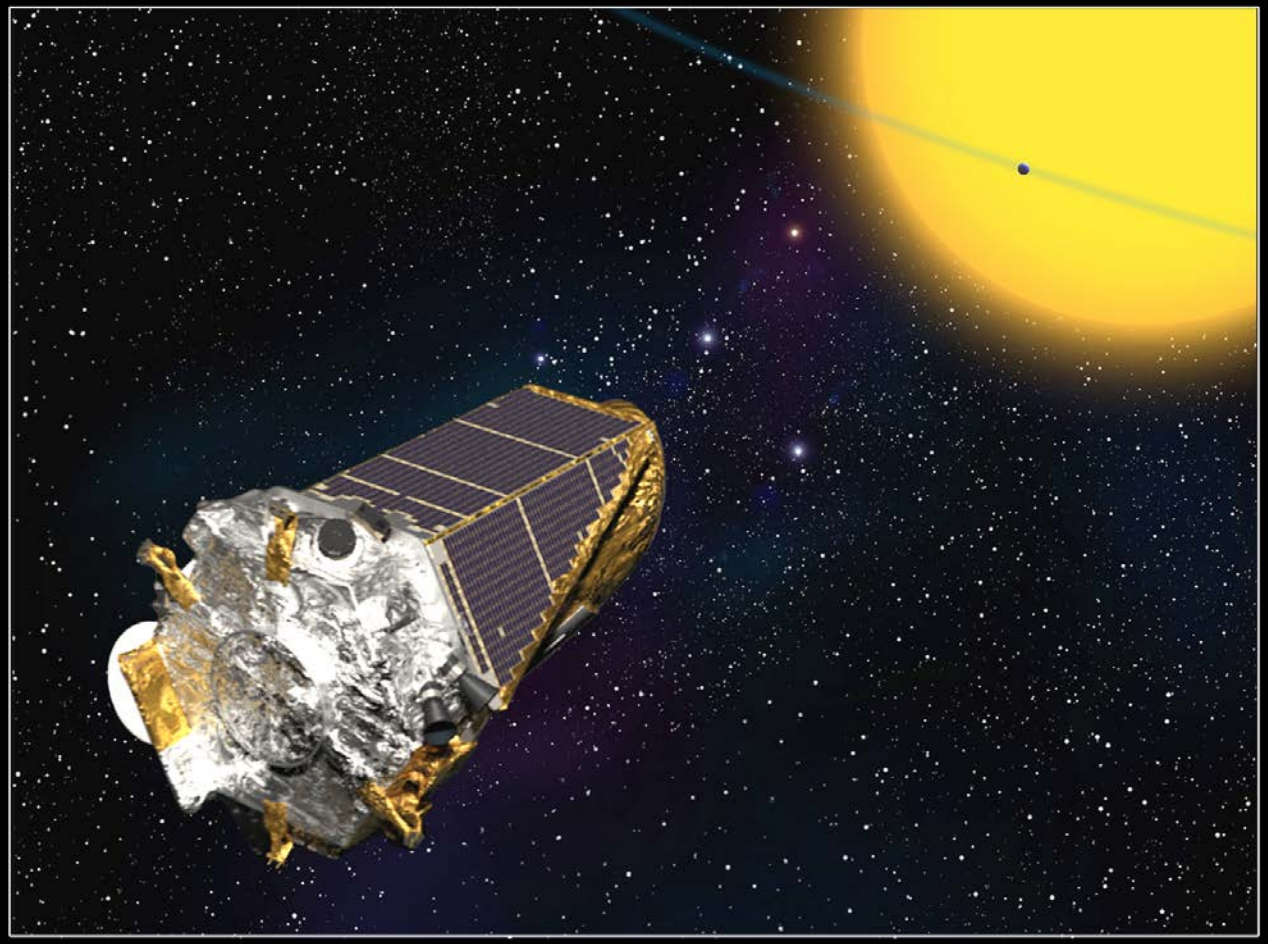
- **Find the number of Earth-size and larger planets in the habitable zone of sun-like stars**

Launched:
March 7, 2009

Observed
145,000 Stars

3461+
Confirmed
Planets

4496+
Candidate
Planets
to be confirmed



LCROSS Mission

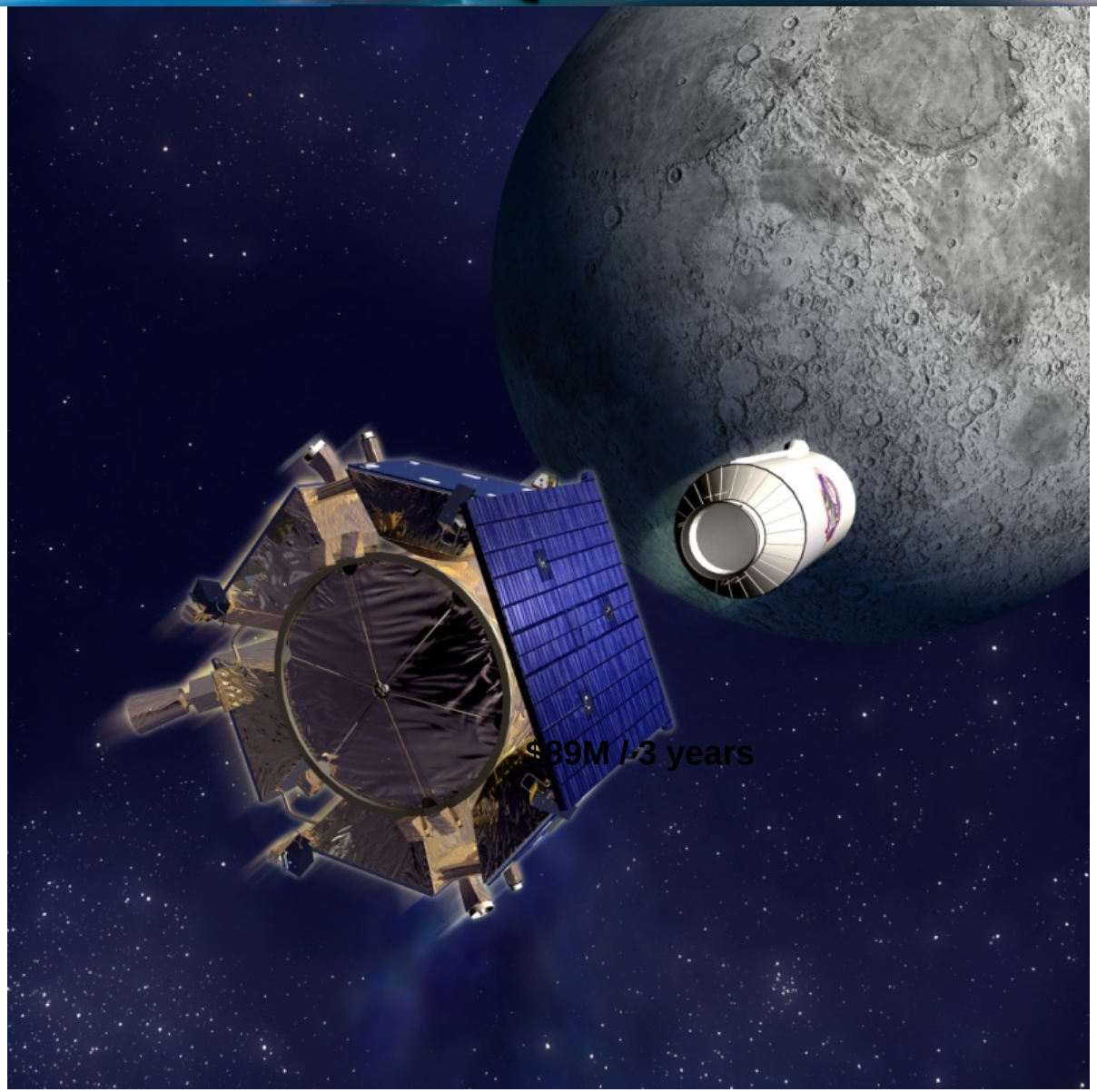
Lunar **CR**ater **O**bservation and **S**ensing **S**pacecraft

Launched: June 18, 2009
Impacted: October 9, 2009

Confirmed Water ice in permanently shadowed craters on the Moon

Demonstrated "Secondary" launch with another spacecraft

Impacted a "used" empty rocket and measured the result



LADEE : Lunar Atmosphere and Dust Environment Explorer

Measure the Lunar Dust and the Examine the Lunar atmosphere

- **Launched Sept 6, 2013**
- **Ended on April 18th, 2014**

- **First Composite Small Spacecraft**
- **Demonstrated Laser Communications from Lunar Orbit**

BioSentinel: Deep-Space Radiation BioSensor

Mission Objectives:

A CubeSat to be launched on NASA's first SLS

- 70 million miles from Earth at 18 months
- Far outside the protective shield of Earth's magnetosphere

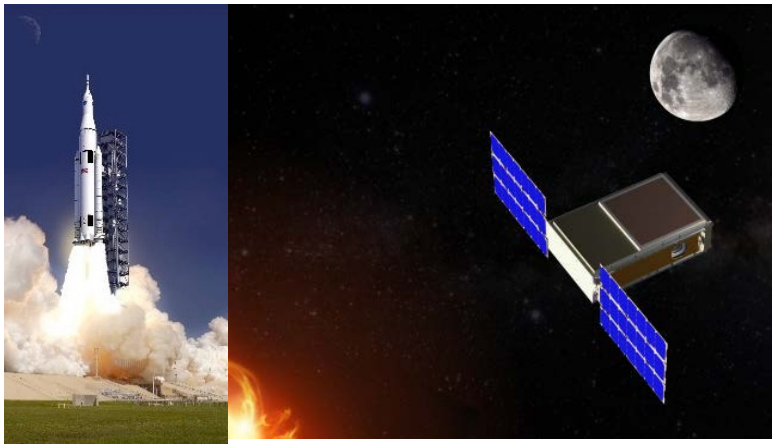
Conduct life science studies relevant to human exploration

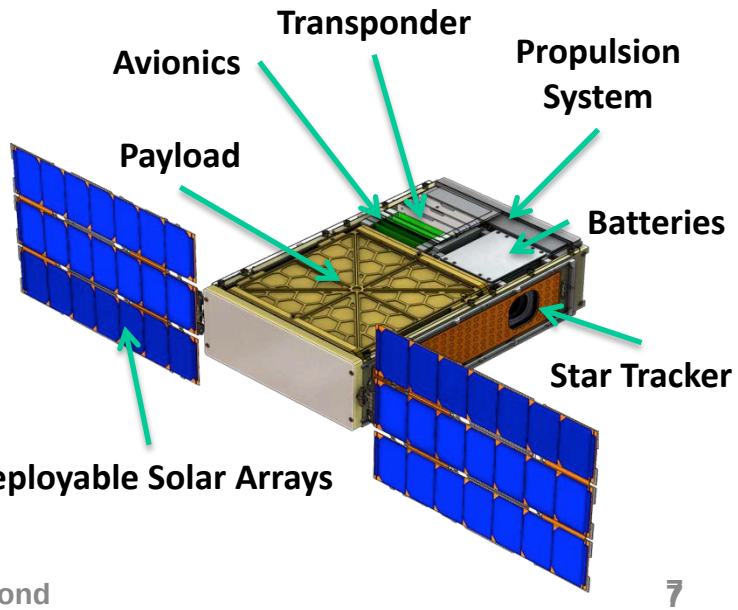
- 1st biological study beyond LEO in over 40 years
- Uses Yeast DNA as a BioSensor

Design payload with sensors for multiple environments

- Instrument on ISS at similar time to SLS launch
- Ground controls in lab and at radiation beam facilities

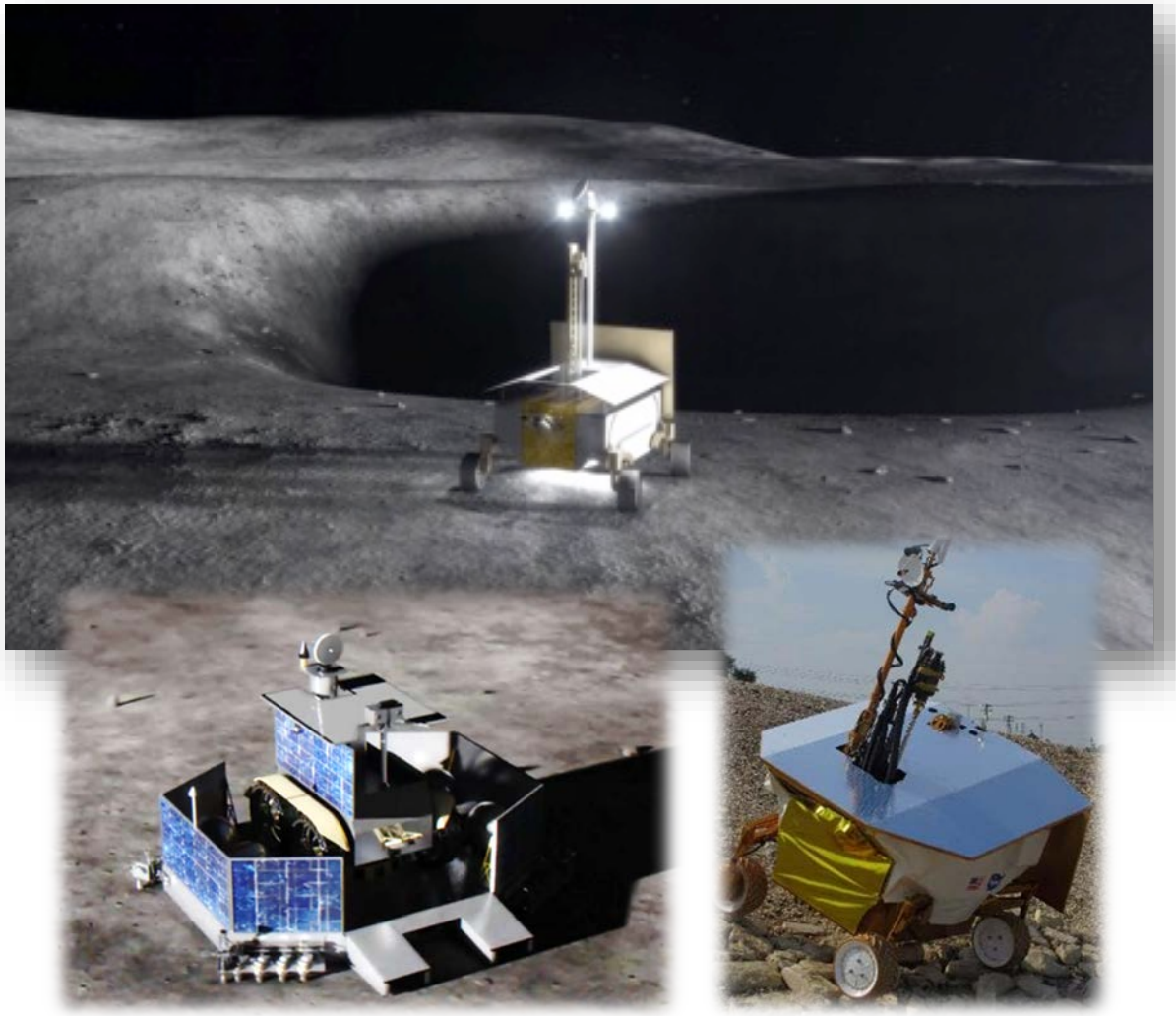
Expected Launch in 2019





Resource Prospector (RP) Mission

Understand the nature and distribution of water/ices in lunar polar soil



Mission:

- **Operate for 6-14 earth days**
- **Drive into permanently shadowed craters**
- **Prospect and Drill for Ices**
- **Determine composition of the Ices and their usabilty**
- **Expected Launch in FY21**

Summary

- Ames Research Center leads NASA in Lunar Exploration missions

- NASA Ames is actively developing and operating robotic missions for Lunar and Deep Space Exploration

- NASA Ames actively partners with California's Universities, Companies, and other Government labs to succeed

Questions?