NASA Ames’
Robotic Exploration of the Moon and Beyond

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Dr. David Korsmeyer
Director of Engineering
NASA Ames Research Center
Moffett Field, California
NASA Ames Research Center – Silicon Valley

- 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

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

4/14/2017

Ames' Expl of Moon & Beyond
78 Years of Innovation at Ames
1939 - 2017

1940
- Flight Research
- Conical Camber

1950
- Lifting Body
- Blunt Body Concept

1960
- Transonic Flow
- Swept-Back/Wing
- Life Sciences Research
- Pioneer 10/11

1970
- Flight Research
- Tiltrotor
- Air Transportation System
- Pioneer Venus

1980
- Lifting Body
- Apollo Heat Shield Tests
- Life Sciences Research
- Viking

1990
- Transonic Flow
- Conical Camber
- Lifting Body
- Space Biology

2000
- Hypervelocity Free Flight
- 60x20 Wind Tunnel

2010
- Flight Simulator
- ISS

2017
- Arcjet Research
- Kepler/K2
- NASA Research Park
- SSERVI

One of the World's Fastest Operational Supercomputers

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Ames' Exploration of Moon & Beyond
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 CRater Observation and Sensing Spacecraft

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 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 usability
• 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?