

# Keck Institute for Space Studies

## List of Study Programs

### 2017 Programs:

1. [Cryogenic Comet Sample Return – Compelling New Science vs. Technological Challenges](#)
2. [Unlocking the Climate Record Stored within Mars' Polar Layered Deposits](#)
3. [The Architecture of LISA Science Analysis: Imagining the Future](#)
4. [Next-Generation Approach for Detecting Climate-Carbon Feedbacks: Space-Based Integration of Carbonyl Sulfide \(OCS\), CO<sub>2</sub>, and SIF](#)
5. [Designing Future CMB Experiments](#)
6. [Caltech Space Challenge \(Student-Led Program\)](#)

### 2016 Programs:

1. [Optical Communication on SmallSats – Enabling the Next-Era in Space Science](#)
2. [Exoplanet Imaging and Characterization: Coherent Differential Imaging and Signal Detection Statistics](#)
3. [Addressing the Mars ISRU Challenge: Production of Oxygen and Fuel from CO<sub>2</sub> Using Sunlight](#)
4. [Space Science Opportunities Augmented by Exploration Telepresence](#)

### 2015 Programs:

5. [Optical Frequency Combs for Space Applications](#)
6. [Methane on Mars](#)
7. [Don't Follow \(Just\) the Water: Does Life Occur in Non-Aqueous Media?](#)
8. [Exploring New Multi-Instrument Approaches to Observing Terrestrial Ecosystems and the Carbon Cycle From Space](#)
9. [Three Dimensional \(3D\) Additive Construction for Space using In-Situ Resources](#)
10. [Caltech Space Challenge](#)

## 2014 Programs:

1. [Science and Enabling Technologies to Explore the Interstellar Medium](#)
2. [Bridging the Gap: Observations and Theory of Star Formation Meet on Large and Small Scales](#)
3. [Gazing at the Solar System: Capturing the Evolution of Dunes, Faults, Volcanoes and Ice from Space](#)
4. [Mapping and Assaying the Near Earth Object Population Affordably on a Decadal Timescale](#)
5. [Adaptive Multi-Functional Space Structures for Micro-Climate Control](#)
6. [Venus Seismology](#)

## 2013 Programs:

1. [The Sleeping Giant: Measuring Ocean Ice Interactions in Antarctica](#)
2. [Airships: A New Horizon for Science](#)
3. [New Approaches to Lunar Ice Detection and Mapping](#)
4. [Planetary Magnetic Fields: Planetary Interiors and Habitability](#)
5. [Satellites to the Seafloor: Autonomous Science to Forge a Breakthrough in Quantifying the Global Ocean Carbon Budget](#)
6. [Inferring Thermal and Mechanical Properties of Celestial Bodies Regolith Using \(Simple\) Low-T](#)
7. [RUAV Scout and Recharging Station](#)
8. [Caltech Space Challenge](#)

## 2012 Programs:

1. [New Methods to Measure Photosynthesis from Space](#)
2. [In Situ Science and Instrumentation for Primitive Bodies](#)
3. [Quantum Communication, Sensing and Measurement in Space](#)
4. [Engineering Resilient Space Systems](#)
5. [Small Satellites: A Revolution in Space Science](#)
6. [CMB Polarization Cosmology in the Coming Decade](#)
7. [Tools and Algorithms for Sampling in Extreme Terrain](#)

## 2011 Programs:

1. [Asteroid Return Mission Study](#)
2. [Digging Deeper: Algorithms for Computationally-Limited Searches in Astronomy](#)
3. [Next Generation UV Instrument Technologies Enabling Missions in Astrophysics, Cosmology a](#)
4. [Monitoring of Geoengineering Effects and their Natural and Anthropogenic Analogues](#)
5. [xTerramechanics - Integrated Simulation of Planetary Surface Missions](#)
6. [High Altitude Ballooning for Space and Atmospheric Observation](#)
7. [Caltech Space Challenge](#)

## 2010 Programs:

1. [Future Missions to Titan: Scientific and Engineering Challenges](#)
2. [The First Billion Years](#)
3. [Innovative Satellite Observations to Characterize the Cloudy Boundary Layer](#)
4. [Quantifying the Sources and Sinks of Atmospheric CO<sub>2</sub>](#)
5. [Innovative Approaches to Planetary Seismology](#)

## 2009 Programs:

1. [Monitoring Earth Surface Changes from Space](#)
2. [Single Photon Counting Detectors](#)
3. [Innovative Approaches to Exoplanet Spectra](#)
4. [Climate Feedbacks and Future Remote Sensing Observations](#)
5. [Shedding Light on the Nature of Dark Matter](#)
6. [Mission Concepts for Accessing and Sampling High-Risk Terrains on Planetary Surfaces](#)
7. [Innovative Concepts in IR/Submm Astronomy from Space](#)

## 2008 Programs:

1. [New Directions in Robotic Exploration of Mars](#)
2. [Coherent Arrays for Astronomy and Remote Sensing](#)
3. [Large Space Structures](#)