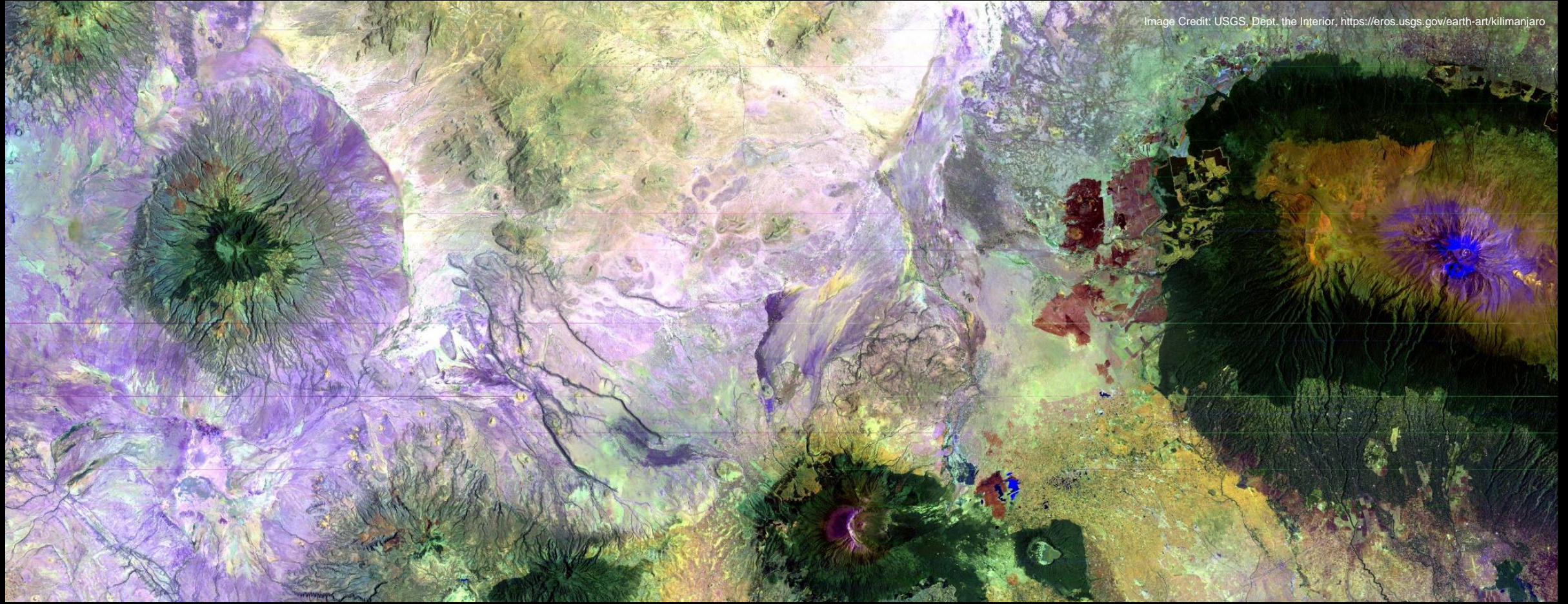
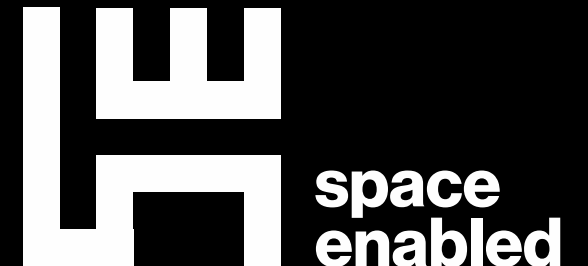


# Exploring space technologies for sustainable development and the benefits of international research collaboration

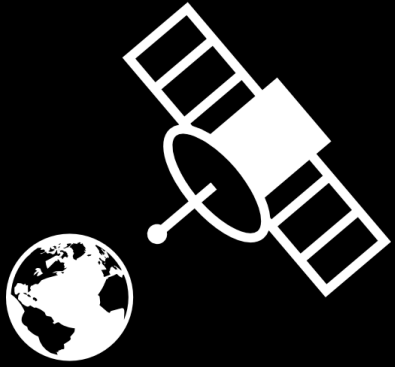


**Advancing justice in Earth's  
complex systems using  
designs enabled by space**





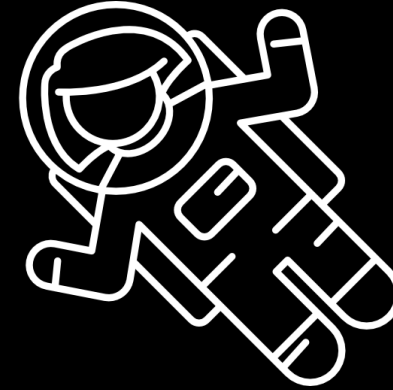
# Six space technologies currently support the Sustainable Development Goals



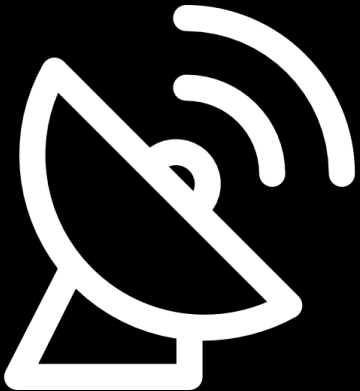
**Satellite  
Earth  
Observation**



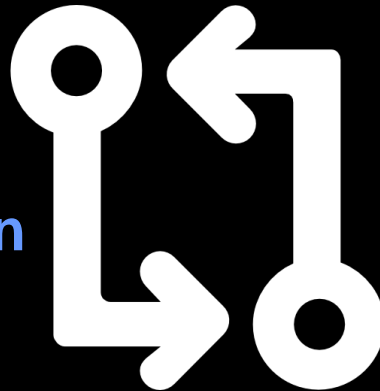
**Satellite  
Positioning  
&  
Navigation**



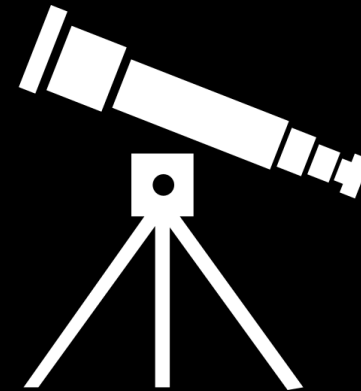
**Human Space  
Flight &  
Microgravity  
Research**



**Satellite  
Communication**

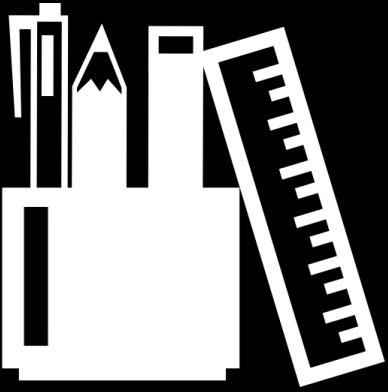


**Space  
Technology  
Transfer**

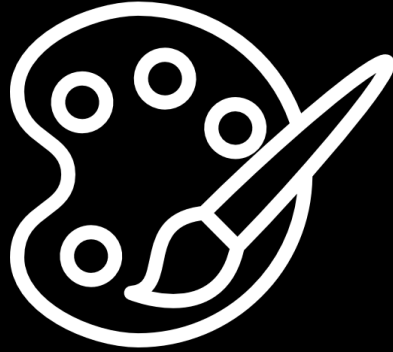


**Research  
Infrastructure**

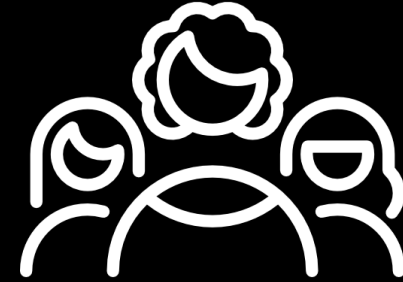
# Space Enabled employs six research methods in support of the Sustainable Development Goals



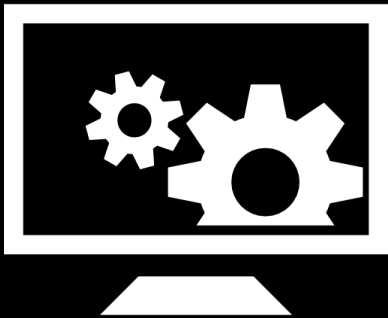
**Design**



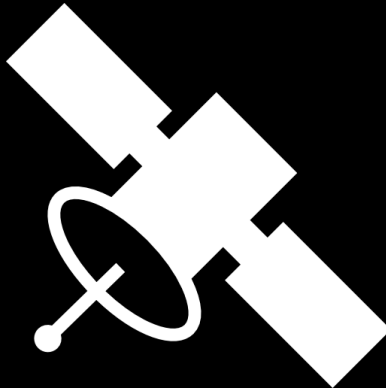
**Art**



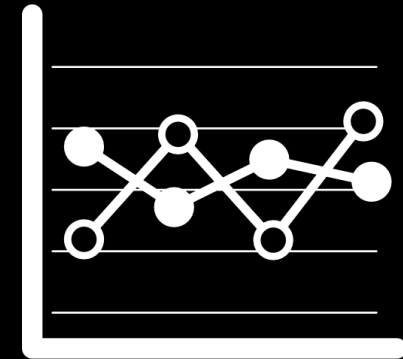
**Social  
Science**



**Complex  
Systems  
Modeling**



**Satellite  
Engineering**



**Data  
Science**

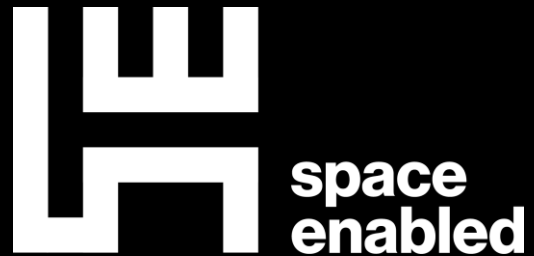
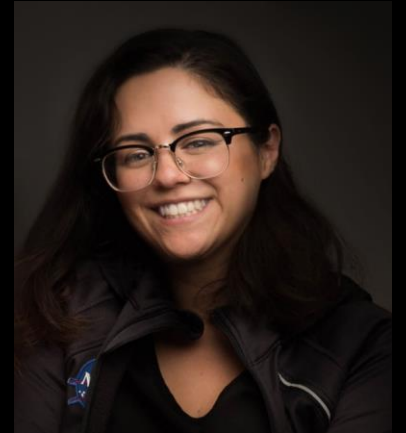
Space Enabled applies the six space technologies in collaboration with development organizations at four levels

International Development Organizations



National and Local Governments


Universities and Non-Governmental Organizations


Entrepreneurial companies












### Cotonou

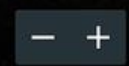
City in Benin

Cotonou is a large port city on the south coast of Benin, in West Africa. At the eastern end of central Boulevard St. Michel is the huge Dantokpa Market, w



Points of interest in Cotonou

Google





Lake  
Nokoué









# A Flower Against Pollution

How we are collaborating with Green Keeper Africa to monitor an invasive plant that is used to clean oil-based waste



## Green Keeper Africa

Green Keeper Africa is an entrepreneurial company based in Cotonou, Benin. They pay local community members to harvest the invasive water hyacinth plant and convert it into kits that absorb oil pollution caused by industry. Their work improves the environment and creates a new eco-friendly source of income. Green Keeper Africa has invited Space Enabled to work together to create an Observation System for Invasive Plants to monitor the water hyacinth and its impact on the community.



## Satellite Earth Observation

Space Enabled is working with Green Keeper Africa to use imagery and measurements from earth observation satellites to monitor the water hyacinth. We are combining information from government and commercial satellites that show how the water hyacinth grows and drifts through rivers and lakes.



## Aerial Earth Observation

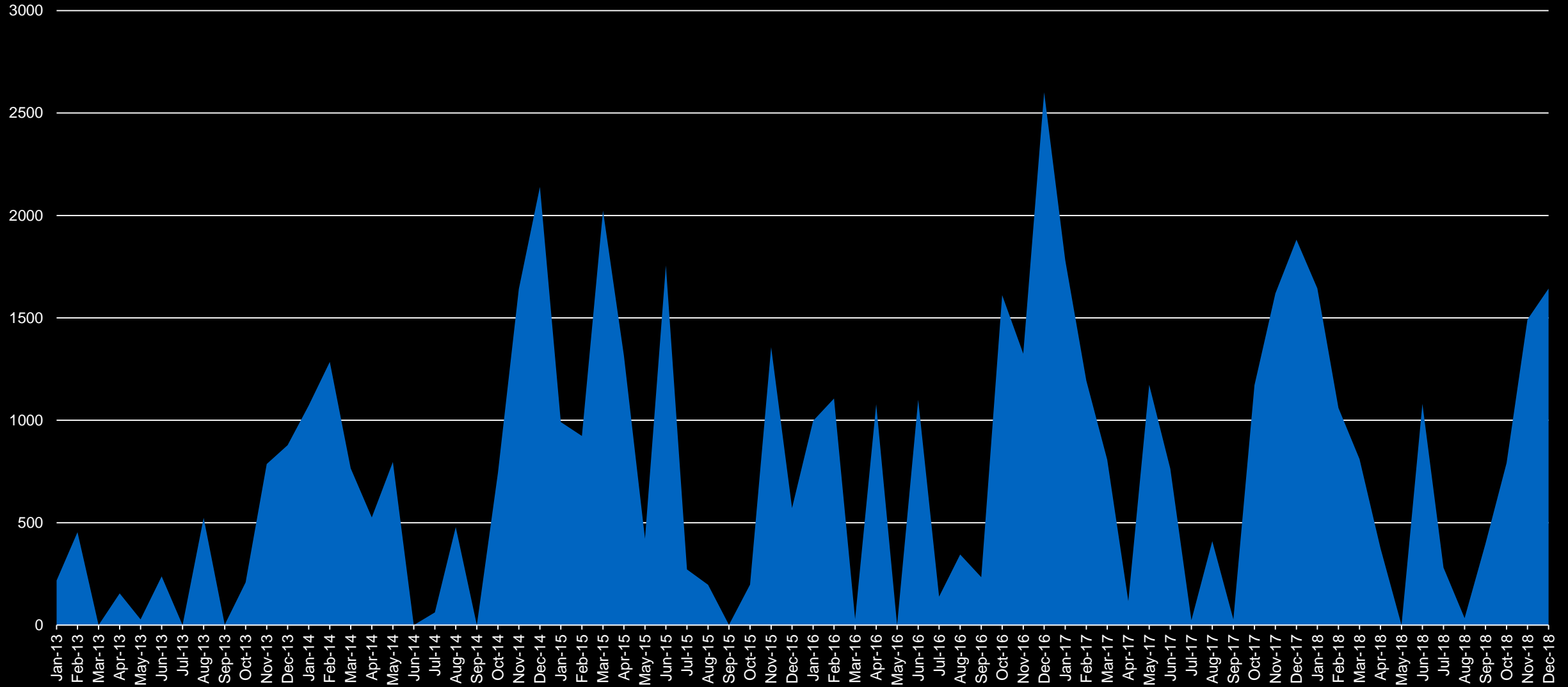
Space Enabled is exploring with Green Keeper Africa how they might use cameras mounted on radio controlled planes, drones, solar air balloons or kites to track the growth of the invasive water hyacinth plant.



## Measuring

The growth of the invasive water hyacinth plant is impacted by environmental factors such as the temperature, salinity and nutrient content of the water as well as local weather patterns. Space Enabled is working with Green Keeper Africa to explore how they can use sensors placed in local water ways to measure environmental changes. In the long term, these measurements may help Green Keeper Africa predict where the invasive water hyacinth plant will bloom.

Water Hyacinth Surface Area (Ha)

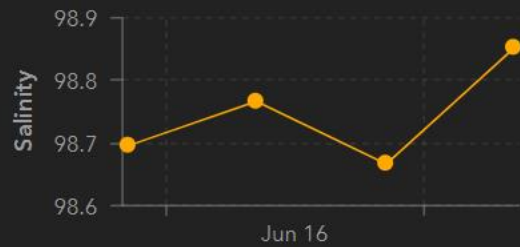




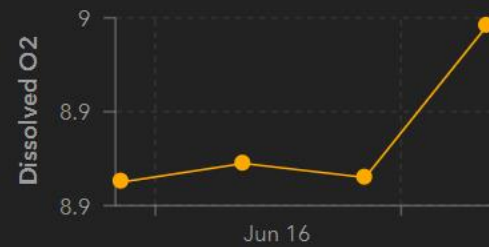
# Lake Nokoue Environmental Monitoring

NDVI Exceedance and Sensor range 1/1/2019

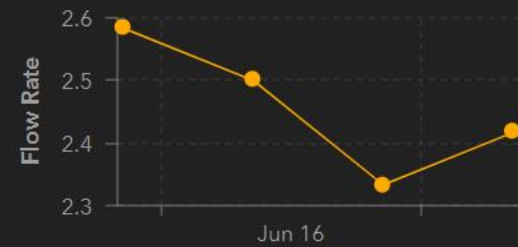
6/30/2019



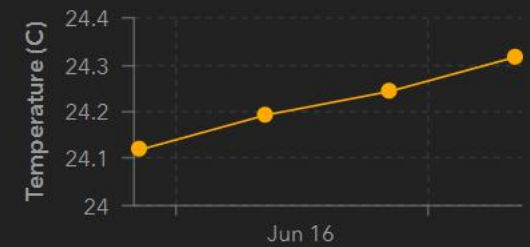
Last update: 14 minutes ago



Last update: 14 minutes ago



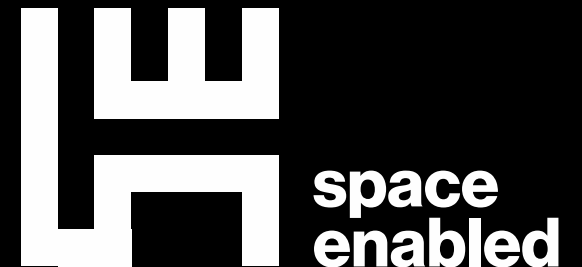
Last update: 14 minutes ago



Last update: 14 minutes ago

# What can we learn from indigenous communities about space?

**Prathima Muniyappa, Danielle Wood**







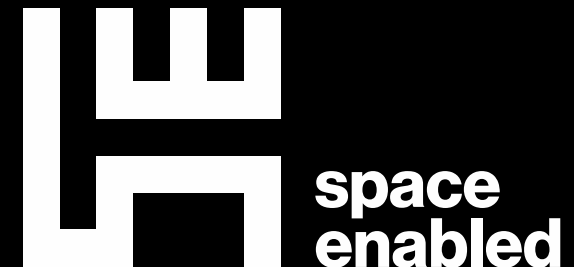


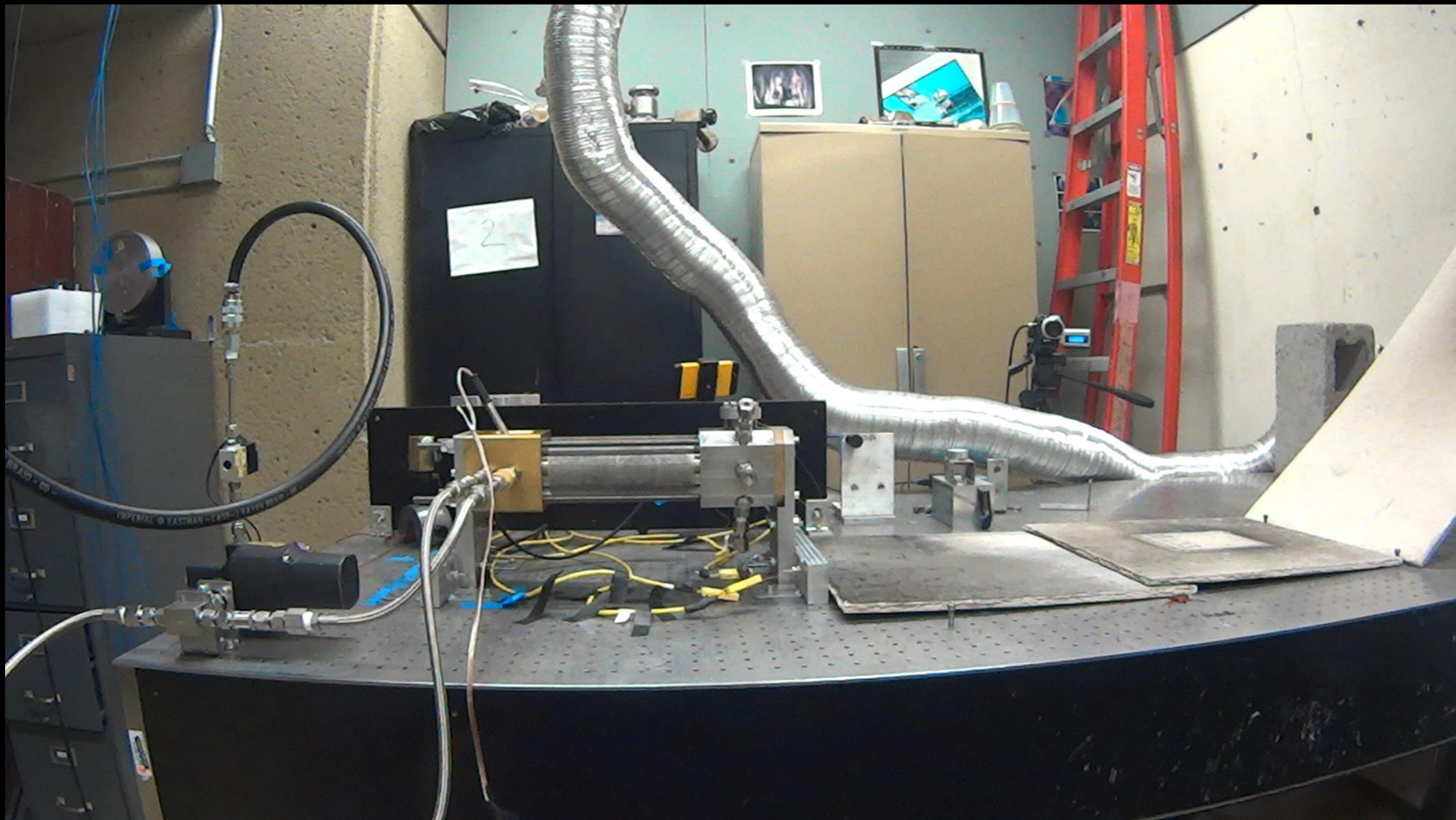
SCRIBE

# Exploring wax as a fuel for small satellites

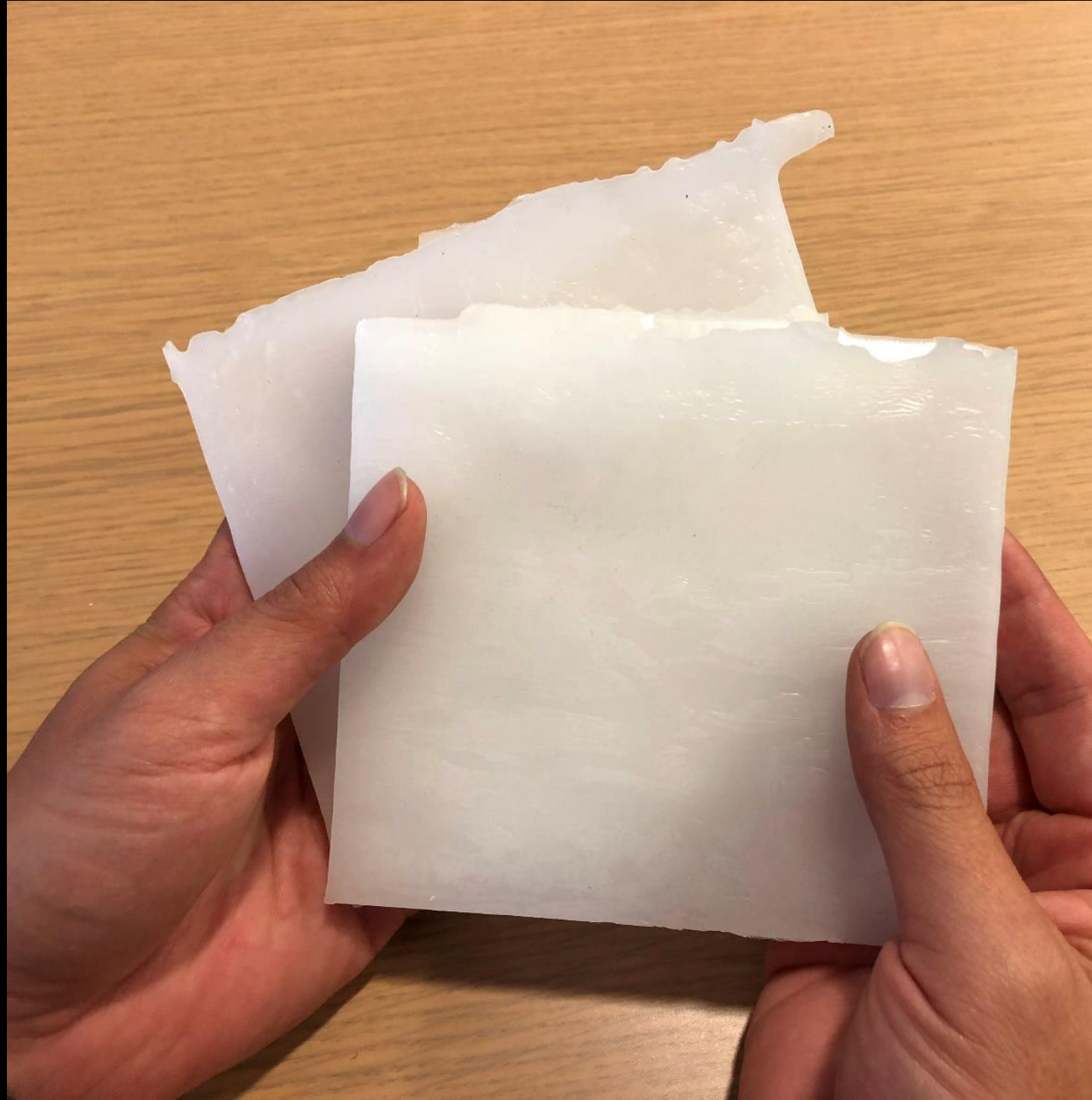
**Javier Stober, Juliet Wanyiri, Christine Joseph, Miles Lifson, Daniel Erkel, Danielle Wood**

**Space Enabled Student Research Assistants**

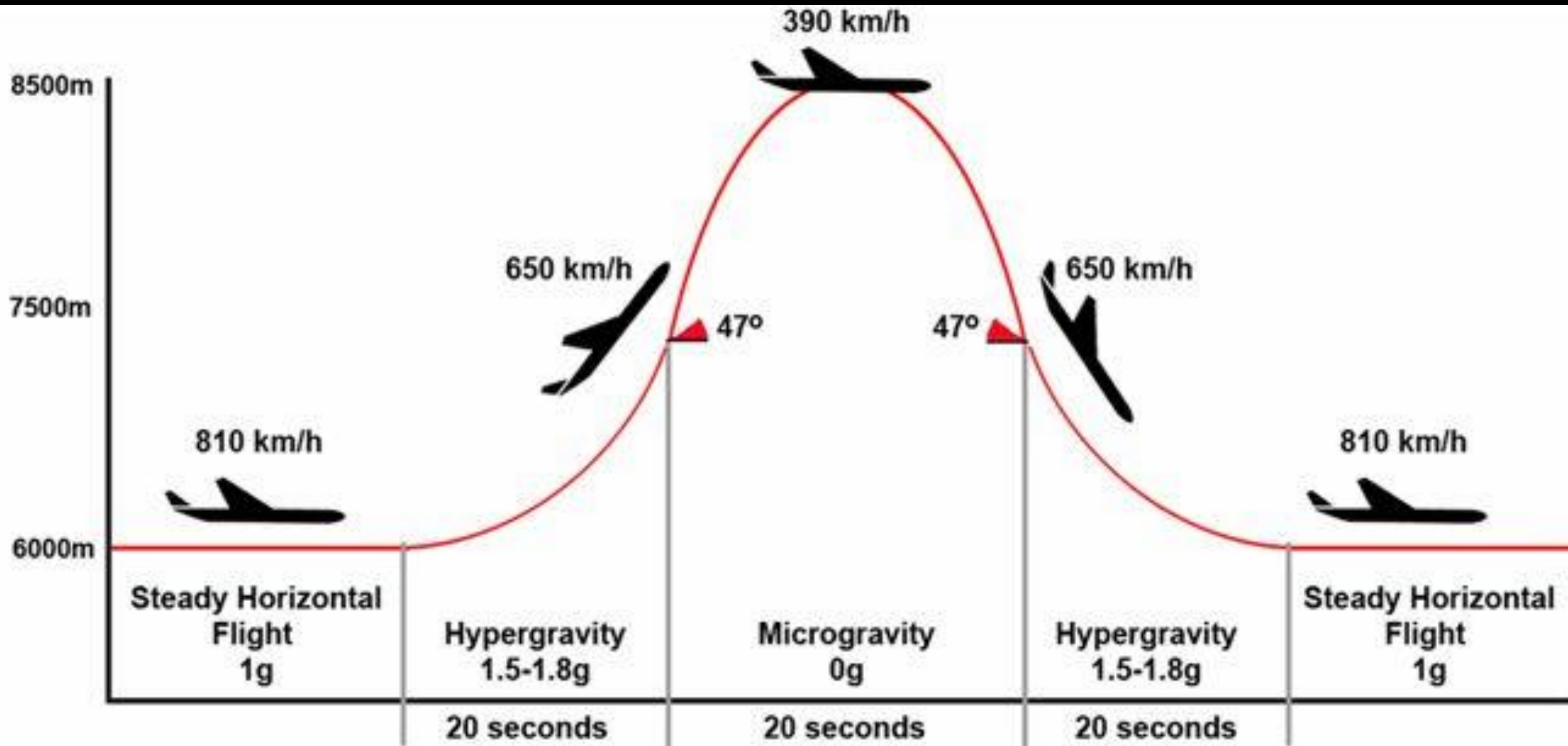




Video Credit: Pavan Narsai



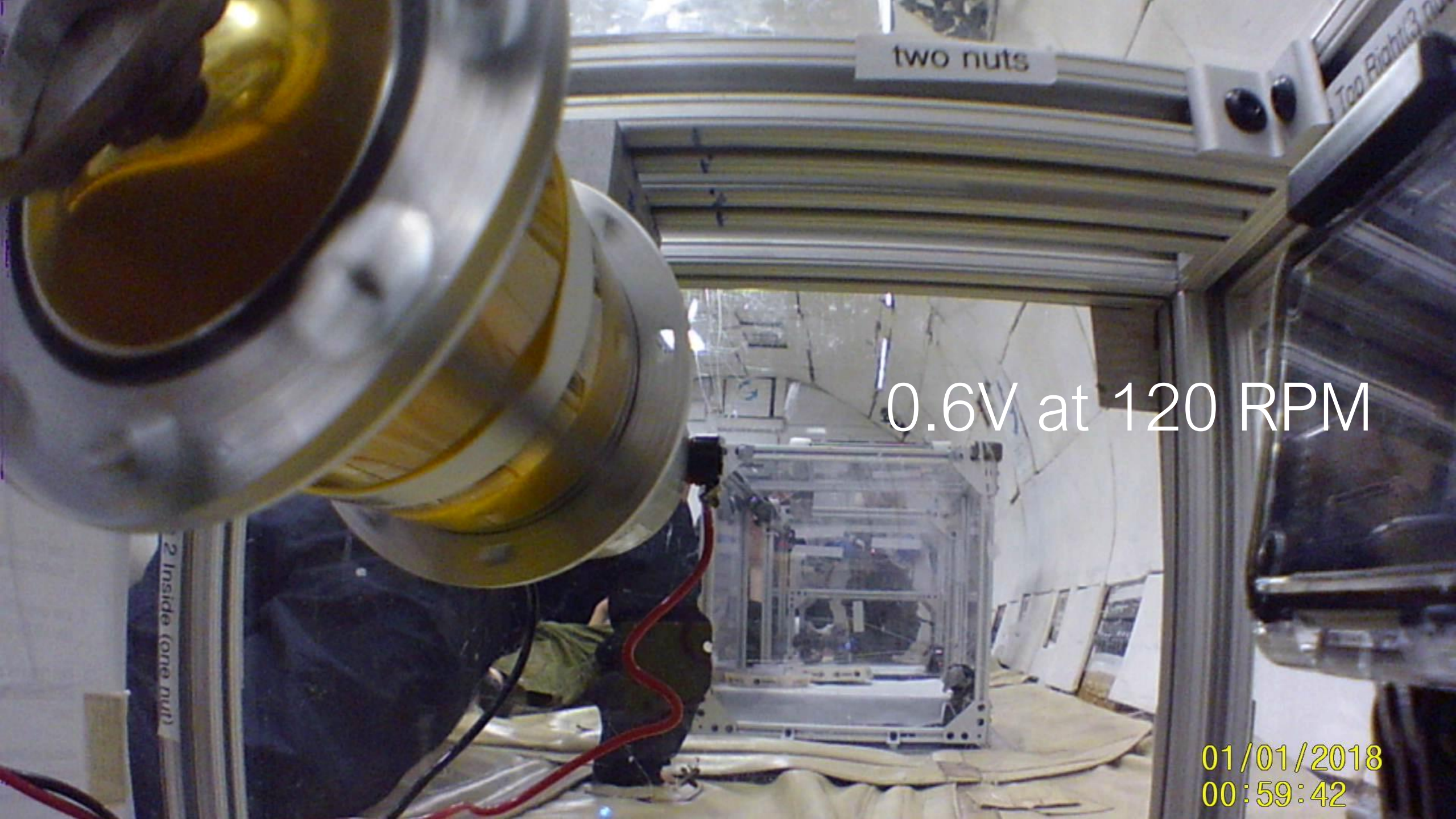
Altitude











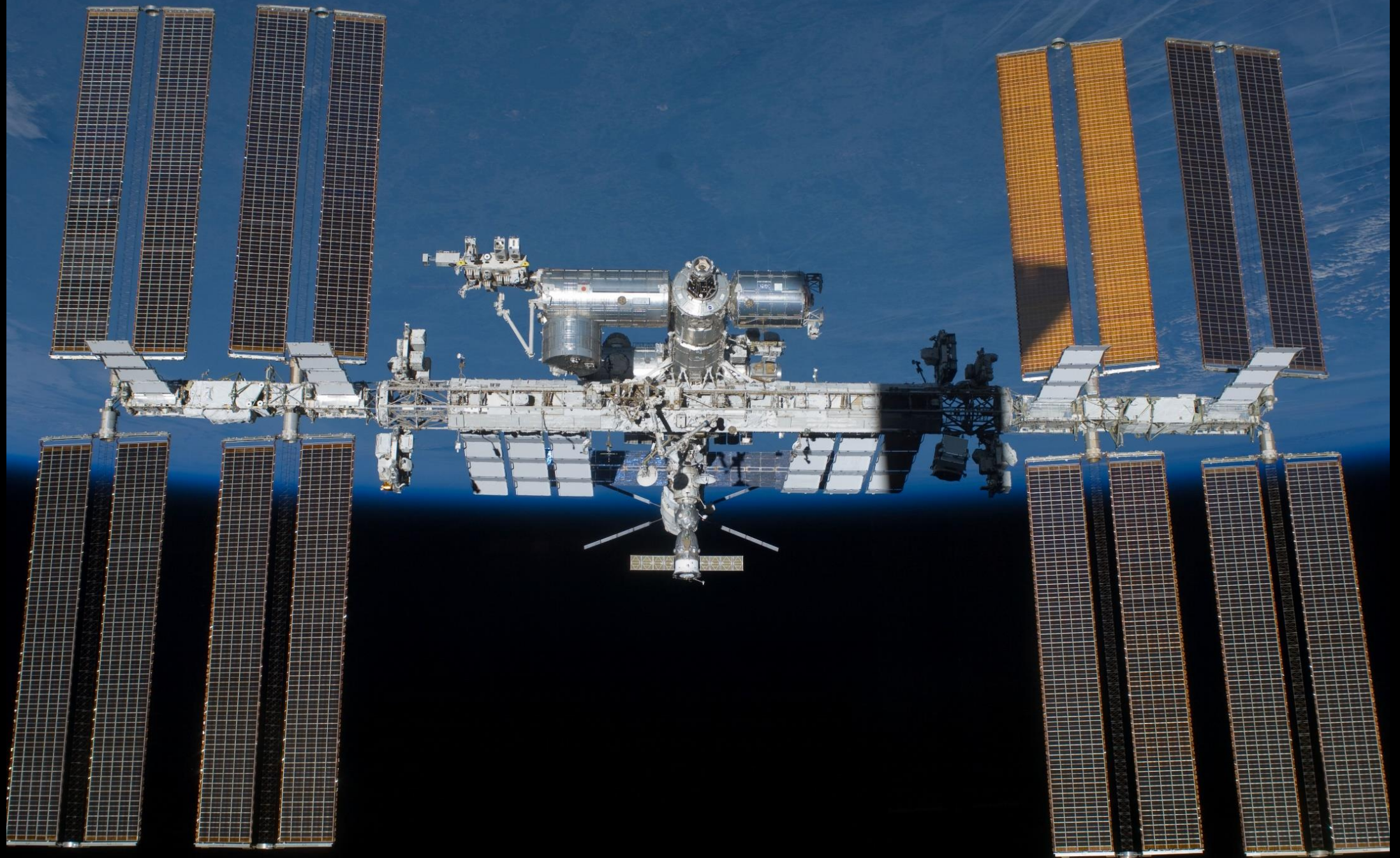
two nuts

Top Right 3

0.6V at 120 RPM

2 Inside (one nut)

01/01/2018  
00:59:42







Danielle Wood (left) and Christine Joseph.

Image: Bryce Vickmark



## Microgravity research after the International Space Station

Researchers say new facilities in space should be available to scientists from any country.



Kenya

Thailand





United Arab Emirates