



Abstract #1756

English

ispace & Team Hakuto's 2017 Lunar Mission

This presentation will introduce ispace, a lunar exploration company headquartered in Tokyo, Japan, and Team Hakuto, a front-running team participating in the Google Lunar XPRIZE (GLXP) competition. ispace owns and operates Team Hakuto, the only Japanese Team competing for the \$30M Google Lunar XPRIZE competition. During this first mission to Mare Imbrium, the 4kg rover will attempt to survive one lunar day. The rover has a hybrid communication system, with both 900 MHz and 2.4 GHz capabilities, enabling both long distance and high speed communication. The rover will travel at least 500m and downlink high-definition video at 100 kbits/sec to Earth via the lander to achieve the required objectives of the GLXP. In order to further test and demonstrate new technologies, the rover will attempt a total traverse distance of up to 10 km. The traverse will be executed in a flower petal pattern, repeatedly circling back toward the host lander to be photographed. The mission will provide a low cost opportunity to obtain ground truth data for the numerous remote sensing missions. In the future this technology can be further used to investigate promising regions for potential resource deposits. This mission is the first of many missions planned by ispace technologies.

French

No abstract title in French

No French resume

Author(s) and Co-Author(s)

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iSpace



Profile of Mr. Kyle Acierno

General

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Position:

Preferred Language: [Language not defined]

Addresses

Business

Home

Biographies

Biography submitted with the abstract

Kyle is the Director of ispace Europe's office in Luxembourg. Previously he served as the Global Business Development Manager and built strategic relations with JAXA, NASA, ESA and universities around the world. Kyle received a BA in International Security from Simon Fraser University in Vancouver, Canada and a M.Sc. in Space Studies from the International Space University. He has previously worked in a Chinese environmental think-tank where he offered policy solutions to the Government of China. He also served as COO of a crypto-currency start-up responsible for providing block-chain solutions to business in Vancouver. Kyle has traveled to over 100 countries and speaks Mandarin.

Biography in the user profile

Collaborators

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ispace

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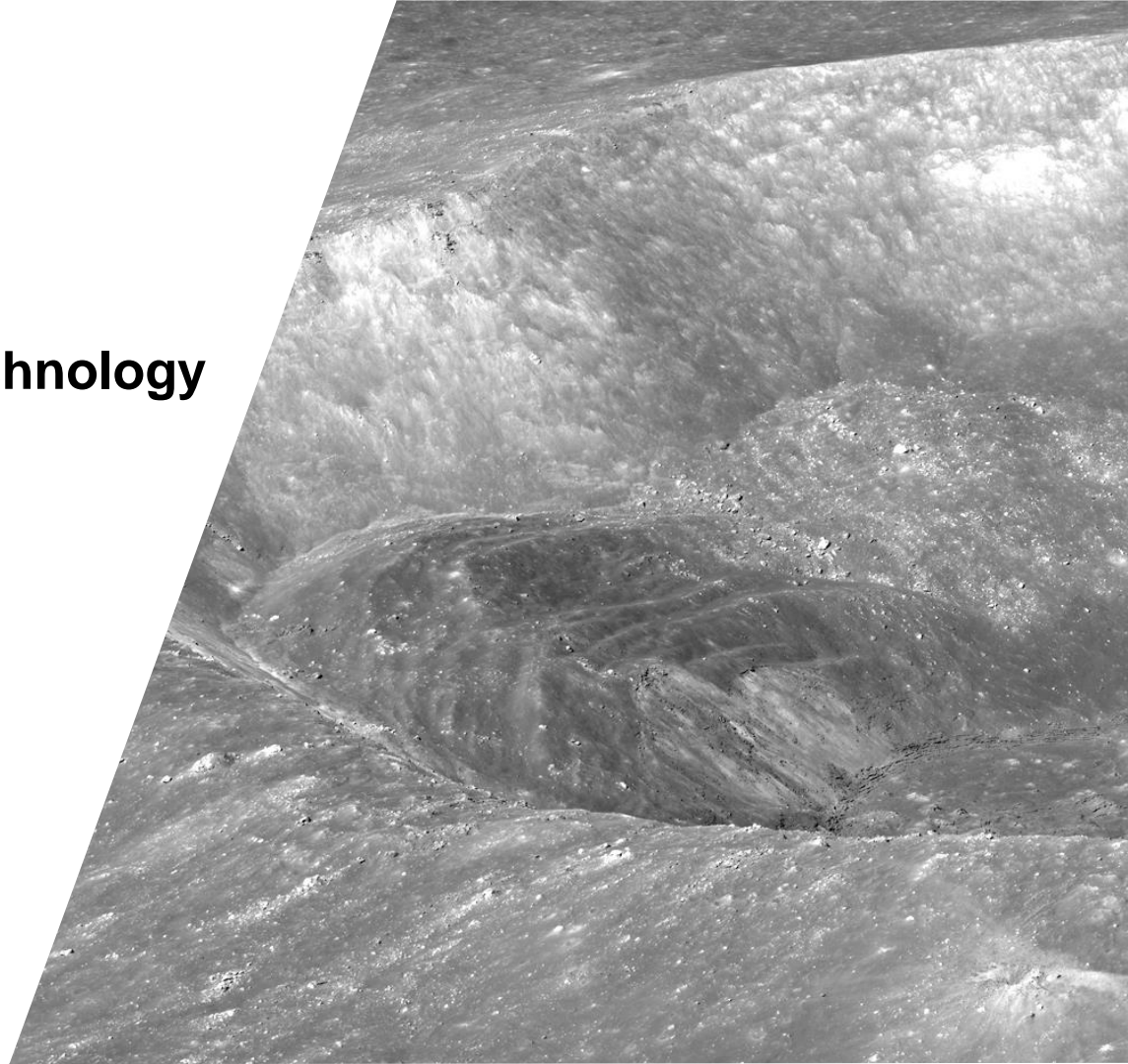
Mr. Kyle Acierno
[Unknown Title]
ispace

The logo for ispace, featuring the word "ispace" in a lowercase, white, sans-serif font. The letter "i" is replaced by a red sun-like icon with a white center and radiating lines.

ispace & Team Hakuto's 2017 Lunar
Mission
CIM 2017
Kyle Acierno

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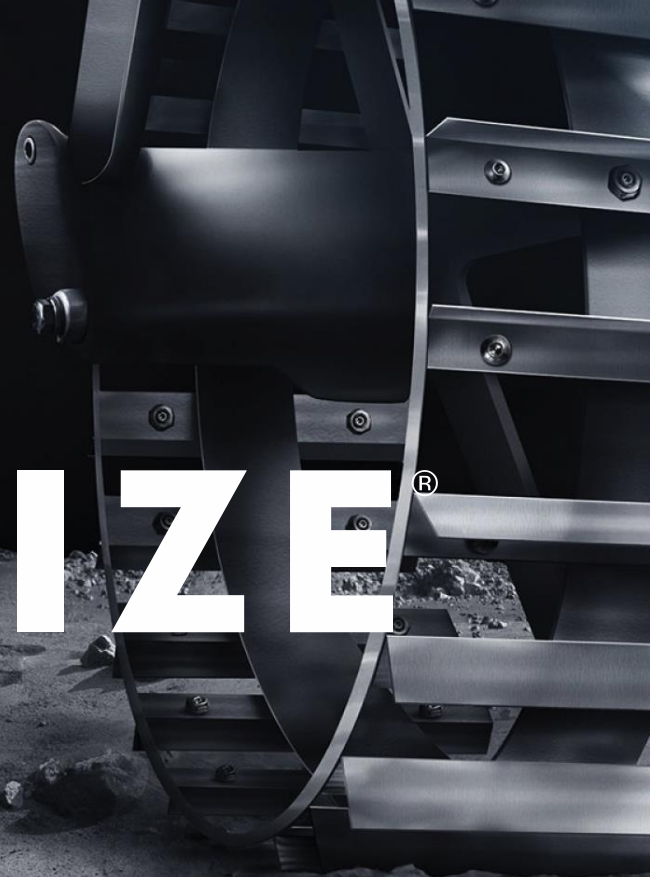
- 🌀 **Google Lunar XPRIZE**
- 🌀 **Team Hakuto Rover Technology**
- 🌀 **Branding**
- 🌀 **Technology**
- 🌀 **Mission**





Google
LUNAR

XPRIZE[®]



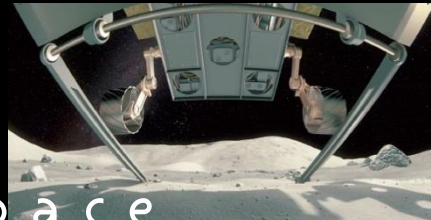


Google LUNAR **XPRIZE**® A global competition of lunar exploration

1. Land a Robot on the Moon
2. Travel more than 500m
3. Transmit HD Movies to Earth

Deadline: **End of 2017**

Condition: **Private capital**





HAKUTO



SORATO

Google LUNAR XPRIZE

ispace

Selected down from 34 teams to just **5 teams**,
HAKUTO is **a front-runner**



HAKUTO
(Japan)

**Plan to launch
in December
2017**



TeamIndus
(India)



SpaceIL
(Israel)



Moon Express
(U.S.)



Synergy Moon
(International)

Our Partners

OFFICIAL PARTNER

あたらしい自由。 *aw*

CORPORATE PARTNERS



SUPPORTING COMPANIES



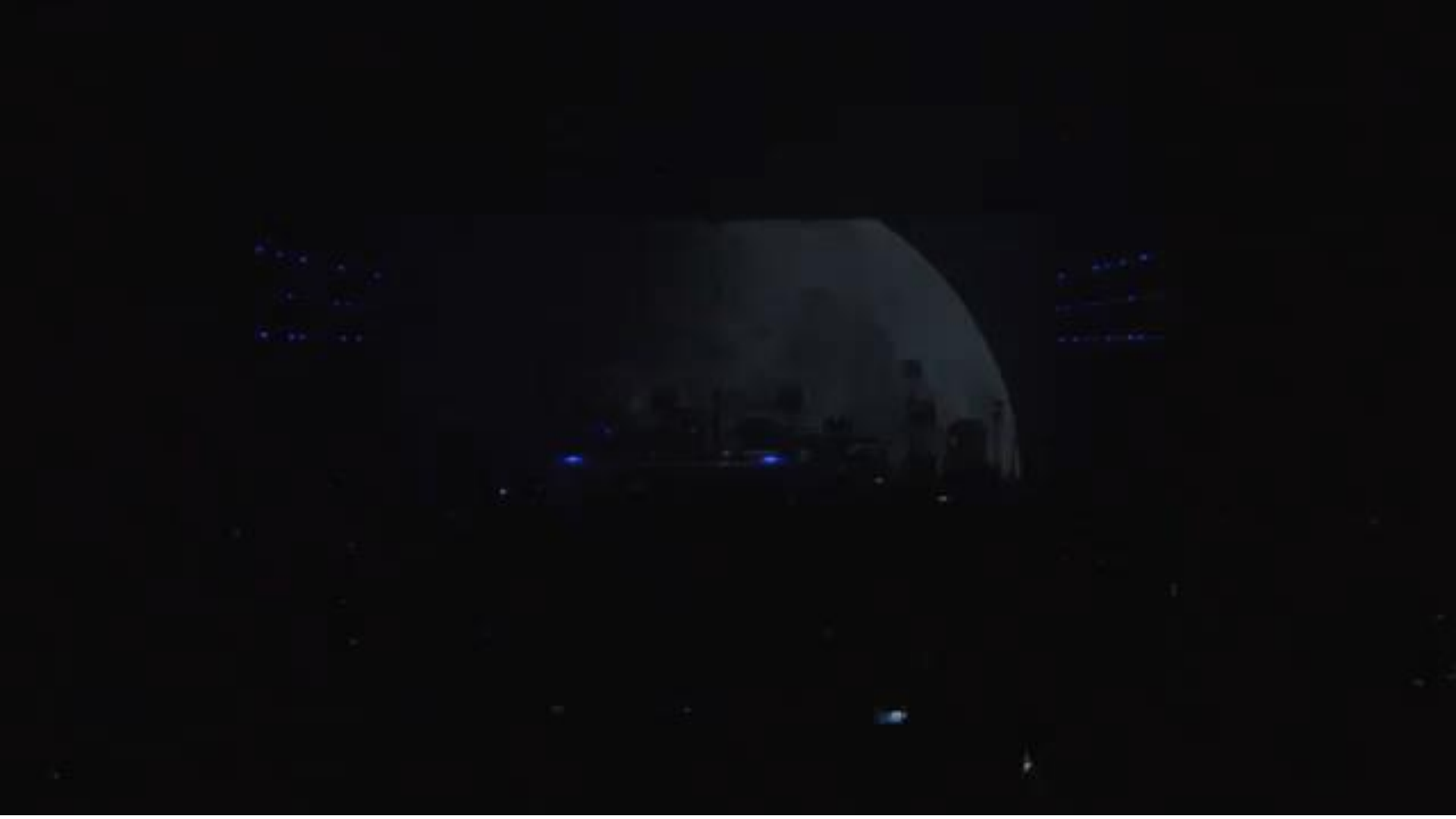
 i s p a c e





Hakuto Ambassadors Models, Comedians, and Rock Band 'Sakanaction'



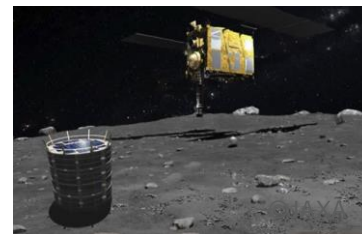


Team Hakuto Rover Technology

Over 20 Years of R&D Efforts by Space Robotics Lab.



CTO, ispace
Dr. Kazuya Yoshida
Professor at Tohoku University



Hayabusa 1&2



Planetary Rovers



Micro-Satellites

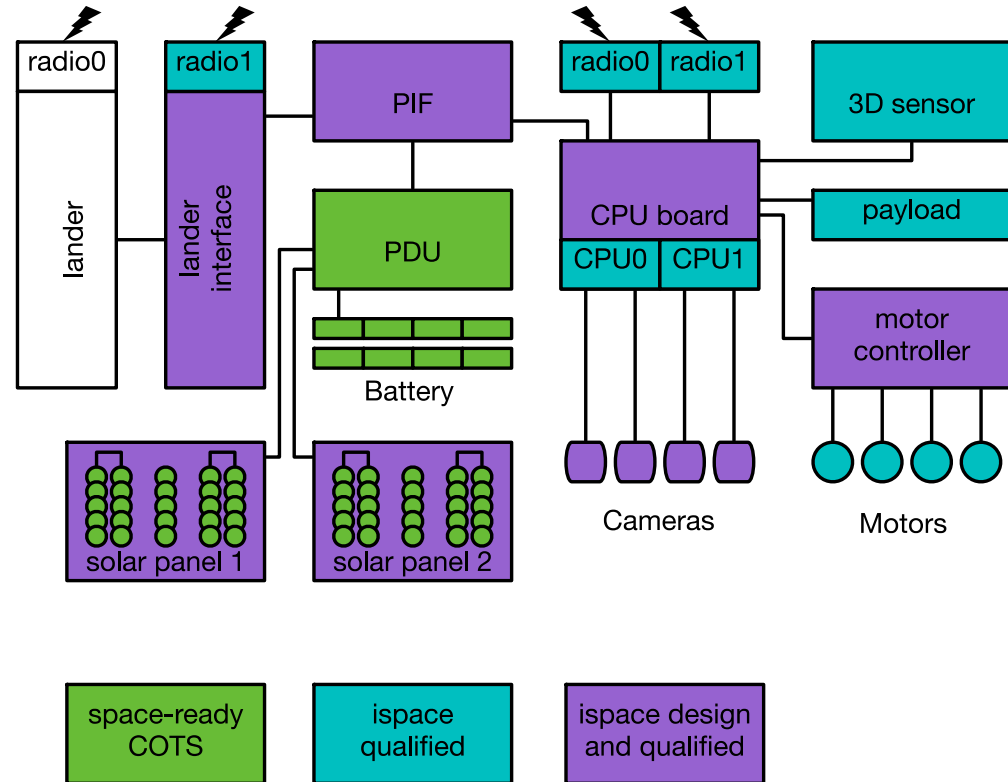
HISTORY

- 2010.9** ● Started as White Label Space Japan
- 2011.8** ● **PM1** Completion of Prototype 1
- 2013.12** ● **EM** Completion of Engineering Model
- 2014.8** ● **PFM1** Completion of Pre-Flight Model 1
- 2015.10** ● **PFM3** Completion of Pre-Flight Model 3
- 2016.8** ● **FM** Flight Model Design Announcement



Design of the Flight Model 4 Wheel Rover

- 4 kg Mass
- 2kg payload capacity
- 15 W power consumption
- 15 km Mission distance capability
- 2 redundant radios
- 2 redundant CPUs
- 4 cameras
- 360° imaging
- 1280x720p video
- 1000 m Radio connectivity



HAKUTO Rover Flight Model

360° VISIBILITY

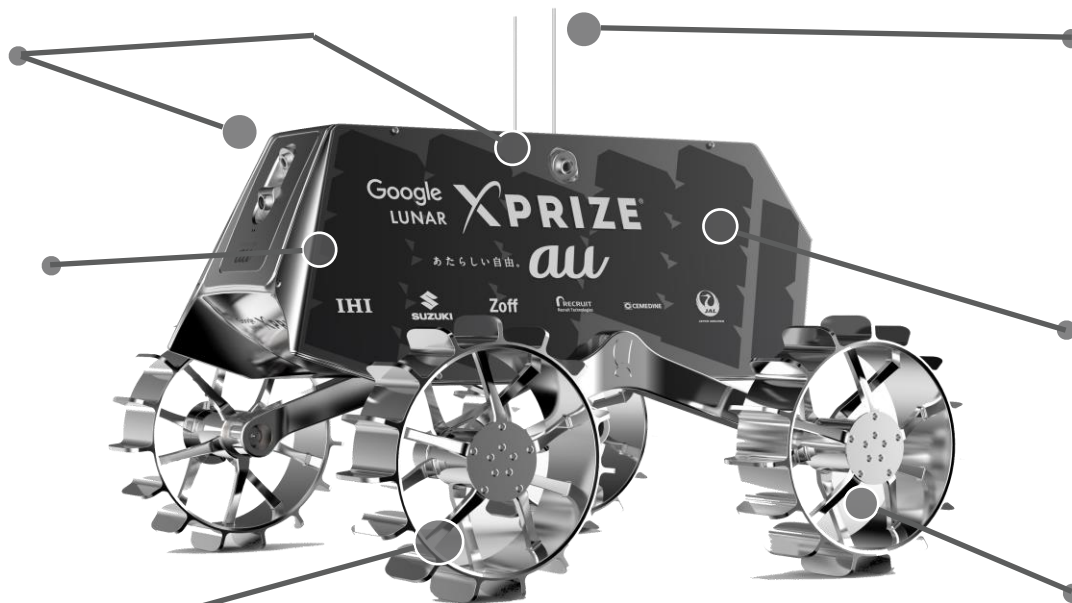
The rover's camera system uses four cameras that capture images from 360° for both research and maneuvering.

CARBON-FIBER ENFORCED PLASTIC

Carbon-fiber enforced plastic (CFRP), makes up the rover's body. It offers unparalleled weight savings and strength.

ULTEM RESIN

We've 3D printed the rover's wheels from ULTEM, which can handle extreme heat and offers strength and rigidity.



HYBRID COMMUNICATION

The hybrid communication architecture combines the 900MHz and 2.4 GHz frequencies for connectivity and speed.

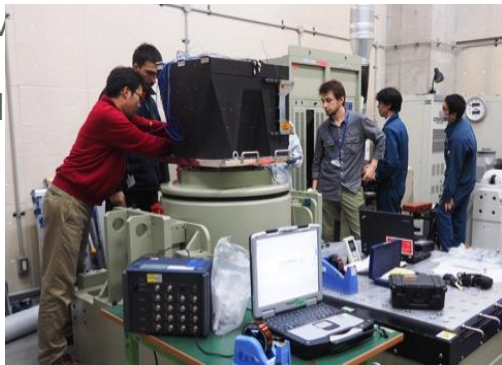
SOLAR PANELS

Lightweight solar panels positioned on either side of the rover offer more exposure to sunlight.

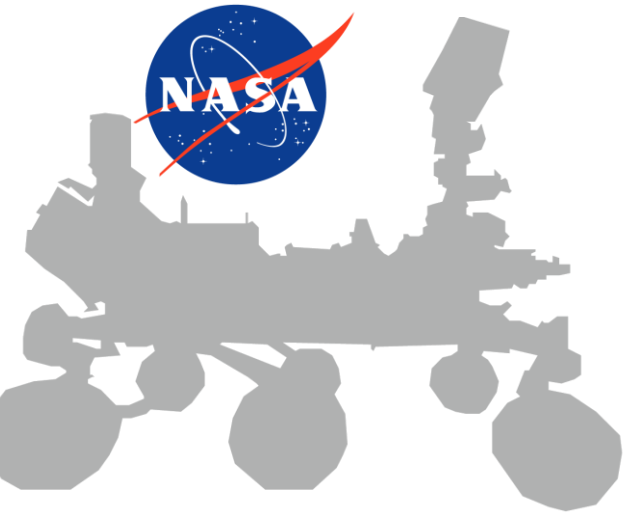
WHEELS

The powder-like sand of the Moon presents new challenges for mobility, so we developed wheels with grouser tracks.

Survived Rigorous Tests, Proven Mobility



The **Smallest** Planetary Exploration Rover



900kg

Curiosity



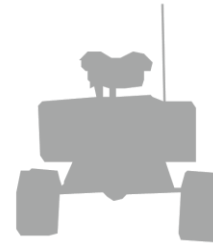
i s p a c e



~ 4kg

ispace

i s p a c e



30kg

Astrobotic



120kg

yutu

Google Lunar XPRIZE MISSION



ECA IS TRAVELLING TO THE MOON WITH HER JAPANESE BUDDY, HAKUTO.

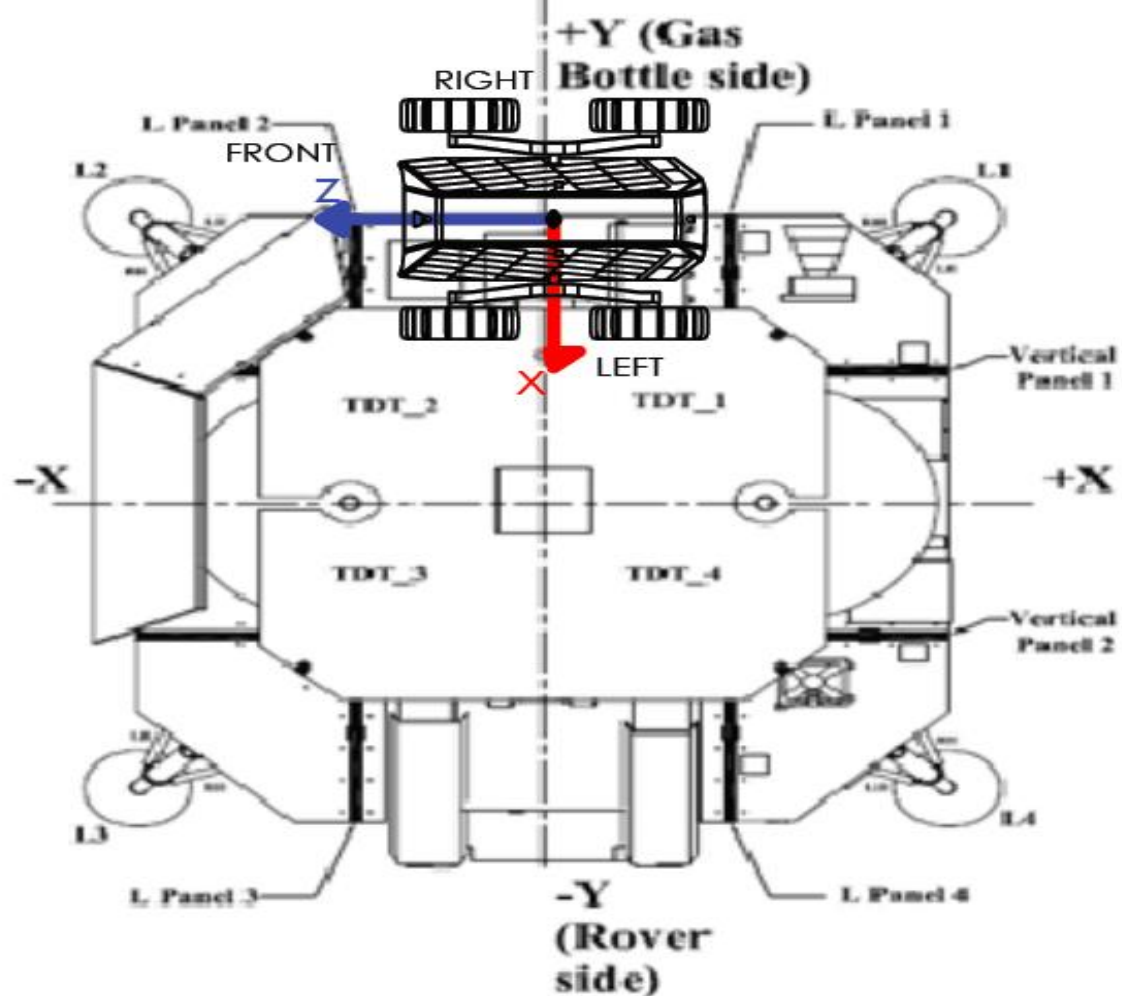


Figure 1: Rover integrated to Indus lander



au ×  **HAKUTO**

民間月面探査チーム「HAKUTO」スペシャルイベント in TeNQ

4月23日(日)～5月7日(日)

India

A satellite-style map of India and its surrounding regions. The landmass is shown in shades of green and brown, while the surrounding oceans are in various shades of blue. Two red circular markers are placed on the map: one in the central part of the Indian subcontinent and another on the eastern coast. Two white text labels with red leader lines point to these markers. The label 'Rover Mission Control Bangalore' points to the central marker, and the label 'Launch Sriharikota' points to the coastal marker. The word 'India' is written in large white font at the top center of the map.

Rover Mission Control
Bangalore

Launch
Sriharikota

PSLV



35.25°N, 29.23°W



Mare Imbrium



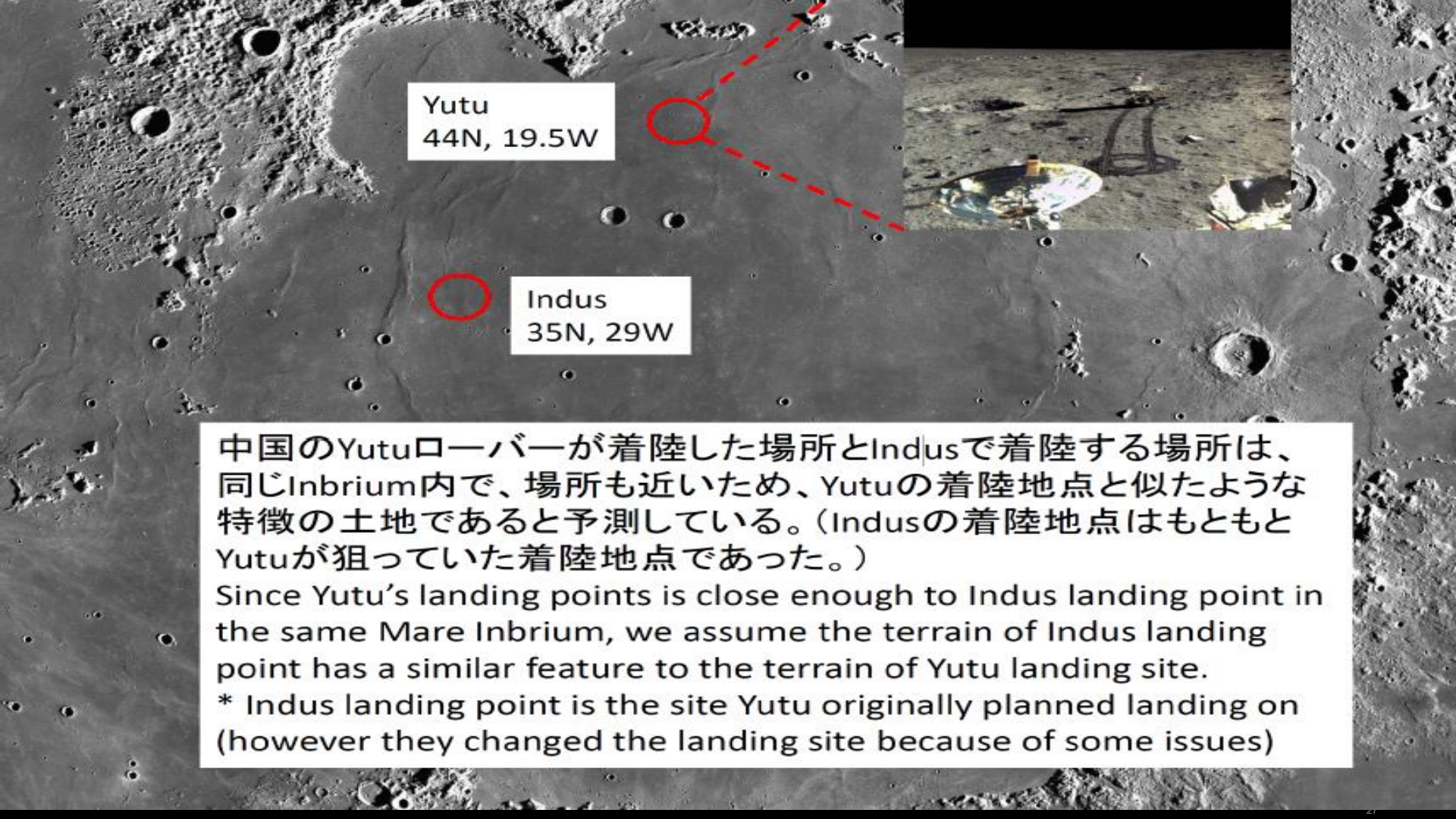
Mare Imbrium



35.25°N, 29.23°W

20 km
20 mi

500 m per pixel



Yutu
44N, 19.5W

Indus
35N, 29W

中国のYutuローバーが着陸した場所とIndusで着陸する場所は、同じInbrium内で、場所も近いため、Yutuの着陸地点と似たような特徴の土地であると予測している。(Indusの着陸地点はもともとYutuが狙っていた着陸地点であった。)

Since Yutu's landing points is close enough to Indus landing point in the same Mare Inbrium, we assume the terrain of Indus landing point has a similar feature to the terrain of Yutu landing site.

* Indus landing point is the site Yutu originally planned landing on (however they changed the landing site because of some issues)

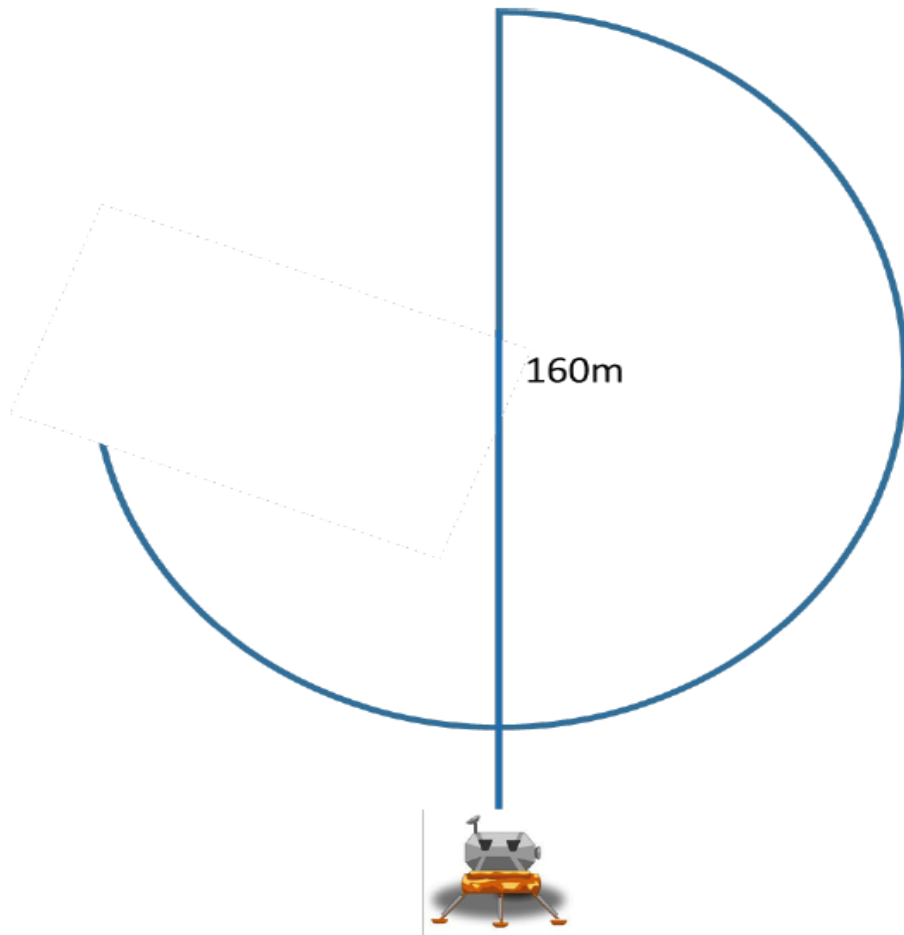
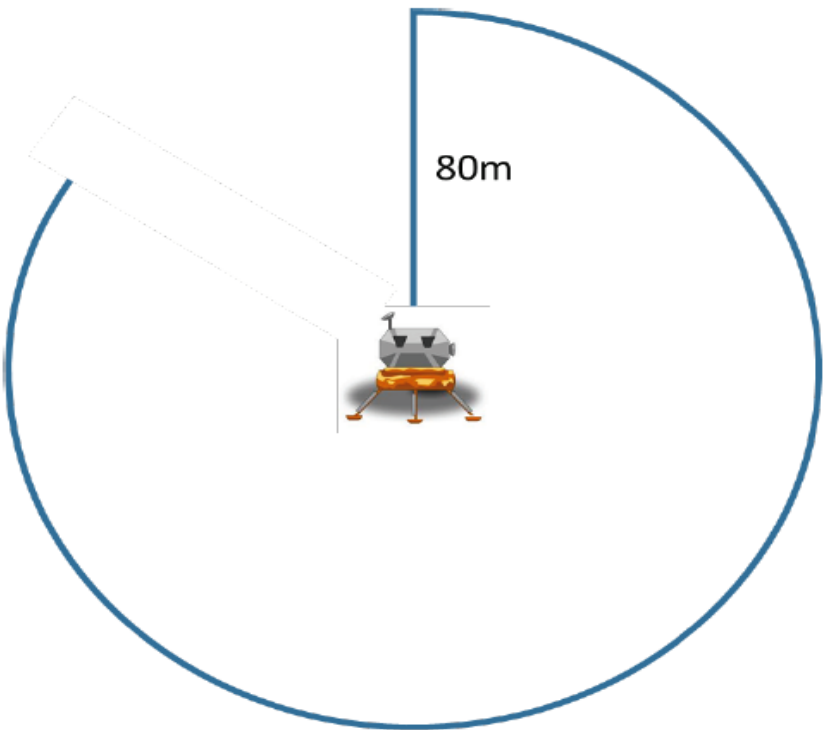


Figure 10 : primary traverse scenario (left) secondary traverse scenario (right) depending in lander antenna. Constraints and features of interest (formalized as waypoints) will cause deviations from these ideal trajectories



Cheer for us!
Launch Date: December 27, 2017
Thank you!