

# Designing and development of deployment solar panels for CubeSat missions

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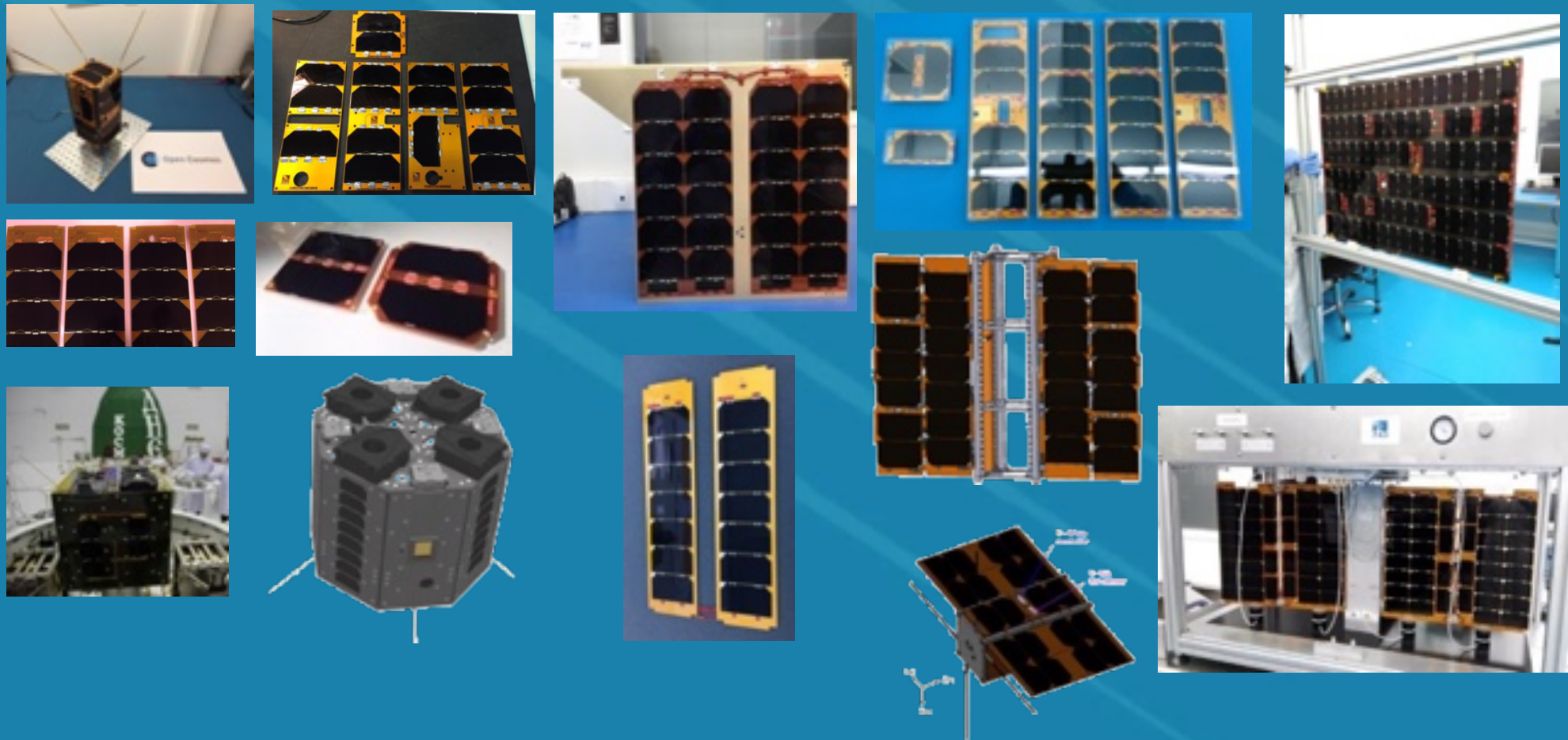
1<sup>st</sup> May 2018, 15<sup>th</sup> Annual CubeSat Developers Workshop  
San Luis Obispo, CA - USA



# Outline presentation

- **Company description**
- **Deployable solar panels for CubeSats**

# Technological based start-up Space photovoltaic technology



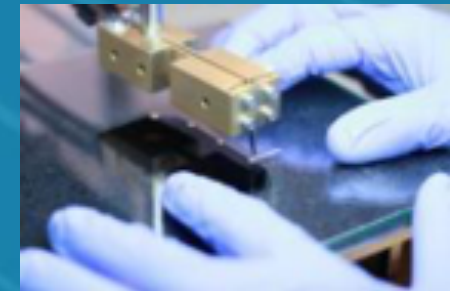
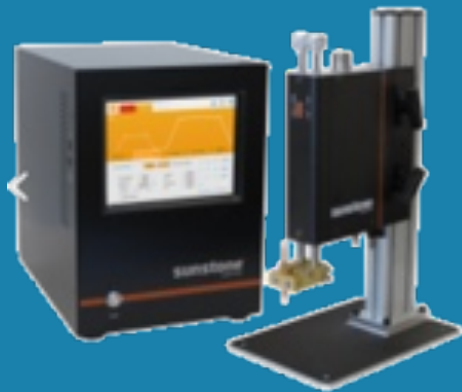
# Markets

- **LEO missions**
  - scientific missions.**
  - commercial missions.**
- **LEO constellations – commercial projects.**
- **Deep Space mission – scientific missions.**

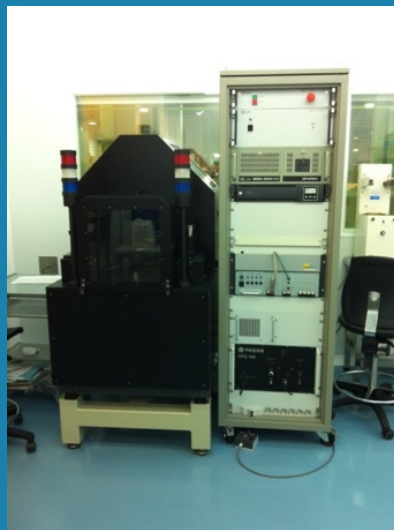
# Facilities



# Facilities

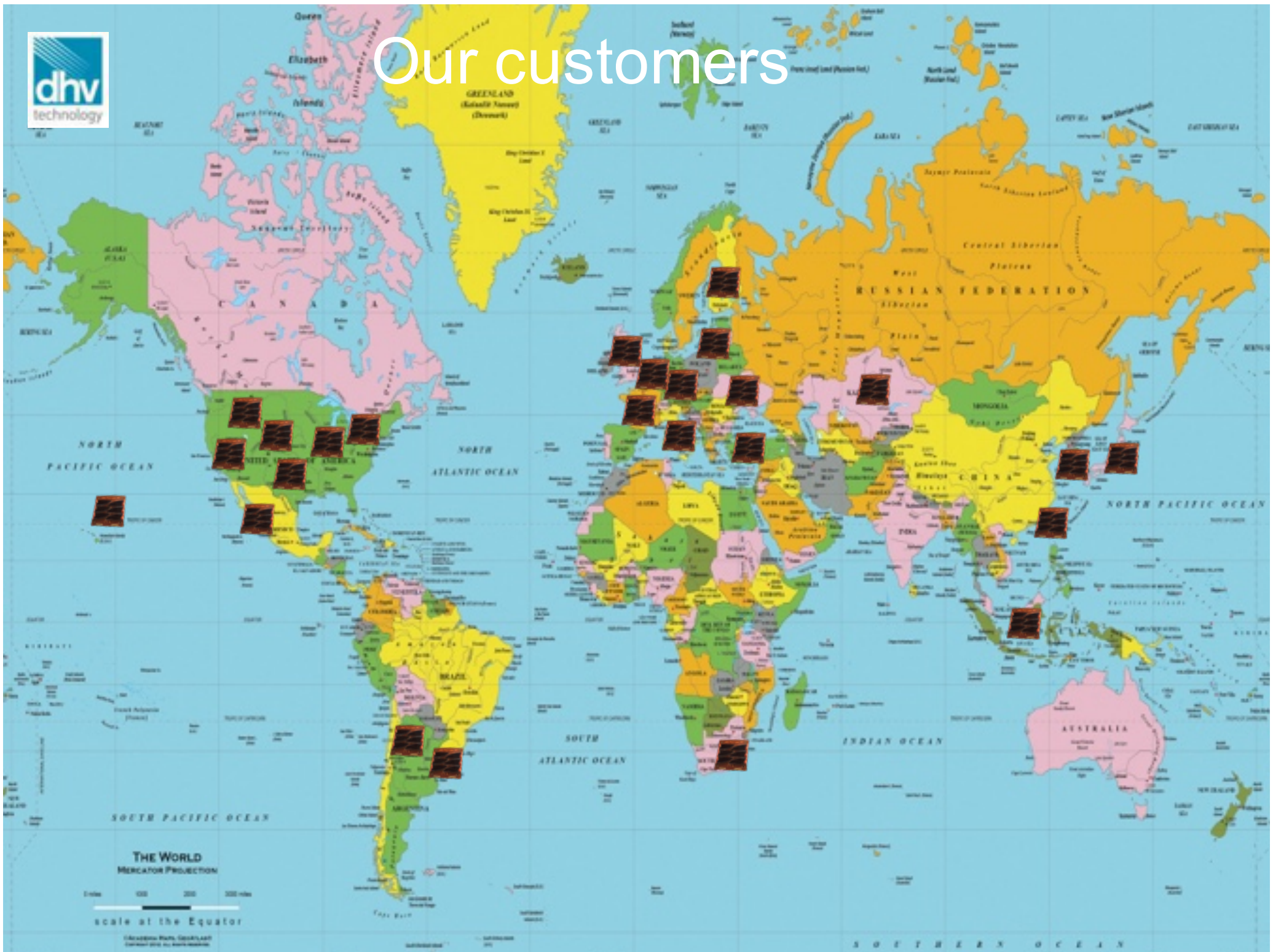


# Facilities





# Our customers

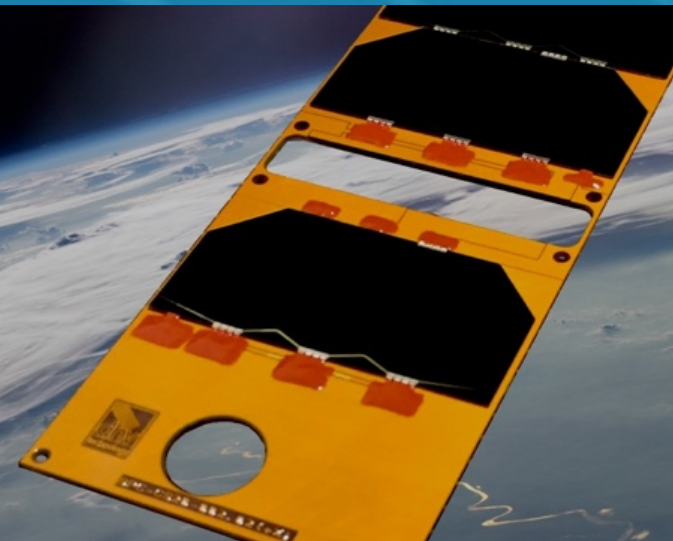




# Deployable Solar Panels for CubeSats



Solar Panels for Space Applications



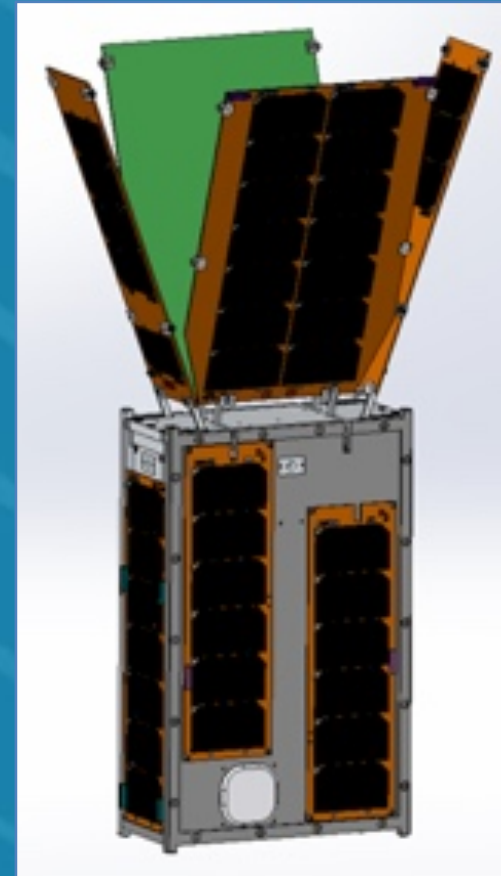
# LEO missions

## *TRYAD mission*



Terrestrial RaYs Analysis and Detection (TRYAD) is a Cubesat mission on 6U platform developed by AUBURN University.

Multi-point Observations of Terrestrial Gamma-ray Flashes (TGFs) to test TGF Beam Models

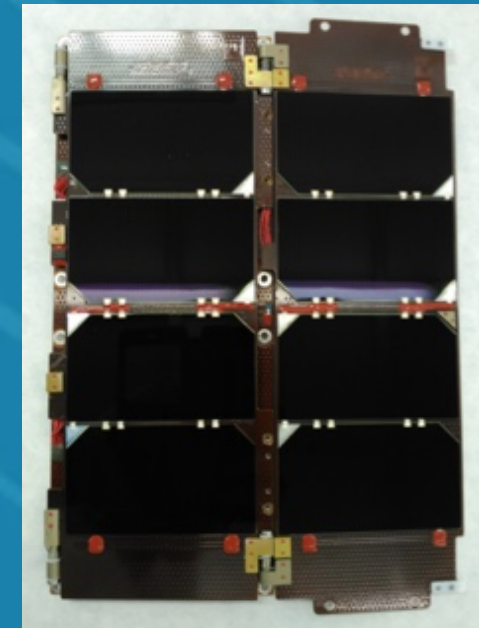
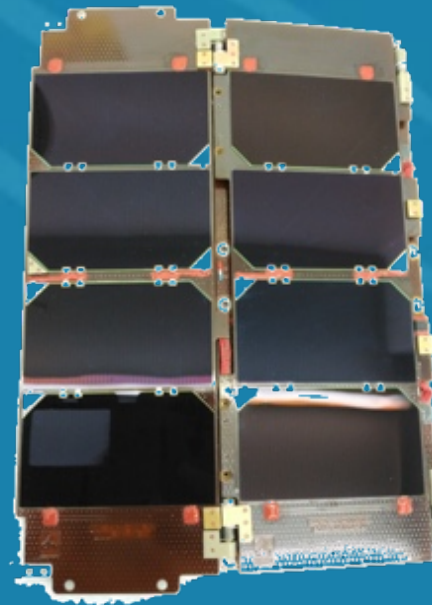
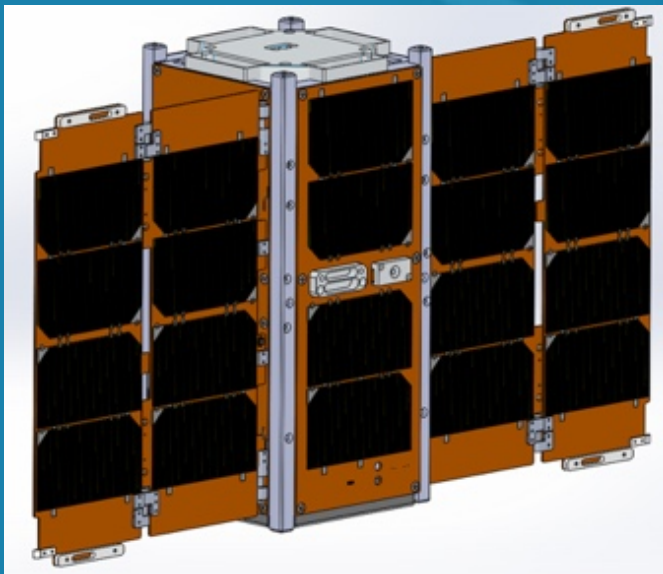


# LEO mission

## *Nanyang Technological University*



This project consists of a set of double-deploy array designed and manufactured by DHV Technology. Each 2U CubeSat structure has two deployable systems. This deployable system will include temperature sensors, photodiodes and thermal knives.

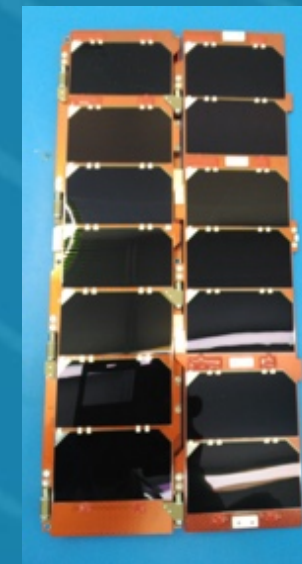
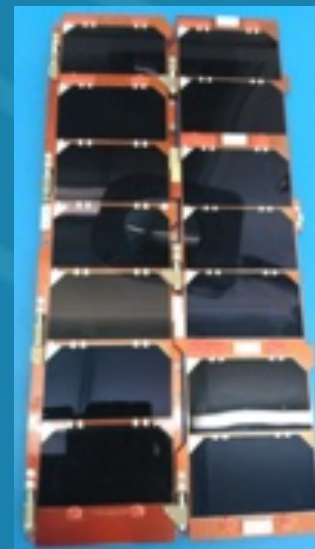
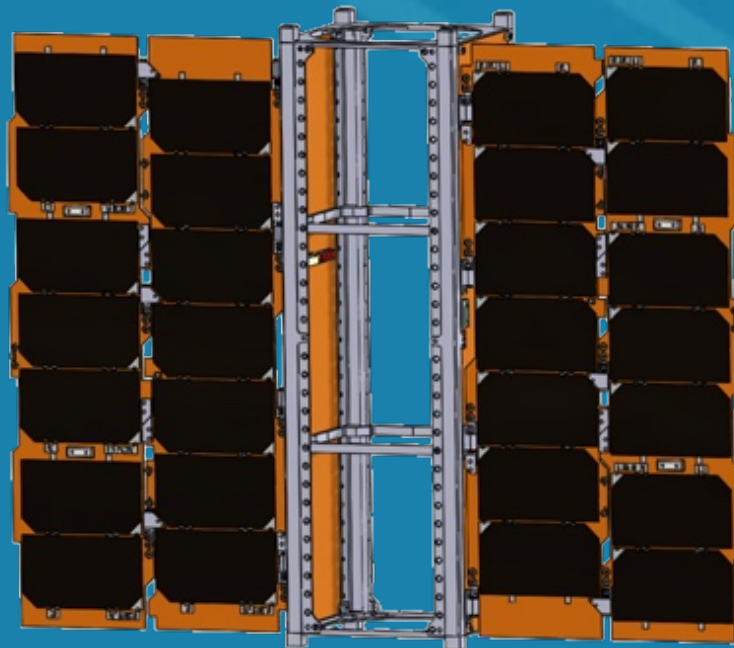


# LEO mission

## *OHB Italia*



During 2016 DHV Technology has signed a contract with OHB Italia to design and to manufacture the double deployable 3U Cubesat solar panels for EAGLET mission. The critical design review has been closed during the summer of 2017 and the solar panels have been delivered in November 2017. The launch is scheduled on 2018.

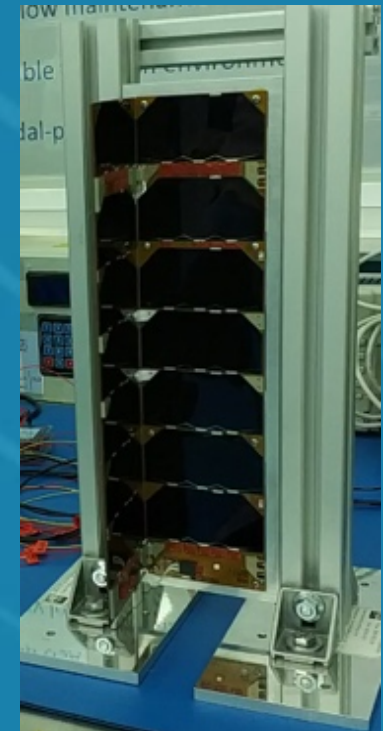


# LEO mission



**TRISAT mission** is an educational 3U CubeSat mission lead by Maribor University from Slovenia funded by ESA

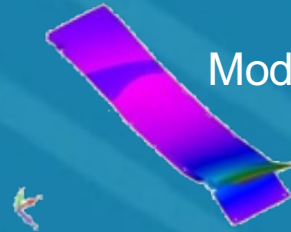
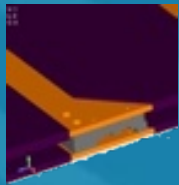
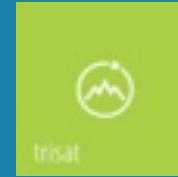
- Detect various vegetation patterns (green areas)
- Assess damage caused by natural disasters
- Detect volcanic dust.



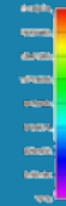
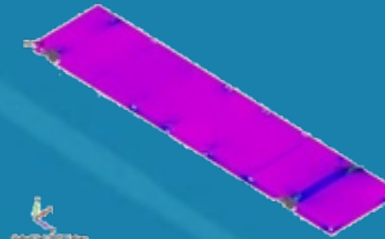


# TRISAT mission

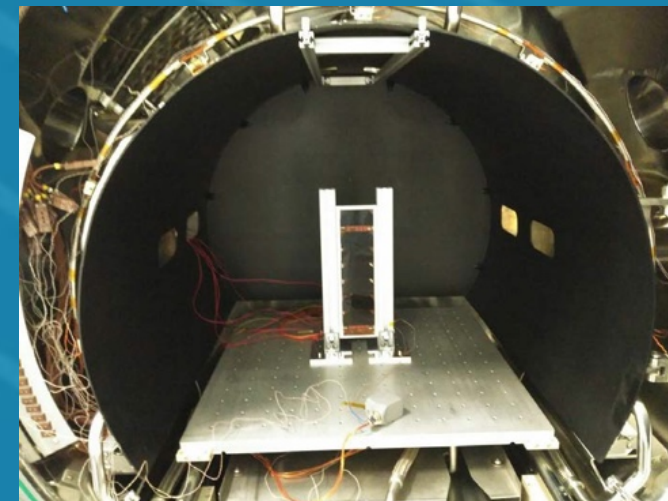
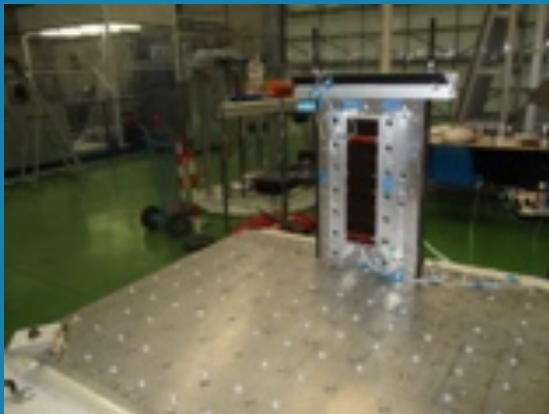
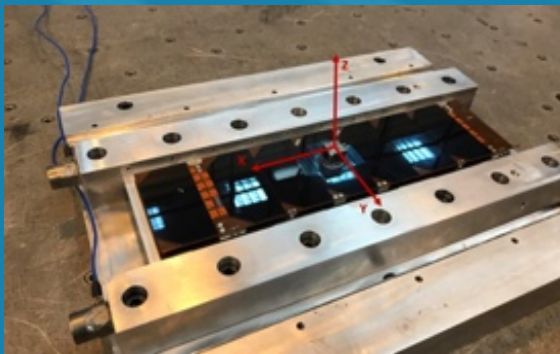
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Mode 1



Random vibration response – stress



# LEO constellation projects

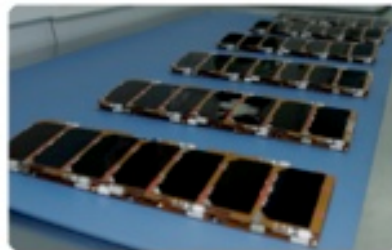
## GEMINI SPACE PANEL

Double Deployable Solar Panels for 3U Cubesats

Designed by SPIRE GLOBAL

Manufactured by DHV Technology

- 44 W nominal power
- One Double side panel
- Tested under launch loads
- Deployment test at low/high temp
- Successful deployment signal
- Temperature sensors



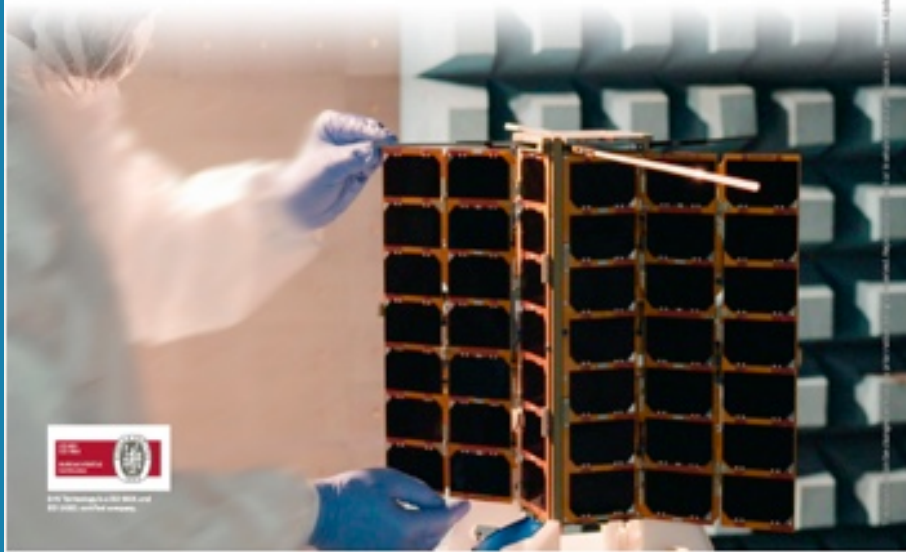
TRL 9 – Proven at LEO constellation level

[www.dhvtechnology.com](http://www.dhvtechnology.com)

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## GEMINI SPACE PANEL

Double Deployable Solar Panels for 3U Cubesats

Designed by SPIRE GLOBAL

Manufactured by DHV Technology

### Features

Solar panel parameters	3U (double deployable)
Power (AM0 WRC) $1367 \text{ W/m}^2$ ; $T = 28 \text{ }^\circ\text{C}$	29.6W (4 x strings)
Max Current (A)	3.7A (4 x strings)
Max Voltage (V)	17.3V (1 x string, 7 x cells)
Standard configuration	754P (7 cells x 4 strings)
Temperature sensor	LM335
Mass (g)	450 ± 50 g
Total thickness in stowed position (mm)	9.6 ± 0.2 mm
Deployed position (deg)	135°

### Manufacturing

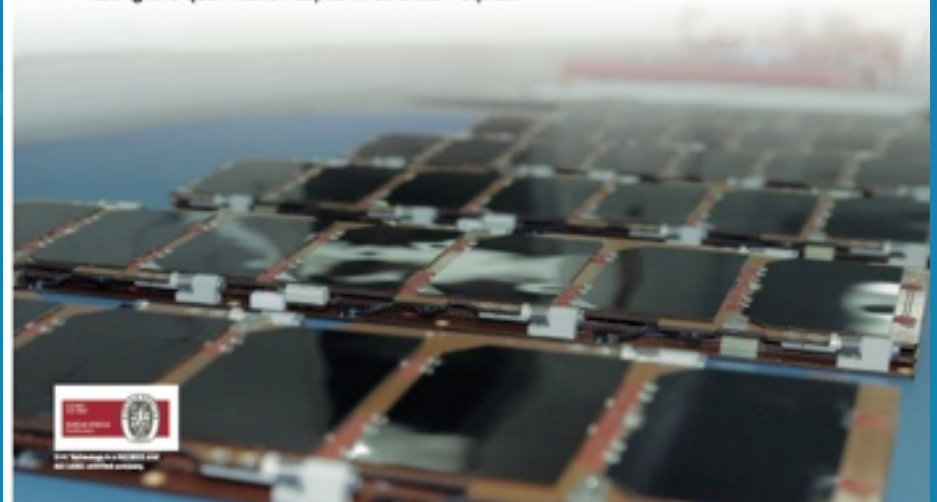
Assembly and integration process

Quality control process in all stages

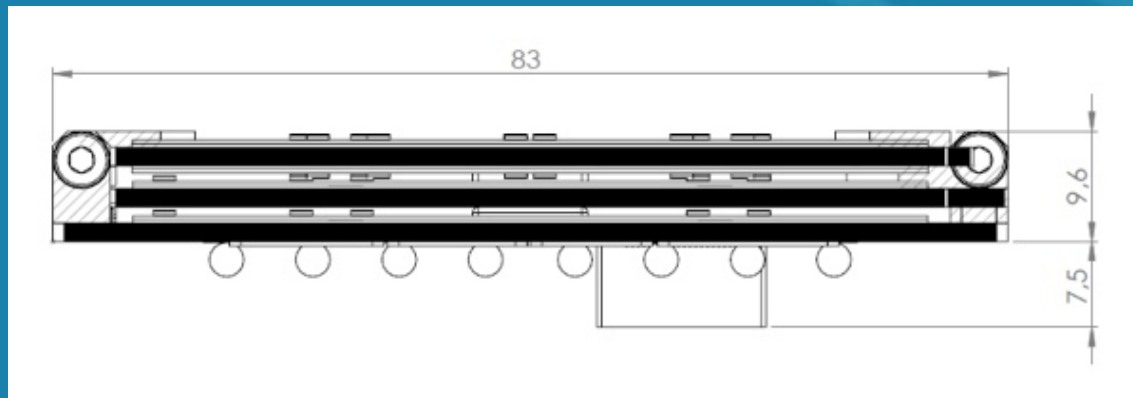
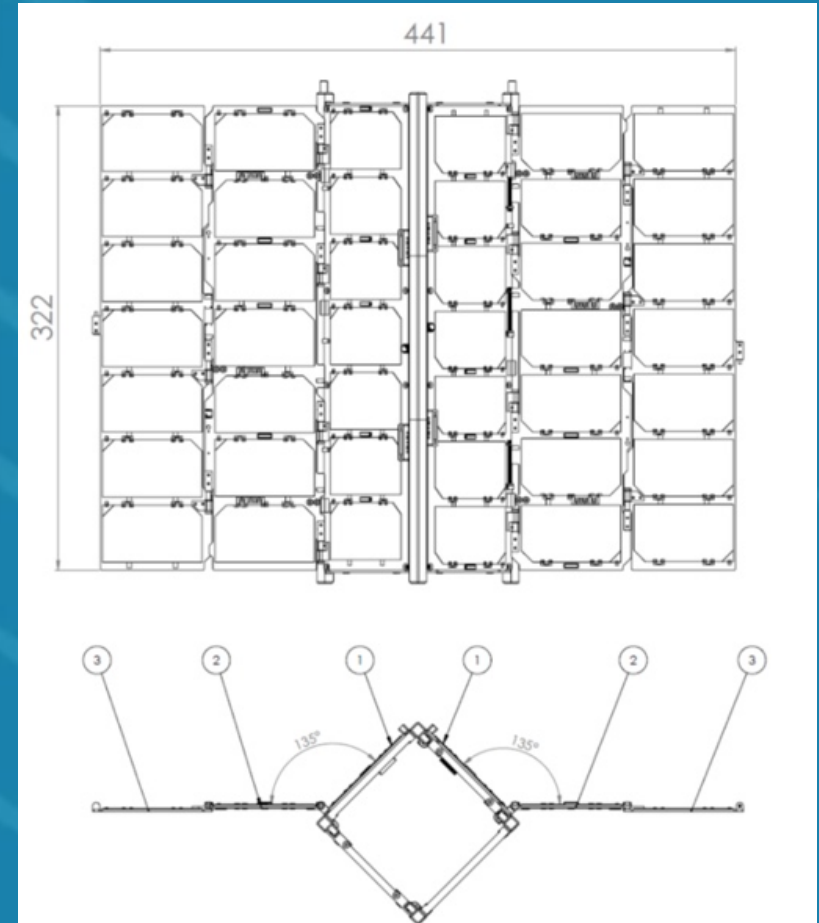
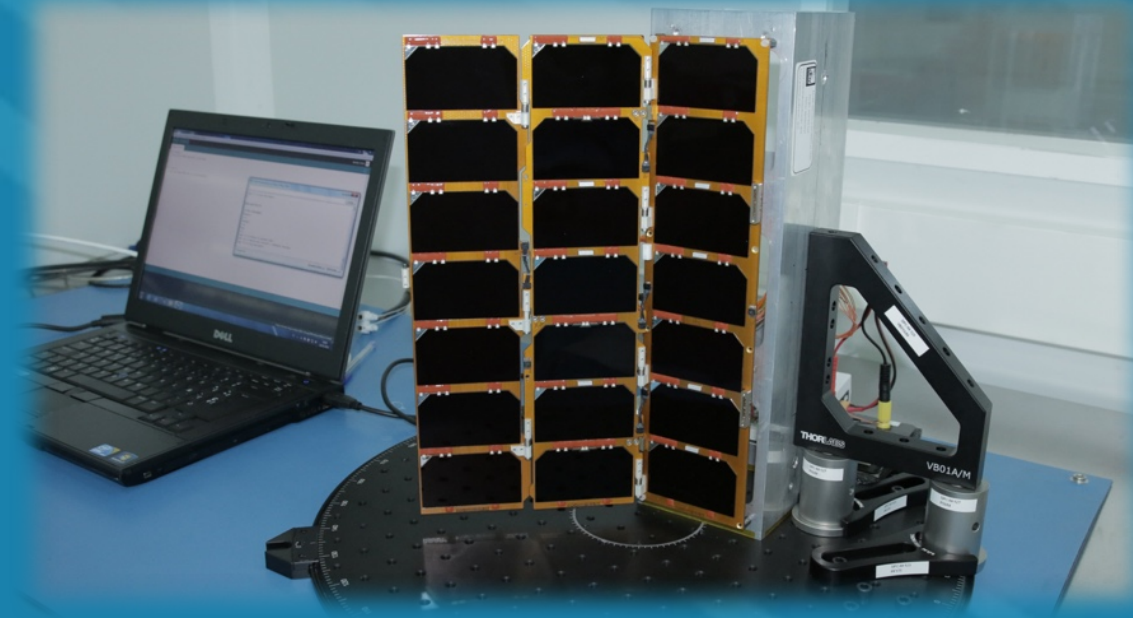
Manufacturing in a clean room ISO 8 level

In mass production for satellite constellations

Testing and qualification capabilities under request



# LEO constellation projects





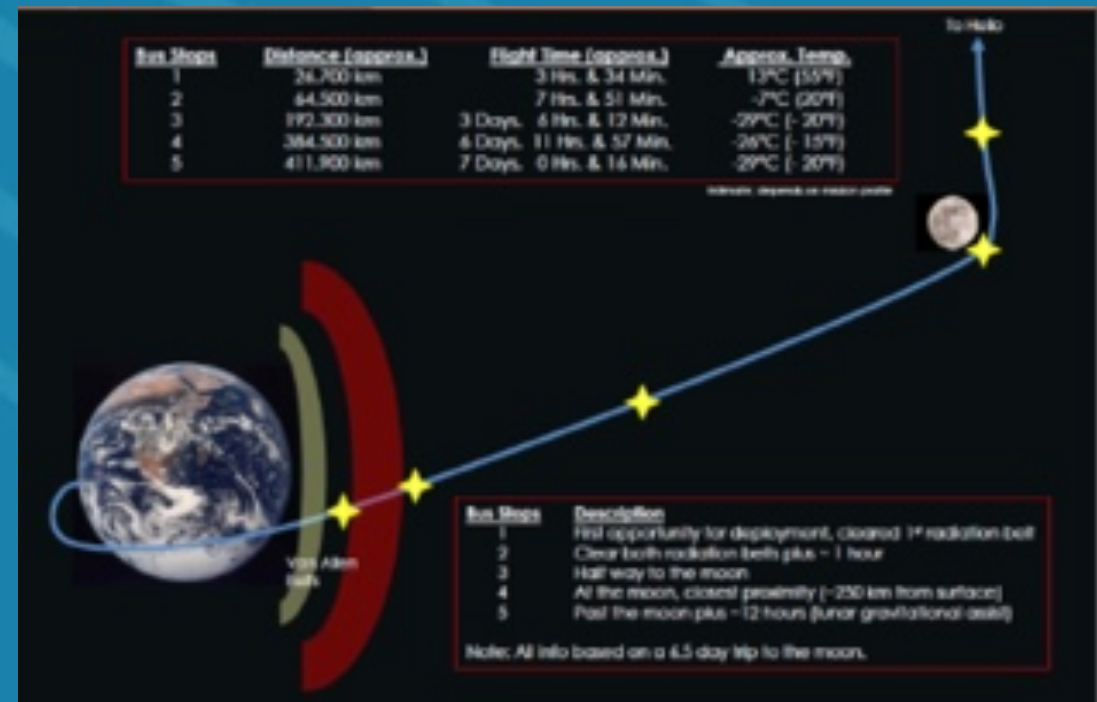
# Deep Space mission

ArgoMoon mission – Argotec



Built by Argotec and coordinated by Italian Space Agency.

Secondary payload of Exploration Mission 1 of NASA.



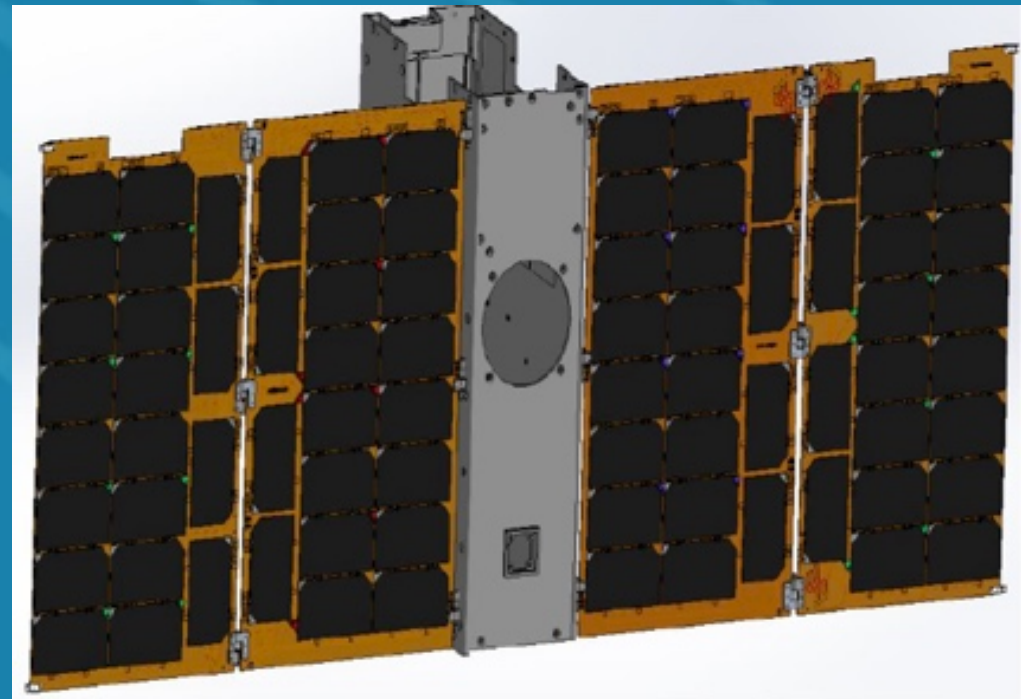
# Deep Space mission

ArgoMoon mission – Argotec



80 W BOL

Vibration, Shock, Vibro  
Acoustic and TVAC tests.



# Deep Space mission

ArgoMoon mission – Argotec



80 W BOL

Vibration, Shock, Vibro  
Acoustic and TVAC tests.

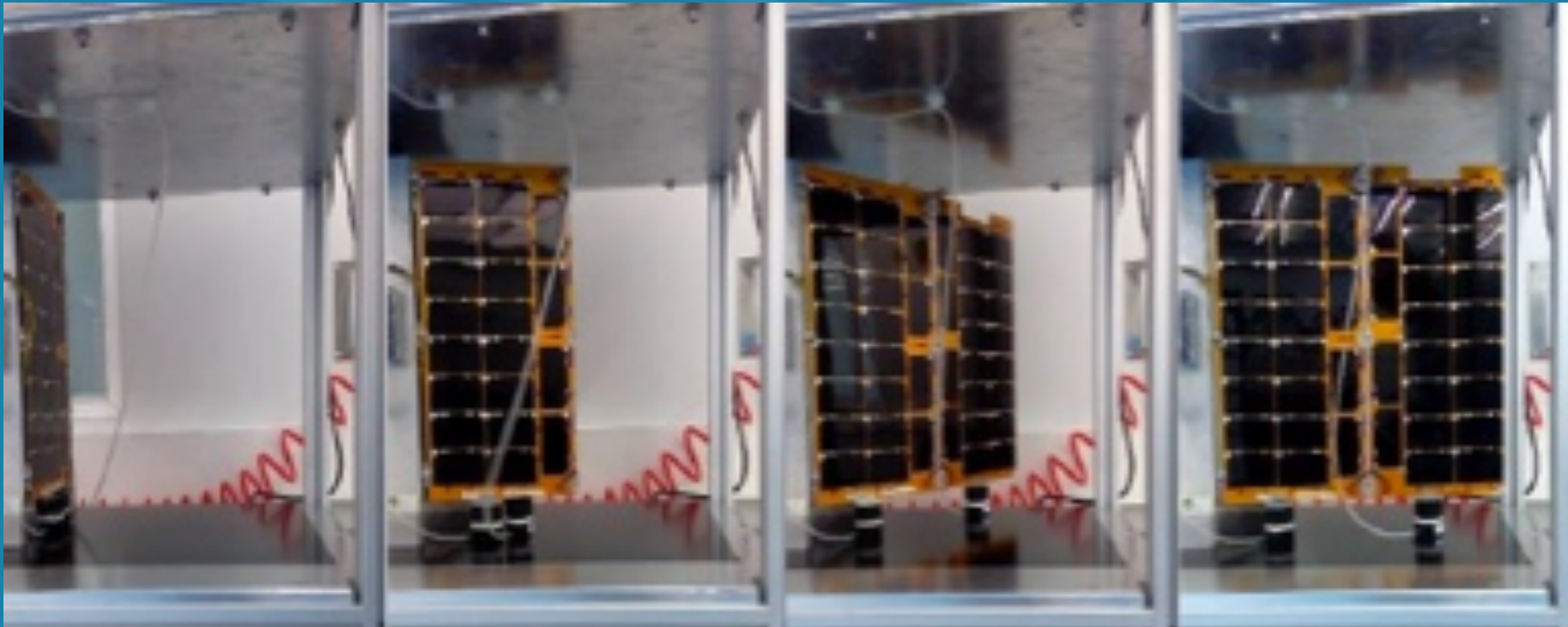


# Deep Space mission

ArgoMoon mission – Argotec



Mechanical Ground Support Equipment for solar panels



# Partners



# Acknowledgement





# Contact us

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**LET US GIVE POWER TO YOUR SPACE MISSION !**