



MATISSE for LICIACube

Angelo Zinzi

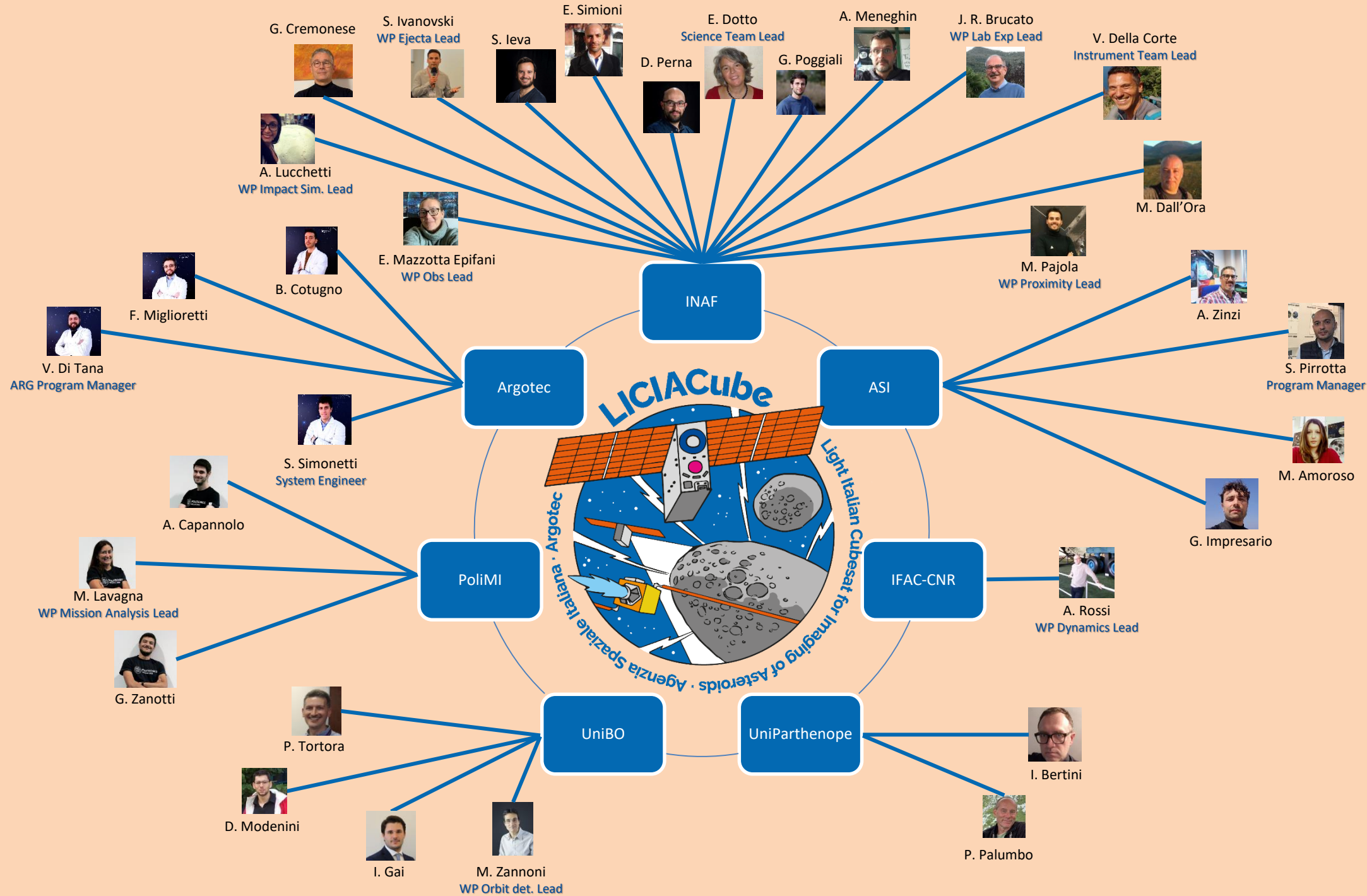
23 Jan 2024

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Geology & Planetary Mapping
Winter School

22-26 January 2024

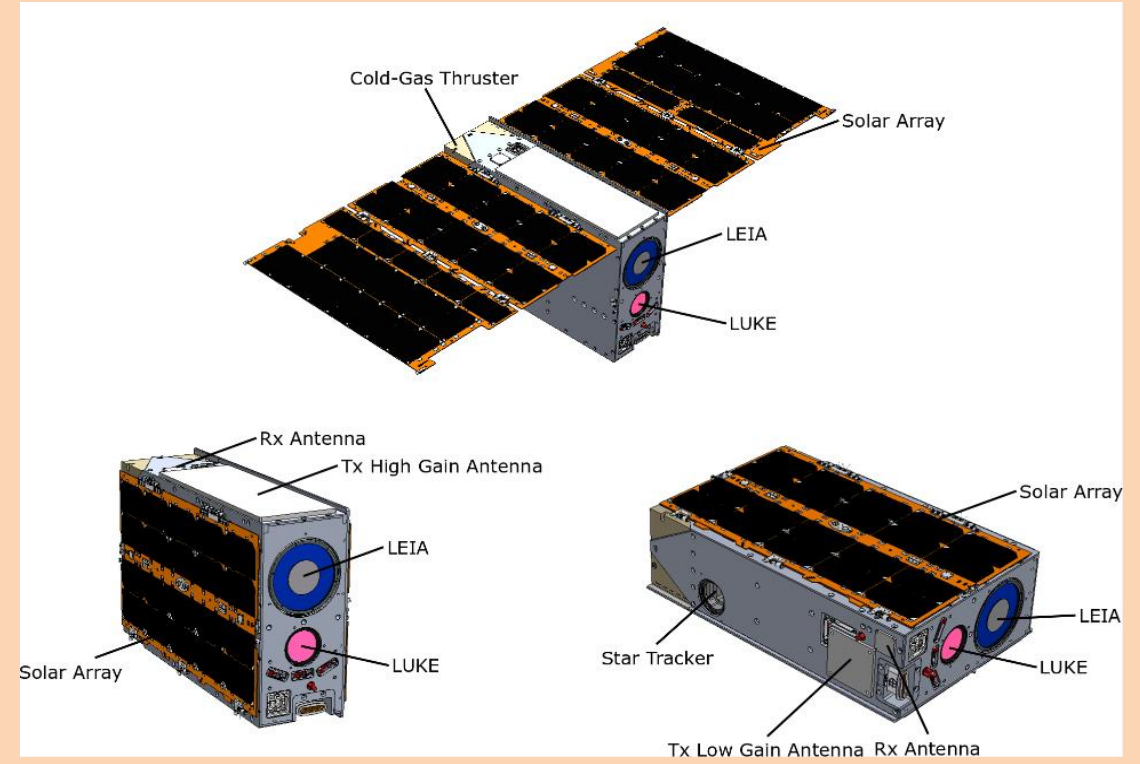


The cubesat and the instruments

Orbit: Heliocentric (~10 Mkm from the Earth)
Mass: 14 kg
Volume: 6U+
 366 mm x 239 mm x 116.2 mm (stowed)
 911.5 mm x 366 mm x 239 mm (deployed)

LEIA: a catadioptric camera
 spatial scale at C/A (~55km) 1.38 m/px

LUKE: a camera with a RGB Bayer pattern filter



Launch

Nov. 24, 2021, h. 7.21 (ET)

SpaceX Falcon 9

Vandenberg Space Force Base, CA

LICIACube
(Light Italian Cubesat
for Imaging of
Asteroids)
ASI contribution

DART Spacecraft

610 kilograms at launch;
~550 kilograms at impact
15,000 miles per hour
(6.6 kilometers per second)

Earth-Based Observations

6.8 million miles (0.07 AU) from
Earth at DART impact

Sept. 26, 2022

- Target the binary asteroid Didymos system
- Impact Dimorphos and change its orbital period
- Measure the period change from Earth

Dimorphos

160 meters
11.92-hour orbital period

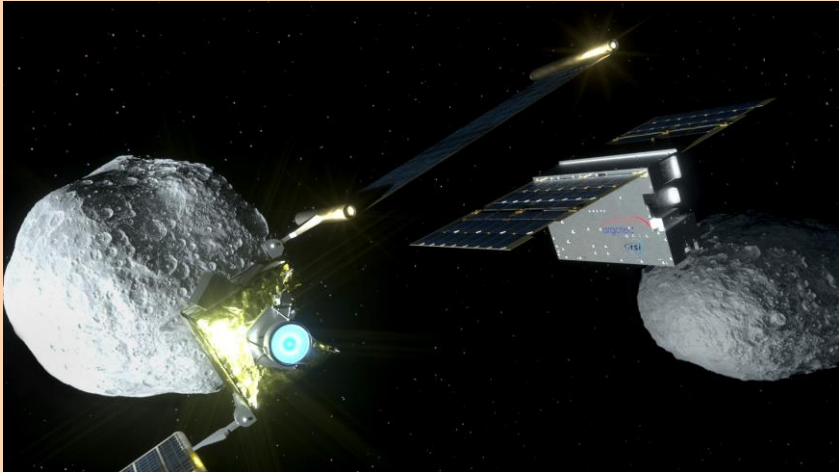
1,180-meter separation
between centers

Didymos

780 meters
2.26-hour rotation period

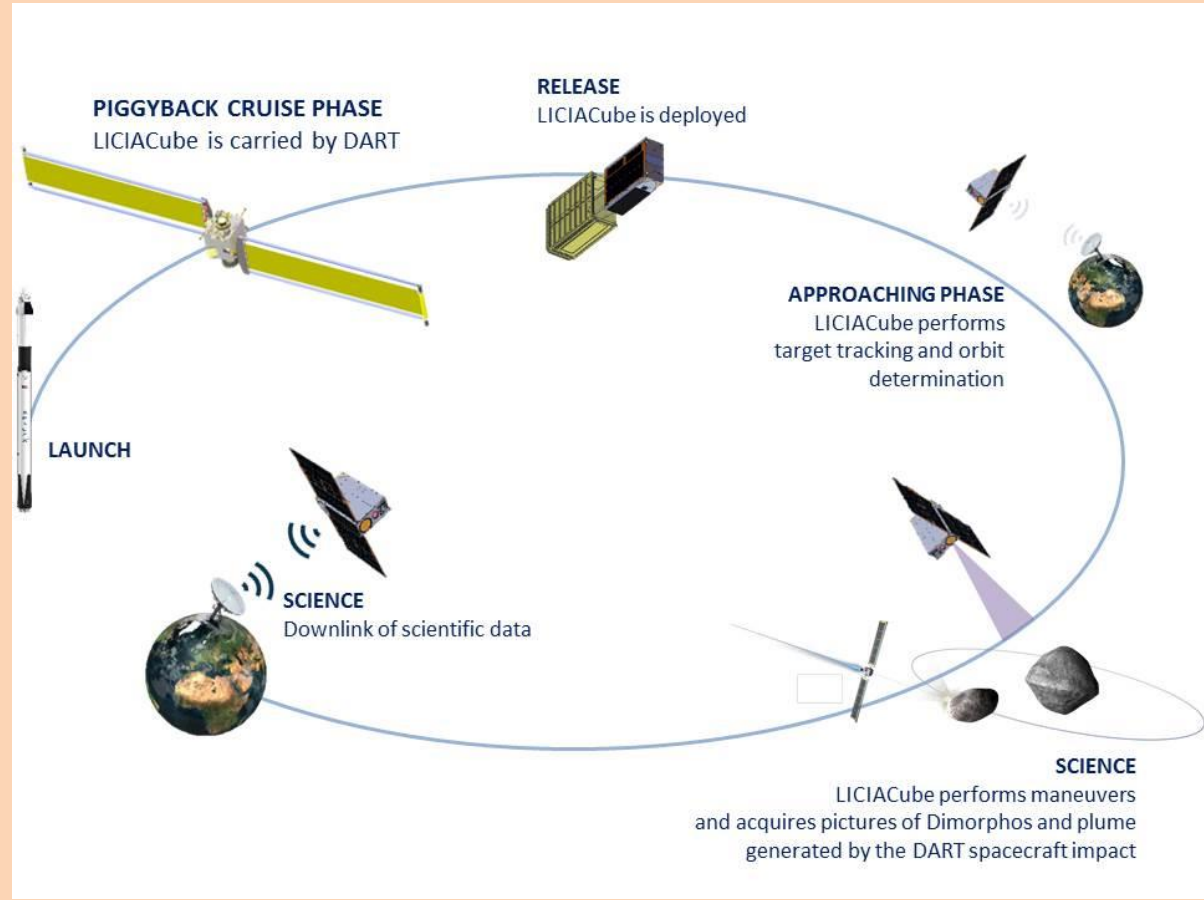


The mission



LICIACube was carried by DART until close to Didymos and then released to perform a fly-by of Dimorphos after DART impact.

LICIACube downlinked images directly to Earth after the target fly-by.





Space Science Data Center



LICIACube



Mission Control Center
(Argotec)

Scientific Operations Center
(ASI-SSDC)

Team

Public

SSDC is responsible for LICIACube data management and dissemination through the Scientific Operations Center (SOC)

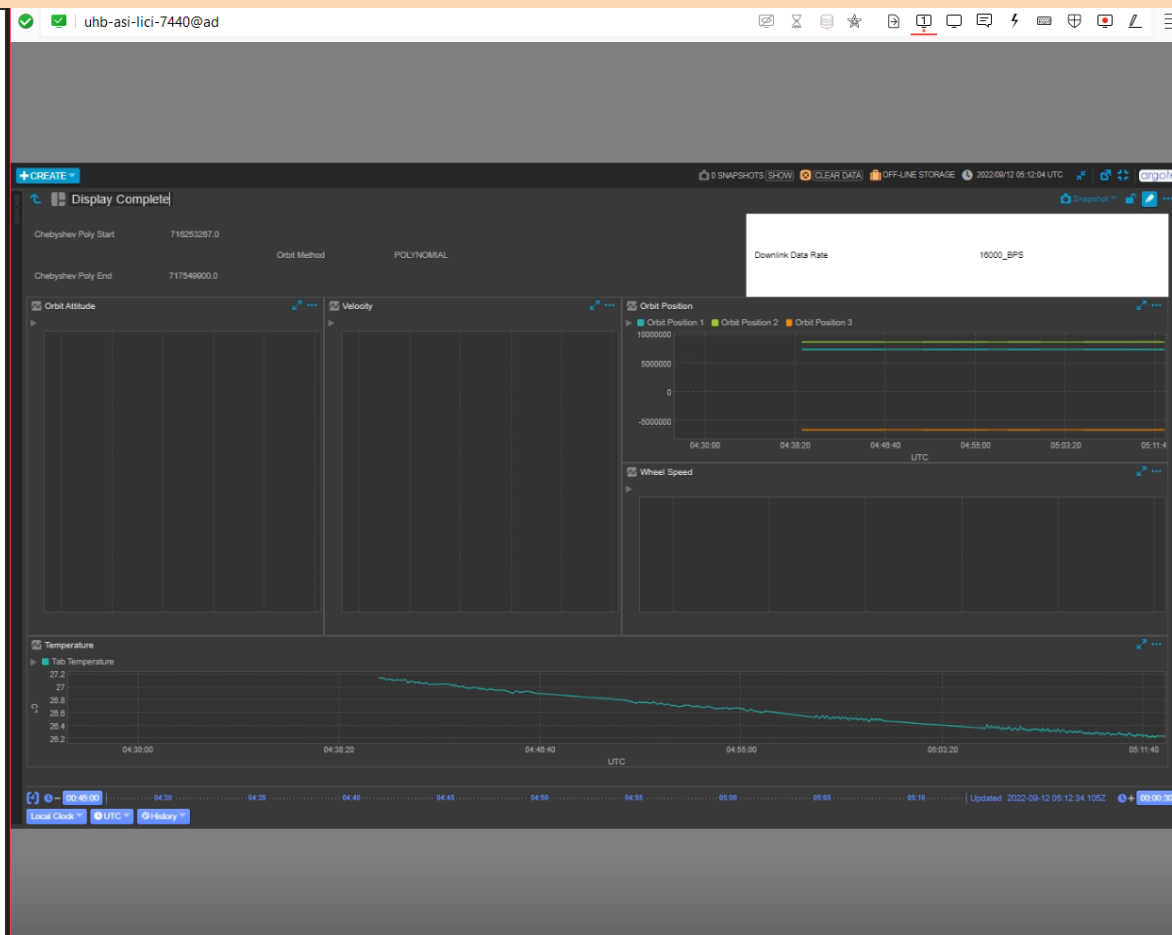




Space Science Data Center



Agenzia Spaziale Italiana



Light Italian Cubesat for Imaging of Asteroids

LICIACube

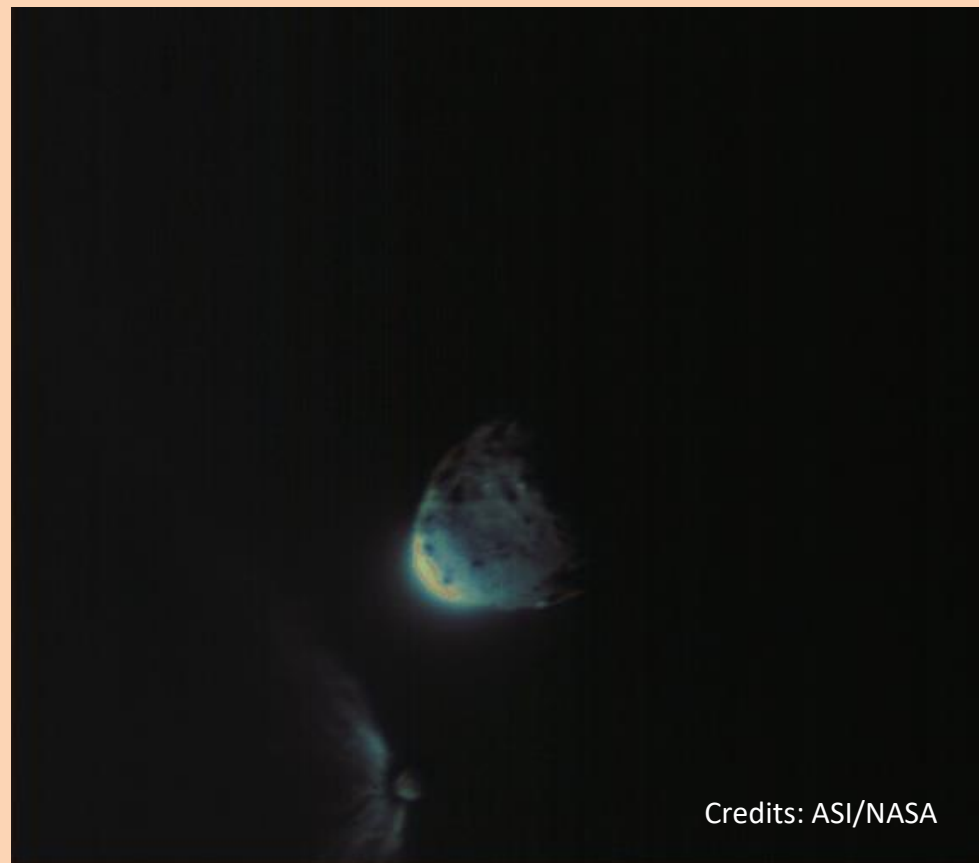




Space Science Data Center



Credits: ASI/NASA



Credits: ASI/NASA





SOC Activities Summary

- LICIACube SOC website updated with a series of data products
- SOC and MCC connection
- Data Products adequately PDS4 formatted
- Data ingested in MATISSE



THE PLANETARY SCIENCE JOURNAL AIA
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OPEN ACCESS
The SSCD Role in the LICIACube Mission: Data Management and the MATISSE Tool

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Abstract
Light Italian Cubesat for Imaging of Asteroids (LICIACube) is an Italian mission managed by the Italian Space Agency (ASI) and part of the NASA Double Asteroid Redirection Test (DART) planetary defense mission. Its main goals are to document the effects of the DART impact on Dimorphos, the secondary member of the (65803) Didymos binary asteroid system, characterizing the shape of the target body and performing dedicated scientific investigations on it. Within this framework, the mission Science Operations Center will be managed by the Space Science Data Center (ASI-SSDC), which will have the responsibility of processing, archiving, and disseminating the data acquired by the two LICIACube

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Abstract

1. Introduction
2. SSCD Heritage in Space Data Management and Exploitation
3. LICIACube SOC Activities at SSCD
4. MATISSE Tool and Its Planned Development for LICIACube
5. Expected Impact of SSCD Activities on the LICIACube Mission



Data format Activities

Together with APL colleagues it has been possible to define the data product format (both images and XML labels) to be PDS4 compliant

Some Python packages have been developed to generate on demand correct files and to place them in the required path

The raw and calibrated datasets have been certified PDS4 compliant on December 2023





Space Science Data Center



LICIACube LUKE data on MATISSE

Using MATISSE, the ASI-SSDC webtool for planetary exploration datasets, and thanks to the PDS4-compliant LUKE dataset, it is now possible to visualize and analyze the data directly projected over Didymos

<https://tools.ssdsc.asi.it/Matisse/>





Space Science Data Center



MATISSE 2.0

Multi-purpose Advanced Tool for Instruments for the Solar System Exploration

Version 2.0.4194

Login

To use the old version of MATISSE (1.5, working but no more maintained) click [here](#).
For any issue or information please contact [Angelo Zinzi](#)
Thank you



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Thank you

Search

Query Results

Visualization

Search parameters

Select Target

65803 Didymos

Missions

LICIACube

Query Name (Optional)

Search

Query Results

Visualization

2024011811426

Query: [Target: 65803 Didymos] [Missions: LICIACube] [Instruments: LUKE]
[Geological Unit:]

Show 10 entries

Visualize Selected

Show Hide Columns

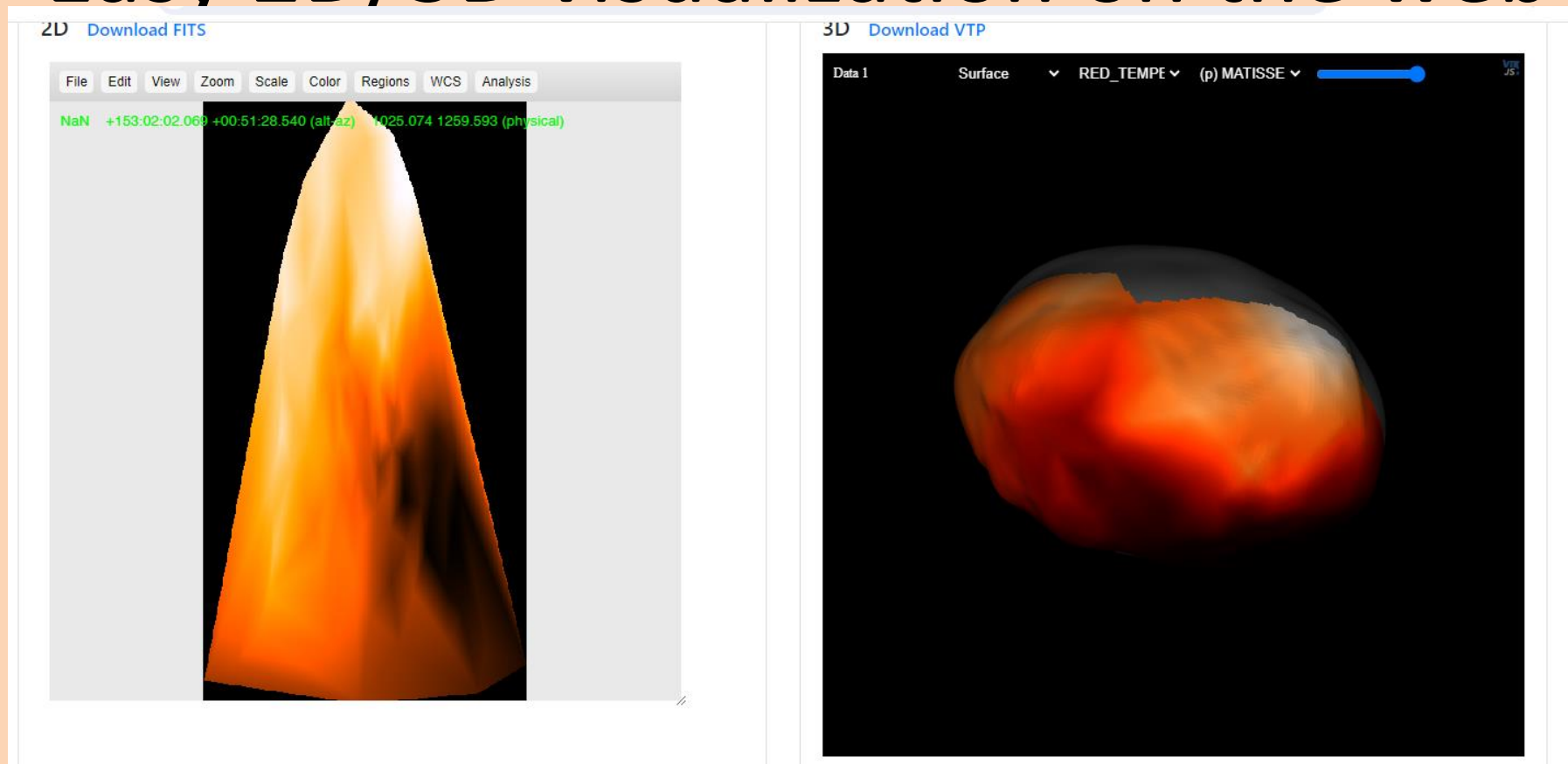
Export to CSV

Search:

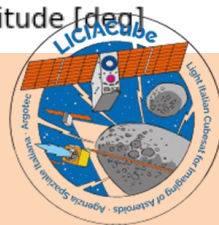
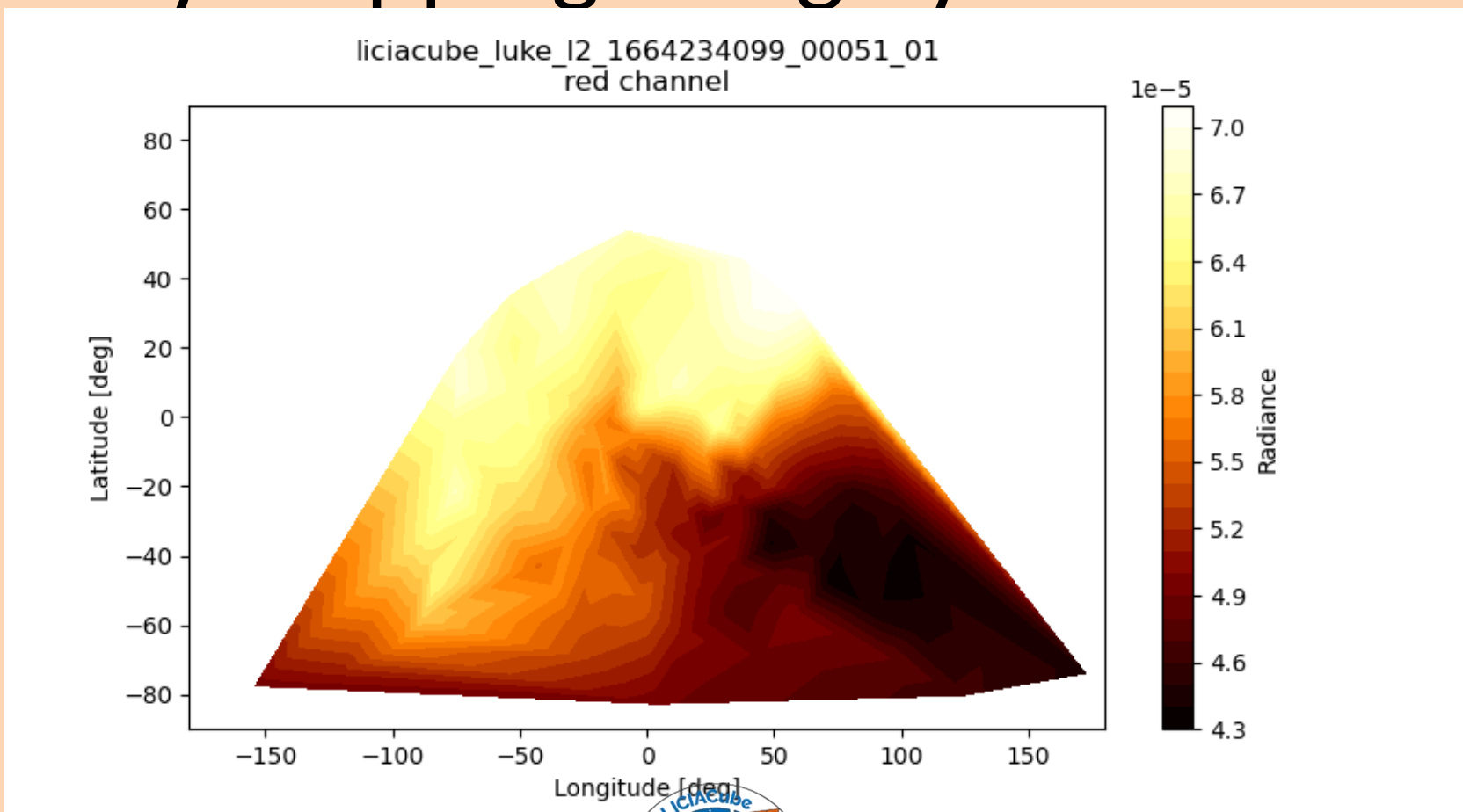
| Instrument | Name | Wave Length | C1min | C1max | C2min | C2max | C3min | C3max |
|------------|--|-------------|----------|---------|---------|--------|----------|----------|
| luke | liciacube_luke_l2_1664234099_00051_01.fits | Red | -153.948 | 172.956 | -83.038 | 54.023 | -401.381 | -210.189 |
| luke | liciacube_luke_l2_1664234237_00112_01.fits | Green | -179.991 | 179.995 | -89.487 | 30.907 | -29.077 | -19.736 |
| luke | liciacube_luke_l2_1664234230_00003_01.fits | Blue | -179.979 | 179.983 | -89.385 | 20.049 | -25.440 | -17.404 |



Easy 2D/3D visualization on the web



Easy mapping using Python offline





Thank you for the attention

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