

Privileged Document/Proprietary Information

Cislunar Explorers June 19, 2017



License to Operate a Private Remote Sensing Space System

Licensee: **Cornell University**

Name of System: **Cislunar Explorers**

Type of System: **2 Electro-Optical Imaging Satellites**

Effective Date: **June 19, 2017** **License**

1. Grant of License

- a. The National Environmental Satellite, Data and Information Service of the National Oceanic and Atmospheric Administration (NOAA), an agency of the U.S. Department of Commerce, hereby grants to **Cornell University** (herein "the Licensee"), a License ("the License"), to operate the Licensee's private remote sensing space system described below at Section 3 of this License ("the System"), consistent with the terms of this License. This License's terms and conditions reflect, among other significant provisions, the System parameters and operating conditions approved by the Secretary of Commerce, or his or her delegate ("the Secretary").
- b. This License is granted under the authority of The National and Commercial Space Programs Act of 2010 ("the Act"), Title 51 U.S.C. §§60101 *et seq.*, and the regulations promulgated thereunder, 15 CFR Part 960 ("the Regulations"). The authorization provided by this License is limited to the remote sensing operations of the System. It does not provide authorization for the conduct of any non-remote sensing operations that are proposed to be undertaken by the System.

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- c. The Licensee shall ensure that the information provided to NOAA and relied upon in issuing this License, and/or any subsequent licensing action, is current and accurate. Consistent with the time limits set forth in the regulations and this License, failure to notify NOAA in a timely manner of any changes to that information on which the determination to issue this License or a subsequent licensing action was or will be made may result in penalties for noncompliance being levied for each inaccuracy and/or license suspension or revocation. (*See, 15 CFR §§ 960.11(a) and 960.13*).
- d. In the event that factual circumstances surrounding the issuance of this License or any subsequent licensing action change, including but not limited to the factual representations which NOAA relied upon in the production of this document, NOAA reserves the right to reexamine and/or revoke this License or any subsequent licensing action at that time.
- e. The terms and obligations of this License shall bind the Licensee's affiliates, subsidiaries, assigns, heirs, and successors (whether through merger, acquisition or otherwise).
- f. This License shall not be transferred or assigned by any means, including without limitation, by operation of law or merger, by the Licensee, without the prior written consent of NOAA.

2. Term of License

- a. This License for operation of the System shall be valid from the effective date through the operational lifetime of the System or until the Secretary determines that the Licensee is not in compliance with: the requirements of the Act; the Regulations promulgated thereunder; the terms and conditions of this License; or that the Licensee's activities or operation of that System are not consistent with the national security, foreign policy and the international obligations of the United States. (*See, 15 CFR § 960.9(a)*).
- b. The Licensee shall notify the NOAA Assistant Administrator within seven (7) days of financial insolvency, dissolution, the demise of its system or of its decision to discontinue system operation. Upon notification, the Assistant Administrator will terminate the License. (*See, 15 CFR § 960.9(b)*).

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3. System Description

The System is described as follows, based upon the information contained in the Licensee's application dated January 26, 2017 and subsequent information provided to NOAA. Details of the approved System configurations are included in Appendix 2.

System's Name: **Cislunar Explorers**

System Type: **2 Electro-Optical Imaging Satellites**

Resolution: **23.6 km Panchromatic (PAN) Ground Sample Distance (GSD)**

Location of Mission Control Center: **Ithaca, NY**

Alternate Mission Control Center: **TBD**

Location of Remote Ground Station(s): **See Attachment 1**

4. Conditions and Operational Parameters of the System:

- a. The Licensee shall operate its System in a manner that preserves the national security and observes the foreign policy and international obligations of the United States.
(*See, 15 CFR § 960.11(b)(1)*).
- b. The Licensee shall maintain operational control of the System from a location within the United States at all times, including the ability to override all commands issued by any operations centers or stations, as well as safeguards to ensure the integrity of the operations of the System. (*See, 15 CFR § 960.11(b)(2)*).
- c. Satellite tracking, telemetry and control (TT&C) and data transmission and storage must be encrypted, using U.S. Government approved encryption. The encryption package is listed in Appendix 2.
- d. NOAA must review and approve the Licensee's Data Protection Plan to ensure adequate protection for all uplinks, downlinks, and data relay.

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- e. The Licensee is authorized to operate in the electromagnetic spectrum from 390-700 nm.
- f. The Licensee shall immediately notify NOAA of any significant operational deviation or proposed deviation of the system which would violate the conditions of the License. This includes notification of any tests of downlinking data to prospective ground stations not authorized as being part of the System by the terms of this License. In the case of such testing, the Licensee shall notify NOAA, in writing, at least 14 days prior to its commencement.
(*See, 15 CFR § 960.11(b)(11)*).
- g. Non-Earth Imaging (NEI) principles:
 - i. The Licensee may not image NEI unless it complies with the conditions in 4.h and 4.i. NEI remote sensing operations consist of two categories: (1) imaging of non-man-made, naturally occurring phenomena and celestial bodies, including the moon, stars, etc., not including the Earth, referred to herein as “naturally-occurring phenomena,” and (2) imaging of artificial resident space objects (ARSO) in Earth orbit, including man-made satellites, etc., which may occur either with or without the consent of the ARSO owner and operator.
 - ii. For purposes of license conditions 4.h, and 4.i, “resolved” refers to an image of an object in which the object fills more than 3 x 3 pixels of the imager's focal plane in two orthogonal axes simultaneously.
- h. Imaging of naturally occurring phenomena:
 - i. The Licensee may image at any resolution, and may disseminate images of, naturally occurring phenomena.
 - ii. Regardless of the Licensee’s intent, incidental imaging of ARSO, coincident with imaging natural occurring phenomena and celestial bodies, must be conducted in accordance with license condition 4.i.
- i. Imaging of ARSO:
 - i. The Licensee may image ARSO in the electromagnetic spectrum from 390-700 nm. The Licensee may not image ARSO outside of this spectrum.
 - ii. The Licensee may image ARSO with or without consent, but the Licensee must comply with the below license conditions corresponding to whether or not consent exists.

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- iii. Consenting imaging operations of ARSO:
 - 1. If the Licensee obtains written consent from the owner and operator to image ARSO, the Licensee may resolve such imagery and may use it to any extent permitted by the consent.
 - a. Written consent from the owner and operator must also include confirmation that the owner and operator have obtained any necessary permission(s) for imaging from all applicable manufacturer(s), regulatory authority or authorities, and foreign entities with an interest in the ARSO.
 - 2. At least 90 days prior to conducting consenting ARSO imaging, the Licensee shall provide notice to NOAA for that imaging. The notice shall include: an identification of the target ARSO to be imaged, a record of all consents obtained, the orbital location of the ARSO, proposed orbital maneuver plan, dates of the ARSO imaging, and the imager's distance from the imaged object.
 - 3. If NOAA places conditions on the ARSO imaging, the Licensee shall comply with such conditions.
 - 4. The Licensee shall delete all ARSO image content that is not part of the target resolved ARSO.
- iv. Non-consenting imaging operations of ARSO:
 - 1. Absent written consent, the Licensee may image ARSO only to obtain unresolved imagery.
 - 2. Non-consenting imaging operations shall not be attempted at a resolution better than 0.5 meters.
 - 3. All intentionally or unintentionally gathered non-consenting ARSO imagery shall be encrypted at all times to the standards provided in Appendix 2.
 - 4. The Licensee shall purge the following imagery upon its discovery: all non-consenting resolved ARSO, and all non-consenting ARSO images at a resolution better than 0.5 meters.
 - 5. The Licensee may downgrade a resolved image to an unresolved image and retain it.
 - 6. The Licensee may disseminate non-consenting unresolved ARSO images subject to the limitations in conditions 4.i.iv.7 and 4.i.iv.8.
 - 7. Prior to dissemination, Licensees must correlate the tracking data of any unresolved ARSO imagery with the USG-approved space tracking catalog found at space-track.org. Licensees shall maintain records of these correlations and submit to NOAA upon request.

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8. Licensees may disseminate unresolved imagery of ARSO after removing meta-data such as time, position and attitude of the sensor.
9. Should the Licensee desire to release imagery that it is unable to correlate pursuant to subparagraph 7 above, the Licensee shall submit to NOAA the uncorrelated imagery proposed to be disseminated for correlation and determination of releasability. The Licensee must purge from servers and storage devices any imagery that NOAA determines is non-releasable.

5. Limitations on Data Collection and/or Dissemination during Periods of Crisis

- a. The Licensee may be required by the Secretary of Commerce, after consultations with the Secretary of Defense or the Secretary of State, to limit data collection and/or distribution by the System as determined to be necessary to meet significant national security or significant foreign policy concerns or international obligations of the United States. NOAA will promptly notify the Licensee when such limitations may be required and the duration of the restricted period(s). (*See, 15 CFR § 960.11(b)(4)*).
- b. The Licensee shall, on request, provide unenhanced restricted images collected by the System on a commercial basis exclusively to the USG, using USG-furnished or approved rekeyable encryption on the downlink. The costs and terms associated with meeting this condition will be negotiated directly between the Licensee and the Department of Defense (for the USG).
- c. The Licensee shall use a data downlink format that allows the USG access to and use of these data during such restricted periods as set forth in Section 5(a) of this License.

6. Imaging Restrictions of the State of Israel Imposed by the 1997 Defense Authorization Act, Pub. L. 104-201, Section 1064

The Licensee shall not operate the System in such a manner as to disseminate images of the State of Israel at a resolution more detailed and precise than the current level of precision of satellite imagery readily and consistently available from non-U.S. commercial sources. "Israel" includes the State of Israel and those territories occupied by Israel in June, 1967 (the Gaza Strip, the Golan Heights, and the West Bank). NOAA will advise the Licensee regarding; (1) changes to the current level of precision of satellite imagery for the State of Israel and (2) changes in the status of Israeli-occupied territories, if any.

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7. Significant or Substantial Foreign Agreements

The Licensee shall notify NOAA of any significant or substantial agreement ("the agreement") the Licensee intends to enter with a foreign nation, entity, or consortium, at least 60 days before concluding such an agreement. The Licensee may not execute the agreement until NOAA has approved it in writing.

(See, 15 CFR §§ 960.8 and 960.11(b)(5)).

8. Provision of Data to Sensed States

Subject to the terms and conditions of this License, the Licensee shall make available to the government of any country, including the United States, unenhanced data collected by the System concerning the territory under the jurisdiction of such government, as soon as such data are commercially available and on reasonable commercial terms and conditions. Upon receiving an unenhanced data request from a government seeking to exercise its rights as a "sensed state" as defined within the Act, the Licensee shall consult with NOAA.

(See, 15 CFR § 960.11(b)(10)).

9. Provision of Data to the National Archive

a. Subject to the terms and conditions of this License, the Licensee shall make available unenhanced land data collected by the System requested by the Department of the Interior on reasonable cost and conditions as agreed by the Licensee and the Department of Interior. After the expiration of any exclusive right to sell, or after a reasonable period of time, as agreed with the Licensee, the Department of Interior shall make these data available to the public at the cost of fulfilling user requests. Except for data which under this license may be approved for release only to the USG or USG-approved users.

(See, 15 CFR § 960.11(b)(8)).

b. Before purging any land data collected by the System in the Licensee's possession, the Licensee shall offer such data to the National Satellite Land Remote Sensing Data Archive at the cost of reproduction and transmission. Except for data which under this license may be approved for release only to the USG or USG-approved users, the Department of Interior shall make these data available immediately to the public at a price equivalent to the cost of fulfilling user requests.

(See, 15 CFR § 960.11(b)(9)).

c. The Licensee shall provide to the USG, upon request, a complete list of all archived, unenhanced land data which has been collected by its System which is

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not already maintained in a public catalog. Any information on this list which is deemed proprietary by the Licensee should be so noted by the Licensee when the list is provided to the USG.

(See, 15 CFR § 960.11(b)(7)).

10. Monitoring and Compliance Requirements

- a. The Licensee shall comply with all monitoring and compliance requirements established by NOAA. These requirements are contained in Appendix 1.
(See, 15 CFR § 960.11(b)(3)).
- b. The Licensee shall allow NOAA access, at all reasonable times, to all facilities which comprise the System for the purpose of conducting License Monitoring and Compliance audits and inspections. NOAA shall conduct all such enforcement activities as are necessary and authorized to ensure the Licensee's compliance with the conditions of this License, the Act, and the regulations promulgated thereunder.
(See, 15 CFR §§ 960.11(b)(3) and 960.14).

11. Disposal of Licensee's System

The Licensee shall perform all actions necessary to place the spacecraft in a safe configuration for final maneuver prior to de-orbit. Prior to de-orbiting the spacecraft, all stored energy sources on board the satellite will be discharged by venting excess propellant, discharging batteries, relieving pressure vessels, and other appropriate measures. No debris from the satellite is expected to reach the Earth's surface.

12. Amendments to Licenses

- a. Prior to undertaking any of the actions identified in 15 CFR § 960.7(a), the Licensee must promptly file all relevant information with NOAA.
- b. Applications for an amendment to an existing License shall be filed at the same address at which the License application was filed, unless otherwise explicitly designated by NOAA.
(See, 15 CFR §§ 960.7(b) and 960.7(f)(1)).

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13. Requirements for Additional Licenses and/or Other Governmental Approval

- a. The issuance of a License does not relieve the Licensee of the obligation to obtain other licenses and specific written approval from other appropriate USG agencies, pursuant to applicable statutes, regulations, or contracts.
- b. Licensed operations are subject to all applicable U.S. law including, but not limited to, any statutory restrictions or sanctions on trade.
- c. Once the satellite is launched into orbit, the Licensee is required to register the payload with the U.S. Department of State Bureau of Oceans and International Environmental and Scientific Affairs, Office of Science and Advanced Technology, which maintains the U.S. national registry of space objects pursuant to the Convention of the Registration of Objects Launched into Outer Space. If the registration of the satellites is the responsibility of KSA, then the licensee will provide NOAA with a notice that KSA has completed any requirements within its country.

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IN WITNESS THEREOF, I hereby grant this License:

June 19, 2017



Stephen Volz
Assistant Administrator
NOAA Satellite and Information Services

Appendices

- Appendix 1: Monitoring and Compliance Requirements
- Appendix 2: Operational and Technical Information
- Appendix 3: Corporate Information
- Appendix 4: Administrative Actions

Appendix 1

Monitoring and Compliance Requirements

1. Annual Compliance Audit

An on-site audit shall be conducted by the NOAA Monitoring and Compliance Program at least annually, following the issuance of a license, to confirm the licensee's compliance with the national security, foreign policy, and international obligations of the United States and compliance with all other license conditions.

2. Pre-Launch Requirements

No Later Than Twelve Months Prior to Launch

- a. Submit operations plan for agency approval describing how licensee will comply with data collection restrictions, operational limitations, or any data protection plans, as required.
- b. Submit operations plan for restricting collection and/or dissemination of imagery of Israeli territory to that which is no more detailed or precise than what will be available from non-U.S. commercial sources during the time of the licensee's planned operations.

No Later Than Six Months Prior To Launch

- a. Submit a data flow diagram that graphically represents the data flow from the sensor to the final product delivery locations.
- b. Submit satellite sub-systems drawing showing the various sub-system locations on the satellite.
- c. Submit a final imaging system specification document for each sensor. This must be coordinated with the imaging system contractor.
- d. Verify all data protection plans for accuracy and submit updated plans to NOAA.

No Later Than 30 Days Prior To Launch

- a. Coordinate close out photo session.
- b. Coordinate on-site inspections of Continental U.S. and overseas locations.
- c. Coordinate final documentation review and close any outstanding actions with NOAA.

3. Spacecraft is Commercially Operational

Prepare for NOAA's site visit to review and confirm operational baseline.

4. Quarterly Reporting

Initiate quarterly reporting to NOAA.

5. Annual Operational Audit and Record Keeping

In addition to the information required for the Annual Compliance Audit, all records and data from the previous twelve months pertaining to the following will be maintained by the licensee: Spacecraft telemetry; imaging sensor tasking and associated metadata to include date/time of collection, image number, imager used, image corner points in latitude/longitude, inertial position (x, y, z), scan duration, imagery data purges and purge alerts provided to the National Satellite Land Remote Sensing Data Archive.

Appendix 2

Operational and Technical Information

Orbital Parameters

Launch Date: NET November 2018

Launch Vehicle: NASA Space Launch System Block 1

Altitude: Approximately 384,400 km

Inclination: 5.145 degrees relative to the moon

Space Segment

System: 2 Electro-optical CubeSats

Encryption: AES 256 bit

Imaging System: 23.6 km PAN GSD (390-700 nm)

Frequencies: Uplink: 437.50 MHz
Downlink: 437.51 MHz
Data Rate: 250 bps

Ground Segment: See Attachment 1

Appendix 3 Corporate Information

Licensee:

Cornell University
144 East Avenue
Ithaca, NY 14853

Lead Advisor:

Professor Mason Peck, U.S. Citizenship
Cornell University
455 Upson Hall
Ithaca, NY 14853

Point of Contact:

Kyle Doyle, U.S. Citizenship

Directors: None

Joint Venture Members: None

Affiliates:

National Space Society
NASA, Wallops Flight Facility
NASA, CubeQuest Challenge

Partners: None

Each Foreign Ownership with Interest Equal to or Greater than 5 Percent in:

None

Directors, Partners, Executive Personnel or Senior Management Who Hold Positions with or Serve as Consultants for Any Foreign Nation or Person:

None

Each Foreign Lender and Amount of Debt Where Foreign Indebtedness Exceeds 25 Percent of an Applicant's Total Indebtedness:

None

Appendix 4
Administrative Actions

	<u>Date</u>	<u>Description of Administrative Action Taken</u>
1.	06/19/17	License Issued