



License to Operate a Private Remote Sensing Space System

Licensee: University Massachusetts Lowell

Application Dated: March 15, 2019

License Date: April 26, 2019

System Name: SPACE HAUC

Number of Satellites: 1

System Type: Electro-Optical

Spatial and Spectral Resolutions:
709 m Ground Sample Distance (GSD); Panchromatic & VNIR 380-1000 nm

Ground Stations are listed in the Ground Station Appendix

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 **University Massachusetts Lowell**, (herein "the Licensee"), a License ("the License"), to operate the Licensee's private remote sensing space system ("the System") described herein, 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"), 51 USC § 60101 *et seq.*; the regulations promulgated thereunder, 15 CFR Part 960 ("the regulations"); and the U.S. Commercial Remote Sensing Space Policy of April 25, 2003. 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.

- 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 this information may result in penalties for noncompliance being levied for each inaccuracy and/or license suspension or revocation. (See 15 CFR §§ 960.11(a), 960.13 and 960.15).
- 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 upon which NOAA relied 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 the System are not consistent with the national security, foreign policy, or the international obligations of the United States. (See 15 CFR § 960.9(a)).
- b. The Licensee shall notify the NOAA Assistant Administrator for Satellite and Information Services 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)).

3. 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. The Licensee shall file applications for an amendment to an existing License 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)).

4. 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 U.S. Government (“USG”) agencies, pursuant to applicable statutes, regulations, or contracts. Such licenses or written approval may include licenses for the employment of foreign nationals at any facility involved in the implementation of this License, and for the use of any intellectual property.
- b. Licensed operations are subject to applicable U.S. law including, but not limited to, any statutory restrictions or trade sanctions.
- c. Once the satellite is launched into orbit, the Licensee shall register the payload with the U.S. Department of State Bureau of Oceans and International Environmental and Scientific Affairs, Office of Space and Advanced Technology which maintains the U.S. national registry of space objects pursuant to the Convention on Registration of Objects Launched into Outer Space.

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

- a. If required by the Secretary of Commerce, after consultations with the Secretary of Defense or the Secretary of State, the Licensee shall 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 their duration. (*See* 15 CFR § 960.11(b)(4)).
- b. The Licensee shall, upon request, provide unenhanced restricted images collected by the System on a commercial basis exclusively to the USG, using USG-approved rekeyable encryption on the downlink.
- 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 this License.

6. Significant or Substantial Foreign Agreements

The Licensee shall notify NOAA of any significant or substantial agreement (“agreement”) the Licensee intends to enter with a foreign nation, entity, consortium, or person at least 60 days before concluding such an agreement. Notification shall consist of providing NOAA with an unsigned proposed agreement. The Licensee may not implement the agreement until NOAA advises the Licensee, in writing, that the provisions of the proposed agreement are acceptable.
(See 15 CFR §§ 960.3, 960.8 and 960.11(b)(5)).

7. 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 (a “sensed state”), 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,” the Licensee shall consult with NOAA.
(See 15 CFR § 960.11(b)(10)).

8. Provision of Data to the National Archive

- a. Subject to the terms and conditions of this License, the Licensee shall make available unenhanced 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 licensed 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.
(See 15 CFR § 960.11(b)(9)).
- c. The Licensee shall provide to NOAA, upon request, a complete list of all archived, unenhanced licensed data which has been collected by its System which is not already maintained in a public catalog. Any information on this list which is deemed proprietary by the Licensee must be so noted by the Licensee when the list is provided.
(See 15 CFR § 960.11(b)(7)).

9. Monitoring and Compliance Requirements

- a. The Licensee shall comply with all NOAA monitoring and compliance requirements and requests. 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).
- b. The Licensee shall complete and submit the Annual Audit by July 15th for the previous 12 months.
- c. Following the launch of the first licensed satellite, and for as long as there is a licensed satellite in space, the Licensee shall complete and submit the Quarterly Audits for:
 - i. January - March by April 15th
 - ii. The Annual Audit submission by July 15th. The Annual Audit (see 9.b. above) fulfills the Quarterly Audit submission for April - June.
 - iii. July - September by October 15th
 - iv. October - December by January 15th.
- d. The Licensee shall allow NOAA access, at all reasonable times, to all facilities which comprise the System for the purpose of conducting inspections.
- e. No later than 120 days prior to launch, the Licensee shall submit to NOAA for approval, a Data Protection Plan (DPP) that ensures adequate protection for all uplinks, downlinks, and data relays. NOAA is the sole authority to determine the minimum DPP content.
 - i. The DPP must include the data downlink format that allows the USG access to and use of these data during restricted periods (See License Condition 5.c).
 - ii. The licensee's Data Protection Plan must be approved by NOAA before the licensee's remote sensing space system may be launched. (See 15 CFR § 960.11(b)(13)(iii)).
 - iii. The Licensee shall comply with the content of the NOAA-approved DPP.
- f. The Licensee shall maintain, and provide to NOAA upon request, all records and data pertaining to, but not limited to, the following: 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, azimuth; imagery data purges and purge alerts provided to the National Satellite Land Remote Sensing Data Archive.

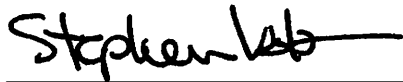
10. Conditions and Operational Parameters of the System

- a. Unless otherwise prohibited by this license, the Licensee may distribute data, imagery and products from the System at no better than the allowed technical parameters specified on page 1 of this license.
- b. 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)).
- c. 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)).
- d. The Licensee shall encrypt satellite tracking, telemetry and control and data transmission and storage, using USG-approved encryption.
- e. The Licensee shall immediately notify NOAA of any operational deviation or proposed deviation of the System. 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)).
- f. The Licensee shall conduct any Non-Earth Imaging (NEI) operations in accordance with the NEI Appendix.

11. Disposal of Licensee's System

Consistent with the Act and the regulations, the Licensee shall perform all actions necessary to place the spacecraft in a safe configuration for deorbit. Prior to de-orbiting the spacecraft, all stored energy sources on board the satellite will be discharged. The Licensee will deorbit the spacecraft by means of an uncontrolled atmospheric re-entry. Satellite lifetime shall be no longer than 25 years after mission completion. No debris from the satellite is expected to reach the Earth's surface. (*See* 15 CFR § 960.11(b)(12)).

IN WITNESS THEREOF, I hereby grant this License:

A handwritten signature in black ink, appearing to read "Stephen Volz", with a horizontal line extending to the right.

Stephen Volz, PhD
Assistant Administrator
NOAA Satellite and Information Services

April 26, 2019

System Information Appendix

Licensee:

University Massachusetts Lowell

POC:

Supriya Chakrabarti
600 Suffolk St. Suite 315
Lowell, MA 01854
Supriya_Chakrabarti@uml.edu

<u>Satellite</u>	<u>Launch Date</u>	<u>Altitude(km)</u>	<u>Inclination(°)</u>
SPACE HAUC	NET OCT 2020	400 - 450	51.6

Frequencies: 7.2 GHz, 8.3 GHz, 401.3, 450 MHz

Encryption: AES 256

Non-Earth Imaging (NEI) Appendix

1. Non-Earth Imaging (NEI) principles:
 - a. The Licensee may not conduct NEI unless it complies with NEI conditions in 2 and 3 below. 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.
 - b. For purposes of NEI conditions 2 and 3, “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.
2. Imaging of naturally occurring phenomena:
 - a. The Licensee may image at any resolution, and may disseminate images of, naturally occurring phenomena.
 - b. 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 3.
3. Imaging of ARSO:
 - a. The Licensee may image ARSO in the electromagnetic spectrum from 370-900 nm. The Licensee may not image ARSO outside of this spectrum.
 - b. 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.
 - c. Consenting imaging operations of ARSO:
 - i. 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.
 - ii. Written consent from the owner and operator must also include confirmation that the owner and operator have notified the satellite manufacturer(s).
 - iii. 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.
 - iv. If NOAA places conditions on the ARSO imaging, the Licensee shall comply with such conditions.
 - v. The Licensee shall delete all ARSO image content that is not part of the target resolved ARSO.

- d. Non-consenting imaging operations of ARSO:
 - i. Absent written consent, the Licensee may image ARSO only to obtain unresolved imagery.
 - ii. Non-consenting imaging operations shall not be attempted at a resolution better than 0.5 meters.
 - iii. 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.
 - iv. The Licensee may downgrade a resolved image to an unresolved image and retain it.
 - v. The Licensee may disseminate non-consenting unresolved ARSO images subject to the below limitations:
 - 1. 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.
 - vi. Should the Licensee desire to release imagery that it is unable to correlate pursuant to subparagraph 3.d.vi (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.

Ground Station Appendix

Any facility or Ground Station, including those for tasking, receiving, and storing data are considered to be part of the System and subject to NOAA inspection. The Licensee shall allow NOAA access, at all reasonable times, to all facilities and Ground Stations which comprise the System for the purpose of conducting inspections.

NOAA must approve any Ground Station prior to the commencement of operations.

Mission Control Center: Lowell, MA

Remote Ground Stations:

Cambridge, MA
Westford, MA

Administrative Record Appendix

	<u>Date</u>	<u>Description of Administrative Action Taken</u>
1.	4/26/19	Issuance of License