

PROPRIETARY INFORMATION
National Oceanic and Atmospheric Administration
License to Operate a Private Remote Sensing Space System



The National Oceanic and Atmospheric Administration (NOAA), an agency of the U.S. Department of Commerce, hereby grants this Tier 1 license authorizing Massachusetts Institute of Technology to operate BeaverCube, a private remote-sensing space system comprised of 1 satellite with the following capabilities and described completely in Part D of this license:

Panchromatic (PAN) (390 - 700 nm) at 162.5 m Ground Sample Distance (GSD)
Longwave Infrared (LWIR) (8000 - 14000 nm) at 347.8 m Ground Sample Distance (GSD)
Longwave Infrared (LWIR) (11500 - 12500 nm) at 347.8 m Ground Sample Distance (GSD)

Please submit any communications, including all communications required by the regulations at 15 CFR Part 960 and this license to:

Commercial Remote Sensing Regulatory Affairs (CRSRA)
1335 East-West Highway SSMC-1/G-101
Silver Spring, MD 20910
Email: crsra@noaa.gov
Phone: 301-427-2560

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Part A: Determination and License Grant

The Assistant Administrator (AA) of the National Environmental Satellite, Data, and Information Service within the National Oceanic and Atmospheric Administration, an agency of the U.S. Department of Commerce, acting pursuant to authority delegated by the Secretary of Commerce (the Secretary), determines that Massachusetts Institute of Technology, as described in Part C of this license, will comply with the requirements of the Land Remote Sensing Policy Act of 1992, as amended, codified at 51 U.S.C. 60101 et seq., (hereinafter Act), the regulations promulgated thereunder, 15 CFR Part 960 (the regulations); and the conditions in this license.

Accordingly, the AA hereby grants Massachusetts Institute of Technology (hereinafter Licensee), as described in Part C of this license, this license to operate BeaverCube (hereinafter the System), as described in Part D of this license, subject to the terms and conditions of this license. This license is valid until its term ends in accordance with the regulations. The Licensee must request and receive approval for a license modification before taking any action that would contradict a material fact listed in Part C or D of this license.

The AA makes this determination, and grants this license, under the authority delegated to him by the Secretary of Commerce through the Under Secretary of Commerce for Oceans and Atmosphere and Administrator of NOAA. The Secretary's authority is found in the Act and the regulations. This license does not authorize the System's use of spectrum for radio communications or the conduct of any non-remote sensing operations that are proposed to be undertaken by the Licensee. This license is not alienable and creates no property right in the Licensee.

IN WITNESS THEREOF, I hereby grant this License:

Stephen M. Volz Ph. D.
Assistant Administrator for
Satellite and Information Services

Date

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Part B: Tier 1 License Conditions

The Licensee must, at all times:

1. Comply with the Act, the Regulations, this license, applicable domestic legal obligations, and the international obligations of the United States.
2. Operate the system in such manner as to preserve the national security of the United States and to observe international obligations and policies, as articulated in conditions included in this license.
3. Upon request, offer 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 without delay and on reasonable terms and conditions, unless doing so would be prohibited by law or license conditions.
4. Upon termination of operations under the license, make disposition of any satellites in space in a manner satisfactory to the President.
5. Notify the Secretary in writing of each of the following events, no later than seven days after the event:
 - i. The launch and deployment of each system component, to include confirmation that the component matches the orbital parameters and data collection characteristics of the system, as described in Part D of the license;
 - ii. Each disposal of an on-orbit component of the system;
 - iii. The detection of an anomaly; and
 - iv. The licensee's financial insolvency or dissolution;
6. Request and receive approval for a license modification before taking any action that would change a material fact in the license.
7. Certify that all material facts in the license remain accurate pursuant to the procedures in § 960.14 no later than October 15th of each year.
8. Cooperate with compliance, monitoring, and enforcement authorities described in the Act and this part, and permit the Secretary to access, at all reasonable times and with no shorter notice than 48 hours, any component of the system for the purpose of ensuring compliance with the Act, this part, and the license.
9. Refrain from disseminating unenhanced data, or processed data or products derived from the licensee's system, of the State of Israel at a resolution finer than the resolution most recently specified by the Secretary in the *Federal Register* as being available from commercial sources.
 - i. The most recent resolution specified by the Secretary is 0.4 m GSD, please see FR Doc.2020-15770, publish date: July 21, 2020.

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Part C: Description of Licensee

Every term below constitutes a material fact. You must request and receive approval of a license modification before taking any action that would contradict a material fact.

1. General Licensee Information:

a. Name of Licensee:

Massachusetts Institute of Technology

b. Location and address of Licensee:

Department of Aeronautics and Astronautics
77 Massachusetts Ave.
37-335
Cambridge, MA 02139

c. Licensee contact information:

Administrative Assistant Elizabeth Zotos
77 Massachusetts Ave.
37-335
Cambridge, MA 02139
339-927-1006
zotos@mit.edu

d. Contact information for a specific individual to serve as the point of contact with Commerce:

Whitney Lohmeyer
23 Sidney Street, Apt. 305
Cambridge, MA 02139
919-413-5434
lohmeierconsulting@gmail.com

e. Place of incorporation and, if incorporated outside the United States, confirmation that the Licensee acknowledged as part of the application that the Licensee will operate its system within the United States and is therefore subject to the Secretary's jurisdiction under 15 CFR Part 960:

N/A

2. Identity of any subsidiaries and affiliates playing a role in the operation of the System, including a brief description of that role:

N/A

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Part D: Description of System

Name of System: BeaverCube

1. Brief mission description:

BeaverCube plans to take a limited number of images of the U.S. Eastern coastline with the VIS and LWIR Cameras and demonstrate use of the Accion TILE-2 electro spray propulsion system to make orbit altitude changes on the order of 250 meters in total. BeaverCube will use 1 satellite to image the Earth at 162.5 m & 347.8 m resolution and will not conduct non-Earth (NEI) Imaging.

2. Remote Sensing Instrument(s) parameters (for each sensor):

Sensor type	Imaging/frame rate (FPS)	Spatial resolution (m)	Spectral range (nm)	Collection volume (km ² /unit of time)
PAN	N/A	162.5	390 – 700	0.181 km ² /min
LWIR	N/A	347.8	8000 – 14000	0.181 km ² /min
LWIR	N/A	347.8	11500 – 12500	0.181 km ² /min

- a. Ability of the remote sensing instrument to slew, point, or digitally look off-axis from the x, y, and z axes of travel:
 Pointing accuracy is at best 5 degrees using magnetorquers.

3. If any entity or individual other than the Licensee will own, control, or manage any *remote sensing instrument* in the System:

Name	Address	Number	Relationship
N/A	N/A	N/A	N/A

4. Spacecraft Upon Which the Remote Sensing Instrument(s) is (are) carried

- a. Description:
 3U CubeSat
- b. Estimated launch date(s) in calendar quarter:
 NET March 12, 2021
- c. Number of spacecraft (system total and maximum in-orbit at one time):
 1
- d. For each spacecraft, provide the following (or if an entire constellation will have substantially the same orbital characteristics, provide these values for the entire constellation and note whether or not all spacecraft will be evenly spaced):

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Spacecraft or Constellation Characteristics			
Altitude (km)	Inclination (°)	Orbital Period (min)	Longitude (°)
410 – 420	51.6	92.7	312.2
Eccentricity	Argument of perigee (°)	Propulsion	
0.002	88.4	Yes	

- e. Ability of the spacecraft to slew, point, or digitally look off-axis from the x, y, and z axes of travel:
 Max slew speed: 0.5 degree/second

- 5. If any entity or individual other than the Licensee will own, control, or manage any *spacecraft* in the System

Name	Address	Number	Relationship	Citizenship Status
N/A	N/A	N/A	N/A	N/A

- 6. Ground Components: See Ground Station Appendix

- 7. If any entity or individual other than the Licensee will own, control, or manage any *mission control center(s)* with the ability to operate the System

Name	Address	Number	Relationship
N/A	N/A	N/A	N/A

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Ground Station Appendix

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

Type	Location	Coordinates
MCC	BeaverCube MOC MIT Building 37 Room 362b 70 Vassar St. Cambridge, MA 02139	
Domestic		
RGT	BeaverCube UHF Ground Station MIT Building 37 Room 362b 70 Vassar St. Cambridge, MA 02139	

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Administrative Record Appendix

<u>Date</u>	<u>Description of Administrative Action Taken</u>
1. 8/28/20	Issuance of License