



**United Nations/Japan Cooperation Programme on CubeSat Deployment from  
the International Space Station (ISS) Japanese Experiment Module (Kibo)  
“KiboCUBE”**

**Announcement of Opportunity**

8 September 2015

- 1. Thematic Area:** Basic and Human Space Technologies
- 2. Title:** United Nations/Japan Cooperation Programme on CubeSat Deployment from the International Space Station (ISS) Japanese Experiment Module (Kibo) or “KiboCUBE”
- 3. Implementing Organizations:** United Nations Office for Outer Space Affairs (OOSA) and Japan Aerospace Exploration Agency (JAXA)
- 4. Deadline for Applications:** Fully completed application forms must be submitted to the United Nations Office for Outer Space Affairs **by 31 March 2016**. Applicants will be notified of the outcome of their application by 1 August 2016.
- 5. Number of Opportunities for Deploying CubeSat:** A One-Unit (1U) CubeSat<sup>1</sup> per Announcement of Opportunity
- 6. Language of the Programme:** English
- 7. Brief Programme Description:**

The United Nations Office for Outer Space Affairs (OOSA) promotes international cooperation and capacity-building in the area of space technology and its applications in the world, especially in developing countries, within the framework of the United Nations Programme on Space Applications.

OOSA launched the Basic Space Technology Initiative (BSTI) in 2009 with the mission of enhancing access to space application tools for sustainable development through building capacity in basic space technology, and in 2010 OOSA launched the Human Space Technology Initiative (HSTI) with the objective to promote international cooperation in human spaceflight and space exploration-related activities.

The Japan Aerospace Exploration Agency (JAXA) carries out Japan’s space programme conducting research and development on launch systems, satellites, and manned space facilities. JAXA developed the International Space Station (ISS) Japanese Experiment Module “Kibo” and has been operating it since 2008. The ISS is a human-tended space facility orbiting at around 400 kilometers above the ground with six crew members on board.

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<sup>1</sup> Please refer to the “CubeSat Design Specification” developed by the California Institute of Technology at [http://www.cubesat.org/images/developers/cds\\_rev13\\_final2.pdf](http://www.cubesat.org/images/developers/cds_rev13_final2.pdf).

Currently, the only way to deploy CubeSats from the ISS is from Kibo. Kibo's unique capability is comprised of an airlock system and a robotic arm. The first orbital deployment of CubeSats from Kibo was successfully conducted through the Small Satellite Orbital Deployer, developed by JAXA, in October 2012. Since then, nano-satellites and CubeSats from numerous countries around the world have been deployed from Kibo, that has contributed to the development of technology as well as to capacity-building, particularly in space engineering.

Both OOSA and JAXA along with the Government of Japan are pleased to announce a new joint cooperation programme that provides an opportunity for orbital deployment of a CubeSat from the ISS Kibo. In line with the mission and objectives of OOSA initiatives BSTI and HSTI, and JAXA's demonstrated commitment to promoting space science and technology in developing countries, this new cooperation programme entitled KiboCUBE is intended to contribute to broadening space activities and applications and to capacity-building in space science and technology.

By providing the opportunity to deploy a CubeSat developed at educational or research institutions from developing countries which are United Nations Member States, OOSA and JAXA will both raise awareness of the role that space science and technology plays in promoting sustainable development and contribute to building capacity in space science and technology.

### **8. Scope of Opportunity for Deploying a CubeSat:**

Through this Announcement of Opportunity, OOSA and JAXA undertake to provide a CubeSat deployment from Kibo. One CubeSat per Announcement of Opportunity will be selected and expected to be deployed into space. JAXA shall bear the costs of launch of the CubeSat to the ISS and deployment from Kibo. The Selected Entity shall bear the costs of the activities identified under Section 11. This Cooperation Programme is subject to the availability of funds of OOSA and JAXA.

### **9. Programme Schedule and Milestone**

#### **(A) Programme Schedule**

Application Submission	31 March 2016
Selection and notification of applicants	1 August 2016
Preparation period including technical coordination	Approximately 5 to 10 months (subject to the progress of the CubeSat development)
Critical Readiness Review	To be determined and arranged by JAXA taking into account the progress of the CubeSat development.
Deployment	Expected in 2017, subject to the ISS operational requirements and progress of the CubeSat development.
Final Report	A final report on the CubeSat mission and related activities must be submitted to OOSA within 3 months following the completion of the CubeSat mission.

It must be noted that the number of opportunities and the launch and deployment schedule may change due to constraints on the ISS operation or for any other reasons.

## **(B) Programme Milestone**

### 1) Selection of successful applicants

- Several entities will be selected as “short listed entities” and notified before 1 July 2016.
- One entity will be selected among the short-listed entities and notified by 1 August 2016.

### 2) Technical coordination and signing of an arrangement (contract)

- Technical coordination in preparation of the CubeSat deployment between JAXA and the short-listed entities.
- Signing of a non-disclosure agreement and a contract between JAXA and the Selected Entity.

### 3) Interface and safety review

- The developer of the CubeSat is required to undergo a JAXA interface and safety review.
- Given that the materials for the safety review are to be handed in no later than 45 days prior to the date of the review, the functional and environmental tests shall be completed at least 45 days before the delivery of the CubeSat to JAXA.

### 4) Compatibility review

- JAXA and the Selected Entity will review the compatibility of the CubeSat with the interfaces, such as the mechanical, electrical, and thermal interfaces between the CubeSat and the deployment structure, and with the launch environment, including vibration frequencies and acceleration rates checks. Applicable testing procedures will be reviewed at this stage.
- Data gathered from the test and inspection conducted during the CubeSat development phase may be required as input for the compatibility tests.

### 5) Critical readiness review

- JAXA and the Selected Entity will conduct the critical readiness review.

### 6) Transport and delivery of the CubeSat to Tsukuba Space Center of JAXA (TKSC) scheduled 1 to 6 months prior to its transport to the ISS

- The Selected Entity shall bring its own CubeSat to a facility specified by JAXA (TKSC, in general) for the handover to JAXA. The battery of the CubeSat shall be fully charged before delivery. After that, JAXA will manage the maintenance work on the satellite.

### 7) Transport of the CubeSat to a launch site

- JAXA will transport the CubeSat to a launch site such as the Tanegashima Space Center.

### 8) Operational work at the launch site

- JAXA will be responsible for the operational work at the launch site.

9) Launch and deployment of the CubeSat

- Launch of the CubeSat to the ISS/Kibo by a designated space transportation vehicle, such as H2 Transfer Vehicle, and deployment of the CubeSat from Kibo.

10) Operation of the CubeSat

- The Selected Entity will conduct satellite operation, data evaluation, and space object registration.

11) Reporting the results

- The first briefing report on the operational results shall be submitted by the Selected Entity to OOSA no later than 3 months after the deployment of the CubeSat.
- A final report on the results of the mission shall be submitted no later than 3 months after completion of the CubeSat mission.
- The final report should include educational and promotional activities related the CubeSat mission.

## **10. Requirements for Participation**

### **(A) Eligibility Criteria**

This Opportunity is open to entities located in developing countries that are Member States of the United Nations:

- Heads of research institutes, universities, and other public organizations are eligible to apply for this Opportunity.
- Entities located in countries that have the means to transport artificial satellites into space and place them in orbit are not eligible, taking into account the objectives of this Opportunity.

Entities applying for this Opportunity are responsible for the development of their CubeSat including the design, manufacturing, test and verification of their CubeSat, as well as its operation and utilization after the deployment. Therefore, to be eligible for this Opportunity, applying entities must have sufficient capability in the following areas, as demonstrated in their application materials upon submission:

- CubeSat development and testing
- Ability to transport the CubeSat to JAXA
- Submission of safety assessment reports
- Coordination of the CubeSat's radio frequency
- Ability to obtain a license of radio stations
- Development of the ground station facility

### **(B) Selection Criteria**

The Selection Board consists of members nominated by OOSA and JAXA and will review the incoming applications according to the following criteria:

- Completeness of application form;
- Public nature of entity applying and location in developing country;

- Scientific and technical value of the CubeSat to be deployed under this Opportunity, as determined by either:
  - (a) The CubeSat's expected contribution to developing human knowledge and capacity to undertake activities in the field of space science and technology in the applying entity's home country or abroad; or
  - (b) The CubeSat's expected contribution to enhancing research and development through the technological demonstration of deploying and operating the CubeSat in the applying entity's home country or abroad.
- Capability of meeting or exceeding the minimum technical requirements as outlined by OOSA and JAXA;
- Demonstrating that the applying entity itself and the intended design and function of the CubeSat are consistent with peaceful exploration and use of outer space, and are not intended solely for commercial, political or religious purposes.

### (C) Technical Requirements

Regarding the detailed interface requirements required for the CubeSat design, please refer to "*JEM Payload Accommodation Handbook -Vol. 8- Small Satellite Deployment Interface Control Document (JX-ESPC-101133)*" herein after "Handbook", which will be provided by JAXA [kibocube@jaxa.jp]

#### 1) Design requirements

Design requirements for CubeSats are indicated in the Handbook. Please see Appendix B-1 for the 1-U CubeSat Design Specifications. The CubeSat Design Specification document can be obtained from the following URL:

[http://www.cubesat.org/images/developers/cds\\_rev13\\_final2.pdf](http://www.cubesat.org/images/developers/cds_rev13_final2.pdf)

#### 2) Safety requirements

CubeSats launched and deployed from Kibo are subject to space debris mitigation requirements, as well as the deployment and safety standards of the ISS. The primary standards specific to the ISS are as follows:

- (a) Assessment and re-approach to the ISS: Once deployed from Kibo, the separation of the CubeSat from the center of ISS shall be larger than 200 m after the first orbit. The initial deployment velocity will be provided by the Selected Entity.
- (b) Restriction of ballistic coefficients: The ballistic coefficient of the CubeSat shall be less than 100 kg/m<sup>2</sup> to ensure a faster orbiting decay of the CubeSat than the ISS.
- (c) Tracking requirements: The CubeSat minimum cross section (any cross section which can be physically or electromagnetically sighted) shall be no less than 100 cm<sup>2</sup> to be trackable by the Space Surveillance Network (SSN) of the United States.
- (d) Prevention of pollution inside the ISS:
  - Restriction of materials (flammable and outgassing)

The materials and their outgassing characteristics shall meet the standard specified in the Handbook. To verify the appropriateness, all the data on the materials shall be reported to JAXA. In order to obtain necessary data of the materials, JAXA can support the outgassing test as needed if samples of the materials are submitted.

- Confining toxic liquid  
Preventing a leak of toxic liquid used in battery electrolyte solutions.
- Control for breakable material release  
Any parts that may be broken by cracking shall be protected/strengthened by sealing.
- Containing materials that have the potential to shatter when cracked

(e) Protection of the astronauts from sharp edges by an inadvertent contact.

### 3) Operation restrictions

- The CubeSat may have to remain in storage at a JAXA facility for duration of six to twelve months from the time of delivery to JAXA to the deployment from Kibo.
- During the transport of the CubeSat to and the deployment of the CubeSat from Kibo, no electrical power will be provided.

### 4) Access to the CubeSat in Kibo

If an astronaut is required to handle the satellite and operate it in the ISS due to constraints of the satellite design, the action shall be planned in accordance with the following conditions:

- (a) The CubeSat shall not be taken out of the Satellite Install Case, but shall be accessed from the access window.
- (b) The action shall be done only to verify the soundness of the CubeSat by the astronaut through manipulating the operation switch and a check of the LED illumination. The check-out equipment of the CubeSat may be examined, if required, but only a JAXA lap-top installed both with windows XP and Linux and USB cable on board Kibo is available.
- (c) The working time of the astronaut shall be limited to 15 minutes. Please note that under microgravity it may take 1.5 times longer than on the ground to perform the same operations.

Under this circumstance, the following two requirements shall be met in addition to the requirements indicated above in (b).

- (d) Compliance with Electromagnetic Compatibility requirements of the ISS; and
- (e) Limits of the contact temperature at which an astronaut touches the CubeSat.

## 11. Roles and Responsibilities

The Selected Entity will conduct the following activities:

- Submit the overall schedule/timeline for the CubeSat development and its mission to JAXA.
- Design, analyze, manufacture and test the CubeSat and its supporting systems including verification of the compatibility with the technical requirements, except for the tests that will be conducted by JAXA as specified in section 12.
- Conduct all radio frequency related matters in full compliance with the applicable International Telecommunication Union radio regulations.

- Implement the safety assessment to verify the compliance with JAXA technical requirements and prepare the materials and operations required for the review.
- Deliver the CubeSat to the location specified by JAXA (expected to be Tsukuba Space Center) for the compliance tests. Fit-check and outgassing test can be conducted by JAXA.
- Transport the CubeSat to the location specified by JAXA (expected to be Tsukuba Space Center) for the CubeSat handover. Conduct a visual inspection, uninstall non-flight items for the compatibility tests and the handover.
- Operate the CubeSat including tracking control and data acquisition after the deployment from Kibo.
- Register the space object (the CubeSat). For more information, please refer to the following document: <http://www.unoosa.org/pdf/misc/2015/Handout-on-Small-SatellitesE.pdf>.
- Cooperate with the public relations and promotion activities of JAXA including responding to press inquiries about the CubeSat and preparing information materials upon request from JAXA.

Please note that any cost associated with the activities above, including employment costs, travel expenses and transportation fees shall be borne by the Selected Entity.

## **12. Terms and Conditions:**

By submitting a completed Application, the applicant agrees to the following:

- The Selected Entity will enter into an arrangement (contract) with JAXA to resolve any and all practical, logistical, technical and/or legal issues related to the deployment of the CubeSat from Kibo that may arise between JAXA and the Selected Entity. The arrangement (contract) will contain terms to define, *inter alia*, scope of work, the necessary conditions for the deployment, allocation of costs, compliance rules, handling of technical information and test results, confidentiality, security issues of JAXA facilities, declarations of immunity and hold harmless on the part of JAXA, cross-waivers of liability for damages sustained by either party, 3rd party liability claims, registration of the CubeSat space object and apportionment of other responsibilities arising under United Nations treaties on outer space, and dispute resolution procedures.
- This arrangement (contract) shall also be consistent with the “Agreement among the Government of Canada, Government of Member States of the European Space Agency, the Government of Japan, the Government of the Russian Federation, and the Government of the United States of America, concerning Cooperation on the Civil International Space Station,” signed on January 29, 1998 (hereinafter referred to as “IGA”). Articles set forth in the IGA, including but not limited to the Cross-Waiver of Liability, shall be applied to the Selected Entity through this arrangement (contract).
- JAXA does not in any way guarantee the launch date, the launch success, the deployment date and/or the deployment success, nor will JAXA be in any way responsible for the overall success of the mission. The specific date of the launch and deployment will be fixed by negotiation between JAXA with the Selected Entity after assignment of the launch.
- JAXA may terminate the provision of the deployment opportunity at any time, should the Selected Entity violate the terms and conditions as described in this Announcement of Opportunity and/or the separate arrangement (contract).

### **13. Application Submission**

The applying entities are requested to submit the fully completed original application form by email and post to the following address:

Office for Outer Space Affairs  
United Nations Office at Vienna  
Vienna International Centre  
P.O. BOX 500  
A-1400 Vienna, AUSTRIA  
Phone: (+43-1) 26060- 8716  
Fax: (+43-1)-26060-5830  
E-mail: [hsti-kibocube@unoosa.org](mailto:hsti-kibocube@unoosa.org)

After receipt, OOSA and JAXA will proceed to evaluate each application. At OOSA's or JAXA's sole discretion, additional information may be requested from applicants, if necessary, to assist in the evaluation of the application. The Selected Entity will then be notified with the results of the selection process. All awards are final, are made at the sole discretion of OOSA and JAXA, and not subject to challenge or review.

### **14. Additional Information**

The latest information on KiboCUBE will be made available on the website of OOSA at:  
<http://www.unoosa.org/oosa/en/ourwork/psa/hsti/kibocube.html>

For further information regarding KiboCUBE and applications, please contact  
[hsti-kibocube@unoosa.org](mailto:hsti-kibocube@unoosa.org).