



# BIRDS Project Newsletter

Issue No. 18 (30 July 2017)



Members of BIRDS-1 Team and BIRDS-2 Team -- 16 May 2017, at Tobata Campus  
Note the mock-up being held by Antara in the front row.

*Edited by:*  
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Kitakyushu, Japan

**Project website:** <http://birds.ele.kyutech.ac.jp/>  
All back issues are archived at this website.

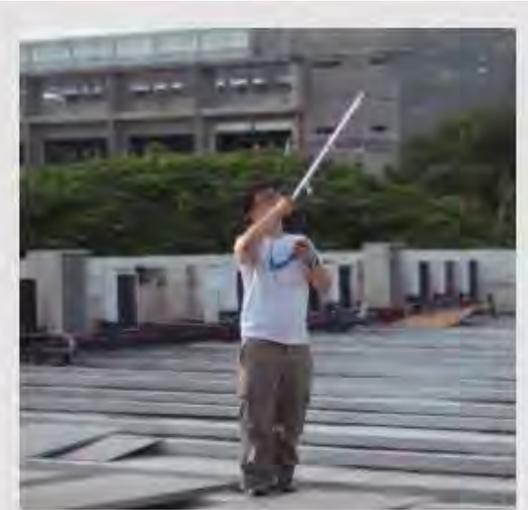


All back issues of this newsletter can be easily downloaded. Go to here: <http://birds.ele.kyutech.ac.jp/>  
At the top, click on the tab called NEWSLETTER. You will get a menu for all back issues.

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## The Guest Box



Situated in University of the Philippines Diliman's Electrical and Electronics Engineering Institute (UPD EEEI), the Amateur Radio and Satellite Station (ARSS) establishes terrestrial and satellite communications in amateur radio bands. ARSS is one of the ground stations for the constellations of cubesats under the BIRDS-2 Project. *In photo: a student conducting an experiment with antenna reception under the facilitation of ARSS.*

From the Philippines

# 01. Yeshey gives a public talk on "Bhutan in Space" at Kyutech Library



Yeshey delivers her presentation at the Kyutech central library on the Tobata Campus

*Excellent job,  
Yeshey!  
– The Editor*

## ***Presentation without Jargon – Share your knowledge***

@ Kyutech Library 1F

21<sup>st</sup> June, 2017 (18:00-19:30)

by Yeshey (BIRDS-2, Bhutan) on 22<sup>nd</sup> June, for this newsletter

The event was organized by Kyutech Library Learning Commons Supporter Matsukawa-san. There were 5 presentations in total. All the other topics were very interesting and stimulating. They were “*Is it possible to change your personality?*”, “*About Language Lounge*”, “*A study on influence of partial shadow in solar panel*” and “*Water-resistant materials*”. Other presenters were also students from various departments. The aim of the seminar was to communicate our research idea to the audience with no jargon whatsoever.

The audience (about 20 people) were primarily Kyutech students from various departments and a few library staff.

I presented about my research, i.e., **Sustainability of Space Programs in developing countries with Bhutan in focus.**

*Due to rapid reduction in cost of satellites many developing countries as well as private companies are now able to build and launch satellites. However, are these sprouting space activities sustainable? Are they progressive and innovative? What does it take to ensure sustainability and progressiveness? And how do we measure sustainability exactly?*

I knew about this event because I am serving as a **Learning Commons Supporter (LCS)** at Kyutech Library. I hold 3 hours of consultation every week with students to help them with learning English, about satellite technology and student life in general.

## 02. The first general paper about the BIRDS Project goes back to November of 2015

### How did the BIRDS Project begin?

It began as a vision. This conference paper (see the next five slides) outlines that vision. Prof Cho and his LaSEINE staff had this visionary plan for BIRDS --- it was carefully considered and conceived. [At the time of this conference paper (IAA-Rome, Italy-2015), Dr John Polansky was no longer a member of the staff, but he too was one of the architects of the BIRDS concept and a major contributor to its initiation. ]

Remarkably, LaSEINE at Kyutech is executing that plan faithfully.  
BIRDS-1 ... BIRDS-2 ... BIRDS-3... BIRDS-4... We are just warming up.  
- The Editor.

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# IAA-CU-15-01-16 Five-nations CubeSat constellation; An inexpensive test case for learning and capacity...

Conference Paper · November 2015

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All content following this page was uploaded by Arifur R. Khan on 11 January 2016.

The user has requested enhancement of the downloaded file. All in-text references [underlined in blue](#) are added to the original document and are linked to publications on ResearchGate, letting you access and read them immediately.

## IAA-CU-15-01-16 Five-nations CubeSat constellation; An inexpensive test case for learning and capacity building

[Arifur R. Khan\\*](#), George Maeda\*\*, Hirokazu Masui\*\*, JGMNB project member\*\* and Mengu Cho\*\*.

### Abstract

A five-nation (Japan, Ghana, Mongolia, Nigeria and Bangladesh) CubeSat constellation has been designed and named as "Joint Global Multi-Nation Birds," shortly "Birds". University students will design, manufacture, assemble, integrate, test, and operate a constellation of five identical 1U CubeSats, along with disposal. Preliminary mission has been designed as Earth observation, outreach, message relay, precise location determination, space environment measurement, technology demonstration, etc. UHF/VHF amateur radio band will be used while interlinking the ground station of the seven countries. Students will make it as a part of graduate academic education in Space Engineering International Course at Kyutech. Five 1U satellites will be sent to International Space Station (ISS) and later will be deployed to LEO. Advantage of this five-nation constellation is that each country will have more than 10 satellite-passes per day. This Birds project will lay down foundation of sustainable space program by accumulating human resource in universities and launching a university space research and education program.

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## Introduction

Now a days small satellites are getting more and more attention due to short incubation time, low cost, and availability of highly reliable and efficient COTS components. Even a small group of university students can assemble, test, launch and operate in orbit if launcher is available, if students are well trained. Therefore, hands-on training is the vital factor for students who are planning to build and launch their own first small satellite, especially the first satellite. Therefore, small satellite, like 1U CubeSat is the best platform for this hands-on training through system engineering course. Moreover, through the making of 1U CubeSat, many high-risk technology demonstration missions can be fulfilled in space. And if it is a CubeSat constellation, precise satellite location determination, space weather monitoring, telecommunication, earth observation, surveillance, etc. even risk-taking single even launch, could be designed and performed. Some significant advantages of small satellite constellation are high performance and robustness. It is productionized rather than projectionized, better in economic quantities instead of custom quantities. It can maintain flexibility in application and it has an ability to evolve the technology.

Recently, five-nation (Japan, Ghana, Mongolia, Nigeria and Bangladesh) CubeSat constellation has been designed and named as "Joint Global Multi-Nation Birds," shortly "Birds". Five identical Cubesats will be designed, manufactured, assembled, integrated, tested, and operated by the students. Each country will be responsible for one CubeSat. After the assembling and testing, with the help of JAXA (upon agreement), it will be sent to ISS for deployment to the LEO. It will be operated from ground station of each country and other collaborating countries by amateur radio band. Through this processes, it can be demonstrated that a 1U Cubesat can be built and operated successfully in a time frame shorter than two years even for countries with limited (or zero) satellite experience with proper design and planning.

The mission of the Birds project is to make the first step toward indigenous space program at each country by successfully building and operating the first satellite of nation. It has the following three specific objectives.

- Learn the entire processes of a satellite program from mission planning to satellite disposal
- Lay down foundation of sustainable space program by accumulating human resource in universities and launching a university space research and education program
- Create international human networks to assist the infant space programs each other

This paper explains the Birds mission as small satellite constellation.

## Implementation and Value

Birds project is a student satellite project. The project team members are made of students from Japan, Ghana, Mongolia, Nigeria, Bangladesh and Thailand. The students come from single institution of each country. They are enrolled at Space Engineering International Course (SEIC) of Kyutech as full-time graduate students at either Master course or Doctoral course. The conditions to participate the Birds constellation are the following;

- Have a contract with Kyutech for satellite development and launch
- Send three or more students to Kyutech from one organization
- Have UHF/VHF ground station
- Continue the satellite education/research/development activities at home country

After completion of the project, students will return to their home countries and initiate a space research laboratory in their home institutions. A sustainable and robust space program, that is less susceptible to political change, can be started with minimum budget at universities in any emerging or developing countries. The Birds project currently aims at a university.

The Birds project has a significant advantage compared to other satellite technology transfer and human resource development programs. The project is run as a university satellite project that offers significant low-cost solution and hands-on opportunity. The project is also run as a part of post-graduate degree program, which is suitable to train academic staff. By employing constellation, the data throughput and program robustness are significantly increased. Use of ISS instead of other launch platform helps lowering the launch cost and having a secure launch slot.

An institution that wants to build a CubeSat through the Birds project has to make contract with Kyutech to secure launch slot and procure hardware. Proper amount of financial resource, though it is much lower compared to other similar programs, must be secured. In return, the participating institute will gain

- International and national reputation
- Scientific papers
- Membership of international ground station network
- Space research laboratory

### Satellite mission

The ultimate objective of this project is to build and operate the first satellite of nation that triggers the first step toward indigenous space program at each country. Students can achieve this by learning the entire processes of a satellite program from mission planning to satellite disposal. It also help lay down foundation of sustainable space program accumulating human resource in universities. This will also create international human networks to assist the infant space programs each other. In order to accomplish this achievement, Birds project has been designed to make a constellation of five identical 1U CubeSat with six missions, such as, Camera (CAM), Digi-singer (SNG), Precise positioning (POS), atmospheric density measurement (ATM), constellation network operation (NET) and single-event-latchup (SEL).

**Camera (CAM):** The objective of this mission is to capture the photograph of motherland of size 640x480 pixels and 2592x1944 pixels with a resolution of roughly 100m/pixels, store the data and transfer the image data to the ground.

**Digi-singer (SNG):** This mission might be renamed as 'Singing from Space'. By uploading MIDI-file to SNG memory through OBC, music data will be converted to analog signal by the vocal synthesizer module of Digi-singer subsystem. Any amateur band radios on the surface can listen the music coming from space.

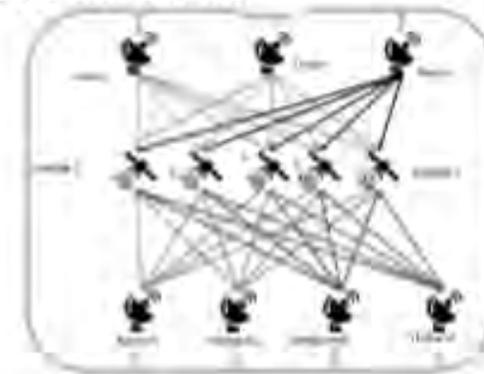
**Precise positioning (POS):** Precise positioning of one CubeSat can be achieved from the time difference ( $t_1$ ,  $t_2$ ,  $t_3$  and  $t_4$ , as shown in Fig.1) of the satellite signal reception among the three or more ground stations as shown in the schematic below. This mission attempts precise tracking of 1U CubeSat that is too small to afford onboard GPS receiver.



Figure 1 Precise satellite-positioning tracking schematic.

**Atmospheric density measurement (ATM):** By measuring the precise position and altitude at two different time, velocity and atmospheric drag can be determined, which derives the atmospheric density and its change accurately.

**Constellation network operation (NET):** It will demonstrate network operation of 5 CubeSats constellation via amateur radio band as shown in Fig. 2. Since all ground stations are connected by internet having synchronized clock with zero time lag and by a central server, run by the same software, it will be a real time ground station. This synchronized GS can access each of the CubeSat (identified with some code) while flying over it. The network operation can increase the data throughput of CubeSats drastically.



Single-event-latchup (SEL): Single event latchup is the change of state caused by highly energetic particle (electron, ion or) hitting the onboard microprocessor, memory, etc. Sometimes it can damage full satellite. Two Renesas H8 microprocessors has been planned to set in all five 1U CubeSat with overcurrent protection circuit. This circuit will keep the record of current, trigger time, duration, and protection mechanism (stop the power system) when current is high. Mapping of SEL occurrences will be conducted by the five satellites.

### Satellite Configuration

This constellation of five CubeSats is designed as 1U (10cm cube and 1kg) CubeSat that are identical (mass, design, payload, communication, ground station, etc.) to each other. Attitude will be controlled by permanent magnet and hysteresis dumper. Five faces is covered by 10 solar cells, each face contains 2 cells in parallel. Six NiMH rechargeable batteries (3S2P) have been decided to provide 6V and 3.3 V bus systems. It is planned to use VHF 1200bps uplink and UHF 1200/9600bps data downlink. Since Kyutech has the heritage and experience of one small satellites Horyu-2 (Ref1) operation, most of the Birds architecture will be based on Horyu-2. To avoid complexity due to wire harness, each CubeSat has been planned to follow so-called backplane style, where different subsystems module such as OBC, EPS, COM, ADCS, Cam, transceivers, will be placed on a backbone-like rail according to the design of UWE-3 of University Wurtzburg, Germany (Ref2). Solar panel will be placed on five faces and one face is assigned for antenna.



Figure 3 Proposed 1U satellite structural configuration

### Satellite Operation

Each country should establish a ground station with necessary equipment to communicate the Birds by UHF/VHF frequency band. Each GS will be connected by Internet and time-synchronized by GPS clock to avoid any time lag. Students should design communication software that will be identical for all the GS connected to one server GS and can communicate a specific CubeSat simultaneously as shown in Fig. 2. Each GS can communicate the satellite more than 10 times per day.

In addition to the owner countries of the five satellites (Japan, Ghana, Mongolia, Nigeria and Bangladesh), Thailand and Taiwan plan to participate in the ground station network. The central server provides tracking information of each satellite. It lists which ground station sees what satellite at what time. It also lists the operation mode to be conducted at each ground station. By connecting the server, operators at each ground station know what to do within next few days and operate the ground station to conduct the tasks assigned. Data downlinked at each ground station will be forwarded to the server. After data analysis, the data will be shared by the member countries, as well as amateur radio community.

### Mission Outcome

Through this multinational constellation, students of developing countries learn the entire processes of a satellite program from mission planning to satellite disposal. It help each country lay down foundation of sustainable space program by accumulating human resource in universities and launching a university space research and education program. Not only that, this opportunity creates international human networks to assist the infant space programs each other.

### Schedule

Birds project had a kick-off meeting in October 2015. The project is now at the stage of finalizing the mission concept. From December 2015, hardware work will be started. It is envisioned that the satellite will be delivered to JAXA by the end of December 2016 and launched

to ISS in Spring 2016. We anticipate their release from ISS to occur by Summer 2016. The project was designed to fit into two year time-frame, so that a Master student can experience the project from the beginning to the end.

### Concluding Remarks

A five-nation (Japan, Ghana, Mongolia, Nigeria and Bangladesh) CubeSat constellation has been designed and named as "Joint Global Multi-Nation Birds," shortly "Birds". University students will design, manufacturer, assemble, integrate, test, and operate a constellation of five identical 1U CubeSats, along with disposal. Preliminary mission has been designed as Earth observation by a COTS camera and Outreach through Digi-Singer, a sound relaying COTS device. Along with this, other mission could be message relay among other countries, Multi-point simultaneous space environment measurement, technology demonstration, etc. UHF/VHF amateur radio band will be used while interlinking the ground station of seven countries. Students from different countries will make it as a part of graduate academic education in Space Engineering International Course at Kyutech. After completing the flight model (FM), five 1U satellite will be sent to International Space Station (ISS) with the agreement of JAXA and latter will be deployed to LEO. Advantages of the constellation are drastic increase of data throughput to distributed ground station network and program robustness. This "Birds" project will lay down foundation of sustainable space program by accumulating human resource in universities and launching a university space research and education program. Together with this, it will create international human networks to assist the infant space programs each other and demonstrate that a constellation of 1U CubeSats can have synergetic mission value and capability via international operation.

The Birds project is strongly tied with Kyutech's space engineering curriculum, Space Engineering International Course, which provides hand-on educational experience to students from all over the worlds. Kyutech is currently under negotiation with several countries that showed interest in the Birds project. The project can be formatted into two-year educational/research program. With enough number of participating countries, Birds-II project can be started in October 2016.

### References

- [1] [http://kitsat.ele.kyutech.ac.jp/index\\_e\\_new.html](http://kitsat.ele.kyutech.ac.jp/index_e_new.html)
- [2] [http://www7.informatik.uniwoerzburg.de/forschung/space\\_exploration/projects/uwe3/](http://www7.informatik.uniwoerzburg.de/forschung/space_exploration/projects/uwe3/)

***Thanks to Dr Khan for providing this conference paper, and giving permission for its reprint in this newsletter.***

**— The Editor**

### 03. JSPS funding for 3 years of BIRDS International Workshops



JSPS Core-to-Core Program (shown at the right) has approved funds for Kyutech to use to conduct BIRDS international workshops for the next three years.

In the table at the right, you can see the institutions that are eligible to receive air fare for attending the workshops.

The workshops will be held in the following places:

- ❑ 2017 - Ghana (All Nations University)
- ❑ 2018 – Mongolia (National University of Mongolia)
- ❑ 2019 – Bangladesh (BRAC University)

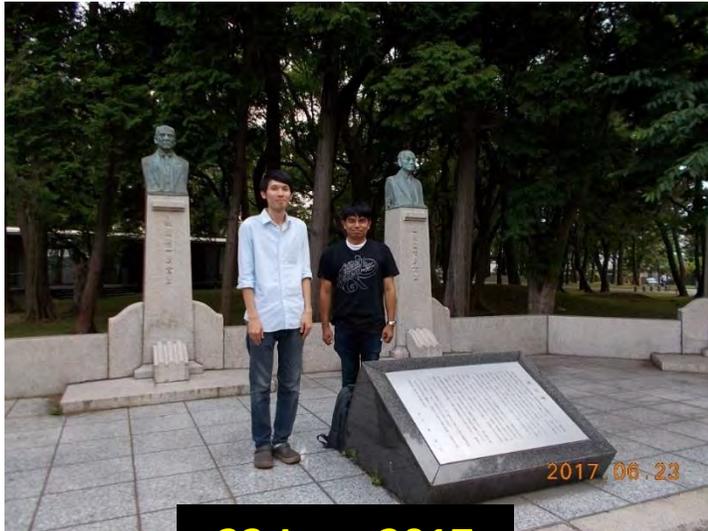
The central purpose of these workshops is to fortify the **BIRDS Network** – this is a human network of all BIRDS participants. Through this network, members can exchange notes, discuss new collaboration, show research results, and brainstorm on a variety of topics.

		List of FY2017 Projects			
		(Apr. 2017 - Mar. 2020)			
7	Data Collection Network in Asia, Africa, and Latin America by CubeSat Constellation	Kyushu Institute of Technology CHO Mengu Professor	PHILIPPINES	University of the Philippines Diliman	Marciano Joel Joseph
			SUDAN	Institute of Space Research and Aerospace	Mirghani Moutaman
			MALAYSIA	Universiti Teknologi MARA	Ibrahim Idnin Pasya
			BHUTAN	Ministry of Information & Communications	Namgyal Jigme Thinlye
			TAIWAN	National Cheng Kung University	Juang Jyh-Ching
			THAILAND	King Mongkut's University of Technology North Bangkok	Saisutjarit Phongsatorn
			GHANA	All Nations University College	Donkor Samuel H
			BANGLADESH	BRAC University	Rhaman Khalilur
			MONGOLIA	National University of Mongolia	Regsuren Bat-Erdene
			NIGERIA	Federanl University of Technology, Akure	Akinyede Joseph
ETHIOPIA	Bahir Dar University	Damtie Baylie			

[http://www.jsps.go.jp/english/e-c2c/adapted\\_b.html](http://www.jsps.go.jp/english/e-c2c/adapted_b.html)



## 04. Apiwat (BIRDS-1 member) recently visited Kyutech



Kyutech,  
Tobata Campus

**23 June 2017**



Vietnamese  
restaurant  
near JR  
Nishi  
Kokura  
Station

In light shirt: Apiwat (BIRDS-1, Thailand)  
In dark shirt: Mr. Anan

Recently, Mr. Apiwat Jirawattanaphol visited Kyutech with his RAST colleague, Mr. Anan Paenthongkham.

RAST=Amateur Society of Thailand.

Apiwat starts as a PNST Fellow (Phd candidate) in October of 2017.

Concerning this June trip to Kyutech, he writes as follows:

“I came back to Kyutech for 1 week during June 19-22 to test satellite components from Thailand. At Kyutech, I met BIRDS team members and joined the BIRDS weekly meeting. We discussed ground station operations after BIRDS constellation deployment from the ISS on July 7.”

*Apiwat, it was a pleasure to see you again here. - G. Maeda.*

## 05. On 27 June, Dr Amelia Greig formally received her Letter of Appointment to Kyutech

Dr Amelia Greig (assistant professor at Cal Poly) received her 辞令 (letter of appointment) from Prof. Serikawa (Dean of the School of Engineering, Tobata, Kyutech) at 10:00 AM on Tuesday, 27 June 2017.

She is now officially a member of Kyutech staff.



At 11:30 AM, on the same day, the BIRDS-2 team and Dr Amelia celebrated her appointment with lunch at the student cafeteria. We had fun.

## 06. All back issues of the LaSEINE Annual Report are available on line



The **BIRDS Project** is conducted by **LaSEINE**, Laboratory of Spacecraft Environment Interaction Engineering, whose director is Prof. Mengu Cho.

The laboratory issues an annual report (mainly in Japanese) each year in March – the cover of the March 2017 issue is shown at the left. It covers fiscal year 2016.

All back issues are available as pdf. Please go to this web link to download any one of them:

<http://laseine.ele.kyutech.ac.jp/download/download.html>

-- The BIRDS Project Newsletter Editor

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- \* CONTENTS

1. APRSAF-24 Updates

- Call for Proposals of Side Event will close on June 30, 2017

2. News on APRSAF Activities

- SEWG is now accepting entries for both the APRSAF-24 Poster Contest and Water Rocket Event  
- First Announcement of 9th MGA Conference Released

3. News on APRSAF Community

- Five CubeSats of BIRDS Project Delivered to ISS  
- India's ISRO Successfully Launches 31 Satellites on PSLV-C38  
- Electron Launch Vehicle Conducted First Test Flight from New Zealand

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- Five CubeSats of BIRDS Project Delivered to ISS

On June 5, 2017 (UTC), five 1U CubeSats of the Joint Global Multi Nation Birds Satellite Project (BIRDS Project) were delivered to the International Space Station (ISS) Japan Experiment Module "Kibo" by the SpaceX Dragon cargo vehicles. The BIRDS Project, led by Japan's Kyushu Institute of Technology (Kyutech), is a cross-border interdisciplinary satellite project with Bangladesh, Ghana, Mongolia, Nigeria and Thailand. These five CubeSats, including the first satellites assembled and integrated by students in Bangladesh and Mongolia, will be deployed from the ISS "Kibo" on July 7, 2017.

NASA ISS Daily Summary Report:

<https://blogs.nasa.gov/stationreport/2017/06/05/>

BIRDS Project Facebook:

[https://www.facebook.com/permalink.php?story\\_fbid=471071559908935&id=171403156542445](https://www.facebook.com/permalink.php?story_fbid=471071559908935&id=171403156542445)

Joint Global Multi-Nation, BIRDS 1:

<http://birds.ele.kyutech.ac.jp/birds1.html>

## 07. Delivery of BIRDS-1 to the ISS is reported in APRSAF News Mail No. 150



This year APRSAF will be in India.

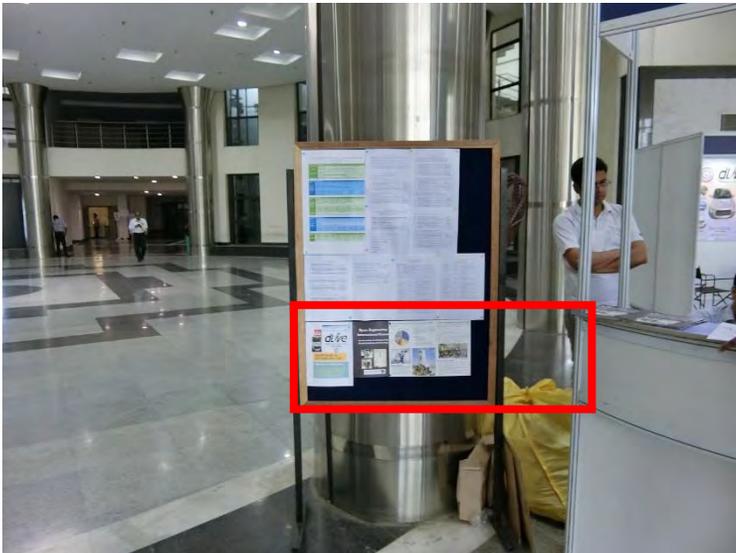
## 08. Prof Shibata (robotics research, Kyutech) promotes SEIC at AIR in India

### Advances in Robotics (AIR 2017)

3<sup>rd</sup> International Conference of Robotics Society of India  
June 28-July 2, 2017  
Indian Institute of Technology Delhi, New Delhi, India



All BIRDS students are enrolled in SEIC, Space Engineering Int'l Course of Kyutech.



At a recent robotics conference in New Delhi, Prof Tom Shibata (Wakamatsu Campus) distributed SEIC brochures at the conference.

*Thank you, Prof. Shibata.*

- G. Maeda

## 09. BIRDS Project written up in the LaSEINE Annual Report (issued in March of 2017)

### ■ BIRDS プロジェクト

2015年10月から Joint Global Multi-Nation Birds (JGMNB)プロジェクト (略称 BIRDS プロジェクト)を行っている。BIRDS プロジェクトの目的は、「各国初の衛星を成功裏に打ち上げ、運用することにより、独立した持続可能な宇宙プログラム形成の第一歩とする」ことである。BIRDS-I では、国際コースに在籍する日本、ガーナ、モンゴル、ナイジェリア、バングラデシュ、タイの6ヶ国15名の学生が同一設計の1Uキューブサット5基を製作した。2016年11月には BIRDS-II が始動し、日本、フィリピン、マレーシア、ブータンの4ヶ国9名の学生によって1Uキューブサット3基が作られる。その内、ガーナ、モンゴル、バングラデシュ、ブータンにとっては、各国で初の人工衛星となる。BIRDS プロジェクトでは、学生達は、ミッションの選定から衛星の廃棄に至る迄の全てのプロセスを2年間で経験することを想定している。そのため、スケジュールは非常に厳しいが、BIRDS-Iでは、プロジェクト開始から16ヶ月後の2017年2月9日に JAXA 筑波宇宙センターに衛星5基を無事に納入した。BIRDS-Iは2017年春に SpaceX 社のドラゴン補給船によってISSに打上げられ、その後に「きぼう」日本実験棟から JAXA の小型衛星放出機構 (J-SSOD) にて放出される予定である。

BIRDS-Iのミッションは、地球撮影・アウトリーチ・シングルイベント計測の他に、ネットワーク運用の技術実証・複数地上局を使った衛星位置決定・大気密度の算出といったものである。BIRDS-IIは、BIRDS-Iのバスに改良を加えた上で、地球撮影、リアルタイムアマチュア無線パケット通信 (APRS)、ストア&フォワード、COTS-GPS 実証、シングルイベント計測、地磁気計測等のミッションを計画している。

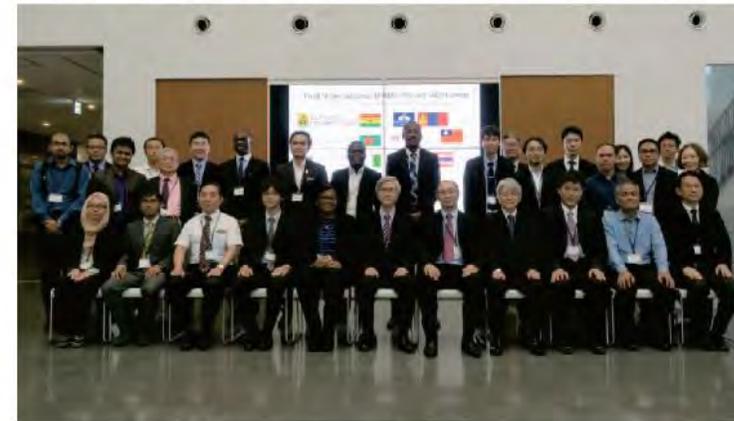
尚、BIRDS プロジェクトの詳細は、月1回発行の BIRDS ニュースレター (電子版、<http://birds.ele.kyutech.ac.jp/newsletter.html>)でも発信中である。BIRDS Project Newsletter is mentioned.



JAXAに納入された BIRDS-I 衛星 5 基と小型衛星放出機構 (J-SSOD) ©JAXA

2016年6月27日から29日にかけて、本学中村記念館にて、BIRDS プロジェクトの国内外のステークホルダーを集めた BIRDS ワークショップを開催した。BIRDS-I 衛星の設計審査会や記者発表以外に、各大学間の連携協力関係について話し合い、会議の最後に Cross-Border Inter-University Collaboration on Space Research and Education を推進するための BIRDS ネットワークを形成すること

について合意する Letter of Intent に署名を行った。このワークショップは2017年から3年間にわたり毎年開催することとなり、2017年は秋にガーナの All Nations University にて開催予定である。



BIRDS Workshop 参加者

Note: all back issues of the LaSEINE Annual Report can be downloaded – explained elsewhere in this newsletter.

## 10. Japan changes landing permission sticker

The next time you land in Japan, have a look at what is affixed to your passport.

# Mt. Fuji, cherry blossom to serve as memento of visits to Japan

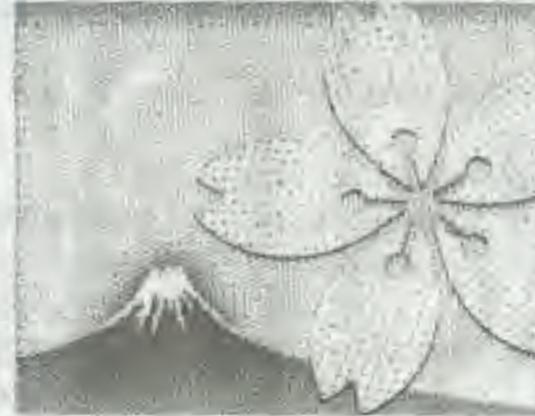
JUL 05 2017

The Yomiuri Shimbun

The Justice Ministry will change the design of the landing permission sticker that is affixed to the passports of foreign nationals at immigration control from the current paulownia plant to Mt. Fuji and a cherry blossom, starting from the beginning of next year, at the earliest.

Ahead of the 2020 Tokyo Olympics and Paralympics, the ministry decided to use motifs that symbolize Japan and are broadly recognized overseas so that foreign tourists can enjoy the sticker as a memento of their visit.

The landing permission sticker is placed on the passports of inbound foreign visitors by immigration inspectors — regardless of visa type, such as tourist or business, or the duration of their stay. The new



The new landing permission sticker featuring Mt. Fuji and a cherry blossom petal

design features a light pink petal from a cherry blossom tree in front of a light blue Mt. Fuji, with the mountain's peak covered in snow.

The paulownia has been used for the sticker-type landing permission stamp since 2003. However, it is not

The new landing permission sticker



so familiar to foreigners.

In 2016, 24.04 million foreigners visited Japan, hitting a record high for the fourth straight year. The government has set a goal of increasing the number of inbound foreign visitors to 40 million by 2020.

# 11. Kyutech welcomes Miss Gladys Oppong of Ghana to inspect BIRDS activities

Gladys Oppong started a one-week visit to Kyutech on 10 July. She is with *All Nations University* in Ghana.

She has just completed her masters degree in India. In the fall, she will pursue a Phd in a field related to business/management.

She has come to Kyutech on a fact-finding mission. Dr Donkor is her father.



Gladys with Prof M. Cho



Taiwo (Nigeria) Gladys (Ghana) Kate (Ukraine)

10 July 2017 @ Cho Lab

## 12. Watch BIRDS-1 FM assembly in fast-motion video



Мазаалай Монголын Анхны хиймэл дагуул - Numsat-1u  
June 26 at 10:00am ·

#Мазаалай #Хиймэл #дагуулын хөөргөх хувилбарын сүүлийн хэсгийн угсралтын бичлэгийг (хурдан хувилбар) та бүхэнд хүргэж байна. Шувууд (#BIRDS) төслийн оролцогч таван улсын баг өөр өөрийн хиймэл дагуулаа "Clean room" буюу ариун өрөөнд угсарч буй байдлыг дараах дүрс бичлэгээс харж болно. Хиймэл дагуул жижиг эсвэл том байхаас үл хамааран тодорхой дэс дараалал, өөрсдийн урдчилан бэлтгэсэн аргачлалын дүрмийн дагуу угсралт явагдах бөгөөд алхам бүрийг зураг даран баримтжуулах ёстой байдаг.

Хиймэл дагуул маань задгай сансарт гарахад 11 хоног үлдлээ.

#BIRDS\_Project, Joint Global Multi Nation Birds - BIRDS project #Flight\_model #assembly #Clean #room 九州工業大学 Kyushu Institute of Technology, #Mazaalai #Cubesat

<https://www.facebook.com/NUMSAT.Mazaalai/videos/1262880753824222>

# BIRDS-2

## Solar Panel Assembly Practice

All BIRDS-2 team members trained by Dr. Pauline Faure

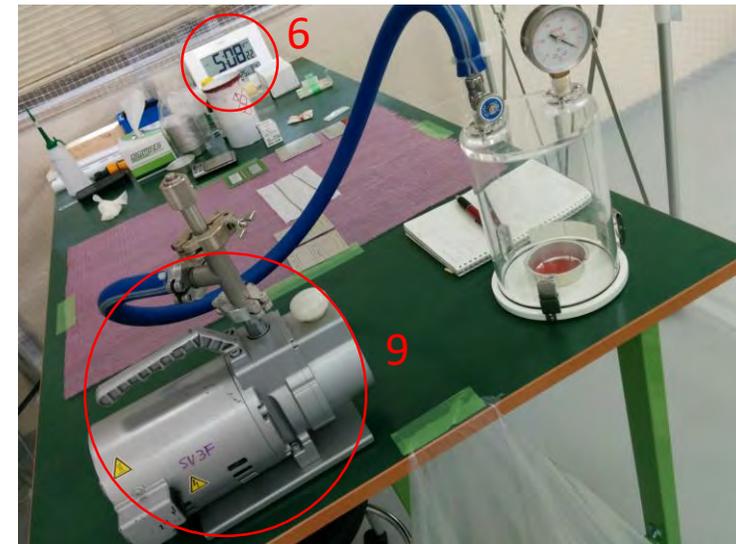
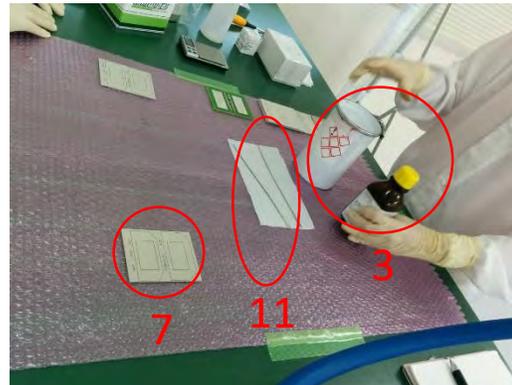
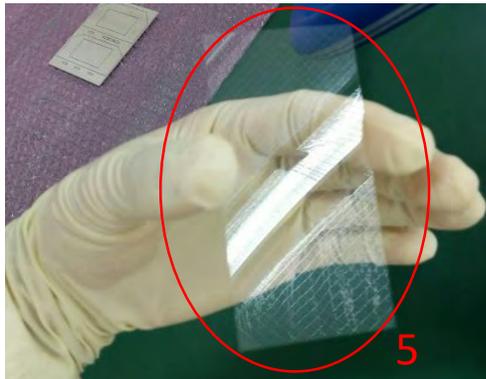
Place: 2<sup>nd</sup> level, SVBL, Kyutech, Japan

Date: 26-27 June, 2017

By Azami (BIRDS-2, Malaysia), 11 July 2017.

# List of Apparatus

- 1) Weighing scale (resolution of 0.1g)
- 2) Dotite (conductive glue)
- 3) RTV silicone
- 4) Rectangular weight and rectangular rubber
- 5) Solar Cell (use Glass cover plate for practice)
- 6) Timer
- 7) FR4 PCB board (use aluminum square sheet for practice)
- 8) Ethanol (as cleaning liquid)
- 9) Vacuum pump
- 10) Aluminum cup
- 11) Stainless steel lab spatula



# Procedure

- I. Prepare all apparatus for solar panel assembly
- II. Clean all tools using ethanol
- III. Calculate the ratio of RTV (according to area, density, and thickness needed)
- IV. Put the mixture of RTV inside vacuum chamber (according pressure and time needed)
- V. Apply RTV on the PCB carefully
- VI. Apply Dotite on the rectangular conductive trace carefully and quickly (because it will dry very soon)
- VII. Put the solar cell slowly according to the trace line
- VIII. Put the rectangular rubber above the solar cell first and put the rectangular weight on top of it
- IX. Let the RTV and Dotite to be dried (about 24 hours)
- X. Clean up all the tools again using ethanol



*Picture of procedure III*

# Pictures from the practice...



*Yeshey (left) and Uemura (right)*



*Adrian (left), Cheki (middle), and Joven (right)*



*Kiran (left) and Yamaguchi (right)*



*Azami (left) and Syazana (right)*



## 14. Announcement from the Malaysians of BIRDS-2

Near the end of last year (17 December 2016) the Bhutan Team of BIRDS-2 celebrated their big national day with the entire BIRDS-2 Team.

*See the photos:*

**Issue No. 12** of the newsletter:

[Section 3] *BIRDS-2 Team celebrates 109th National Day of Bhutan.*

This time, the Malaysian Team will do some thing similar. Their announcement is shown at the right.



### **INVITATION** **THE 60<sup>TH</sup> MALAYSIA** **INDEPENDENCE DAY** **CELEBRATION**

**DATE**  
**August 31<sup>st</sup>, 2017**

**TIME**  
**12:00 ~ 13:30**

**VENUE**  
**Cho Lab Seminar Room**

**INVITED BY**  
**Syazana**  
**Azami**

#### **TENTATIVE**

**12:00 ~ 12:15**  
**Guest Arrival**

**12:15 ~ 12:30**  
**Introduction to**  
**Malaysia**

**12:30 ~ 12:45**  
**'Merdeka' live**  
**stream events**

**12:45 ~ 13:30**  
**Lunch**

**MENU**  
**Famous**  
**Malaysian**  
**Cuisine**

## 15. Deployment Viewing at JAXA Tsukuba Space Center, non-JAXA photos

This section [15] covers the deployment of the BIRDS-1 CubeSat constellation using non-JAXA photos.

The next section [16] does the same thing using JAXA photos.



On 8 July 2017 the Ghana delegation (*in this photo: Dr Carlene, Dr Donkor, and his wife*) made a “pre-visit” to the JAXA Tsukuba Space Center. They pose at the engine end of JAXA rocket models.

Below is a side view of the photo of the left.



**The delegation from Ghana**



1 2 3 4 5

2017.07.07

**On the grounds of the JAXA Tsukuba Space Center**

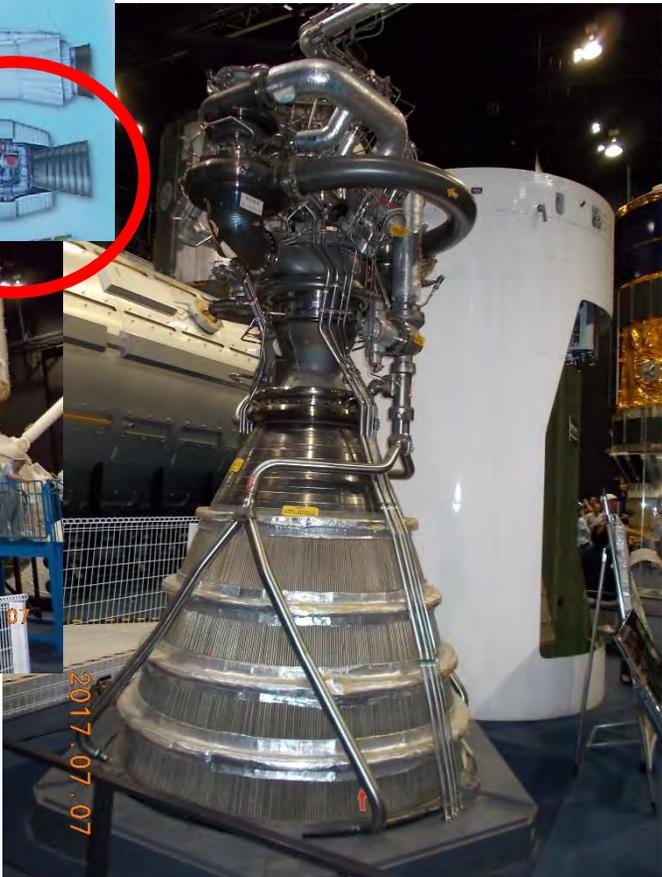
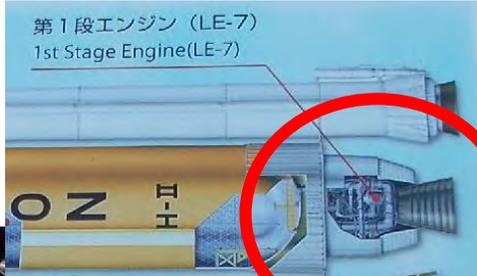
**BIRDS-1  
deployment day  
-- 7 July 2017**

**JAXA displays the flags of  
the participating nations:**

- 1. Bangladesh**
- 2. Ghana**
- 3. Japan**
- 4. Mongolia**
- 5. Nigeria**



There was a 30-minute tour of JAXA's "Space Dome" for the guests of BIRDS deployment



**筑波宇宙センター**

筑波宇宙センターは筑波研究学園都市の一角にあり、1972年に開設しました。

約53万平方メートルの敷地に、研究学園都市にふさわしい緑豊かな環境と最新の試験設備を備えた総合的な事業所です。

**JAXA Tsukuba Space Center**

The Tsukuba Space Center is located in Tsukuba Science City, opened its doors in 1972. On an approx. 530,000m<sup>2</sup> site, this consolidated operations facility with beautiful natural surroundings is equipped with the very latest testing facilities.

2017.07.07



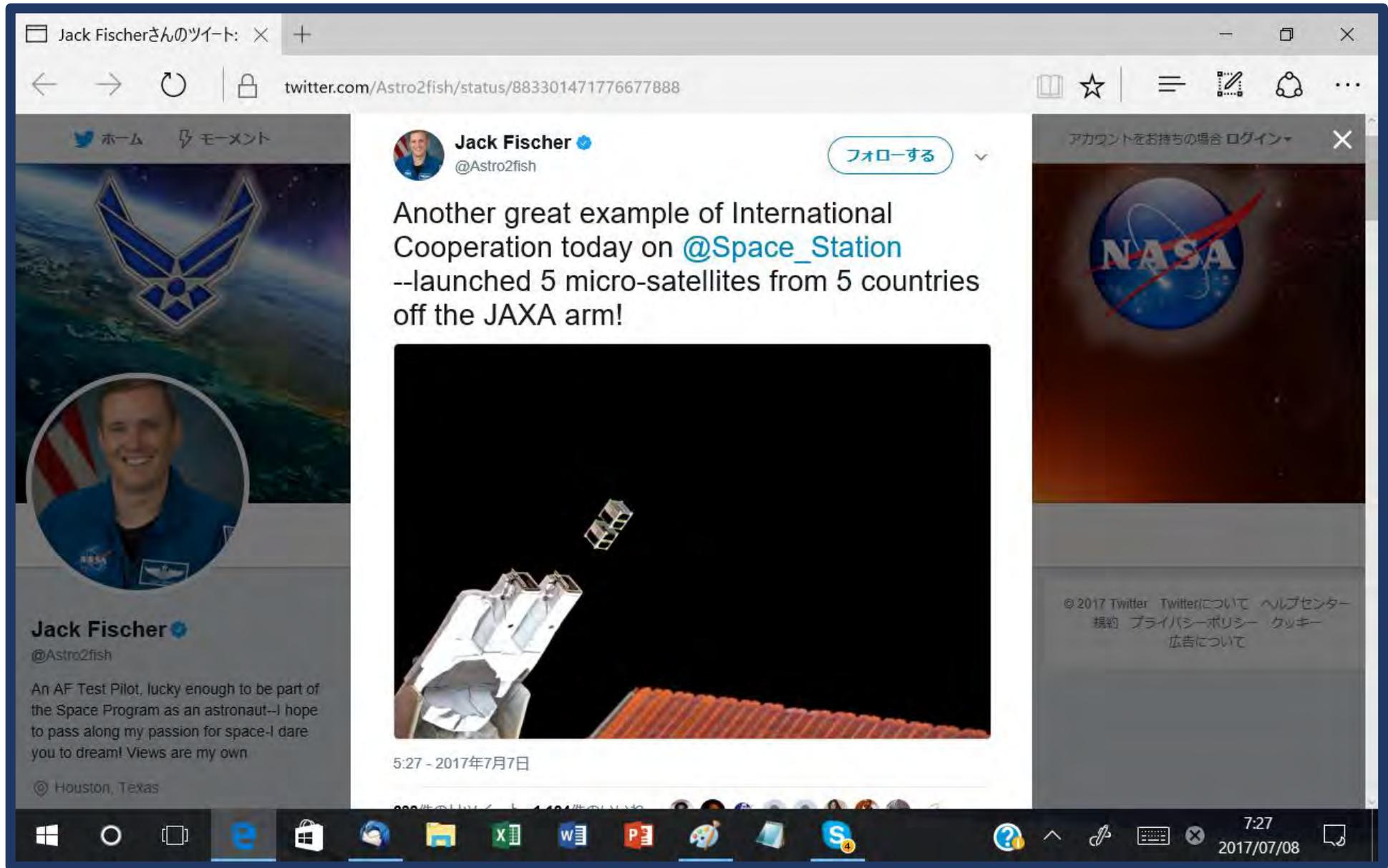
Empty land in 1972, Tsukuba Space Center



The main engine of the H2A rockets. It is called the **LE-7A**, and it can generate a thrust of 110 tons -- the same level of a jumbo jet.

**7 July 2017 –  
deployment  
of BIRDS-1  
CubeSats**

After  
deployment  
Astronaut Jack  
Fischer posted  
this comment  
via Twitter.



# The BIRDS-1 Team right after ISS deployment of their satellites on 7 July 2017



Ambassadors of  
Nigeria Mongolia Bangladesh Ghana



The panelists of the press conference

Lots of media attendance



Ambassador of Bangladesh receives certificate from JAXA President



Dr Donkor and the Ambassador of Ghana receive certificate from JAXA President



President of Kyutech (right) receives certificate from JAXA President (left)



Dr Donkor makes a comment – this screen shot was taken at Kyutech

# THE PRESS CONFERENCE

Photos of this page were taken by T. Wakabayashi of Kyutech

Program Manager Wakata (ISS astronaut, standing at the far right) introduces the JAXA “BIRDS” staff and G. Maeda during a reception after the press conference.





- 1
- 2
- 3
- 4
- 5
- 6
- 7

1. Mr. Bello Kazaure HUSSEINI, Charge d'Affaires ad interim of Nigeria
2. Mr. Batjargal, Minister of Mongolian Embassy
3. H.E. Ms. Rabab FATIMA, Ambassador of Bangladesh
4. H.E. Mr. Sylvester Jude Kpakpo PARKER-ALLOTEY, Ambassador of Ghana
5. JAXA: Dr. Okumura, President
6. Kyutech: Dr. Oie, President

Photos of this page were taken by T. Wakabayashi of Kyutech

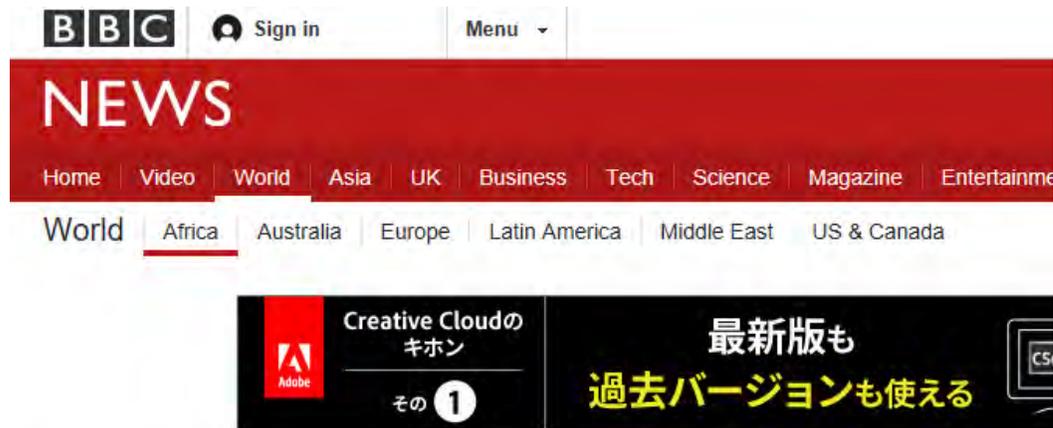


Group Photo taken at the end of the evening  
 - BIRDS-1 Deployment Viewing, 7 July 2017  
 - JAXA's Tsukuba Space Center

# BBC reports the deployment of BIRDS-1-Ghana

<http://www.bbc.com/news/world-africa-40538471>

Posted on 7 July 2017



## Ghana launches its first satellite into space



### Ghana has successfully launched its first satellite into space.

GhanaSat-1, which was developed by students at All Nations University in Koforidua, was sent into orbit from the International Space Centre.

Cheers erupted as 400 people, including the engineers, gathered in the southern Ghanaian city to watch live pictures of the launch. The first signal was received shortly afterwards.

Congratulations to the BIRDS-1 Team.

On 8 July 2017, the amateur radio community certified that all BIRDS-1 satellites are active.

Status

Author: DK3WN Saturday, July 8, 2017

Status of active Satellites on Amateur Radio Frequencies

last update: July 08, 2017

8 July 2017

Satellite	Status	NORAD	Uplink	Downlink	Beacon	Mode	Callsign	Reports	Info	Telemetry Decoder
BIRD-B (BRAC Onnesha)	ACTIVE	tbd			437.372 437.375	LW 1k2 AFSK/9k6 FSK/digital Voice	JG6YJS	latest report	details	
BIRD-G (GhanaSat-1, ANUSAT-1)	ACTIVE	tbd			437.372 437.375	CW 1k2 AFSK/9k6 FSK/digital Voice	JG6YJP	latest report	details	
BIRD-J (Toki)	ACTIVE	tbd			437.372 437.375	CW 1k2 AFSK/9k6 FSK/digital Voice	JG6YJO	latest report	details	
BIRD-M (Mazaalai, NUMSAT-1)	ACTIVE	tbd			437.372 437.375	CW 1k2 AFSK/9k6 FSK/digital Voice	JG6YJQ	latest report	details	
BIRD-N (EduSat-1)	ACTIVE	tbd			437.372 437.375	CW 1k2 AFSK/9k6 FSK/digital Voice	JG6YJR	latest report	details	



Small celebration party  
at Kyutech right after  
deployment



Waiting for first signals from the BIRDS-1 satellites

*All photos on this page are from Dr. Kim of LaSEINE.*

# BIRDS Project Facebook – you are invited

Joint Global Multi Nation Birds - BIRDS project

Home  
About  
Photos  
Events  
Videos  
**Posts**  
Community

Liked Following Share ...

Send Message

Education

Very responsive to messages

Community See All

**Joint Global Multi Nation Birds - BIRDS project** feeling fantastic with Tejumola Taiwo and 11 others.  
July 10 at 12:24pm · 🌐

The 5 BIRDS CubeSats were successfully deployed to space from the robotic arm of the JAXA's Kibo experimental module of the ISS on July 7th. We thank everybody who realised the satellite deployment.

[https://www.facebook.com/permalink.php?story\\_fbid=485067075176050&id=171403156542445&substory\\_index=0](https://www.facebook.com/permalink.php?story_fbid=485067075176050&id=171403156542445&substory_index=0)



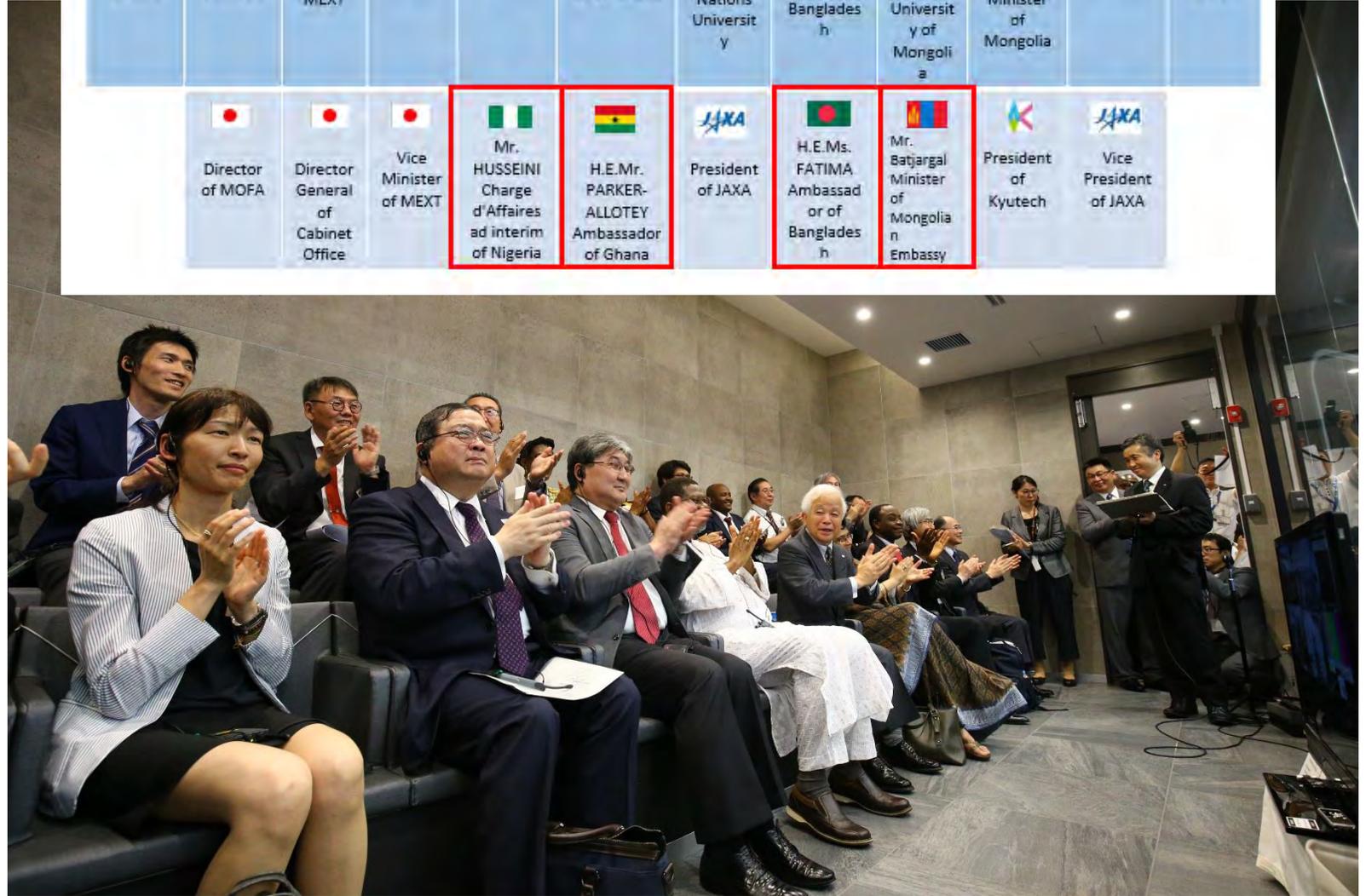
## 16. Deployment Viewing at JAXA Tsukuba Space Center, JAXA photos

This section [16] covers the deployment of the BIRDS-1 CubeSat constellation using photos from JAXA.

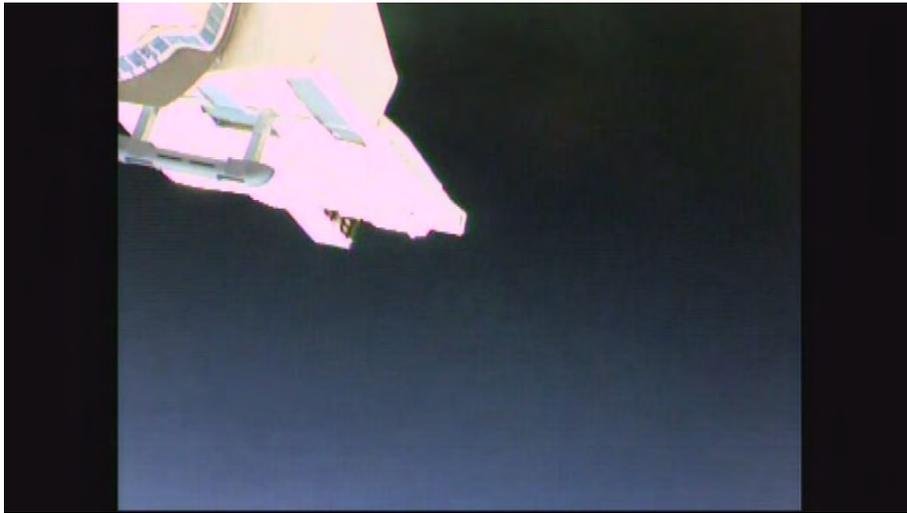
# The Deployment Viewing Booth for VIPs

Note:  
 The chart shows the original plan. Due to last minutes cancellations, the photo is slightly different from the plan – but the plan reveals what kind of VIPs were in attendance. By and large, the plan is correct.

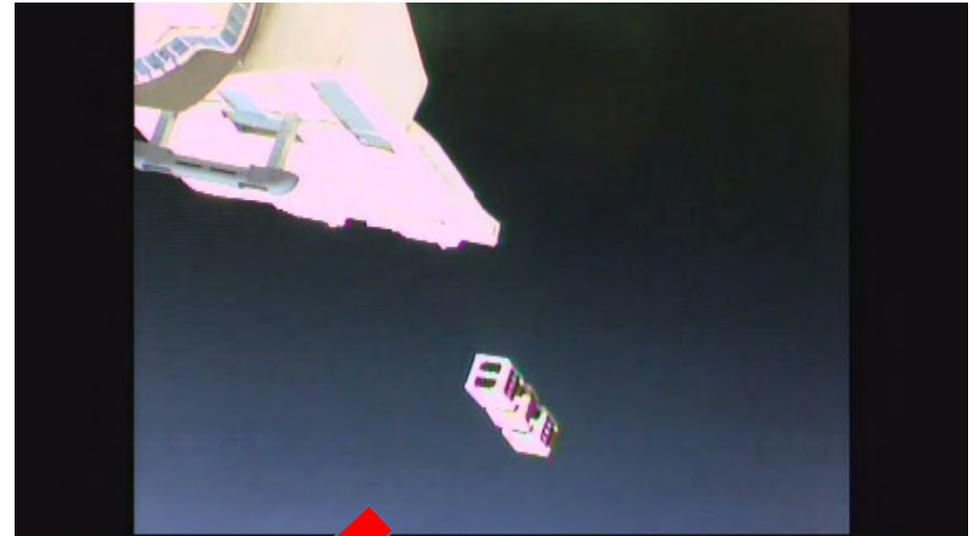
 Director of JAXA	 Director of MOFA	 Director of MEXT	 Nigeria	 Nigeria	 Ambassadre ss of Ghana	 President of All Nations University	 Diplomat of the Embassy of Bangladesh	 Vice President of National University of Mongolia	 Advisor to Deputy Prime Minister of Mongolia	 Kyutech	 Director of JAXA
 Director of MOFA	 Director General of Cabinet Office	 Vice Minister of MEXT	 Mr. HUSSEINI Charge d'Affaires ad interim of Nigeria	 H.E.Mr. PARKER-ALLOTEY Ambassador of Ghana	 President of JAXA	 H.E.Ms. FATIMA Ambassador of Bangladesh	 Mr. Batjargal Minister of Mongolian Embassy	 President of Kyutech	 Vice President of JAXA		



# First deployment: Japan (Toki), Ghana (GhanaSat-1), and Mongolia (Mazaalai)



©JAXA



©JAXA



©JAXA



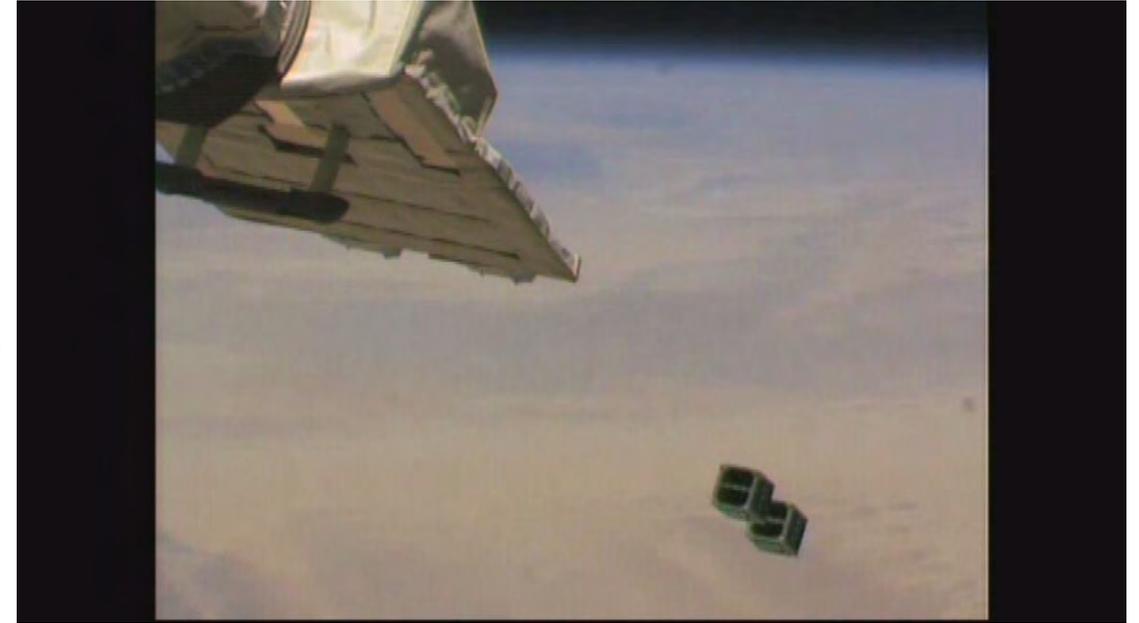
©JAXA

**5:50 PM on  
7 July 2017**

## Second deployment: Bangladesh (BRAC Onnesha) and Nigeria (Edusat1)



©JAXA



©JAXA

**6:10 PM on 7 July 2017**



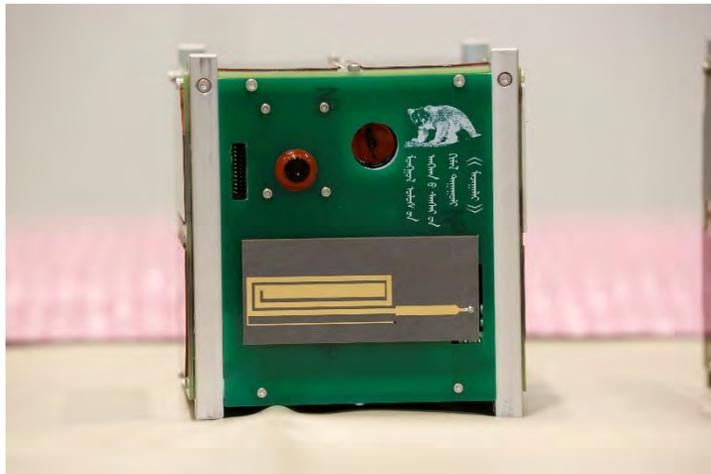
Ghana

©JAXA



Bangladesh

©JAXA



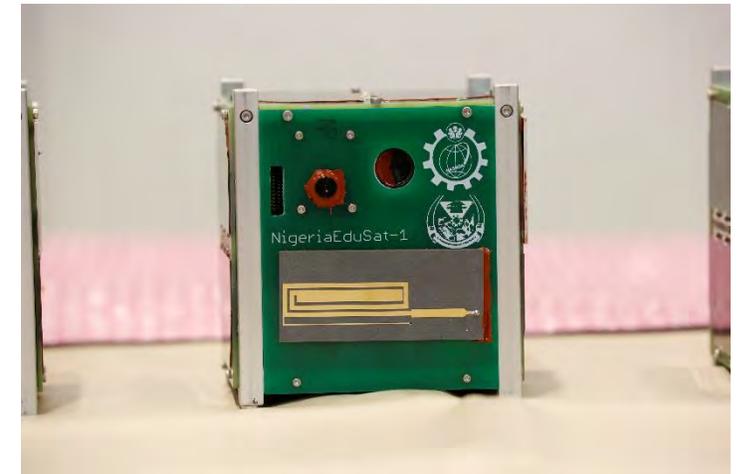
Mongolia

©JAXA



Japan

©JAXA



Nigeria

©JAXA



Kyutech, Japan

©JAXA

# Joyous reactions after deployment



JAXA Mission Control, Japan

©JAXA



BRAC University, Bangladesh

©JAXA



All Nations University, Ghana

©JAXA



National Univ. of Mongolia

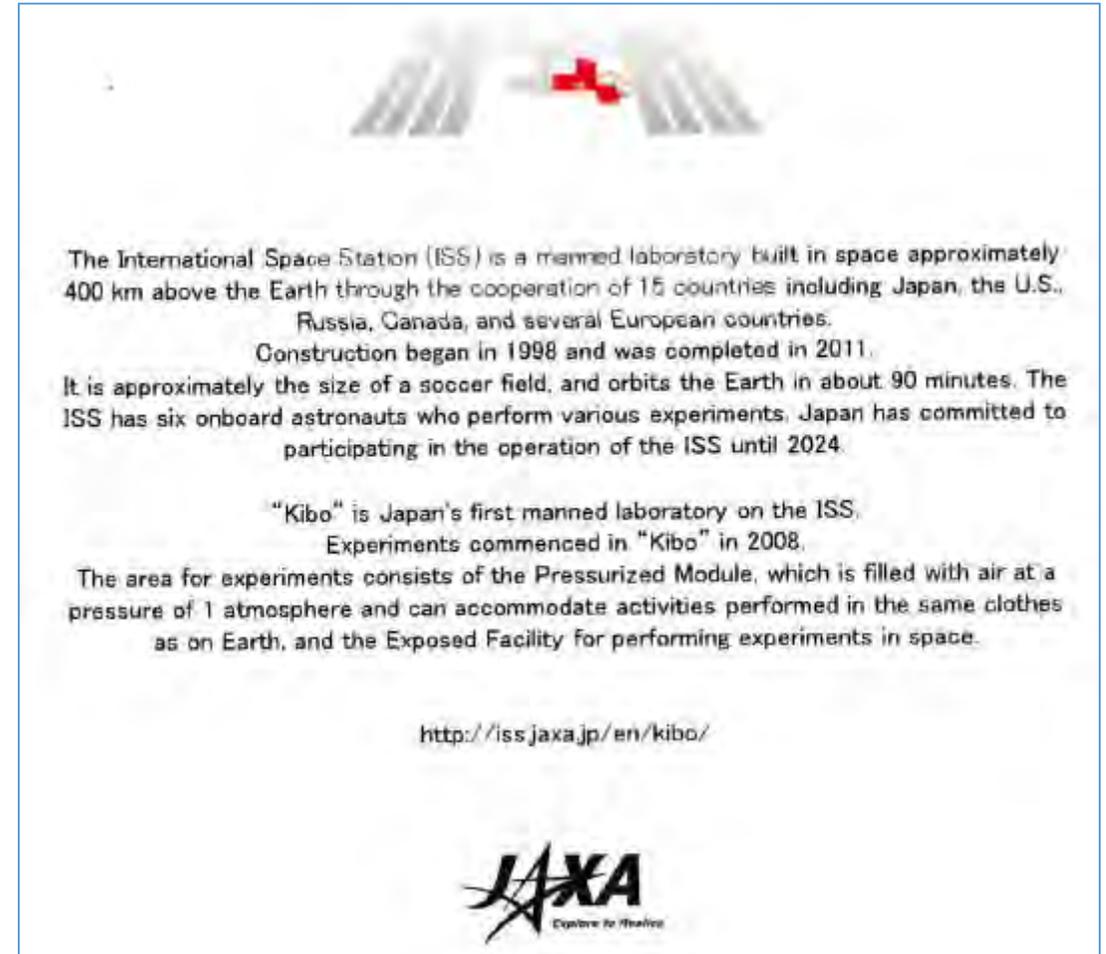
©JAXA

This momento (postcard size) was given to each Deployment Guest as he or she left TKSC.



©JAXA

Signed by Program Manager K. Wakata

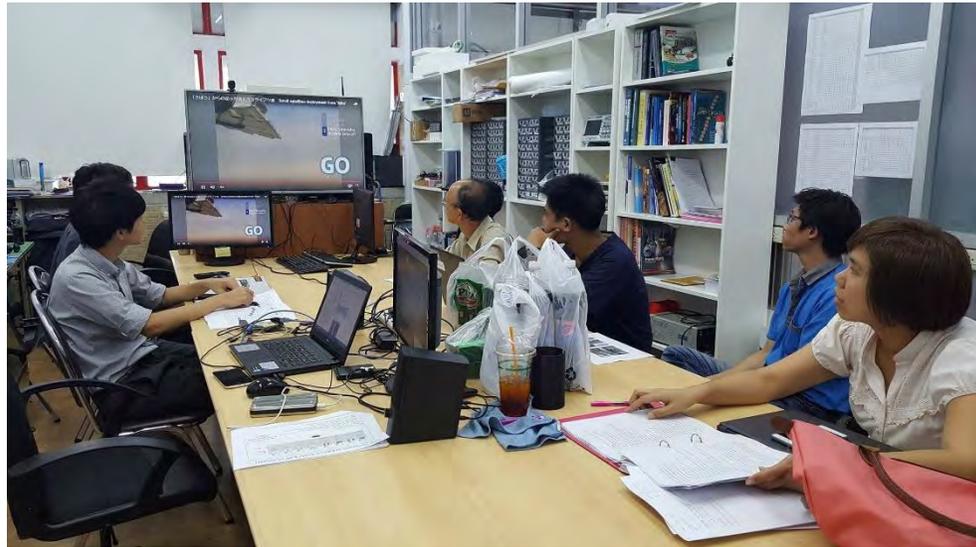


©JAXA

This concludes the photos covering deployment viewing at Tsukuba on 7 July 2017.

# 17. BIRDS-1 deployment viewing in Thailand

This slide was prepared by Apiwat on location.



**During BIRDS-N and B deployment!!**

BIRDS-1 deployment viewing was held at **KMUTNB Space System Laboratory** on 7 July, 2017. Apiwat gave a short lecture to Lab members about the BIRDS Project and how satellites will be deployed from Kibo, the Japanese Experiment Module (JEM) of the ISS.



## **Successful Deployment of BIRDS Satellites**

We had a small pizza party together after the BIRDS-1 deployments and while waiting for the first pass to receive satellites beacon signal.

## 18. Naadam Celebration by Kyutech Mongolians

You're invited to Dinner Party for

# Mongol Naadam Celebration

We are organizing humble dinner party for Mongolian traditional Festival "Naadam". We will prepare popular Mongolian foods of Naadam Festival and some Mongolian drinks. Please join with us.

Like this



These were  
delicious

**Where:** Kyutech International  
Dormitory Hall, Tobata Campus.

**When:** 11<sup>th</sup> of July, 2017

**Time:** 18:00 – 20:00

Mongolian students at Kyutech



招待状



“Naadam” is a major festival-holiday in Mongolia. Accordingly, the Mongolian students of Kyutech (half of them are members of the **BIRDS-1 Project**) celebrated Naadam on 11 July 2017 at the International House (dormitory) on Tobata Campus with the feast shown above. Second from the left is Turo’s younger sister – visiting Kyutech for one month as a summer holiday. Professors Yamaguchi, Omura, and Cho, attended this event.

## 19. JA1GDE sent a signal report for BIRDS-1

We are receiving signal reports from the amateur radio community .... here is one such person.



Dear George san,

It is a clunky shack, but I send you my photo.

Please do Twitter at (@ BIRDS)

73

\*

\* Toshio Kasei  
\* ja1gde(at)jarl.com  
\* Twitter : @JA1GDE

14 July 2017

## 20. DK3WN sent a signal report for BIRDS-1

Mike in Germany has helped us a lot, too.



Hi George,  
Find my picture attached.

Here is my gear:

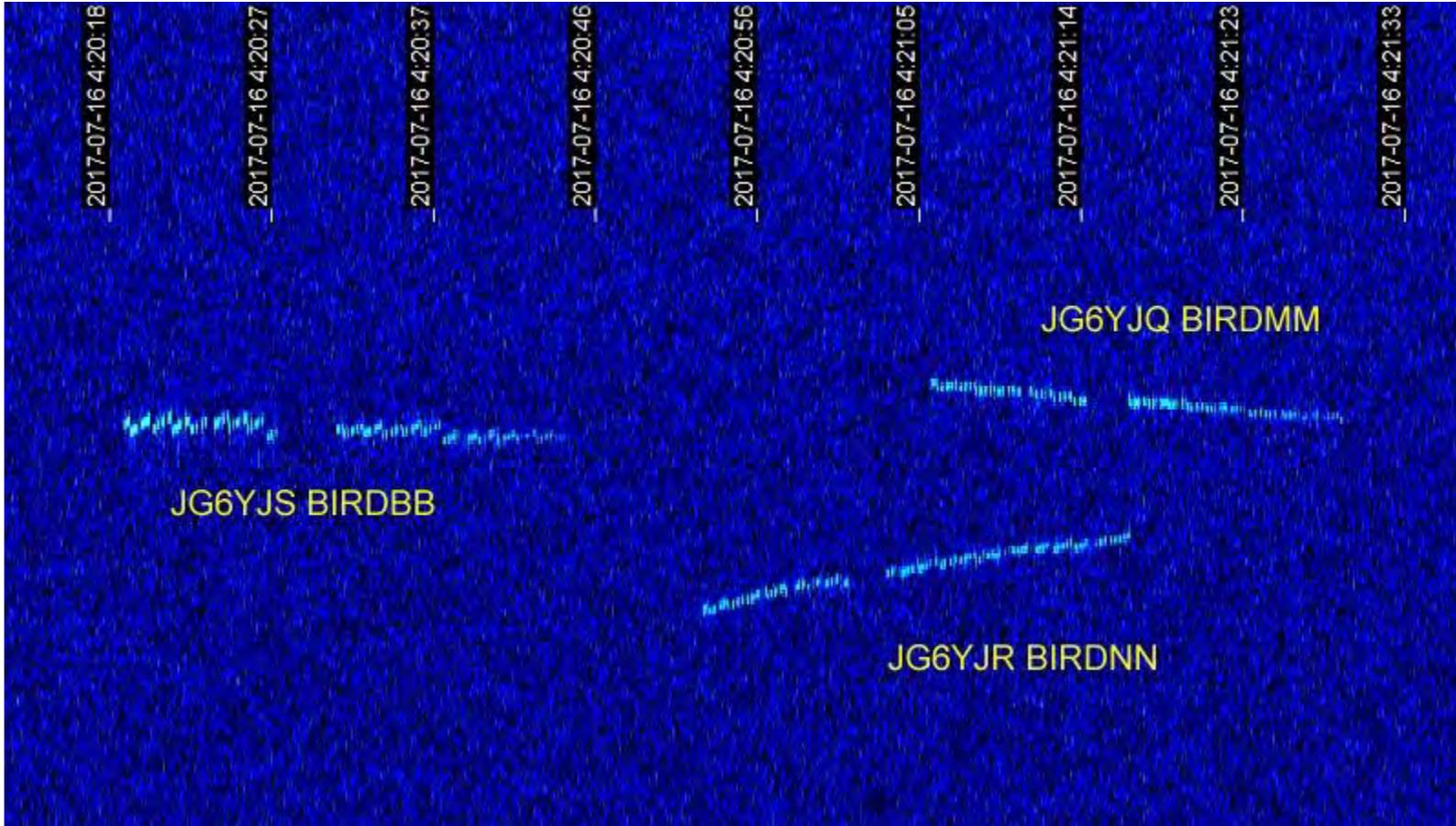
- YAESU FT-736R + SDR-IQ
- 2x20 element X-Yagi 435SHS20 MASPRO, 13.4 dBD....see the page after next.
- 20 dB preamp SSB-electronics

QTH: Kirchbrombach, Germany JN49LR

73 Mike  
DK3WN

16 July 2017

**SEE THE NEXT PAGE FOR ONE  
OF HIS SIGNAL REPORTS**



... continued from the previous page.

16072017 04:20 UTC

jg6yjs birdbb c07dd8f8e2e69ab0  
 jg6yjr birdnn b274dcf8e1e89830  
 jg6yjq birdmm c794dbfbe5e79a..

BIRD B = TLE #42823  
 BIRD M = TLE #42822

BIRDS-1 CW beacon signals visually displayed by DK3WN (Mike in Germany)

**SEE THE NEXT PAGE FOR THE QSL CARDS HE HAS RECEIVED**



**... continued from the previous page.**

Mike holding his BIRDS-1 QSL cards sent from Japan.

Behind him is his 2x20 element X-Yagi antenna for tracking satellites.

*Dear Mike:  
Thank you for these fabulous photos of your equipment. Your Yagi antenna is fantastic .... no wonder you get the signals so well at your station.*

*73,  
George Maeda,  
Editor.*

**... see the next page for the cards that we received from Mike.**

# QSL cards received from Mike (DK3WN) of Germany.

**DK3WN**  
 Mike Rupprecht  
 Johann-Adam-Groh-Strasse 20  
 D - 64753 Brombachtal  
 GERMANY  
**JN49LR**  
 AMSAT #9502099  
 SatBlog - <http://www.dk3wn.info/p>

JG6YJQ  
 Date UTC Band RST 2X  
 15-Jul-2017 03:32 sat 599 CW  
 73 de Mike, DK3WN

BS89DCF1DBE999Bp

YAESU FT-736R  
 YAESU FT-857  
 VHF: 2x20 El. X-Yagi WX720 WIMO, 12,3 dBD  
 UHF: 2x20 El. X-Yagi 435H520 MA PRO, 13,4 dBD

Mode: CW  
 vy 73 Mike 

Satellite: **BIRD-M**

**DK3WN**  
 Mike Rupprecht  
 Johann-Adam-Groh-Strasse 20  
 D - 64753 Brombachtal  
 GERMANY  
**JN49LR**  
 AMSAT #9502099  
 SatBlog - <http://www.dk3wn.info/p>

JG6YJO  
 Date UTC Band RST 2X  
 15-Jul-2017 03:32 sat 599 CW  
 73 de Mike, DK3WN

C78GDCF2DDEE899p

YAESU FT-736R  
 YAESU FT-857  
 VHF: 2x20 El. X-Yagi WX720 WIMO, 12,3 dBD  
 UHF: 2x20 El. X-Yagi 435H520 MA PRO, 13,4 dBD

Mode: CW  
 vy 73 Mike 

Satellite: **BIRD-J**



**DK3WN**  
 Mike Rupprecht  
 Johann-Adam-Groh-Strasse 20  
 D - 64753 Brombachtal  
 GERMANY  
**JN49LR**  
 AMSAT #9502099  
 SatBlog - <http://www.dk3wn.info/p>

JG6YJR  
 Date UTC Band RST 2X  
 16-Jul-2017 04:20 sat 599 CW  
 73 de Mike, DK3WN

8274DCF8E1E8983p

YAESU FT-736R  
 YAESU FT-857  
 VHF: 2x20 El. X-Yagi WX720 WIMO, 12,3 dBD  
 UHF: 2x20 El. X-Yagi 435H520 MA PRO, 13,4 dBD

Mode: CW  
 vy 73 Mike 

Satellite: **BIRD-N**

**DK3WN**  
 Mike Rupprecht  
 Johann-Adam-Groh-Strasse 20  
 D - 64753 Brombachtal  
 GERMANY  
**JN49LR**  
 AMSAT #9502099  
 SatBlog - <http://www.dk3wn.info/p>

JG6YJS  
 Date UTC Band RST 2X  
 15-Jul-2017 03:33 sat 599 CW  
 73 de Mike, DK3WN

BE75D9F3DD E99A3p

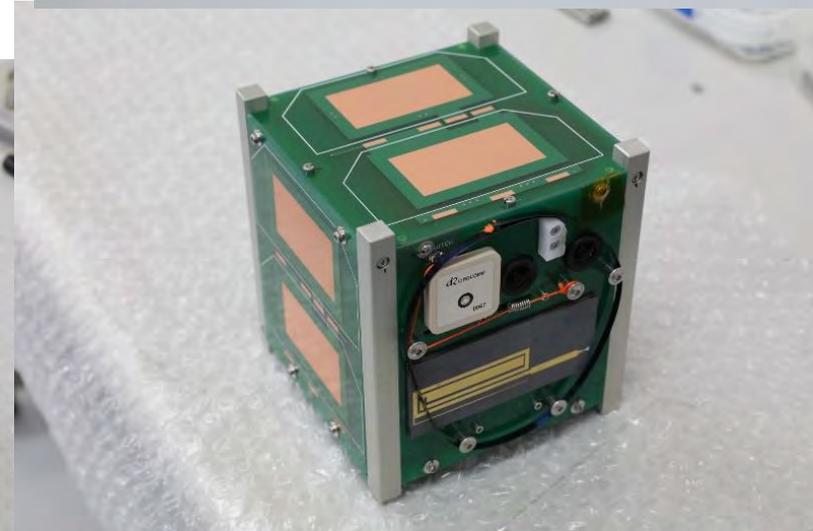
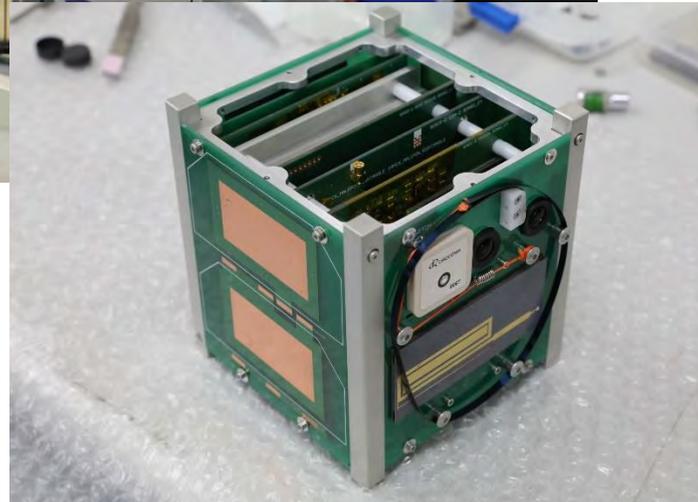
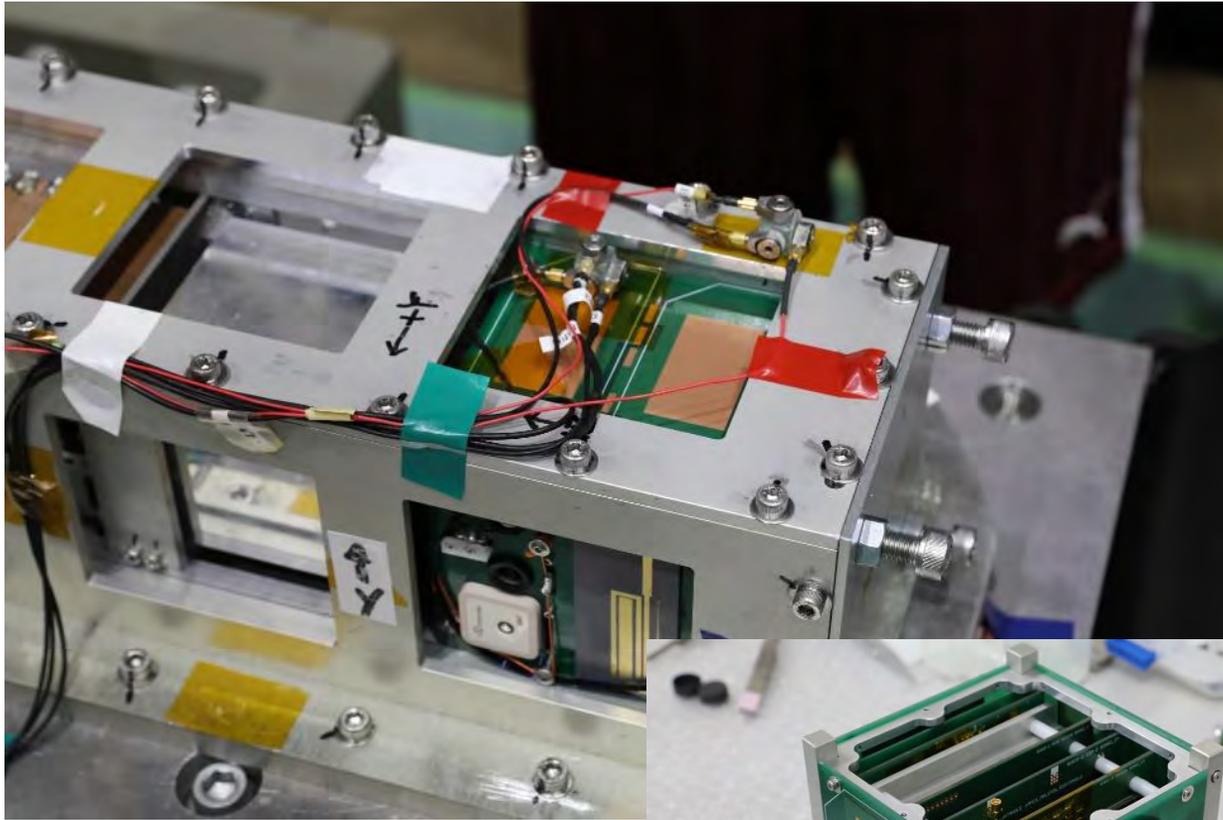
YAESU FT-736R  
 YAESU FT-857  
 VHF: 2x20 El. X-Yagi WX720 WIMO, 12,3 dBD  
 UHF: 2x20 El. X-Yagi 435H520 MA PRO, 13,4 dBD

Mode: CW  
 vy 73 Mike 

Satellite: **BIRD-B**

# 21. Assembly of BIRDS-2 Engineering Model EM-1 on 15 July 2017

All photos on this page are from Dr Kim of LaSEINE.



## 22. Arrival of the 5-person delegation of Bhutan for the BIRDS-2 CDR



The delegation of Bhutan, with the students (Cheki, Kiran, and Yeshey) and G. Maeda in the lobby of **APA Hotel Kokura** – 11:15 AM on 17 July 2017.

The 5-person delegation of Bhutan safely arrived in Kitakyushu on 17 July. They have come to Kyutech to attend the **CDR** (Critical Design Review) of BIRDS-2 on 18 July 2017.

This CDR will be covered in detail in the next issue of the **BIRDS Project Newsletter** (August Issue).

## 23. Report by Ms. Gladys Yaa Saah Oppong on her recent visit to Kyutech



This 9-page report was submitted by Ms. Gladys to the BIRDS Project Newsletter on 15 July 2017. She is a member of ANU management.

### REPORT: VISIT TO KYUSHU INSTITUTE OF TECHNOLOGY (KYUTECH) 11-13 JULY 13, 2017

Author: Ms. Gladys Yaa Saah Oppong

Country : Ghana

Position :

Administrator of All Nations University  
Space Science and Technology Laboratory  
(ANU-SSTL)

Background :

Masters in Business Administration

## Arrival at the Laboratory of Spacecraft Environmental Interaction Engineering (LaSEINE), Kyushu Institute of Technology.



Picture with GhanaSat1 members namely, Mr. Benjamin BONSU (left) Ms. Gladys (middle) and Mr. Joseph Quansah (right) on July 11, 2017

## Tour at the LaSEINE NanoSatellite Exhibition Center



Ms Gladys Oppong (Right) Pose with Mr Quansah Joseph(Left ) at the LaSEINE Nanosatellite Exhibition Center

← Ms Gladys Oppong takes the tour at the LaSEINE Nanosatellite Exhibition Center

# Tour at the Center for Nanosatellite Testing (CENT)



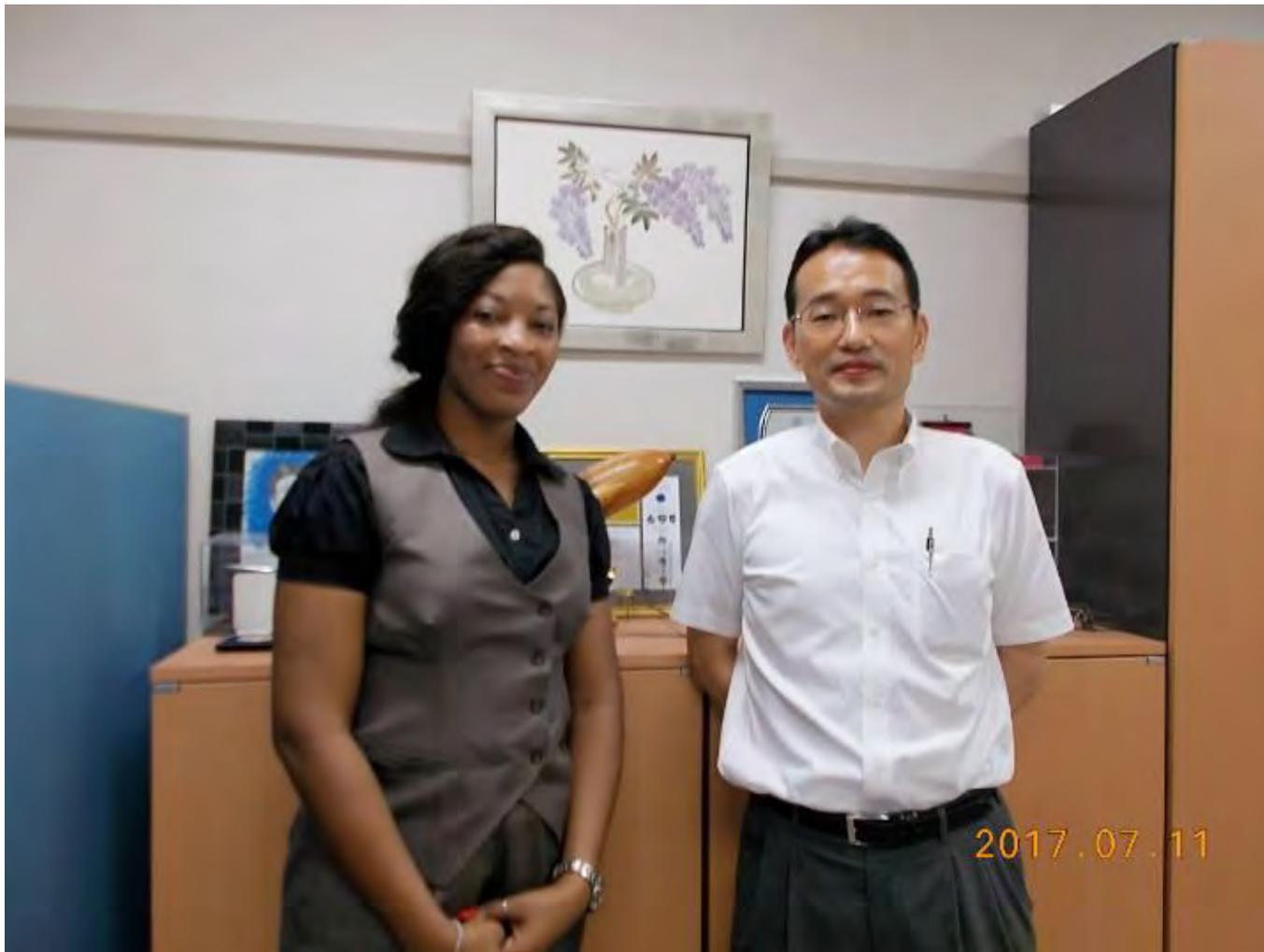
The front view and Entrance of CENT,  
Kyushu Institute of Technology.

← Observing the Small Vacuum Chamber for testing Cubesats at CENT

# Meeting with BIRDS Project Team Members



Pose with BIRDS Project Team Members (Bangladesh , Nigeria and Ghana) after presenting Ghana Chocolate as a souvenir from Ghana and congratulated them for their successful deployment into earth orbit.



## Meeting with Prof. Mengu Cho

Pose with Prof Mengu Cho (right) , the Director of LaSEINE and Project Investigator of BIRDS Satellite Project on 11 July 2017.



TOUR AT  
*LABORATORY OF SPACE  
ENVIRONMENT  
INTERACTION  
ENGINEERING*  
(LaSEINE)



Dr. Pauline Faure (Left) as my tour guide explaining the types of vacuum chambers used for testing Nanosatellites at different Orbits at LaSEINE on July 13 ,2017

# Tour of the Kyutech Amateur Ground Station (GS) Control Room on the 8<sup>th</sup> floor



Pose with the Ghana team at the GS control room during Birds Satellite operation on July 13, 2017 during the 1 am to 9am passes



Pose with Dr. Pauline (Right ) at the GS control room

# Summary

On behalf of President, Dr. Samuel H. Donkor the ANUC Management, Staff and Students of All Nations University College (ANUC), I would like to give special thanks to Kyushu Institute of Technology, Professor Mengu Cho, Assistant Professor George Maeda and everyone who has helped and supported BIRDS project to come to reality.

I also want to use this opportunity to thank Japan Aerospace Exploitation Agency (JAXA) and the BIRDS team.

Cheers to the never giving up team!

All the extra hours, all the sacrifices, all the sleepless nights and early mornings have finally paid off. It is never easy to hold on when things get tough or to shut out the negative vibes and work hard at what you want.

Your success is proof that indeed, at the end of the tunnel there is light. We are impressed and proud of you all.

Congratulations on your success.  
(Ayekoo in Ghana language).

Arigato Gozaimasu! Thank you!



Gladys Yaa Saah Oppong

## 24. Nikkei writes about the deployment of BIRDS-1 constellation

Nikkei is the leading business newspaper of Japan – all corporate people read it each day.



日本経済新聞  
2017.7.17

### 日本経済新聞

#### 超小型衛星、発射4倍

は、新興国の需要を日本に波及させた。各国の学生は今後、宇宙産業に取り込める。

7月7日には、九州工業大学で宇宙工学を学ぶガーナ、ナイジェリア、モンゴル、パングラデシユの留学生らが製作した超小型衛星5基をきぼうから放出した。

出身国ごとに1基ずつつくり、ガーナ、モンゴル、パングラデシユにとっては国家初の衛星となった。筑波宇宙センター（茨城県つくば市）に各国の関係者を集め、管制室の様子や衛星放出の瞬間を撮影した。

宇宙から母国を撮影した画像や音楽を地上に送信できるか確かめる。地上施設の運用方法やデータの扱い方を学ぶ。

日米欧などが参加するISSの運用期限は24年までとなっているが、文部科学省によると、ロシアなどから延長を求め、議論が出ているという。

JAXAはこれまで、ファイリピンやシンガポール、ブラジルの大学などの超小型衛星約20基をきぼうから放出している。

9 科学技術 12版

【第三版】

宇宙航空研究開発機構（JAXA）は、国際宇宙ステーション（ISS）にある日本の実験棟「きぼう」で新興国への支援を拡充する。アジアやアフリカの新興国が設計や製作に関わった超小型衛星の受け入れを増やし、2019年度初めには一度に宇宙空間へ送り出せる数を4倍にする。実験や衛星の活用を通じ、人材育成に協力する。

「きぼう」は宇宙空間に超小型衛星を放つ「発射基地」としての使い方が注目されている。無人

### JAXAの宇宙実験棟 「きぼう」で新興国支援

輸送機で宇宙飛行士の日用品や実験器具とともに複数の衛星を運び込む。

新興国向けの超小型衛星を宇宙に送り出した（JAXA提供）

宇宙飛行士らが衛星を収めた筒をきぼうの外に出し、宇宙空間に送り出す。ロケットで衛星を打ち上げる一般の方法とは大きく異なる。

JAXAは一度に打ち出せる超小型衛星の数を増やす。これまで約10機の衛星では12基程度が

限界だったが、19年度には最大48基に対応する設備を取り付ける。多くの衛星をまとめて輸送し、同時に打ち出せるようになる。

アジアや南米、アフリカの学生らが手がけた超小型衛星を原則無償で受け入れる。宇宙に関心を

持つ新興国では、超小型衛星の設計や製作が技術の習得に役立つ。日本と新興国で交流が生まれ



# 25. "Certificates of Appreciation" given out during BIRDS-1 Deployment Party

Sunday  
16 July 2017



Prof Cho receives from Maisun



Asst. Prof. Masui receives from Taiwo



小倉北区の地鶏と豚のお店 / 居酒屋  
かんできや かし町店

Kokura



Dr Yamauchi receives from Antara;



Dr Faure receives from Joseph;



Ms Ward receives from Turo.



## 26. Report on the ground station in the Philippines



# UP EEI Amateur Radio and Satellite Ground Receiving Station (ARSS)

This 6-page (including this page) report was created on 18 July 2017 by the **Electrical and Electronics Engineering Institute (EEI)** University of the Philippines (UP) Diliman, Quezon City, Philippines



# Purpose, System Configuration and Parts

## The UPEEEI ARSS

- A platform for tracking and communicating with satellites operating in amateur band for research and educational purposes
- Communication node for terrestrial communication in case of emergency
- Assist in the proliferation of knowledge in satellite technology by providing assistance and guidance to universities/schools that wish to establish their own ARSS



System configuration of UP EEEI ARSS

# Equipment

- Radios: ICOM9100
- Antennas: VHF, HF and UHF (not yet fully functional)
- Rotor controllers: Yaesu G5500 and Yaesu 450
- TNC: KAM XL
- Sound card: Signalink USB
- Softwares Used: SatPC32, Digipan, Airlink Express, APRSIS32, Hyperterminal
- Power distribution and conditioning system



# Development Progress

- Transmissions Received
  - ISS SSTV, XW-2F, XW-2B, IO-86, AO-85, AO-73, UKube-1, DUCHIFAT, Tanusha-1



Received SSTV image from ISS



Received beacon from AO-85

# Future tasks

- Automation of tracking
  - Recently purchased Ham Radio deluxe license
- Track satellites using UHF antenna
  - Currently using UHF/VHF cross yagi
- Obtain Radio station License
  - Currently 13 people with license. 12 people from Holy Angel University (partner university) will join the Amateur Radio club of UPEEEI
  - Conduct Amateur radio seminars to facilitate licensing of students interested in amateur radio on September
- QIKCOM-2 project development
  - Problem with interfacing of modules

# People Involved

- Engr. Izrael Zenar Bautista, DV1PUI – ARSS Operations Head
- Engr. Charleston Dale Ambatali, DV1QNE – ARSS Technical Head
- Students
  - Hanns Christian Chua, 4F1XIH – antenna and radio and operations support
  - Sophia Ralota – blog site administrator and operations support (in process of applying callsign)
  - Carlos Ramos, DW1QVL – APRS implementation and R&D of USNA's QIKCOM-2
  - Bernalyn Decena, DW1QJK – Frequency tracking and automation
  - Angel Aquino – operations support (in process of applying callsign)
- Faculty adviser: Dr. Marc Talampas



L-R (1<sup>st</sup> row) Sophia Ralota, Bernalyn Decena, Carlos Ramos  
(2<sup>nd</sup> row) Hanns Christian Chua, Engr. Charleston Dale Ambatali, Engr. Izrael Zenar Bautista

**END OF REPORT FROM THE PHILIPPINES**  
**– Thanks to all the photo above. The Editor.**

## 27. Tobata Gion Yamagasa Festival was attended by many members of BIRDS

The Tobata Gion Yamagasa festival (戸畑祇園山笠) is a popular local Japanese festival (matsuri) which takes place annually in Tobata, a ward of Kitakyushu in Fukuoka prefecture, Kyūshū, Japan. It is held for three days (Friday–Sunday) before and after the fourth Saturday of July. The festival is a national cultural asset of Japan, and is centred on the parading of the "Yamagasa" (山笠).

The Yamagasa (or Yamakasa) are very large floats, and are the focal point of the festival. There are four regions of Tobata which participate: Higashi, Nishi, Tenraiji and Nakabaru. Each region has a large Yamagasa for men and a small one for boys, making eight main floats in total.

During the festival in the daytime, the eight official floats with twelve great flags hoisted on the four large ones are carried for a parade, followed by some small floats for children. But in the nighttime, the floats are completely transformed into pyramids of light—huge Lantern Yamakasa floats, their decorations with the flags removed. Each with twelve layers of 309 lanterns, 10 meters high, and 1.5 tons in weight, is shouldered by about 100 carriers.

To move the Yamagasa is an art which requires concerted lifting by all the carriers. To ensure that they do it successfully, they all shout "yoitosa, yoitosa" together in a rhythmic chant with drums and cymbals.

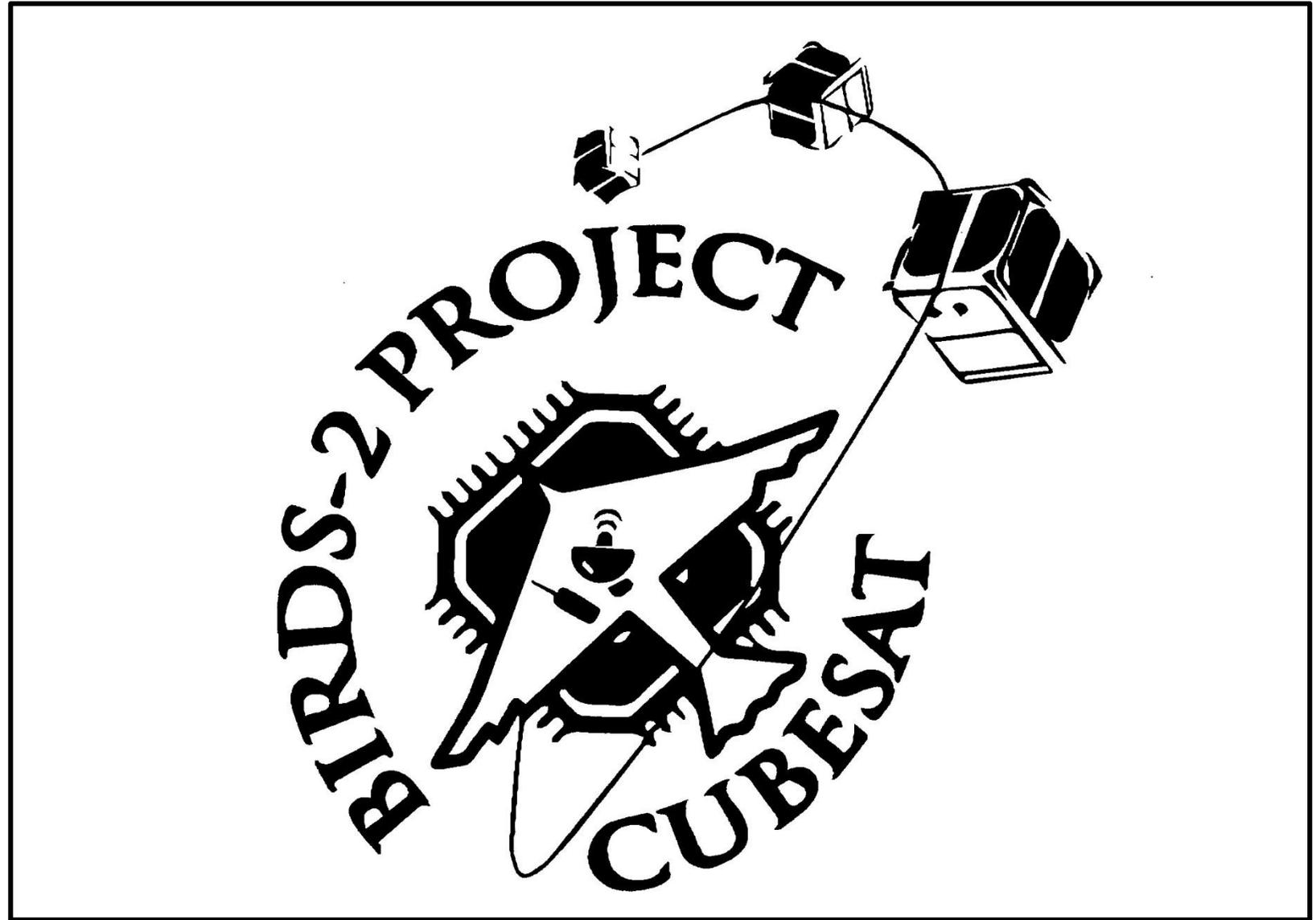
All of the above text is from Wikipedia:  
[https://en.wikipedia.org/wiki/Tobata\\_Gion\\_Yamagasa\\_festival](https://en.wikipedia.org/wiki/Tobata_Gion_Yamagasa_festival)



## 28. BIRDS-2 Logo

This is the BIRDS-2 logo, which was designed by committee of BIRDS-2 members.

It is used on the BIRDS-2 official jacket. Photos of the jacket will be in the next issue of this newsletter.



# BIRDS-2

## Antenna Gain & Radiation Pattern Measurement

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*This report was prepared by:*

*Syazana Basyirah (Malaysia)*

*on July 21<sup>st</sup> 2017.*

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### **Sequence of activities (Year 2017)**

- 3 July.....Setting-up Anechoic Chamber
- 4 July.....Equipment Preparation & Antenna Setup
- 5-8 July.....Gain & Radiation Pattern Measurement (UHF&VHF)
- 9-10 July...Results Analysis
- 11 July.....Anechoic Chamber Clean-up

# Setting-up Anechoic Chamber, Equipment Preparation & Antenna Setup

The walls, ceilings and floor are lined with special electromagnetic wave absorbing material.

AUT Preparation

BIRDS-2 member after preparing anechoic chamber absorber installation for antenna measurement.

*1st Set Setup*

Don't Care Antenna (Dipole Antenna)

*2nd Set Setup*

Reference Antenna (Log Periodic Antenna)

Reference Antenna (Log Periodic Antenna)

Antenna Under Test (BIRDS-2 UHF & VHF Antenna)

UHF & VHF Frequency Tuning by using VNA

## Why and How We Perform Antenna Measurement for BIRDS-2?

### Purposes:

- *To perform antenna measurement in ideal condition where no reflection occurs and simulate measurements that would be performed in space.*
- *To perform the UHF and VHF antennas test for BIRDS-2 satellite measuring the gain and radiation pattern of both antennas attached to the CubeSat structure.*
- *To investigate the results of the gain and radiation pattern of both UHF and VHF whether meets the Link Budget calculation value and Omni-directional pattern or not.*

### Requirement:

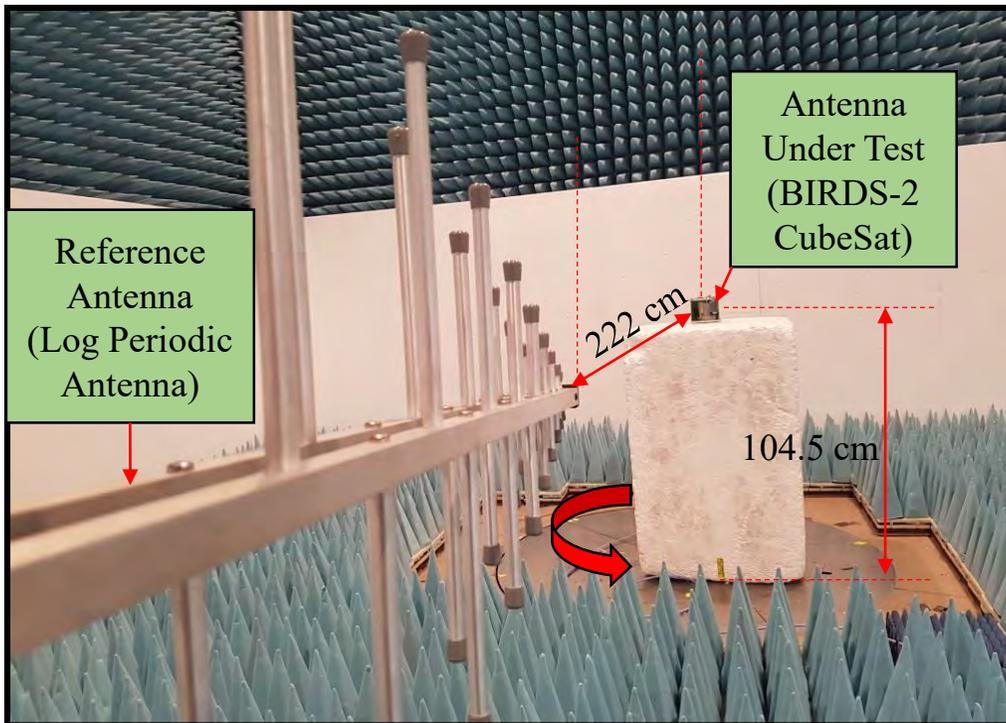
- *To acquire the gain and radiation pattern results according to JAXA requirement.*

### Method:

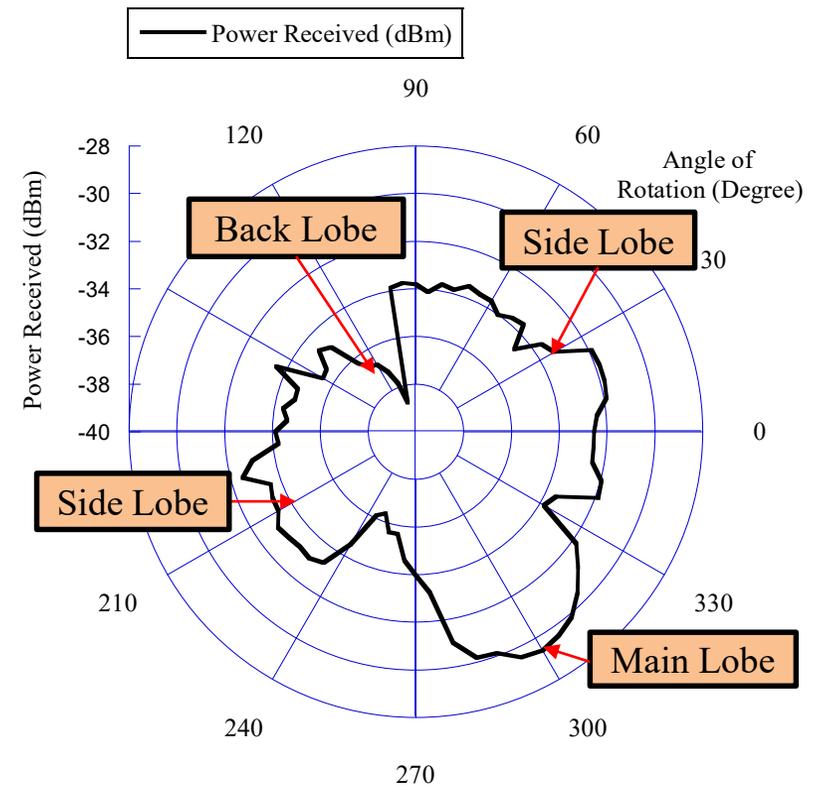
- *By using 3 antennas and 2 setups; UHF and VHF antennas with the Reference Antenna and Don't Care Antenna with Reference Antenna. The desired result for both UHF and VHF antenna gain will be around 0-2.2 dBi (according to Link Budget calculation).*

# UHF Patch Antenna Radiation Pattern

Sweep 1: Horizontal  
Degree of Rotation: Counter Clockwise

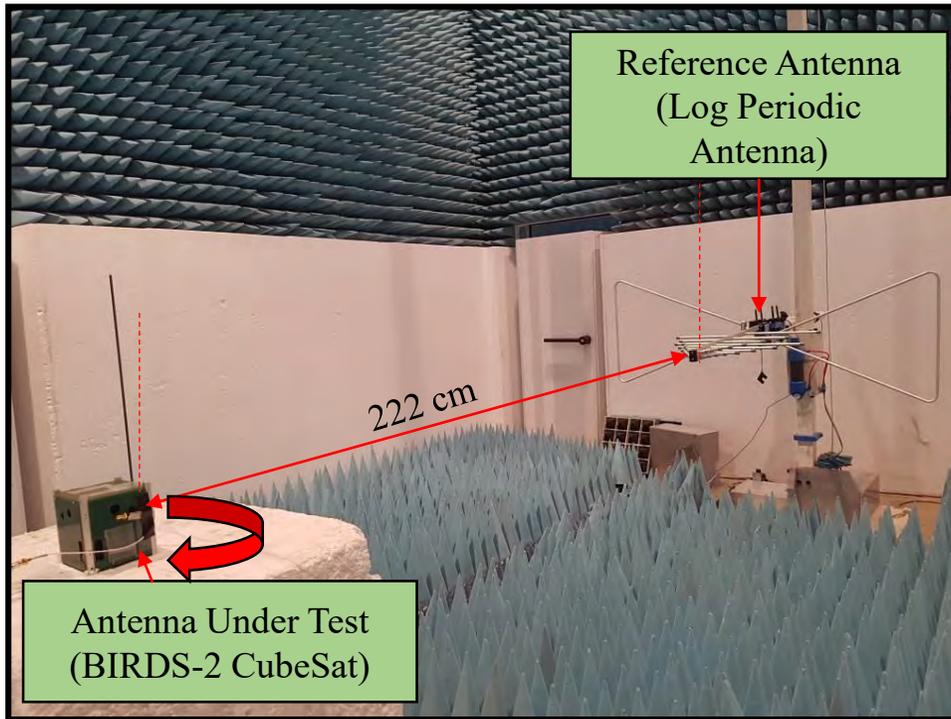


2D Radiation Pattern in Polar Coordination

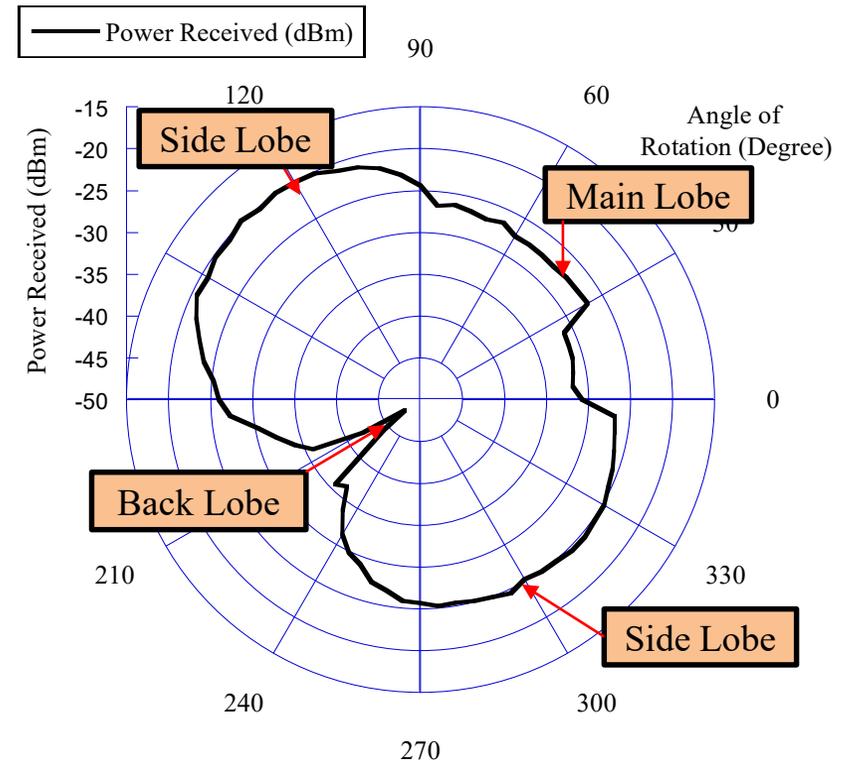


# UHF Patch Antenna Radiation Pattern

Sweep 2: Vertical  
Degree of Rotation: Clockwise



### 2D Radiation Pattern in Polar Coordination



# BIRDS-2 Project Structure Assembly Procedure

*Reference:* BIRDS-2 Structure assembly Procedure by Tomoki Uemura

*Photos are courtesy of:* All BIRDS-2 members and Dr. Kim

Article prepared by:

Kiran Kumar Pradhan (Bhutan)

21 July 2017

# CubeSat Assembly Procedure

- Typically a 2-day procedure.
- One day is for preparation:
  - Prepare all the tools and parts necessary.
  - All parts requiring RTV adhesive work should be carried out on first day for before.
- Assembly protocol should be read and strictly followed.
- The axes of the CubeSat is defined as shown in Fig.1.

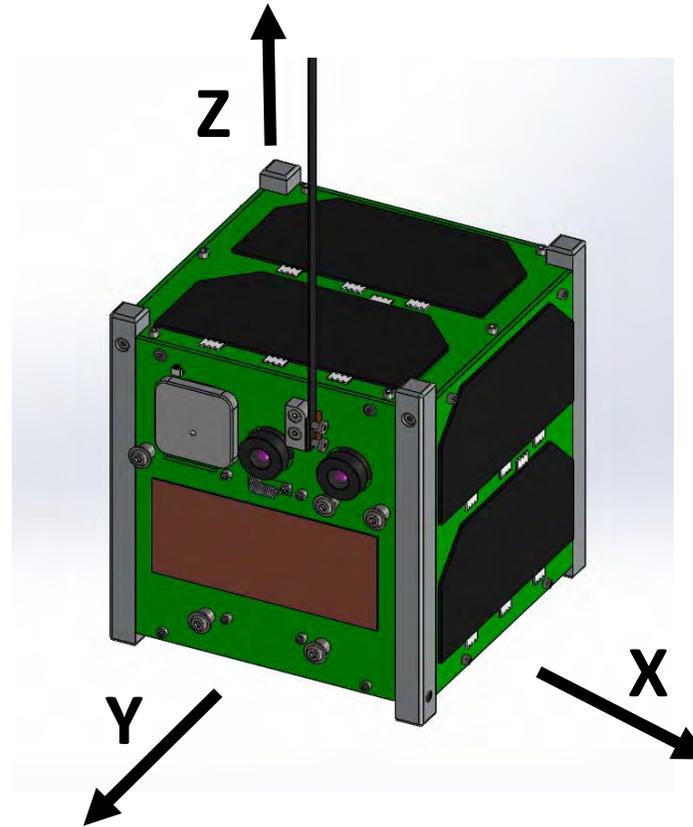


Fig. 1: CubeSat axis definition

## Tools Required

1. Rubber gloves
2. Hair Cap
3. Face mask
4. Dustproof coat
5. Torque Driver
6. Torque Driver Socket
7. Allen Wrench
8. Tweezers
9. Kempton tape
10. Isopropyl alcohol
11. Kim Wipes
12. Digital Multimeter
13. Anti-static strap
14. Vernier Caliper
15. Height gauge
16. Marker

# Day-1 (Preparation)

## Precautions

- Do not place the structure on its side, always use the support provided
- Ensure correct torque is applied on fasteners
- Prepare checklist of all the tools and parts required and confirm it

## Circuit Board Preparation

- Fix modules with RTV
- Cut protruding pins on all PCBs
- Insulate all metallic parts with Kempton tape



Fig. 2: Assembly preparation for BIRDS-2 EM

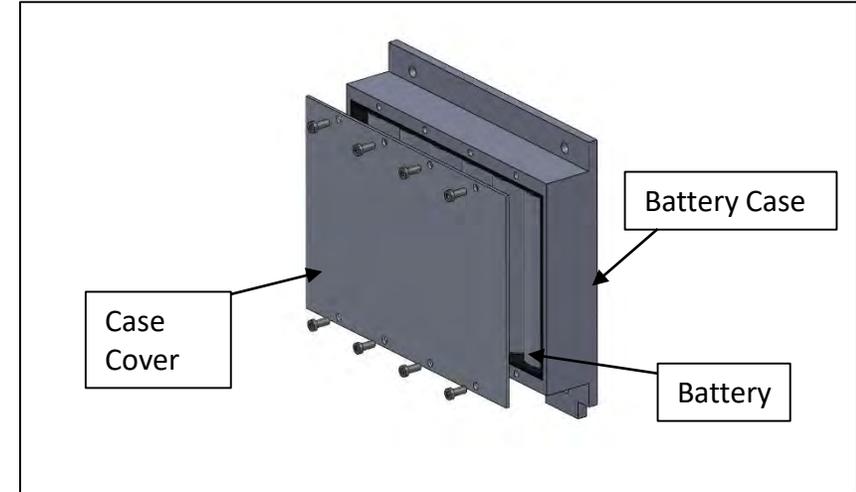


Fig. 3: (STEP-1) Preparation of battery box

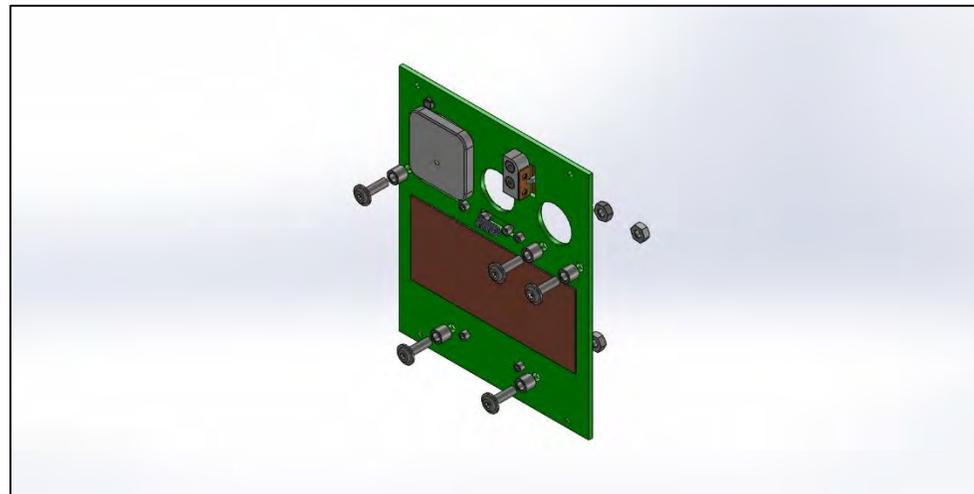
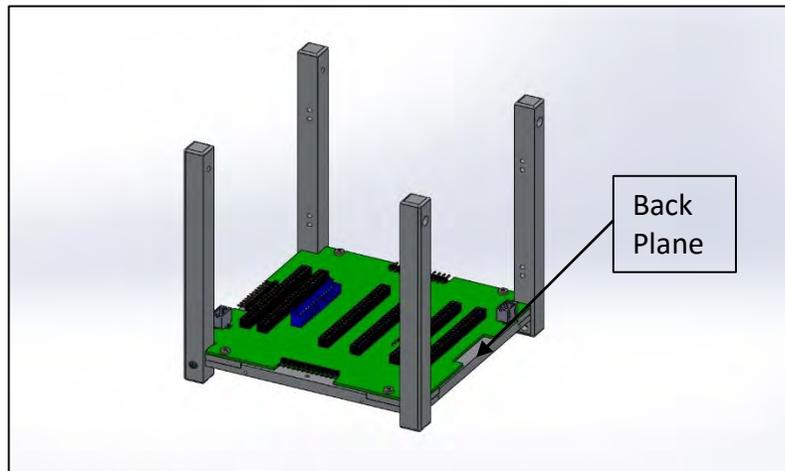
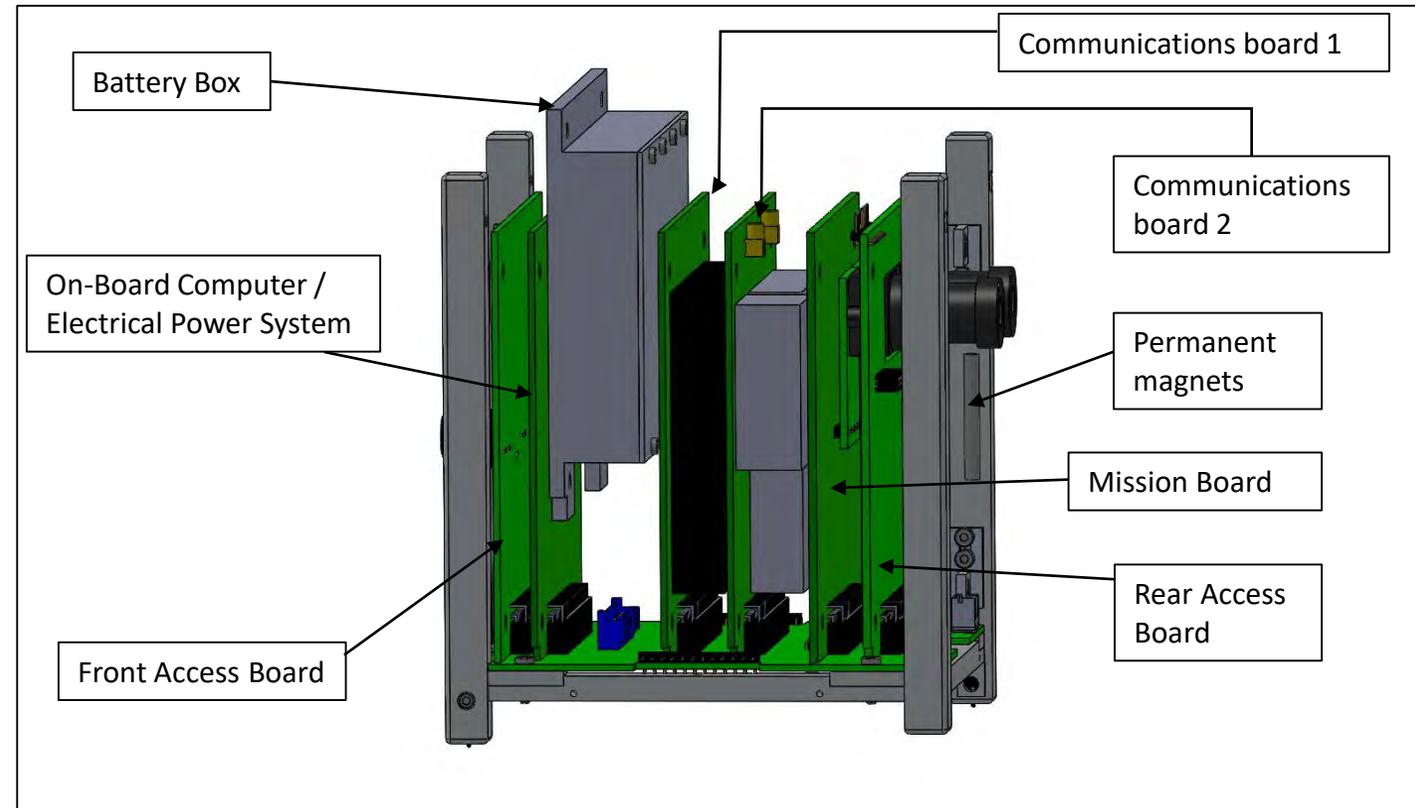


Fig. 4: (STEP-2) Preparation of +Y panel for circuit burner for monopole antenna and holding it before deployment

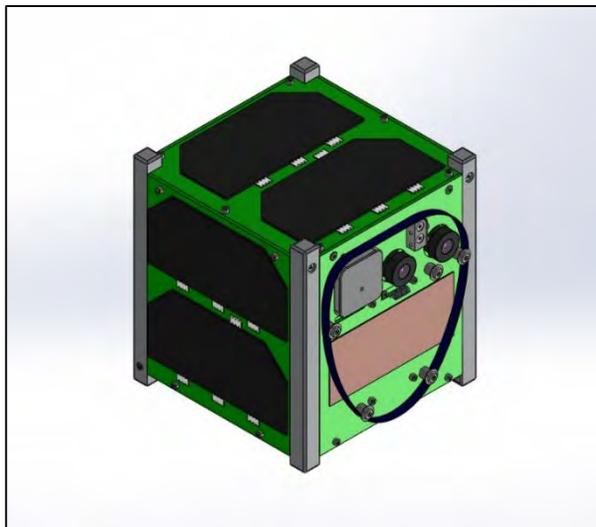
# Day-2 (Assembly)



*Fig. 5 (Above): (STEP-3) Assembly of base frame with side rails and the installation of backplane*

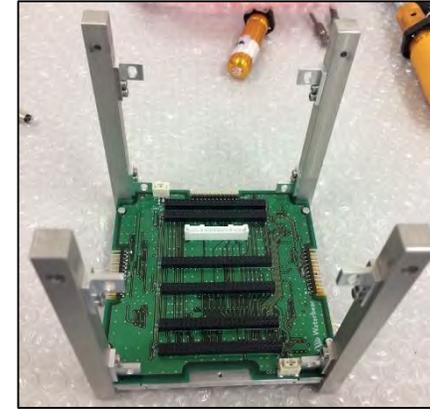


*Fig. 6 (above): (STEP-4) Attaching the magnets on rails and all the boards including battery box*

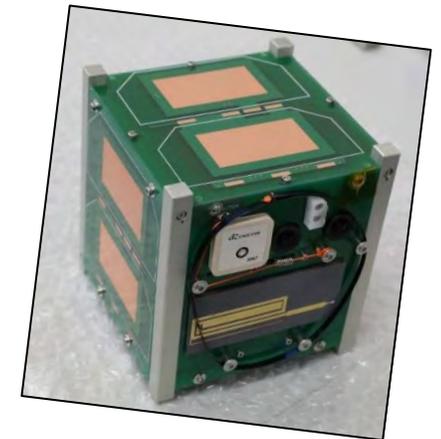
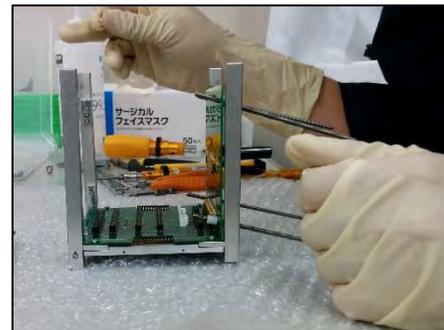
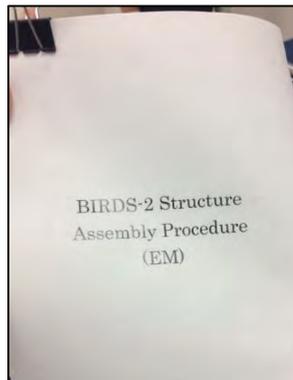


*Fig. 7 (left): (STEP-5) Assembly of all the side boards with solar cell and the +Y panel with antennas*

# BIRDS-2 EM Assembly Pictures



See Section 21 for  
a group photo of  
relevant persons.



# BIRDS-2 Project Vibration Test Activity

*Reference:* BIRDS-2 Vibration Test Procedure by Yasuhiro Tokunaga

*Photos are courtesy of:* All BIRDS-2 members, including Dr. Kim

Article prepared by:

Joven C. Javier (Philippines)

25 July 2017

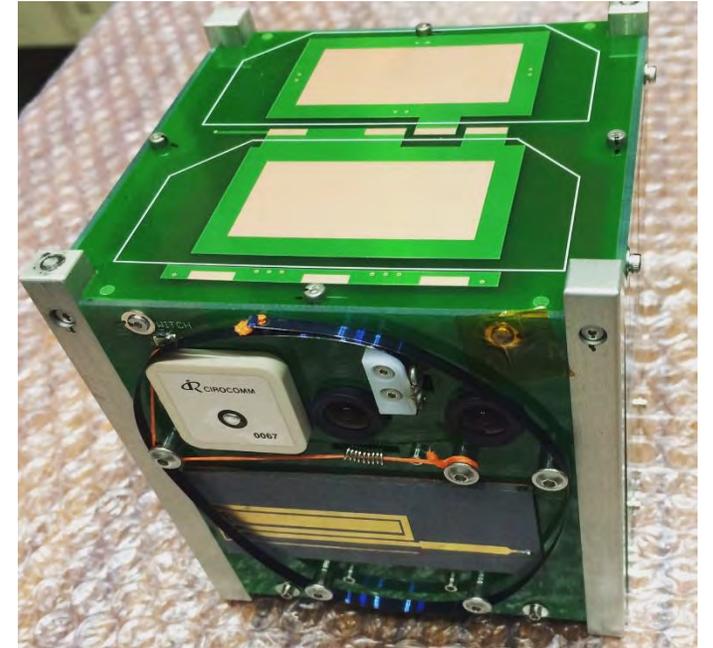
# Launch Environment – BIRDS-2 EM Vibration Test

## *Why the need for vibration test?*

- Rocket launch is first harsh environment the CubeSat will encounter before the getting in to space. It will receive severe random vibration from the rocket that can damage its internal or external structures or components.
- Hence vibration testing is essential for all satellites to test the survivability of the satellite's structure and component's inside and out.
- This test simulates the actual environment that the CubeSat will experience during rocket launch and it enables an analysis for design modification if necessary based on the test results.

# Vibration Testing

In order to have effective and efficient test, it is important to first develop a test plan. The test plan is a document that shows detail test procedure, the test set-up, needed tools and equipment and test sequence. And this also includes to prepare the “Test Article”. Figure 1 shows the BIRDS-2 EM as test article.



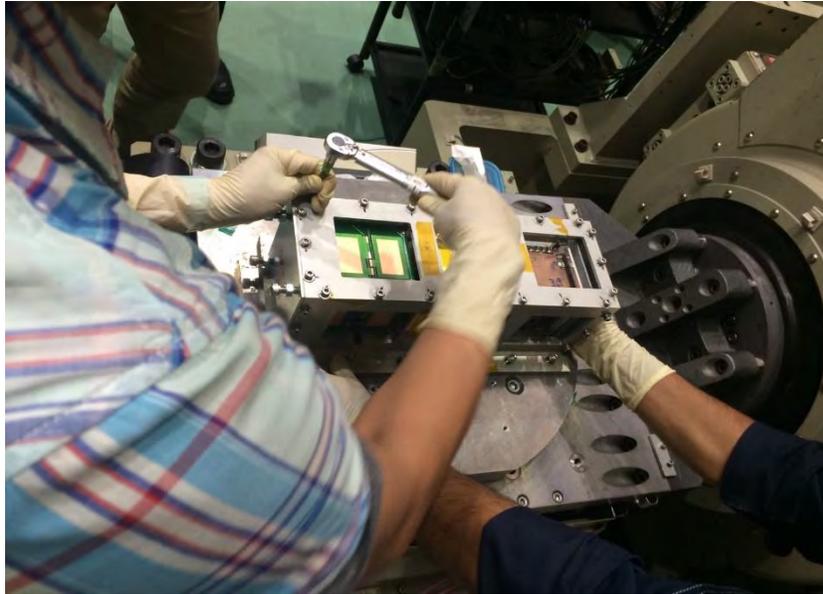
*Fig. 1: BIRDS-2 EM after Assembly*



*Fig. 2: Dr. Masui helping BIRDS-2 Team prior to testing*

Next, the to prepare the necessary tools like as torque wrenches, drivers, accelerometers (pick-ups) and adhesives are collected for easy reach. All pick-ups are connected to the satellite body and designated data acquisition terminals (DAQ).

# Vibration Testing



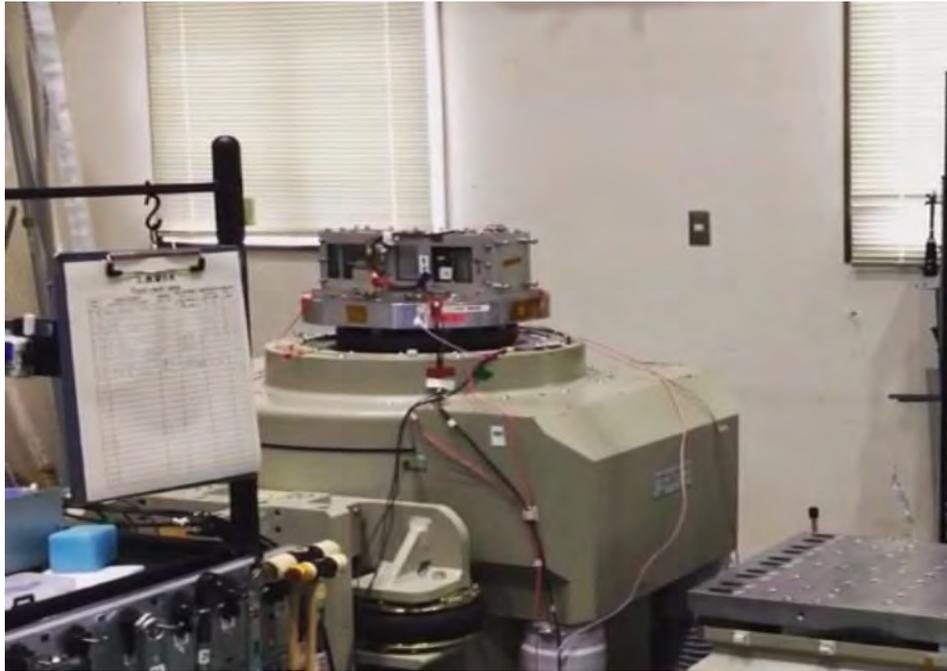
*Fig. 3: EM inserted and fixing into the POD*

It is important that every bolts and nuts are fixed properly and labelled with a clear torque mark in order to observed and identify any movement or displacement outside the test article. Loose bolts, nuts and other fasteners imply that insufficient torque was applied. Care should be taken to apply required torque when tightening fasteners.

# Vibration Testing

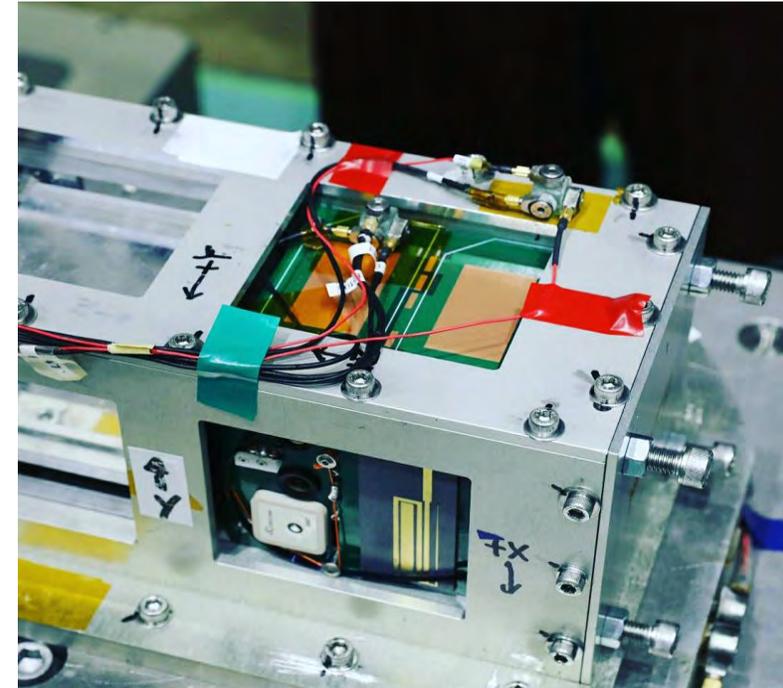
During Vibration Test the team is divided accordingly

1. Observer and checker of the test article before and after each vibration.
2. Operating the software and inputting the values



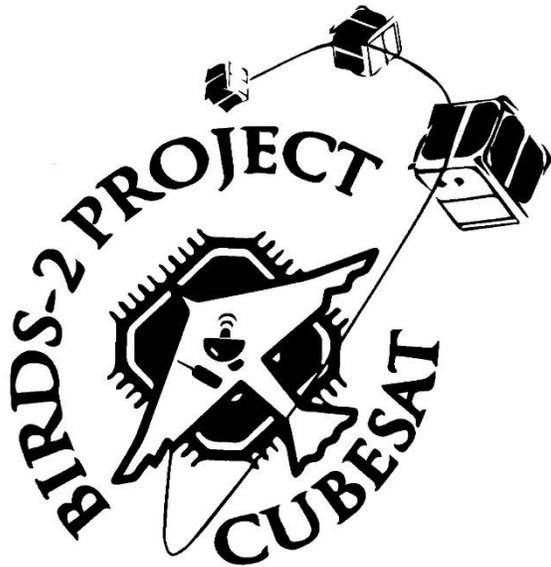
*Fig. 5: BIRDS-2 EM under vibration test*

The CubeSat must withstand certain forces with sufficient margin. Each Rocket provider gives the profile of loads impacted by the launch vehicle, so that the satellite can be designed to withstand such load.



*Fig. 4: EM Ready for Vibration Testing*

# BIRDS-2 team after vibration testing



# End of **BIRDS Project Newsletter** – Issue Number Eighteen

This newsletter is archived at the BIRDS Project website:

**Project website:** <http://birds.ele.kyutech.ac.jp/>

When a new issue is entered in to the archive, an email message is sent out over a mailing list maintained by the Editor (G. Maeda, Kyutech). If you wish to be on this mailing list, or know persons who might be interested in getting notification of issue releases, please let me know.

This newsletter is issued once per month. The purpose of it is to keep BIRDS stakeholders (the owners of the satellites) informed of project developments.