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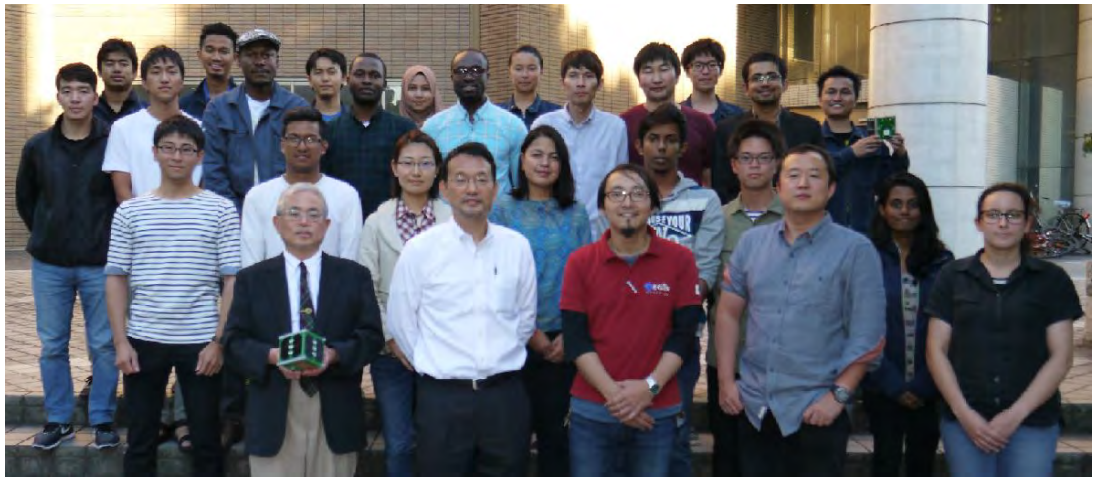
BIRDS Project Newsletter

Issue No. 31
(28 August 2018)

Edited by:
G. Maeda
Laboratory of Spacecraft Environment Interaction Engineering (LaSEINE),
Kyushu Institute of Technology (Kyutech)
Kitakyushu, Japan



Members of BIRDS -1, -2, and -3 on 4 October 2017, at Tobata Campus

Archive website: http://birds1.birds-project.com/newsletter.html
All back issues are archived at this website.

Acknowledgment of support: This newsletter is supported, in part, by
JSPS Core-to-Core Program,
B. Asia-Africa Science Platforms.

La SEINE

SEIC Space Engineering International Course

All back issues of this newsletter can be easily downloaded.
Go to here: http://birds1.birds-project.com/newsletter.html and scroll down to the desired issue.

Table of Sections

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The Guest Box

From Bangladesh

Shaheed Minar, is a national monument in Dhaka, Bangladesh built in memory of the mother language martyrs, who were killed on 21 February 1952 during the Bengali language movement in the rule of East Pakistan. The Shaheed Minar symbolizes attempts to represent the strength of Bangladeshi nationalism. It also emphasizes the magnitude of the Bengali language in the cultural and social growth of the country.
Hundreds and thousands of people with floral wreaths and bouquet gather on 21 February every year to pay respect to Language Movement Martyrs in a solemn atmosphere. As recognition of the language movement UN declare 21 February as International mother language day in 1999, which observe all over the world every year on 21 February.

- Antara (BIRDS-1 team member)

Table of Sections

THE MAIN EVENT OF THIS MONTH

Section 41 (the last section of this issue) covers 3BIW -- the 3rd BIRDS International Workshop that was held in Mongolia during 16-19 August 2018.

The following article was submitted to the BIRDS Project Newsletter on 19 July 2018.

It describes how the Bhutan ground station was built from scratch.

BHUTAN-1 GROUND STATION DEVELOPMENT

The ground station for BIRDS project is set up at the office premises of Department of IT & Telecom (DITT) inside the Ministry of Information and Communications (MoIC) campus located at the capital city of Bhutan, Thimphu. The ground station will be operated and managed by the Division of Telecom and Space (DoTS) under DITT.

Article by Karma Yuden Dorjee, DoTS, DITT, 18-JULY-2018

Starting with the Tower Base

(Up) Assessing the identified site for construction of Antenna Tower

(Below) Development of the base for the antenna tower.

(Up) Completion of base construction with tower erected.

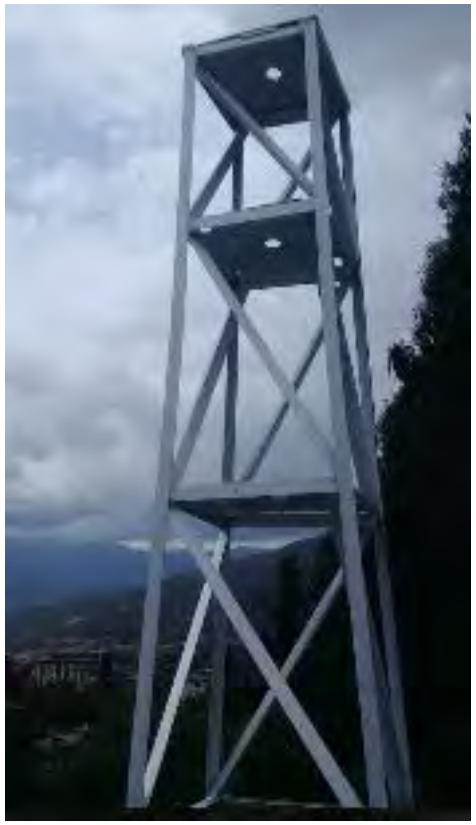
The work of construction of the Antenna Tower was awarded to the National Housing Development Corporation Limited (NHDCL), a state owned corporate office responsible for constructing and managing residential accommodation for government employees in populated cities.

Development of Antenna Tower

(A)

(B)

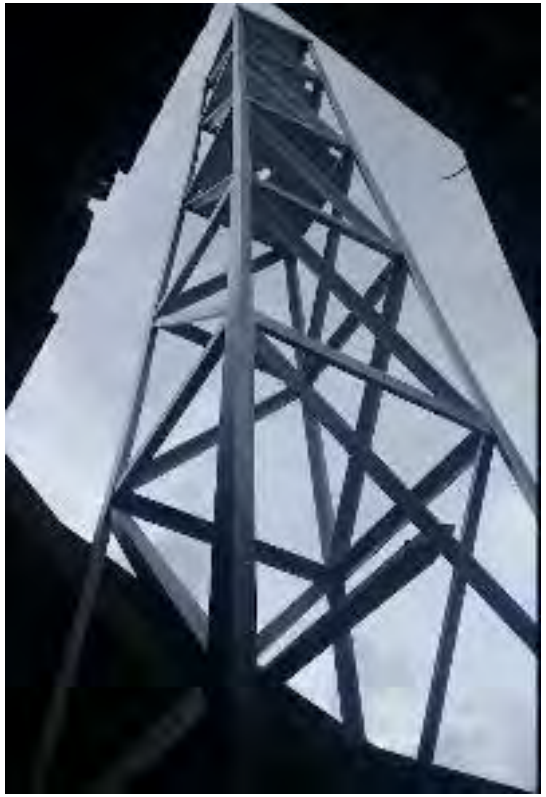
(C)



(D)

Once the tower was erected, additional elements (metal plates) where welded *(A)* to aid in installation of mast which holds the antenna rotator and the antennas itself. The tower was then painted *(B & C)* to prevent corrosion and rusting. The picture *(D)* shows the tower after completion of the aforementioned works.

Installing Mast, Rotator and Stack Boom



(Up) View of tower from the base inside the ceiling below roof of the building.

(Right) The Mast, Rotator and the Stack Boom installed to give support to the antennas

(Left) Mr. Dawa of DoTS getting the alignment correct before installing the rotator and stack boom.

(Below) Mr. Rinchen installing the rotator cables

Assembling of Antenna Elements

(Up) Mr. Rinchen looking for correct antenna element.

(Up & Right) Mr. Rinchen and Ms. Karma assembling the VHF antenna elements.

Installation of Antenna

(Up) The staff of MoIC checking the antenna before installing it on the stack boom.

(Below) Preparing to lift the antennas to be installed on the stack boom at top of the tower.

Mounting of UHF & VHF Antenna on Tower

(Left) The staffs of MoIC installing the UHF antenna onto the stack boom.

(Up) UHF and VHF antennas after successful installation on the stack boom

(Right) View from below the base of the tower after both the UHF and VHF antennas were installed.

Antenna Cable Connections

(Left) Amplifier and lightning protectors are installed at the base of the tower. Ground connectivity is provided to each device.

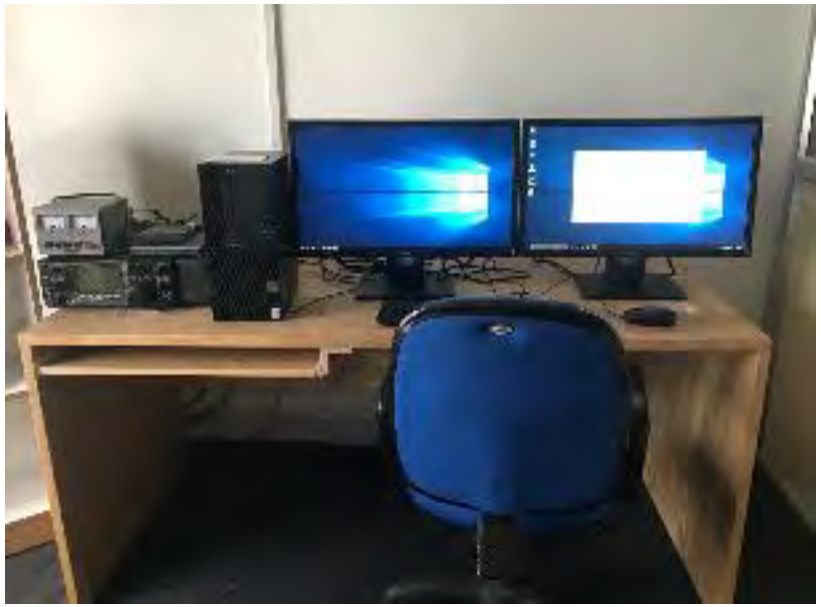
(Right) The Power cable for the amplifier is modified to meet the power supply arrangement.

(Left) The RF cables and the rotator cables are laid through a PVC pipe from top of the tower to the base.

Control Room Setup

(Up) Mr. Rinchen and Mr. Dawa setting up the radio and connecting it with the newly installed UHF and VHF antennas.

(Right) Mr. Rinchen and Ms. Karma setting up the PC and connecting it with the radio. The basic connectivity has been tested.



(left) Final set up of the ground station devices inside of the control room which has been relocated from ground floor to the second floor of the building.

Ground Station Operation Team at DITT

Mr. Karma Jamyang
Sr. ICT Officer, DoTS

Mr. Sonam Phuntsho
Chief of DoTS

Mr. Thuenzang Choephel
Engineer, DoTS

Ms. Thaye Choden
ICT Officer, DoTS

Mr. Dawa Puensum Lodey
Engineer, DoTS

Ms. Karma Yuden Dorjee
ICT Officer, DoTS

Mr. Rinchen Khando
Engineer, DoTS

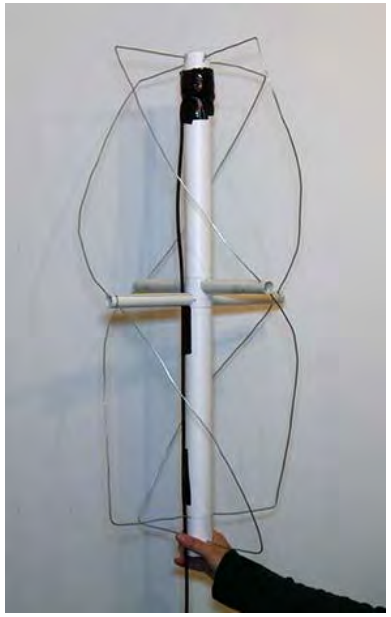
End of article by Karma Yuden Dorjee

02. Receiving satellite signals can be easier than you realize

All you need are: **(1)** SDR, Software Defined Radio, **(2)** an antenna of some kind, and **(3)** computer software.

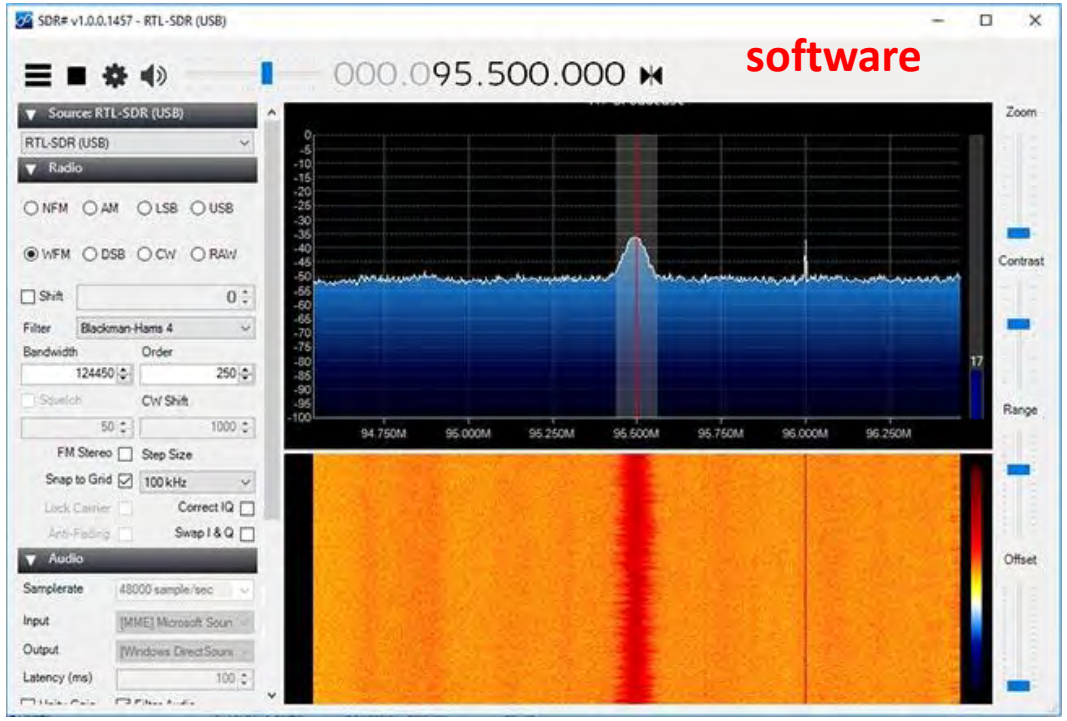
This is an SDR (software defined radio) dongle, which you can easily buy from Amazon. Most are in the $15-$30 range because the core component is essentially the same (a chip called **R820T/2**).

antenna



Home-made antenna (sample)

software



Listening to an FM radio station with SDR#

All of the above were taken from this website
http://spaceskills.org/receiving-satellite-transmissions/

Compared to five years ago, you can now make a home satellite ground station at a very very low price. The SDR is under thirty dollars and the needed software is downloaded from the Web at no cost to you.

03. IAF Emerging Space Leaders (ESL) selected for Year 2018

Summary intro for all 25 winners are here:
www.iafastro.org/iaf-emerging-space-leaders-2018/

The **IAF Emerging Space Leaders (ESL) Grant Programme** enables each year 25 students and young professional between the age of 21 and 35 to participate in the **International Astronautical Congress (IAC)**, as well as in the **UN/IAF Workshop and the Space Generation Congress**, both held the week prior to the Congress.

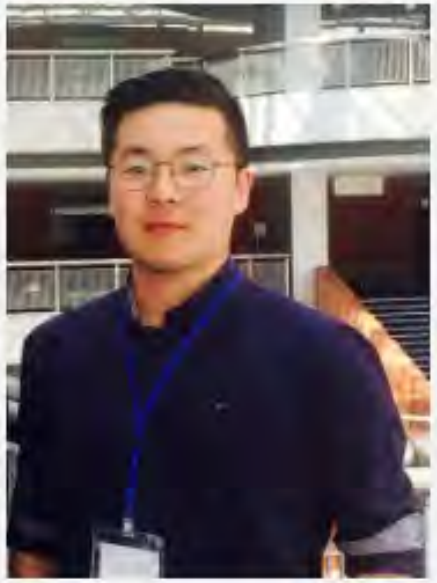
The IAF is proud to introduce the 2018 IAF Emerging Space Leaders!

These 25 students and young professionals were chosen by the Emerging Space Leaders Steering Committee composed of nine highly experienced space stakeholders. They will fly off to Bremen in September 2018 to participate in the IAC and have the opportunity to extend their network, gain knowledge and meet space experts!
[this text from the link shown at the left]

Kyutech (and its BIRDS Project) is pleased to announce that four of the selected 25 Emerging Space Leaders are associated with the BIRDS Project.

Please see the next four pages.

Erdenebaatar Dashdondog . . . or “Erka”



“I am the head of Nano-Satellite development laboratory of the National University of Mongolia. I was interested in space activities and involved in space programs when it was just emerged in university level. I have participated National Cansat Competition as a supervisor of NUM Cansat team. I have got my doctor degree in space engineering while I design, build and operate first Mongolian satellite named MAZAALAI with team of Mongolia at Kyutech (Kyushu Institute of Technology) Japan. We, team who build the first Mongolian satellite, founded a non-governmental organization so called Mongolian Space Technology Association (MoSTA) in 2017, with the support of NUM and Institute of Astronomy and Geophysics Mongolian Academy of Sciences. MoSTA’s goals are to promote education and application of space technology, and then to support research and collaboration of local and foreign institutions, and to advise to the government in this field. Yet, Mongolia has no space agency, but demands, interests and activity in this field have been increasing rapidly. MoSTA will be the helpful non-governmental organization for establishment of national space agency by collective knowledge, information and human resource.”

MAZAALAI is one of the five satellites of BIRDS-1

Summary intro for all 25 winners are here:
www.iafastro.org/iaf-emerging-space-leaders-2018/

Siti Amalina Enche Ab Rahim

Siti Amalina received her Diplôme d'Ingénieur from École Nationale Supérieure d'Electronique et de Radioélectricité de Grenoble, France and her Doctor of Engineering from Kyushu University, Japan, both in electronics engineering, in 2008 and 2017, respectively. She is currently a lecturer at Universiti Teknologi MARA (UiTM), Malaysia and also a research coordinator at Center for Satellite Communication, UiTM. Her current project is the development of ground communication system for the first UiTM's nanosatellite, which is a collaboration project with other universities from Japan, Bhutan and Philippines. As a beginner in space and satellite technology, she believes in teamwork, where, the development of space research activities in Malaysia can be accelerated when every party works in a team. For that reason, collaborations or partnerships, both national and international, are important.

Summary intro for all 25 winners are here:
www.iafastro.org/iaf-emerging-space-leaders-2018/

UiTM's nanosatellite is one of three satellites of BIRDS-2, which was deployed from the ISS in August of 2018

Esteban Martínez

Esteban Martínez is an electronic engineer who is currently pursuing MSc in Embebbed Systems at the Costa Rica Institute of Technology (TEC) in San Jose, Costa Rica. His main interest and main research is the Store & Forward systems for remote sensing in small satellites as CubeSats. In the Space Systems Laboratory (SETEC-Lab), he worked as the telecommunications engineer in the Irazú Project, the first satellite in Central America that aims to monitor the carbon dioxide fixation in the Costa Rica's forests. After integrating and long-distance testing of the communications subsystems of the flight and ground segments, he went to the Kyushu Institute of Technology (Kyutech) in Japan to perform the satellite environmental tests and get the certification for the ISS launch with JAXA.

He was part of the International Workshop of Lean Satellite (IWLS) in 2018 organized by Kyutech, where he had the opportunity of participating in the First Ground Station Operation Workshop for the BIRDS project, consisting of a ground station network with more than 13 countries involved.

Summary intro for all 25 winners are here:
www.iafastro.org/iaf-emerging-space-leaders-2018/

Oniosun Temidayo

Oniosun is currently the Regional Coordinator (Africa) for Space Generation Advisory Council of the United Nations where he is leading African Students and Young Professionals in the creation of International Space Policy, ensuring their opinion is heard in key policy making at the United Nations Office for Outer Space Affairs.

He has been listed as one of the World 24 Under 24 Leaders and Innovators in SPACE and STEAM by The Mars Generation and by BellaNaija as one of the 25 under 25 Nigerians who are influencing and disrupting the world of Entrepreneurship, Leadership, Governance and Corporate World.

Oniosun was a research scientist at the Centre for Space Research and Applications, Federal University of Technology, Akure where he Coordinated all Space Education and Outreach of the Centre and was on the Ground Station development team of NigeriaEduSAT-1 (Nigeria's first CUBESAT). **This CUBESAT was one of five satellites of BIRDS-1**

Summary intro for all 25 winners are here:
www.iafastro.org/iaf-emerging-space-leaders-2018/

04. Member of BIRDS-1 team secures one of the the Emerging Space Leaders awards

Dr. Erdenebaatar Dashdondog
2018 recipient of IAF
Emerging Space Leader Award

Dr Dashdondog now teaches at the National Univ. of Mongolia. He was a member of the student team that built Mongolia's first satellite, as part of BIRDS-1. At IAC Bremen (later this year) he will present the talk outlined below.

25th IAA SYMPOSIUM ON SMALL SATELLITE MISSIONS (B4)
19th Workshop on Small Satellite Programmes at the Service of Developing Countries (1)

Author: Dr. Erdenebaatar Dashdondog
Mongolia, erdenebtr@gmail.com

POSSIBLE PLAN OF SPACE TECHNOLOGY DEVELOPMENT IN MONGOLIA CORRESPONDING THE COUNTRY'S FEATURES

Abstract

The low population density, wide land, rich natural resources and nomadic life culture make unique needs of space technology and its application for Mongolia. In order to satisfy needs of country, small satellite development is suitable as considering economical and infrastructural capacity. On the other hand academic organization such as national university which has broad international network can be acceptable starting point of place to carry out space activities in Mongolia. Dedicated human capacity building is highest priority to make above real. In order to do this legal environment should be clearly defined. National University of Mongolia plays for main role on it. Each issues are mentioned in the proposing plan.

05. Definition and Requirements of Small Satellites Seeking Low-Cost and Fast-Delivery

Definition and Requirements of Small Satellites Seeking Low-Cost and Fast-Delivery

SKU: B048

Description:

Definition and Requirements of Small Satellites Seeking Low-Cost and Fast-Delivery, Published in January 2018, 83 pages. Soft cover. Objectives of this report are to examine the definitions of small satellites, identify the requirements every satellite should follow regardless of its size or development philosophy and then reflect some of the findings to the draft of ISO-20991, "Space Systems - Requirements for Small Spacecraft". The standard aims at describing minimum requirements for small satellites to answer the concerns raised over due to the recent explosive growth of small satellite launches. Over the course of the study, intensive discussion was made about how to describe small satellites best. The majority of the opinions was that neither "mass" nor "size" is suitable for defining small satellites. Rather, philosophy of design, manufacturing, mission, program management, etc., should be used for the definition. The study group came to the conclusion that using the term "lean satellite" to reflect satellite development philosophy is more suitable than saying "small satellite". 35 Euros shipping included.

€35.00

NEW BOOK PUBLISHED BY IAA

The cover of this book was designed by Abdulla Hil Kafi (BIRDS-1 team member from Bangladesh)

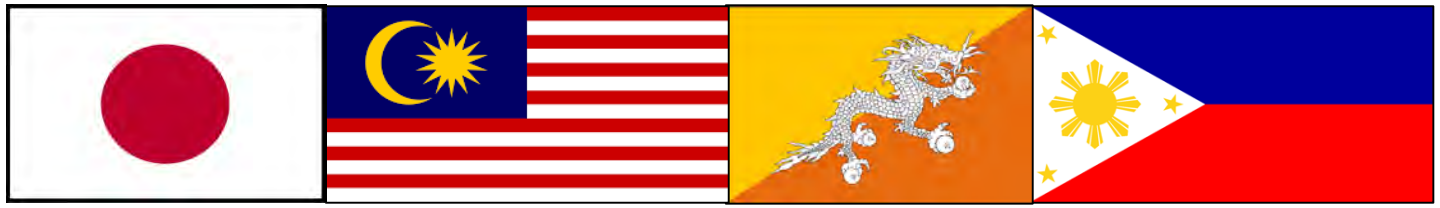
Definition and Requirements of Small Satellites Seeking Low-Cost and Fast-Delivery

Edited by: Mengu Cho, Filippo Graziani
International Academy of Astronautics
Code ISBN/EAN IAA: 978-2-917761-59-5; 2017

Go to the IAA link for this book:
https://shop.iaaweb.org/?q=catalog/3&page=3

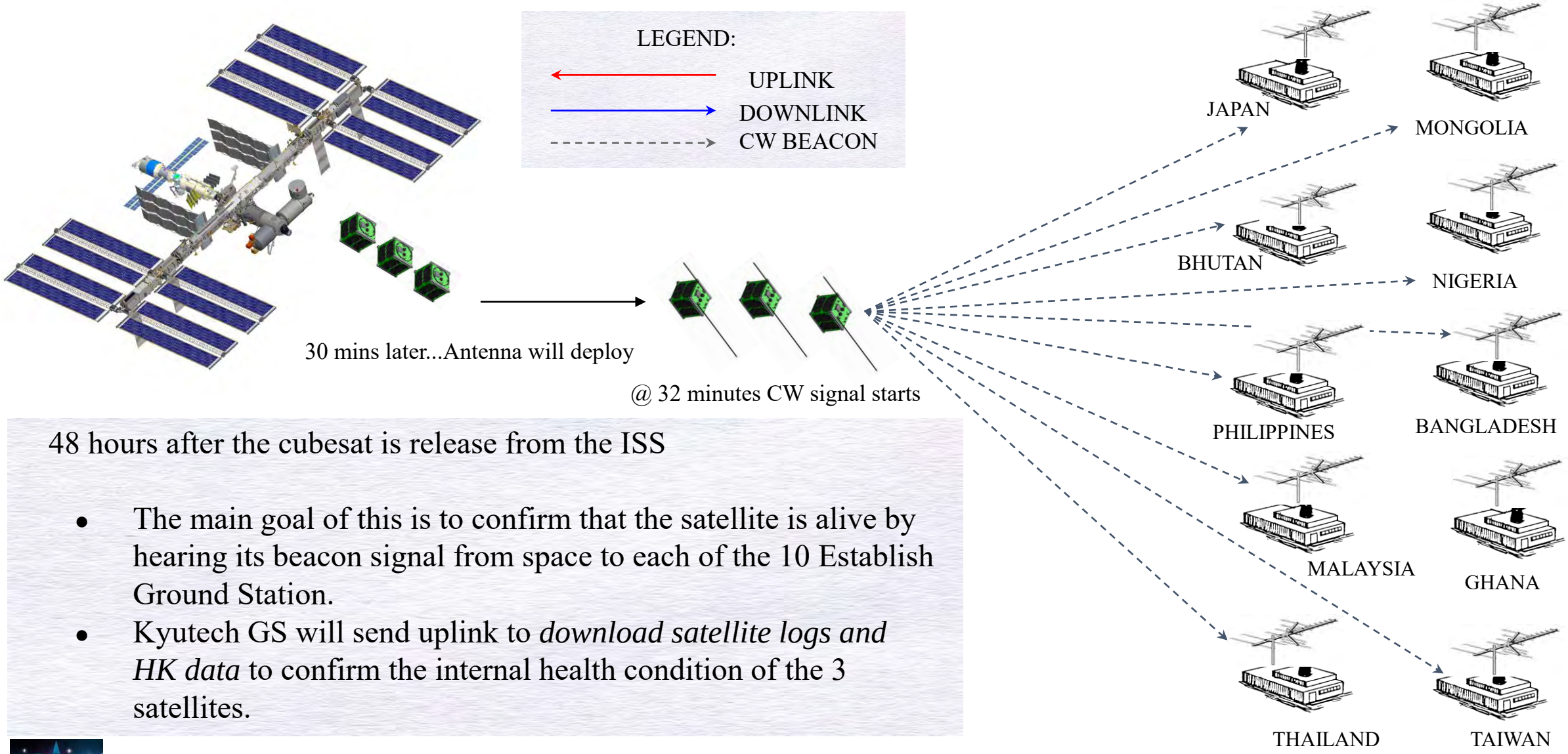
BIRDS-2

Japan Malaysia Bhutan Philippines



Documentation produced by the team

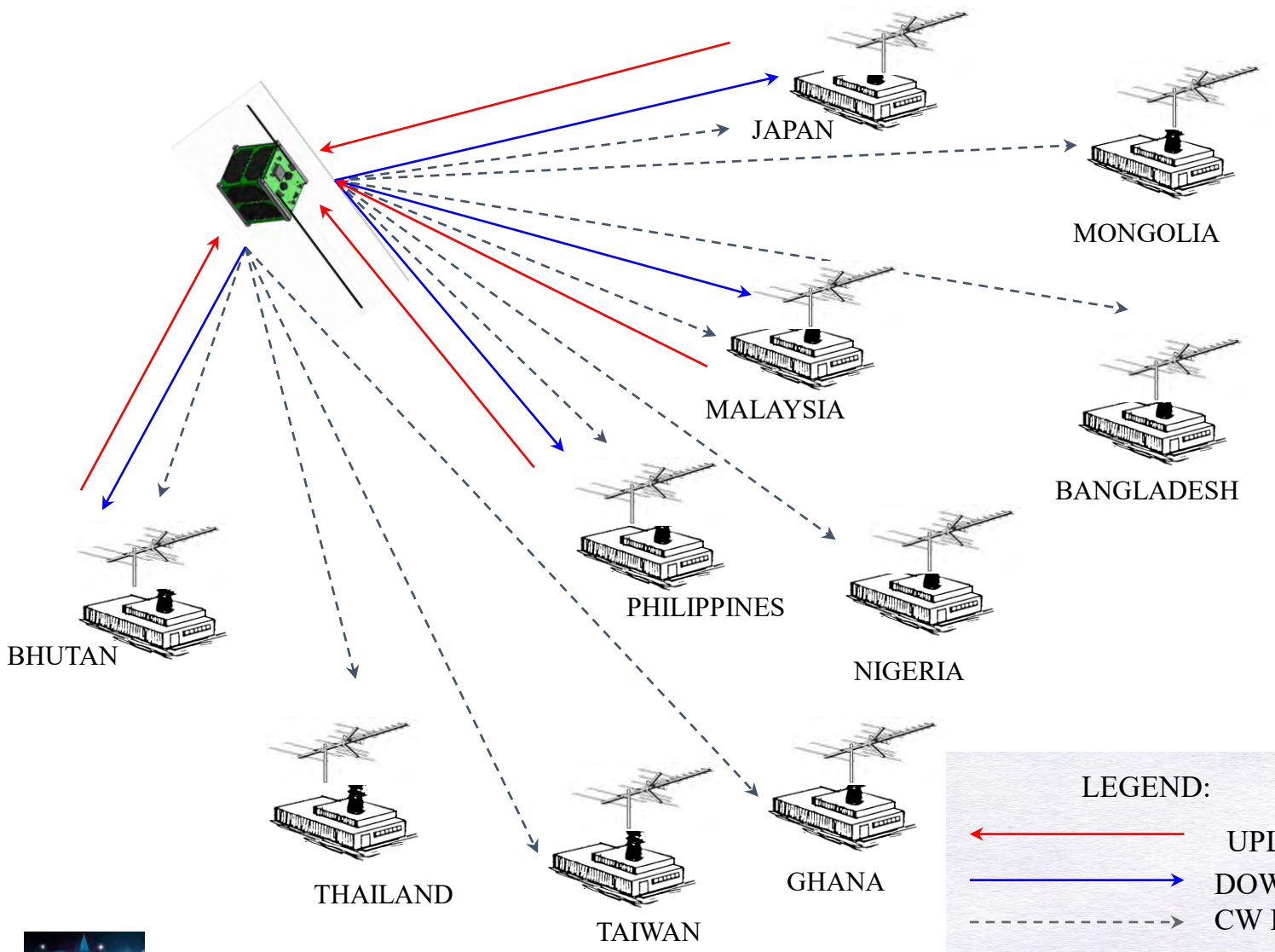
First Acquisition Phase: x + 48 hours



48 hours after the cubesat is release from the ISS

- The main goal of this is to confirm that the satellite is alive by hearing its beacon signal from space to each of the 10 Establish Ground Station.
- Kyutech GS will send uplink to *download satellite logs and HK data* to confirm the internal health condition of the 3 satellites.

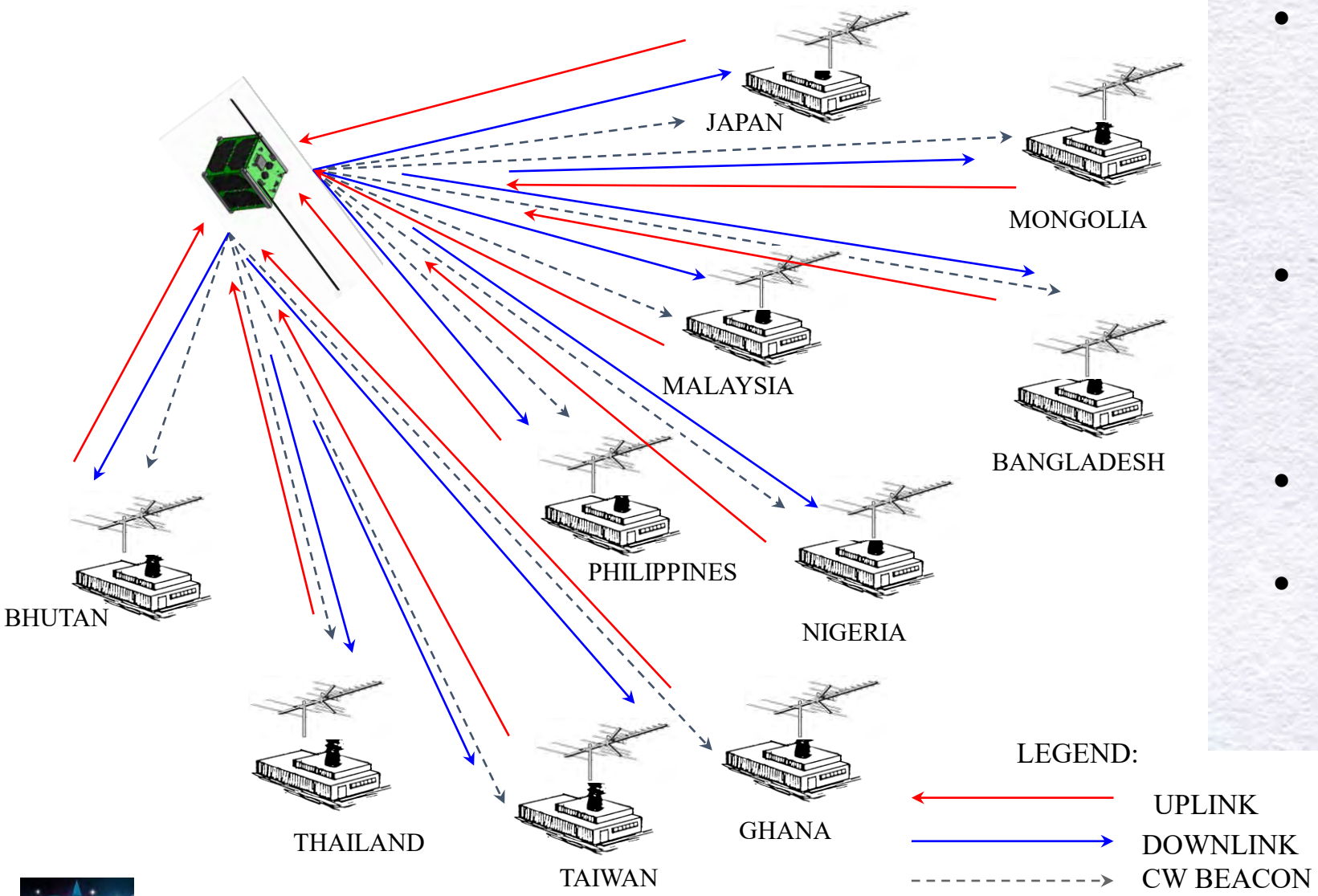
Initial Operation Phase: x+ 7 days



- BIRDS-2 Members country will confirm the UPLINK & DOWNLINK capability of there each GS
  a. Deactivate Heater / GPS
  b. Satellite logs & Latest HK data
  c. Execute Missions - Camera
  d. Data & Start download from ISS deployment

- The rest of the BIRDS network GS and the Amatuer Radio Community *will continue tracking the satellites*
- All the data will be sink and stored in cloud server
- Skype meeting will be done to check the local GS operation status

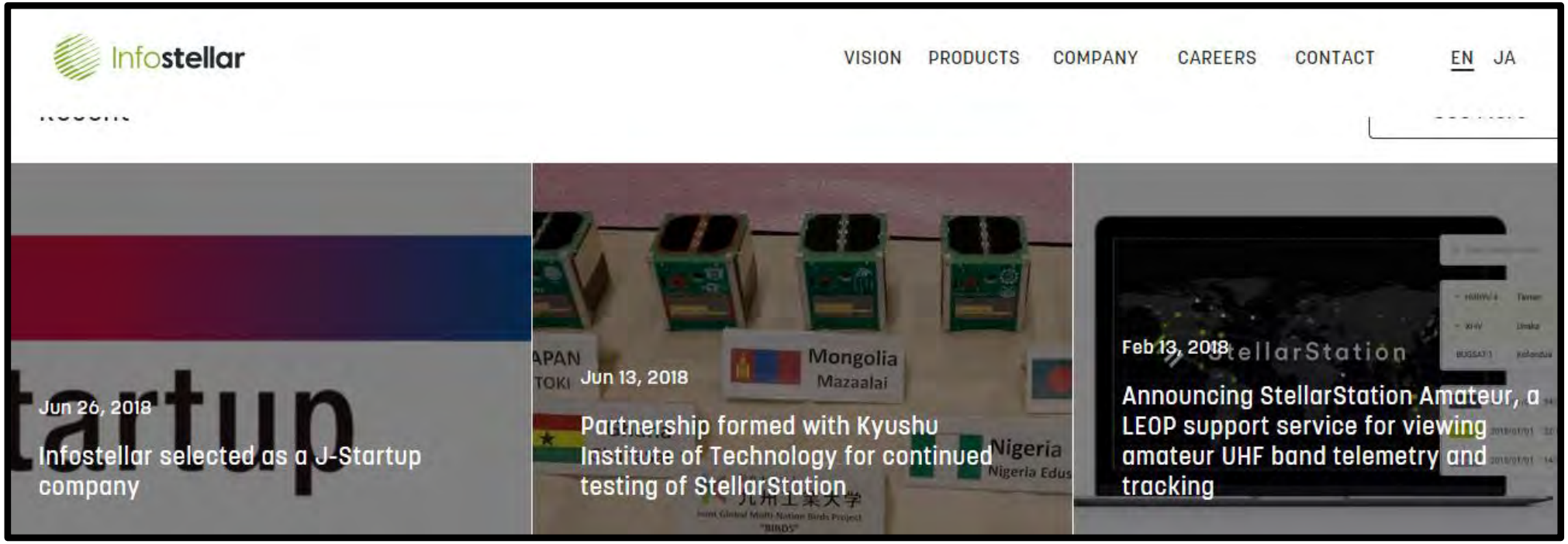
Pre-Nominal Operation: x + 25 days



- Within 25 days or more. All 10 BIRDS Network GS will confirm the UPLINK & DOWNLINK capability of there each GS *but depends and according to schedule given GS HQ (Kyutech GS)*
- Download commands will be based on the satellite health status due to power limitation in of satellite in space
- All the data will be sink and stored in cloud server
- Within the accomplishment of this phase. We can evaluate the initial success of BIRDS-2 cubesat missions

07. Infostellar is an important partner of the BIRDS Project

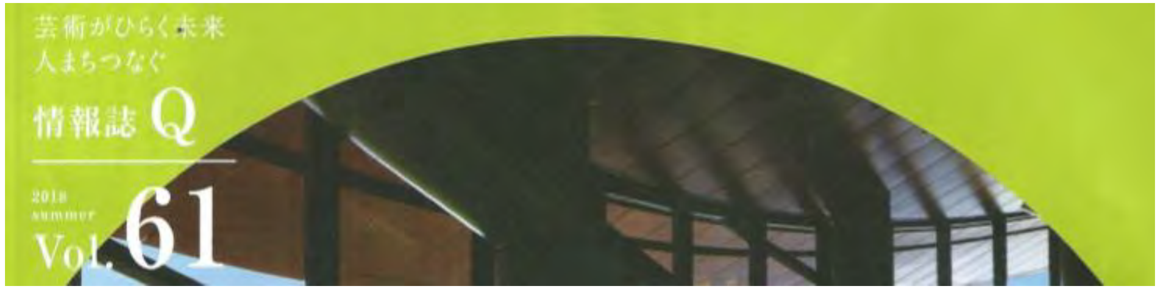
The **BIRDS Project** works with Infostellar to secure radio licenses and to organize BIRDS network ground stations.



Infostellar

To learn more about Infostellar, please visit their website:
https://www.infostellar.net/

08. September cultural events in Kitakyushu, from Q magazine



9 September

♬	川久保賜紀×遠藤真理×三浦友理枝	8土	15:00	一般¥3000、25歳以下¥2000	響ホール音楽事業課 093-663-6661
♬	CONCERT響2018「縦横無尽」	9日	15:30	一般¥2000、学生(小〜大学生)¥1000	北九州音楽協会 080-5286-0512(中)
🎤	アーツスタッフ養成講座シリーズ ホスピタリティ・カスタマーサポート研修 〜車いすユーザーサポート〜	11火	10:00/13:30	¥756(資料代)	響ホール音楽事業課 093-663-6661
♬	森野由み ソプラノリサイタル Prologue〜with Gratitude〜 感謝	29土	15:00	一般¥3000、会員¥2500	森野由みさんを支援する会 080-9792-6268

北九州市立 響ホール
HIBIKI HALL

〒805-0062 北九州市八幡東区平野1丁目1-1国際村交流センター内
TEL 093-662-4010(9:00〜18:00) FAX 093-662-0100
http://www.hibiki-hall.jp

JR Yahata Station

9 September

♬	大	九州交響楽団 第65回北九州定期演奏会	1土	15:00	一般¥3700、学生(小〜大学生)¥1100	九響チケットサービス 092-823-0101
♬	小	5人のギターリストによるスペイン音楽の夕べ	1土	19:00	一般¥3000、学生(小〜大学生)¥2000	093-522-3857
♬	小	第8回東日本大震災復興支援チャリティーコンサート 〜熊本地震・大雨災害にも復興支援を〜	2日	14:00	一般¥1000、高校生以下¥500	チャリティーコンサート実行委員会
🎤	大	市制55周年記念 第53回年長者の祭典	3月	14:00	無料	
🎤	大	2018ワールドパラ・パワーリフティング アジア&オセアニアオープン選手権大会	8土-12水	11:00	無料	03-6229-5423
🎤	中	新小倉病院 市民公開講座	8土	14:00	無料	093-571-1031(井之上)
🎤	中	プロフェッショナル修斗公式戦福岡大会「闘裸男23」	9日	15:00		TORAO NATION STATE(SECONDOUT)
♬	大	北九州歌謡フェスタ	16日	10:15	無料	093-583-1991
♬	小	杉岡寿子ピアノ教室発表会	16日	14:00	無料	
⛩	中	2018年度小倉北区文化祭参加 ほほえみさん ため息さん こんにちは	17月祝	14:00		093-571-6718
♬	中	秋の交通安全運動キャンペーン 交通事故防止コンサート	20木	14:30	無料	小倉北区交通安全推進協議会
⛩	小	DDW/「石川直樹 この星の光の地図を写す」展関連企画 森下真樹「ベートーヴェン交響曲第5番「運命」全楽章を踊る」	22土・23日祝	14:00	一般¥3000、ユース¥1500	北九州芸術劇場 093-562-2655
⛩	中	が〜まるちょばサイレントコメディー JAPAN TOUR 2018	23日祝	17:30	¥5500	092-714-0159
♬	小	第3回みんなで歌おうコンサート	25火	15:00	¥1000	
⛩	中	北九州市民劇場9月例会 劇団青年座「横濱短篇ホテル」	28金-10/5金		会費	北九州市民劇場 093-541-0075

北九州芸術劇場
KITAKYUSHU PERFORMING ARTS CENTER

〒803-0812 北九州市小倉北区室町1丁目1-1-11リバーウォーク北九州内
TEL 093-562-2655(10:00〜19:00) FAX 093-562-2588
http://q-geki.jp

JR Kokura Station

09. The world of home-made CubeSats

Some staff and students of Kyutech created this article (see the stuff at the right) for the magazine below.

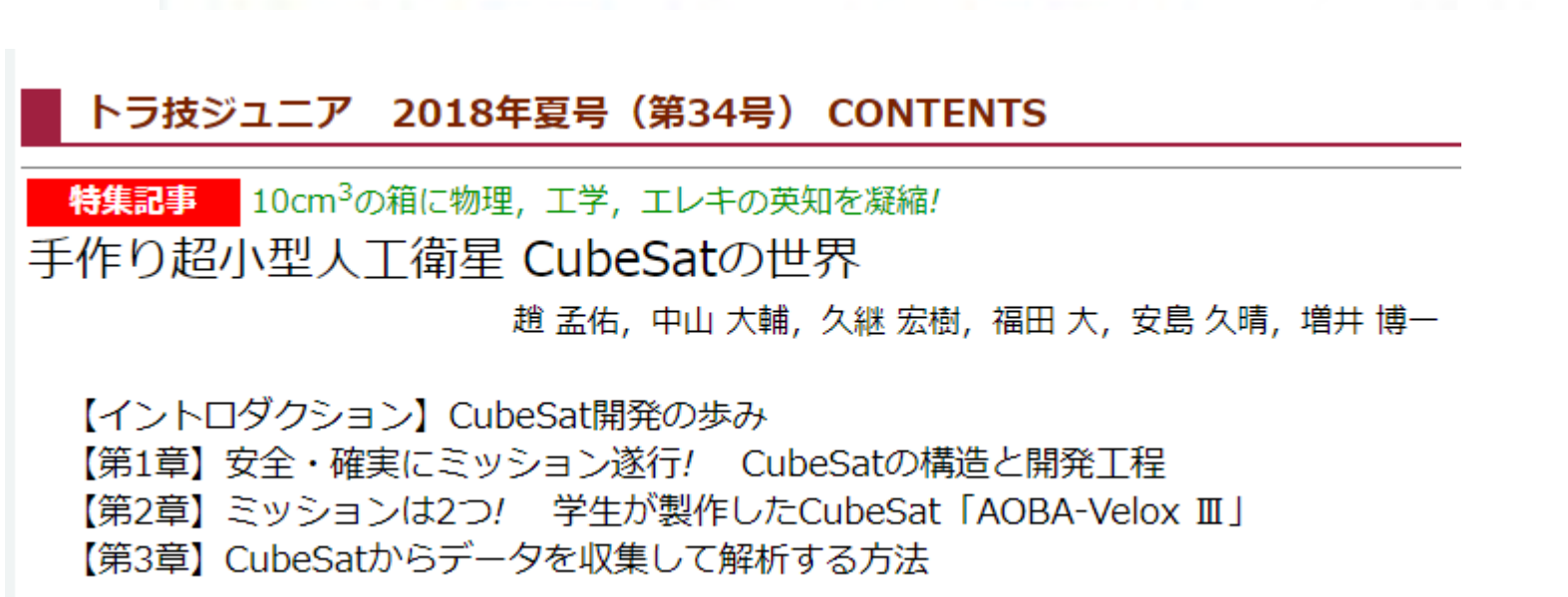
CQ出版社

ものづくり 初めの一歩

トラ技Jr.

トラ技Jr.とは？
送付申込

To learn more about this magazine, visit the site below.



トラ技ジュニア　2018年夏号（第34号） CONTENTS

特集記事 10cm³の箱に物理，工学，エレキの英知を凝縮!

手作り超小型人工衛星 CubeSatの世界

趙 孟佑，中山 大輔，久継 宏樹，福田 大，安島 久晴，増井 博一

【イントロダクション】CubeSat開発の歩み
【第1章】安全・確実にミッション遂行!　CubeSatの構造と開発工程
【第2章】ミッションは2つ!　学生が製作したCubeSat「AOBA-Velox Ⅲ」
【第3章】CubeSatからデータを収集して解析する方法

View the magazine here (in Japanese):
http://toragi.cqpub.co.jp/Portals/0/support/junior/

10. Tobata Gion Yamagasa Festival defied the approach of Typhoon No. 12

The night of 28 July 2018

光の山笠 夜に映えて

巨大な提灯山笠で知られる「戸畑祇園大山笠」（国指定重要無形民俗文化財）の競演会が28日夜、北九州市戸畑区の戸区役所前で開かれた。鉦や太鼓のおはやしに合わせて「光のピラミッド」が揺れ動き、夜の街を幻想的に彩った＝写真、久保敏彦撮影＝。

4基の大山笠が、金糸などで刺しゅうされた装飾幕で飾られた舁き山笠から、12段309個の提灯が飾り付けられた提灯山笠（高さ約10m、約2.5トン）に変える「五段上げ」を披露。法被姿の男衆のかけ声に合わせて練り歩いた。戸畑祇園大山笠は約210年の歴史があり、2016年には国連教育・科学・文化機関（ユネスコ）の無形文化遺産に登録された。

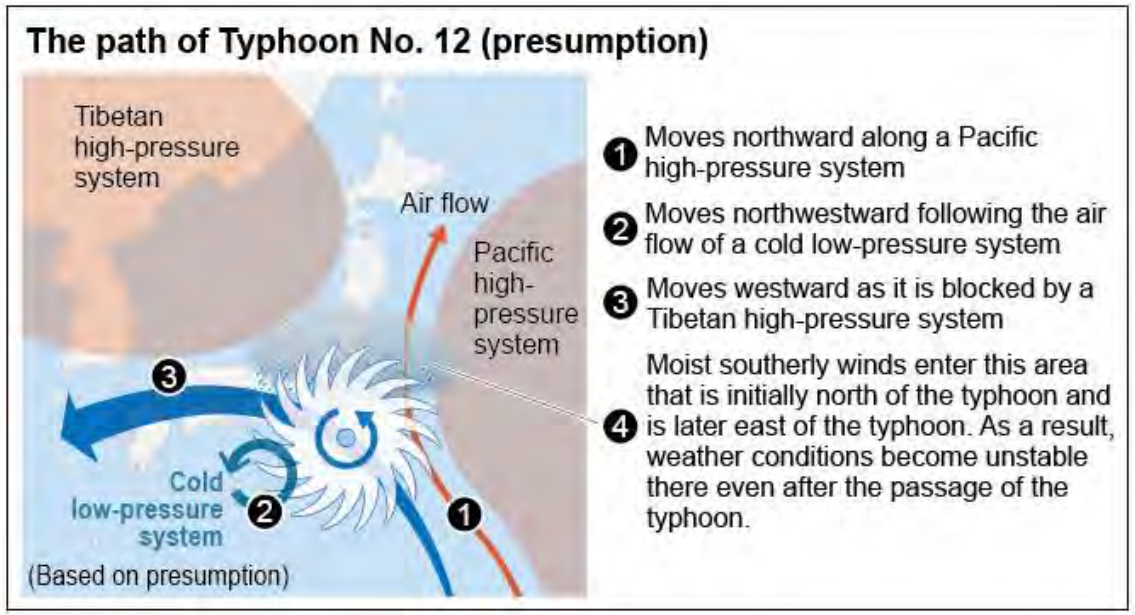
THE YOMIURI SHIMBUN

讀賣新聞

2018年(平成30年) 7月29日日曜日

Typhoon No. 12 took rare path not seen in the record books

By RYO YAMAGISHI/ Staff Writer
Asahi Shimbun
July 29, 2018 at 18:25 JST



(The Asahi Shimbun)

Since the Japan Meteorological Agency began compiling records in 1951, Typhoon No. 12 stands out as the only one that has barreled across the Japanese archipelago from east to west.

The powerful typhoon took the rare path mainly because of the presence of a cold low-pressure system.

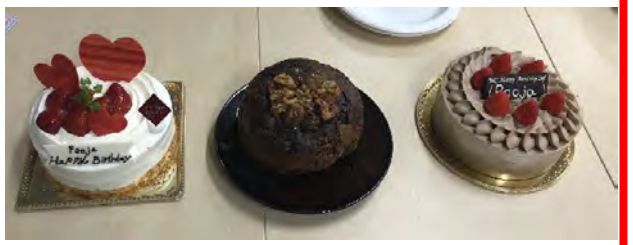
The occurrence of that low-pressure system is not rare in itself. However, influenced by the presence of two high-pressure systems, the typhoon took the rare path.

Typhoon No. 12, which formed south of Japan on July 25, moved northward along the Pacific high-pressure system. After that, it approached a cold low-pressure system, which was initially located east of Japan.

The cold low-pressure system slowly moved westward while maintaining a counterclockwise air flow. Then, the typhoon moved northwestward and then westward as if it was engulfed in the air flow of the cold low-pressure system.

The festival as explained by Wiki:
https://en.wikipedia.org/wiki/Tobata_Gion_Yamagasa_festival

11. Monthly BIRDS-3 Pot Luck Dinner, and birthday celebration for Pooja



Watermelon from dad of Goto-san

12. JICA and NUST send-off Senior (recipient of ABE Initiative Scholarship)

FROM LEFT: Mr Shiro Nabeya, Resident Representative: JICA; Senior Shimhanda, scholarship recipient; Nora Lydia Ngatjizeko, scholarship recipient; Dr Tjama Tjivikua, NUST Vice-Chancellor; Mr Ned Sibeya, Chief Development Advisor: National Planning Commission; H. E. Hideaki Harada: Ambassador of Japan, and Dr Samuel John, Dean: NUST Faculty of Engineering.

NAMIBIA UNIVERSITY OF SCIENCE AND TECHNOLOGY

From NUST website:

A send-off ceremony was held for two beneficiaries of full scholarships awarded through the African Business Education Initiative for the Youth (ABE Initiative) from the Government of Japan. The recipients, Senior Shimhanda [the one coming to Kyutech] and Lydia Ngatjizeko, are NUST graduates.

Link to this site:
http://www.nust.na/?q=news/japanese-government-awards-full-scholarships

13. Kyutech upgrades the English version of its official web site on the Internet

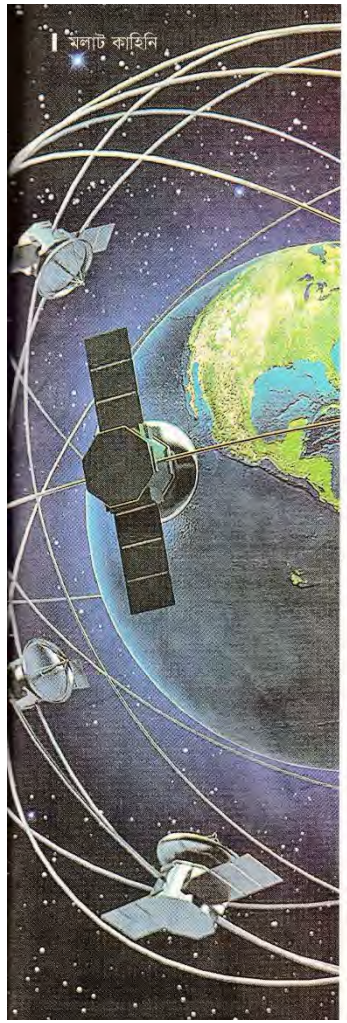
Please visit the new English site of Kyutech:

http://www.kyutech.ac.jp/english/index.html

14. Two items from Bangladesh

One article is below, and the other one is on the next page.

An article written by Kafi and Antara on “Biggan Chinta”, one of the popular Monthly Science Magazine about the transfer orbit concept, technical specification and application of **Bangabandhu-1**, the first geostationary satellite of Bangladesh. This satellite was launched on May 12, 2018.



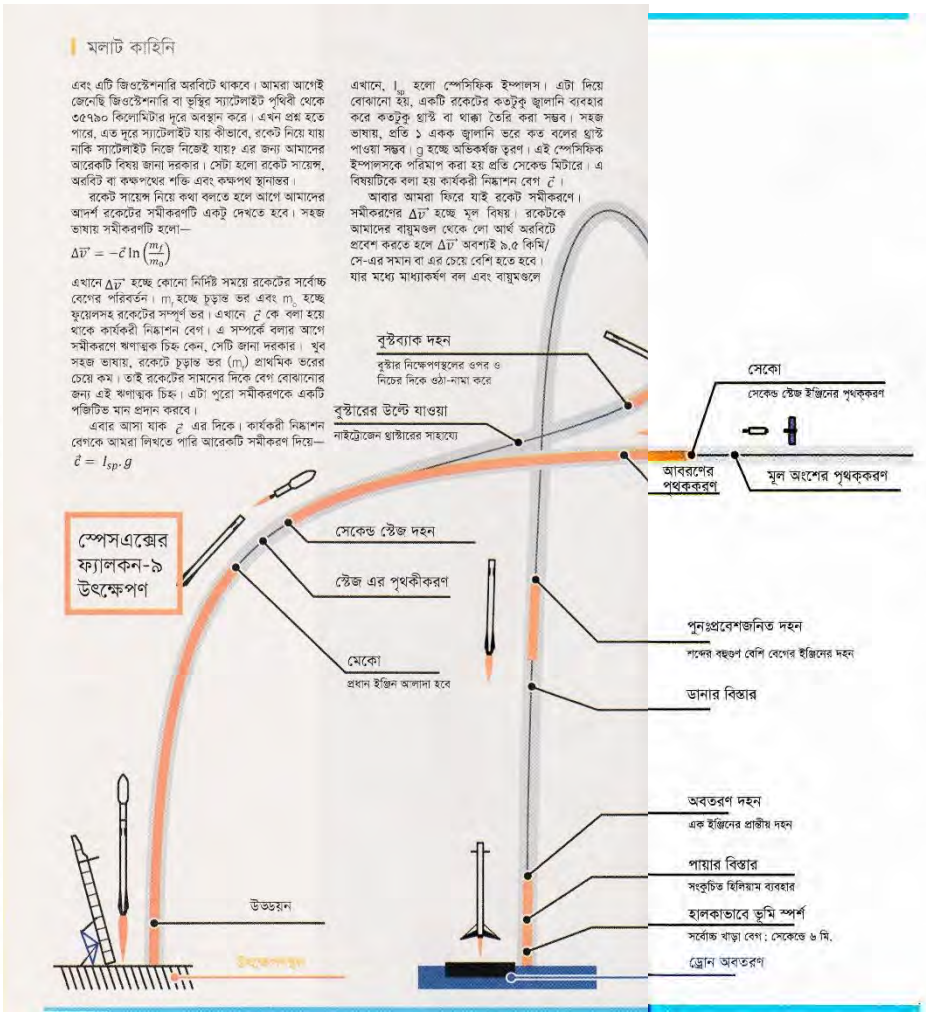
মলাট কাহিনি

মহাকাশে স্যাটেলাইট

আবদুল্লা হিল কাফি
রায়হানা শামস ইসলাম

মহাবিশ্বে যত গ্রহ বা উপগ্রহ আছে, সবার নিজস্ব কিছু চলার পথ আছে, যাকে বলা হয় অরবিট বা কক্ষপথ। এসব বস্তুর একটি করে নিজস্ব কক্ষীয় শক্তি আছে। এবার আসা যাক কৃত্রিম উপগ্রহে। যেসব উপগ্রহ মানুষের তৈরি, তাকে কৃত্রিম উপগ্রহ অথবা আর্টিফিশিয়াল স্যাটেলাইট বলা হয়। এসব কৃত্রিম উপগ্রহেরও নিজস্ব কক্ষপথ আছে। একটা কক্ষপথে কৃত্রিম উপগ্রহের অবস্থান বা গতি বোঝার জন্য মোট ছয়টি বিষয় খুব গুরুত্বপূর্ণ—নতি কোণ (Inclination Angle), পেরিঅ্যাপসিস আরগুমেন্ট (Argument of Periapsis), লঙ্গিটিউড অব অ্যাসেন্ডিং নোড (Longitude of ascending node), ইকসেনট্রিসিটি (Eccentricity), সেমি-মেজর অ্যাক্সিস (Semi-Major-Axis) এবং মধ্যকোণ (Mean Anomaly)। এগুলো নিয়ে অন্য কোনো লেখায় বিস্তারিত বলা যাবে।

বেশ কয়েকটি বিষয়ের ওপর ভিত্তি করে বিভিন্ন অরবিটের নাম দেওয়া হয়েছে। একেকটি অরবিটের জন্য এসব বিষয়ের মান একেক রকম হয়। তবে মিশনের ধরনের ওপর ভিত্তি করে কৃত্রিম উপগ্রহের কক্ষপথ বিভিন্ন রকম হয়ে থাকে। যেমন লো আর্থ অরবিট ২০০-১০০০ কিলোমিটার, মিডিয়াম হাইট আর্থ অরবিট ১২০০-৩৫৭৮৬ কিলোমিটার, জিওস্টেশনারি অরবিট ৩৫৭৯০ কিলোমিটার, হাইলি ইলিপটিক্যাল অরবিট, নন-জিওসেন্ট্রিক অরবিট, স্পেস স্টেশন, গ্ল্যানেটারি সার্ফেস এবং অন অরবিট সার্ভিসিং অ্যান্ড রেসকিউ। এ ছাড়া আরেকটি মজার কক্ষপথ আছে, যার নাম কবরস্থান বা গ্রেভইয়ার্ড কক্ষপথ। এটা জিওস্টেশনারি কক্ষপথ থেকে প্রায় ৩০০ কিলোমিটার ওপরে অবস্থিত। জিওস্টেশনারি কক্ষপথের কৃত্রিম উপগ্রহের কাজ শেষ হয়ে গেলে সেগুলোকে এই গ্রেভইয়ার্ড অরবিটে পাঠানো হয়। আমাদের বঙ্গবন্ধু স্যাটেলাইট-১ দেশের প্রথম কমিউনিকেশন স্যাটেলাইট



এবং এটি জিওস্টেশনারি অরবিটে থাকবে। আমরা আগেই জেনেছি জিওস্টেশনারি বা ভূস্থির স্যাটেলাইট পৃথিবী থেকে ৩৫৭৯০ কিলোমিটার দূরে অবস্থান করে। এখন প্রশ্ন হতে পারে, এত দূরে স্যাটেলাইট যায় কীভাবে, রকেট নিয়ে যায় নাকি স্যাটেলাইট নিজে নিজেই যায়? এর জন্য আমাদের আরেকটি বিষয় জানা দরকার। সেটা হলো রকেট সায়েন্স, অরবিট বা কক্ষপথের শক্তি এবং কক্ষপথ স্থানান্তর।

রকেট সায়েন্স নিয়ে কথা বলতে হলে আগে আমাদের আদর্শ রকেটের সমীকরণটি একটু দেখতে হবে। সহজ ভাষায় সমীকরণটি হলো—

$$\Delta\vec{v} = -\vec{c}\ln\left(\frac{m_f}{m_0}\right)$$

এখানে $\Delta\vec{v}$ হচ্ছে কোনো নির্দিষ্ট সময়ে রকেটের সর্বোচ্চ বেগের পরিবর্তন। m_f হচ্ছে চূড়ান্ত ভর এবং m_0 হচ্ছে ফুয়েলসহ রকেটের সম্পূর্ণ ভর। এখানে $\vec{c}$ কে বলা হয়ে থাকে কার্যকরী নিষ্কাশন বেগ। এ সম্পর্কে বলার আগে সমীকরণে ঋণাত্মক চিহ্ন কেন, সেটি জানা দরকার। খুব সহজ ভাষায়, রকেটে চূড়ান্ত ভর (m_f) প্রাথমিক ভরের চেয়ে কম। তাই রকেটের সামনের দিকে বেগ বোঝানোর জন্য এই ঋণাত্মক চিহ্ন। এটা পুরো সমীকরণকে একটি পজিটিভ মান প্রদান করবে।

এবার আসা যাক $\vec{c}$ এর দিকে। কার্যকরী নিষ্কাশন বেগকে আমরা লিখতে পারি আরেকটি সমীকরণ দিয়ে—

$$\vec{c} = I_{sp}.g$$

এখানে, I_{sp} হলো স্পেসিফিক ইম্পালস। এটা দিয়ে বোঝানো হয়, একটি রকেটের কতটুকু জ্বালানি ব্যবহার করে কতটুকু থ্রাস্ট বা ধাক্কা তৈরি করা সম্ভব। সহজ ভাষায়, প্রতি ১ একক জ্বালানি ভরে কত বলের থ্রাস্ট পাওয়া সম্ভব। g হচ্ছে অভিকর্ষজ ত্বরণ। এই স্পেসিফিক ইম্পালসকে পরিমাপ করা হয় প্রতি সেকেন্ড মিটারে। এ বিষয়টিকে বলা হয় কার্যকরী নিষ্কাশন বেগ $\vec{c}$।

আবার আমরা ফিরে যাই রকেট সমীকরণে। সমীকরণের $\Delta\vec{v}$ হচ্ছে মূল বিষয়। রকেটকে আমাদের বায়ুমণ্ডল থেকে লো আর্থ অরবিটে প্রবেশ করতে হলে $\Delta\vec{v}$ অবশ্যই ৯.৫ কিমি/সে-এর সমান বা এর চেয়ে বেশি হতে হবে। যার মধ্যে মাধ্যাকর্ষণ বল এবং বায়ুমণ্ডলে

টান অন্তর্ভুক্ত। যদি আমরা জিওস্টেশনারি অরবিটে প্রবেশ করতে চাই তাহলে অতিরিক্ত ৪.২ কিলোমিটার/সেকেন্ড $\Delta\vec{v}$ এর প্রয়োজন।

ভূস্থির স্যাটেলাইট স্থাপন করা হয় জিওস্টেশনারি কক্ষপথে। এই জিওস্টেশনারি স্যাটেলাইট বহনকারী রকেট কিন্তু জিওস্টেশনারি অরবিট পর্যন্ত স্যাটেলাইটকে পৌঁছে দিয়ে আসে না। এই রকেটের মিশন জিওস্টেশনারি ট্রান্সফার অরবিট বা জিটিও পর্যন্ত সীমাবদ্ধ। এর কারণ হচ্ছে জিও (GEO) অরবিটের জন্য প্রচুর $\Delta\vec{v}$ এর প্রয়োজন, তার মানে প্রচুর জ্বালানির প্রয়োজন। জিটিওতে যেতে যেতেই রকেটের দ্বিতীয় স্টেজের জ্বালানি শেষ হয়ে যায়।

বঙ্গবন্ধু স্যাটেলাইটের ওজন প্রায় সাড়ে ৩ টন। একটি ভূস্থির স্যাটেলাইটের জ্বালানি সবচেয়ে বেশি ওজন বহন করে। কারণ এই জ্বালানি ব্যবহার করেই স্যাটেলাইটটি GTO থেকে GEO-তে অবস্থান লাভ করে থাকে। তা ছাড়া এই জ্বালানি দিয়েই স্যাটেলাইট তার কক্ষপথে অবস্থান স্থির রাখা এবং মিশন শেষ হওয়ার পর গ্রেভইয়ার্ড কক্ষপথেও নিয়ে যাওয়া হয় জ্বালানি ব্যবহার করে।

রকেটের স্টেজ-২ প্রথমে যখন GEO স্যাটেলাইটকে ট্রান্সফার অরবিটে ছেড়ে দেবে তখন সেই অরবিট হবে গোলাকার প্রকৃতির। কিন্তু স্যাটেলাইটকে GEO অরবিটে যেতে হলে এর কক্ষপথকে বড় করতে হয়। তাই কয়েক ধাপে স্যাটেলাইটটি GEO-তে পৌঁছায়। প্রথম ধাপে সার্কুলার থেকে ইলিপ্টিক্যালে প্রবেশ।

গোলাকার অরবিটের বেগ যদি v_i হয় এবং ব্যাসার্ধ যদি r_i হয় তা হলো—

$$v_1 = \sqrt{\frac{\mu}{r_1}}$$

যেখানে, μ = GM, G- মহাকর্ষীয় ধ্রুবক, M পৃথিবীর ভর

এখন মনে করি, ইলিপ্টিক্যাল অরবিটের সবচেয়ে কাছের অংশের দূরত্ব r_1 (পেরিজি বা অনুভূ) এবং সবচেয়ে দূরের অবস্থান r_2 (এপোজি বা অপভূ)। তাহলে ইলিপ্টিক্যাল অরবিটে যাওয়ার জন্য r_1 অবস্থানে বেগ হবে—

$$v_p^2 = \mu\frac{2r_2}{r_1(r_1+r_2)}$$

অর্থাৎ পেরিজিতে বেগ পরিবর্তন লাগবে (১ নম্বর স্থানে)

$$\Delta v_{v_1 \to v_p} = \sqrt{\frac{\mu}{r_1}}.\left(\sqrt{\frac{2r_2}{(r_1+r_2)}} - 1\right)$$

এপোজিতে (২ নম্বর স্থানে)

$$\Delta v_{v_a \to v_2} = \sqrt{\frac{\mu}{r_2}}.\left(1 - \sqrt{\frac{2r_1}{(r_1+r_2)}}\right)$$

এত কষ্টের পর আমাদের বঙ্গবন্ধু স্যাটেলাইট-১ জিওস্টেশনারি কক্ষপথের ১১৯.১ ডিগ্রি পূর্বে অবস্থান করবে। যেকোনো স্যাটেলাইটের কিছু মৌলিক বৈশিষ্ট্য বা সিস্টেম থাকে। প্রথম এবং অতিগুরুত্বপূর্ণ একটি সিস্টেম হলো EPS (Electronics Power System)। এটা মূলত স্যাটেলাইটে শক্তি সরবরাহ করে। সোলার সেল এবং ব্যাটারি এবং এদের ডিস্ট্রিবিউশন সিস্টেম EPS-এর অন্তর্ভুক্ত। এরপর OBC (On Board Computer)। এটা মূলত স্যাটেলাইটের মাদারবোর্ড

হিসেবে কাজ করে। স্যাটেলাইটের সঙ্গে যোগাযোগের জন্য ব্যবহার করা হয় COM system। স্যাটেলাইটের অ্যানটেনা এই সিস্টেমের অন্তর্ভুক্ত। স্যাটেলাইটের মূল উদ্দেশ্য কী, তা সম্পন্ন করে মিশন পে-লোড। এ ছাড়া সেসব স্যাটেলাইটের অরবিট ট্রান্সপন্ডার বা কন্ট্রোলের জন্য থ্রাস্টার সিস্টেম থাকে। বঙ্গবন্ধু-১ স্যাটেলাইটের মিশন পে-লোড হিসেবে থাকছে ২৬টি Ku ব্যান্ড এবং ১৪টি C ব্যান্ডের ট্রান্সপন্ডার। ট্রান্সপন্ডার হলো এমন একটি যন্ত্র, যা পৃথিবী থেকে পাঠানো কিছু নির্দিষ্ট তথ্যের ওপর ভিত্তি করে স্যাটেলাইট থেকে তথ্য আবার ভূপৃষ্ঠে পাঠাবে। Ku ব্যান্ডের ফ্রিকোয়েন্সি রেঞ্জ হলো ১২-১৮ গিগাহার্জ পর্যন্ত এবং তরঙ্গদৈর্ঘ্য হলো ২.৫-১.৬৭ সেন্টিমিটার। তাই এই ব্যান্ডের অ্যানটেনার সাইজ ছোট হয়। Ku ব্যান্ডের মাধ্যমে আমরা টেলিভিশনের ব্রডকাস্টিং সিস্টেমের ক্ষেত্রে ব্যবহার করতে পারি না। তবে বৃষ্টিপ্রবণ এলাকায় এই ku ব্যান্ড ব্যবহার করা একটু কষ্টসাধ্য। এটি মূলত রেইন ফেড (Rain fade)-এর কারণে হয়। সাধারণভাবে ku ব্যান্ডের তরঙ্গদৈর্ঘ্য খুব ছোট, প্রায় বৃষ্টির ফোঁটার কাছাকাছি। তাই বৃষ্টি হলে এই ব্যান্ডে যোগাযোগে বিঘ্ন ঘটে। এর অন্যতম সমাধান হলো C ব্যান্ড ব্যবহার করা।

C ব্যান্ডের ফ্রিকোয়েন্সি রেঞ্জ হলো ৪.৮ গিগাহার্জ এবং তরঙ্গদৈর্ঘ্য ৭.৫-৩.৭৫ সেন্টিমিটার। এই ব্যান্ডের মাধ্যমেও আমরা টেলিভিশন ব্রডকাস্টিং করতে পারি। আবার পৃথিবীর বিভিন্ন অঞ্চলভেদে C ব্যান্ডের রেঞ্জের তারতম্য দেখা যায়। এই দুটি ফ্রিকোয়েন্সি ব্যান্ড দিয়ে আমরা ট্রান্সমিট এবং রিসিভ দুটিই করতে পারব। তাই যোগাযোগ স্থাপন করার সব সুযোগ-সুবিধাই আমরা বঙ্গবন্ধু স্যাটেলাইট-১ থেকে পাব। বঙ্গবন্ধু স্যাটেলাইটের অবস্থান ১১৯.১ পূর্বে হওয়ায় এর কাভারেজ এলাকার মধ্যে পড়বে দক্ষিণ এশিয়ার থেকে শুরু করে ইন্দোনেশিয়া পর্যন্ত দেশগুলো। এ ছাড়া এসব দেশের পার্শ্ববর্তী কিছু জায়গায় কাভারেজ পেতে পারে কিন্তু সেসব স্থানে সিগন্যাল একটু দুর্বল হতে পারে। তাই বঙ্গবন্ধু স্যাটেলাইটের ট্রান্সপন্ডার এসব এলাকার মানুষ কিনতে পারবে। ku ও C ব্যান্ডের ট্রান্সপন্ডার ব্যবহার করে আমরা ডিটিএইচ (ডিরেক্ট টু হোম), টিভি সম্প্রচার, ইন্টারনেট সেবা পাব। যদিও জিওস্যাটের ইন্টারনেট আধুনিক যুগের ইন্টারনেট থেকে অনেক ধীরগতির হবে। তবে প্রত্যন্ত এলাকায় ইন্টারনেট সেবা পৌঁছানো যাবে।

বঙ্গবন্ধু স্যাটেলাইট-১ উৎক্ষেপণের এই মুহূর্তে স্যাটেলাইট সম্পর্কে এ দেশের মানুষের জানার আগ্রহ প্রতিনিয়ত বেড়েই চলেছে। আমরা সংক্ষিপ্ত আকারে স্যাটেলাইটের সার্বিক বিষয় তুলে ধরার চেষ্টা করেছি মাত্র। স্যাটেলাইট সম্পর্কে জানার বিষয়ে মানুষের মধ্যে আরও আগ্রহ বৃদ্ধি পাক, এটিই আমাদের প্রত্যাশা।

লেখকদ্বয়: প্রকৌশলী, ব্র্যাক অফেয়া, ব্র্যাক বিশ্ববিদ্যালয়

Antara has been featured in 5th issue of "Women in Leadership(WIL) Magazine"

See Page 52 of this link: [WIL Magazine 5th Edition]

Women in Science, Oil on Canvas, by Nazia Andaleeb Preema

REDEFINING VISIBILITY FOR WOMEN IN THE TECHNICAL FIELD

I dream of a day when I shall be writing about contribution of people, be it men or women, in the arena of STEM (Science, Technology, Engineering, Mathematics), and not just highlight women's contributions in this field merely because they do not receive the recognition they should receive as a human being. Even in the 21st century, the notion circulates that women are technically handicapped and do not have the spark to make it big in the STEM field. Isn't it strange that even after Sally Ride, a woman who walked the moon in the 70s, Svetlana Savitskaya, a woman who walked in the Space during the 80s, women in the 21st century are still considered inferior to their male counterparts when it comes to working in the STEM field?

Visibility. Visibility is what women need to prove themselves and rightfully obtain their fair share of credits for their contributions, to challenge the aforementioned notion and to empower themselves in the process.

Before delving further into how women can become more visible, we first need to know, what visibility is. According to a Harvard Business Review article, titled, "To Succeed in Tech, Women Need More Visibility", published in September 2016, visibility is defined as, "...a complex interaction of perceived skills (particularly technical and leadership ones), access to stretch assignments, and being known — and liked — by influential senior leaders within informal networks. All three are necessary for advancement." Moreover, after conducting a research on factors that contribute most significantly to promotion and advancement at work place, visibility was ranked on top, leaving beyond critical factors such as, technical competence, business results and team leadership ability.

A lot of debate circulates around the stigma that prevails concerning women not being competent enough to leave their marks in the path of STEM. And this issue pertains in the West at a very significant level. We cannot completely abolish this notion because incompetence indeed does prevail in the society not because women are not smart enough, but it is due to the lack of opportunities available to them to excel and prove themselves. It can be said that women, unfortunately, get trapped in a never-ending cycle of invisibility. Due to the belief that women cannot undertake too much work pressure for reasons such as lack of capability, family responsibilities, and such like, they are not considered for stretch projects and projects that are challenging enough to enable employees to grow and excel. Consequently, women do not get the exposure and skills required to take themselves forward in this regard, keeping them stuck in the same position or providing them with slow growth. The authenticity of this fact can be validated by reports from Forbes, Harvard Business Review, The Huffington Post, and several other media portals shedding light on this issue.

However, it would be wrong to claim that women do not get opportunities at all and are always overshadowed by men. Though this is true under many circumstances, particularly in the West, the good news is, we can find empowered women in the STEM field who are leaving their marks not just in the world but on Space as well! Yes, you read it right. And I am proud to state that besides a handful of renowned women from the West who are leaving their imprints, women from Bangladesh are also creating their unique mark.

In regard to this, let me introduce to you, or remind you about, if you already know about her great accomplishments, Ms. Raihana Shams Islam Antara, a former undergraduate student of Electrical and Electronic Engineering (EEE), BRAC University, and current Research Associate at BRAC University, who, during her postgraduate studies in Japan's Kyushu Institute of Technology, developed BRAC Onnesha, along with two other male team members. BRAC Onnesha is the first of any kind of satellite from Bangladesh, a nano-satellite in particular, the ground station of which is in the Mohakhali campus of BRAC University. BRAC Onnesha was launched from the Launch Pad 39A Kennedy Space Centre, Florida, USA, the same place from where Apollo-11 lunar mission was launched. And if you can recall, Apollo-11 lunar mission is the first mission to have marked man's footprint on the Moon for the first time in the history of mankind.

Raihana Shams Islam Antara

While we get to read about the uneven treatment of women in technology, we might take pride in the fact that Ms. Antara has received equal recognition for her equal contribution along with her male counterparts in the launch of this historical event. She has dedicated 16 hours per day besides her team members, to make this dream come true. And now, whenever we hear about BRAC Onnesha, Ms. Antara's contributions are acknowledged equally by the society and her name holds as much value as her other two team members. Ms. Antara is also currently serving as the Point of Contact (POC) on behalf of Bangladesh for UNISEC-global, an international non-profit organization that aims to establish a liaison for science and technology around the world, including both rich and poor countries. Ms. Antara aims to create a stronger base for space science and technology among universities of Bangladesh through this platform. From her sheer dedication, zeal and persistence, the bar has certainly been raised for young women in the country which portrays that they too can be equally visible only if they believe in themselves and do not give up on their dreams. In that way, reaching the Space and creating history will not be a distant dream anymore. When I asked her to provide her valuable insight on how women in Bangladesh can be more visible, she emphasized on encouraging girls since childhood on dreaming big and aspiring to become professionals in the STEM field if they want to. She further emphasized that educational institutions, work place, family, friends-everyone in the surrounding should always treat women equally and believe in them and their capabilities.

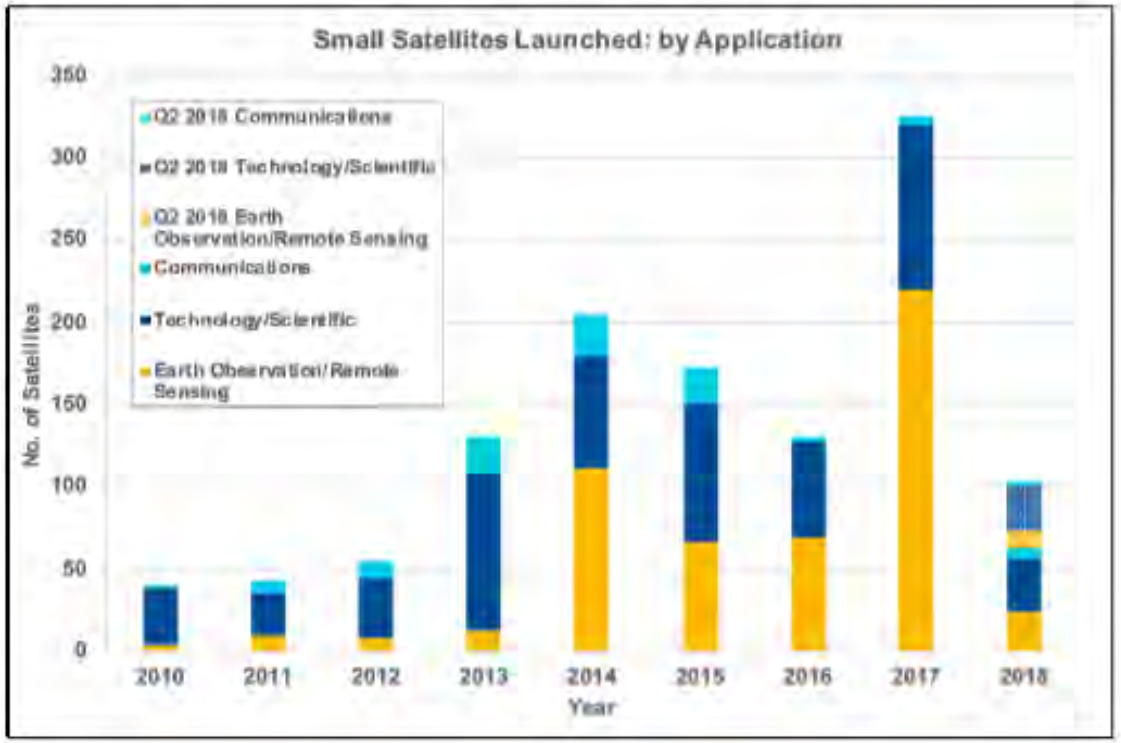
Besides Ms. Antara, I had the privilege of obtaining feedback and opinion from Ms. Tanisha Sadeque Ziasa, an established employee of a renowned multinational company (MNC) of Bangladesh. Ms. Tanisha studied Bachelors in Chemical Engineering (BEng) from University of Surrey, UK, in her undergraduate years and upon return to Bangladesh, she joined the renowned MNC as a Petroleum Engineer in the Asset Development team of the company. She is also one of the few female employees in the company. When asked, she highlighted some crucial factors that affect the workplace environment in regards to the issue at hand.

• Speaking up: "There have been many instance in meetings when men have taken over a meeting or interrupted a female

15. BIRDS is mentioned in small satellite market report

Application

Page 4 of the report



In Q2 2018 Technology/Scientific remained the dominant application, making up 58% of small satellites launched. This comprises CubeSats launched by universities and schools with a small number of technology demonstration satellites. Programmes to assist educational institutions and small nations to launch satellites have contributed strongly to this trend, including seven this quarter supported by NASA's ELaNa programme and the three from the Joint Global Multi-Nation Birds Satellite Project.

BIRDS

A subscription to this report service is free. Subscribe here: https://sa.catapult.org.uk/services/market-reports/small-sats-market-intel/

16. New Kyutech promotional video is out

Kyutech President Prof. Oie

Last month in newsletter issue no. 30 [page 50], it was announced that Kyutech has produced a 5-minute promotional video. That version is in Japanese. This month, Kyutech has released the English version of that video: https://www.youtube.com/watch?v=URXGQ5HJZuI&feature=youtu.be

Check It Out

OLAYINKA'S WORLD

3 August 2018, Column #2

OLAYINKA FAGBEMIRO
PRINCIPAL SCIENTIFIC OFFICER, HEAD, SPACE EDUCATION UNIT
NATIONAL SPACE RESEARCH & DEVELOPMENT AGENCY (NASRDA),
ABUJA. NIGERIA

JULY 27TH LUNAR ECLIPSE AND MARS OPPOSITION PUBLIC OUTREACH IN NIGERIA

We had the opportunity to experience the Total Lunar eclipse on Friday, July 27, 2018. The event held at Jabi Lake Park in Abuja, Nigeria. It was interesting to see Mars at its closest to Earth in 15 years. There was heavy rainfall earlier in the day and the skies remained cloudy for the whole day. This had a negative impact on our viewing but, we had a glimpse of the eclipse for about 5 minutes till the clouds covered the moon.

Jupiter, Venus and Mars appeared brightly on our horizon per time before cloud cover took its toll. We had several visitors and enthusiasts that came over and learned about the Lunar eclipse and Mars opposition. Some of them indicated keen interest in joining our team. One People, One Sky.

Our major aim is to use Astronomy to promote STEM in Nigeria. We want to also use our outreach activities to raise awareness on STEM and also promote the participation of school kids in STEM related activities. The Lunar eclipse event provided us with such opportunity to reach out to young people and spur their interest in the Space Science and Technology.

Nigeria, and by extension Africa, has a problem of inadequate capabilities in Space Technology. We therefore use our regular public outreaches as a means of creating this awareness. We hope that young people would be encouraged to pick up interest in Space related fields in the nearest future.

SEE PHOTOS ON THE NEXT PAGE


FRAGILE
FRAGILE


FRAGILE

18. Reminder to acknowledge the support of JSPS

When you publish something that is remotely related to BIRDS, please include the statement below. It helps us with more funding from JSPS. After your work is published, please send pdf copy to me and Prof Cho. We enter it into our records.

Acknowledgement of support

This work was supported by JSPS Core-to-Core Program, B. Asia-Africa Science Platforms.

The JSPS rooster story →

JSPS Logo Mark

Crowing Rooster, logo of the Japan Society for the Promotion of Science

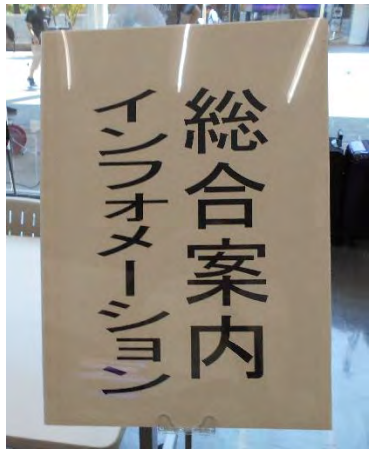
From days of old in Japan, it has been the belief that the vigorous cry of the rooster in the gray of the morning augurs the coming of a new and bright day. As the crowing rooster can therefore be thought of as a harbinger of the kind of new knowledge that promises a brilliant future for humankind, it was chosen as the logo of the Japan Society for the Promotion of Science.

This logo was designed in 1938 by Professor Sanzo Wada of Tokyo Fine Arts School to depict the rooster that symbolizes the breaking dawn in a verse composed by Emperor Showa.

JAPAN SOCIETY FOR THE PROMOTION OF SCIENCE 日本学術振興会

19. Open campus – Tobata campus of Kyutech

Each year, around this time, Kyutech opens its campus to all local secondary school students so that they see see and touch our wares. We hope the bright ones will select Kyutech for a university education.



⇦ A lot of high school students attended Open Campus

3 and 4 August
Tobata Campus

⇦ Free cold drinks

CONTINUED ON THE NEXT PAGE

Kyutech Open Campus 3 Aug 2018

New: (Above) space engineering for undergrads

It was a very hot day !

CONTINUED ON THE NEXT PAGE

Open Campus photos of Saturday, 4 August 2018: Lots of high school students visited Kyutech

LaSEINE students promote space engineering

END

20. Kyutech competes in “Student Formula Japan”

THE YOMIURI SHIMBUN

讀賣新聞

2018年(平成30年)
8月5日日曜日

In September, Kyutech will be competing in
"Student Formula Japan"
- Monozukuri Design Competition -

English web site is here:
http://www.jsae.or.jp/formula/en/

FORMULA SAE JAPAN Student Formula Japan
全日本 学生フォーミュラ大会

レースカー 新技術で挑む

九工大チーム 来月国際大会

九州工業大が製作したフォーミュラカーとチームのメンバー

「9位以内を目指す」

レーシングカーを設計・製作する九州工業大（本部・北九州市戸畑区）の学生チームが、静岡県で9月に開かれる「全日本学生フォーミュラ大会」に挑む。7カ国・地域の86チームが出場する国際大会。14回目の出場となる今年は複数の新技術を導入しており、宮津遼代表(23)は「シングルナンバー（9位以内）を目指す」と意気込んでいる。

大会は物づくりの魅力を学生に体験してもらおうと、公益社団法人「自動車技術会」（東京都）が2003年から年1回開催。世界各国の大会を基準に、加速や燃費などの走行性能に加え、コストやデザインなどの静的審査や安全性能の審査も行い、総合点で争う。

九工大の今年の車両は全長2・95㍍、車重250㌔、600CCバイクのエンジンを採用。アクセルによる挙動をスムーズにする電子スロットルを導入したほか、空気抵抗を活用してコーナリングを安定させる「エアロデバイス」（通称・ウィング）を設けた。学生らは「技術的には過去に例を見ない出来」と力を込める。

九工大は05年から連続出場し、11年に9位、15年には8位に入った。昨年は大会当日にエンジンやアクセルなどの不具合が続き、32位と低迷。車両の完成が遅れ、エンジンやアクセルなどの調整不足のまま、大会に臨んだことが原因だった。

このため、チームは今年、設計段階から新技術を導入。自動車関連業者の協力を得て、強度を維持しながら車両を軽量化したり、駆動系の出力バランスを調整したりできるソフトを活用し、車両の完成を急いだ。

「パソコンの設計通りに作るのは至難の業だった」と、メンバーの小西剛史さん(21)。車両は計画通りに3月に完成し、飯塚市内の駐車場を借り、試験走行を続けている。「コンマ一秒でも縮めたい」と、走行性能を競うコースをパソコン上に再現し、運転技術も高めている。

大会は9月4～8日、静岡県の小笠山総合運動公園で開かれる。宮津代表は「新しく導入したウィングや電子スロットルの調整を済ませ、万全の態勢を整えたい」と話している。

In addition to speedy car races, Kyutech is competitive at international robotics contests

北九州 13 S 地域 30

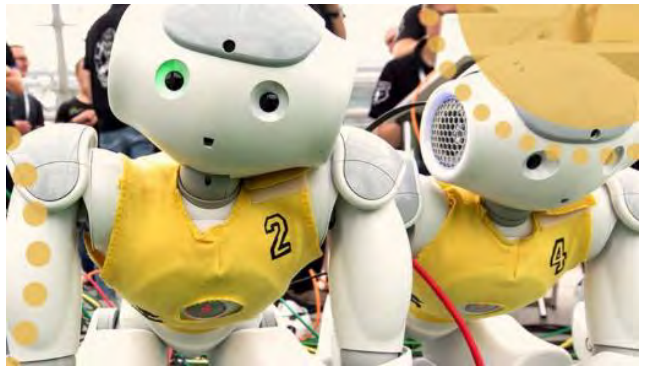
YOMI-URI

ロボカップ世界大会V2

九工大開発チーム 知事に喜び報告

2018.8.9

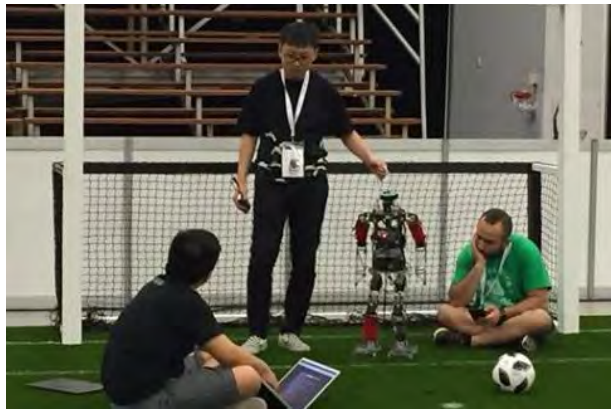
Yomiuri, 2018.8.9



Organizer's Facebook:
https://www.facebook.com/RoboCup2018/

RoboCup 2018
MONTRÉAL · CANADA

Kyutech students competed in
==========
RoboCup 2018, MONTRÉAL, Canada,
June 18-22, 2018, at the Palais des congrès
==========
See their website (in English):
http://www.robocup2018.com/



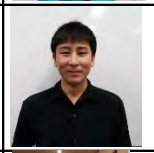
21. Review of the members of the BIRDS-3 team

The team line up is shown at the right.

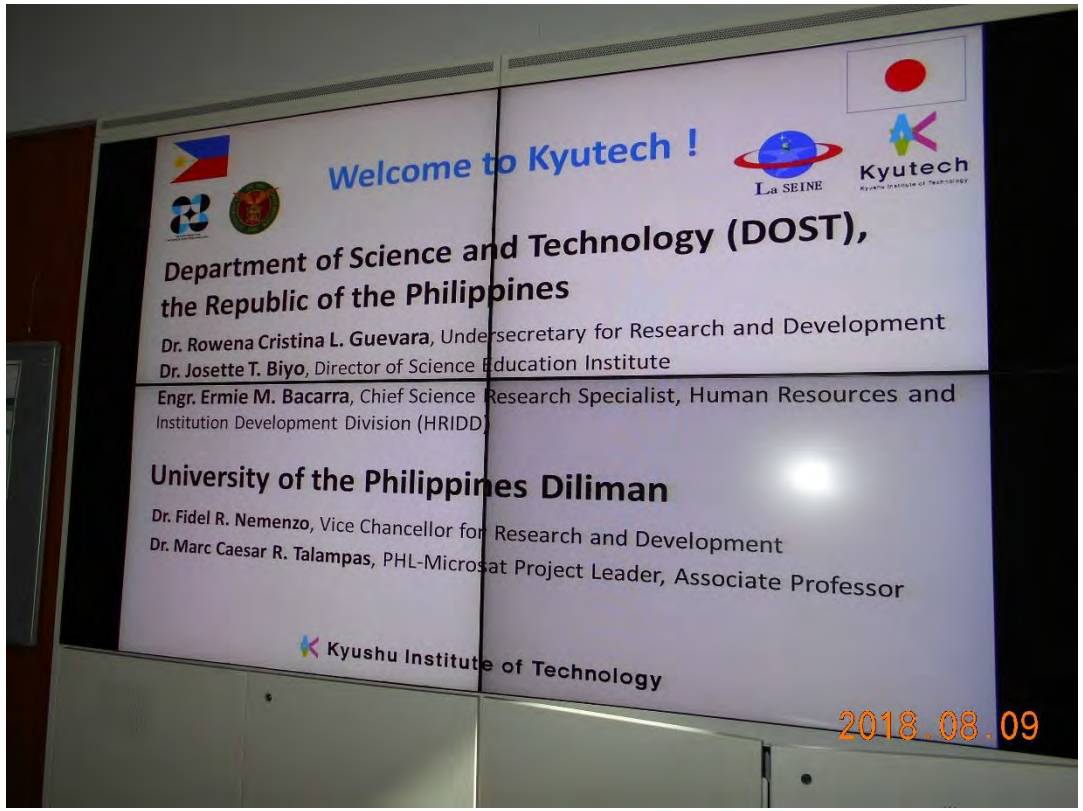
Note that the students from Nepal and Sri Lanka are space pioneers for their respective nations: They are building the *first* artificial satellites for their respective nations. This salient point will be noted in future text books that kids will read in primary school.

Mr Hari of Nepal joins the Nepal team during Sept-Oct. time frame. He joins a bit late, but better late than never. Welcome aboard Hari.

BIRDS-3 CDR is now set for 01 Sept. 2018.

No.	Photo	Name	Country	Student standing
1		Abhas Maskey	Nepal	D1
2		Hari Ram Shrestha	Nepal	M1
3		Withanage Dulani Chamika	Sri Lanka	M1
4		Tharindu Lakmal Dayarathna	Sri Lanka	M1
5		Pooja Lepcha	Bhutan	M1
6		Yuta Kakimoto	Japan	M1
7		Makiko Kishimoto	Japan	B4
8		Yuji Sasaki	Japan	M1

22. On their way to JAXA for BIRDS-2 PV, Philippines delegation visited Kyutech



During the morning of Thursday, 9 August 2018, Kyutech warmly welcomed a 5-person delegation from the DOST and University of Philippines.

1. Dr. Rowena Cristina L. Guevara
   Undersecretary for Research and Development
   Department of Science and Technology
   Republic of the Philippines
2. Dr. Josette T. Biyo
   Director, Science Education Institute
   Department of Science and Technology
   Republic of the Philippines
3. Engr. Ermie M. Bacarra
   Chief Science Research Specialist
   Philippine Council for Industry, Energy and Emerging Technology Research and Development
   Department of Science and Technology
   Republic of the Philippines
4. Dr. Fidel R. Nemenzo
   Vice Chancellor for Research and Development
   University of the Philippines-Diliman
   Republic of the Philippines
5. Dr. Marc Caesar R. Talampas
   PHL-Microsat Project Leader and Associate Professor
   University of the Philippines-Diliman
   Republic of the Philippines

Dr. Rowena Cristina L. Guevara

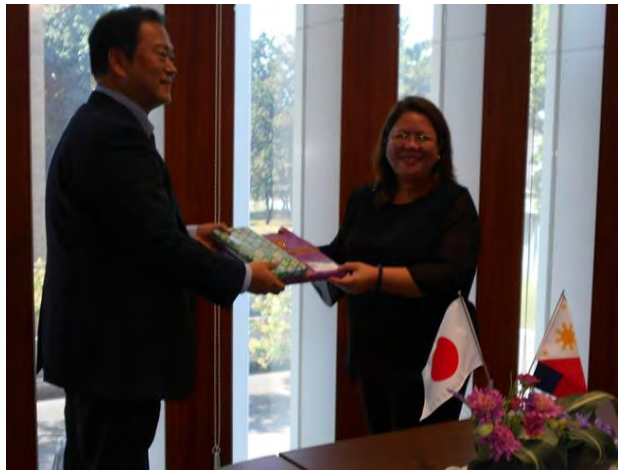
Dr. Fidel R. Nemenzo

Dr. Josette T. Biyo

Engr. Ermie M. Bacarra

Dr. Marc Caesar R. Talampas

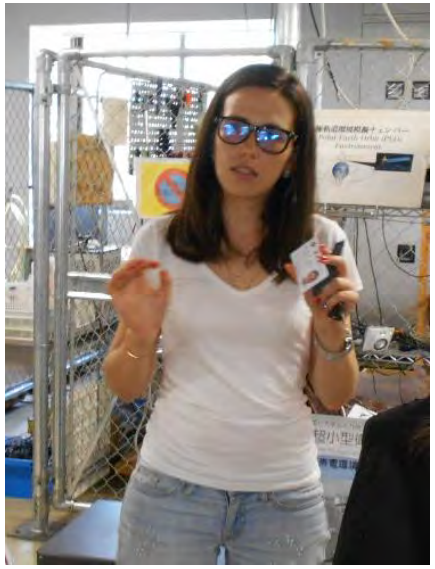
Exchange of tokens

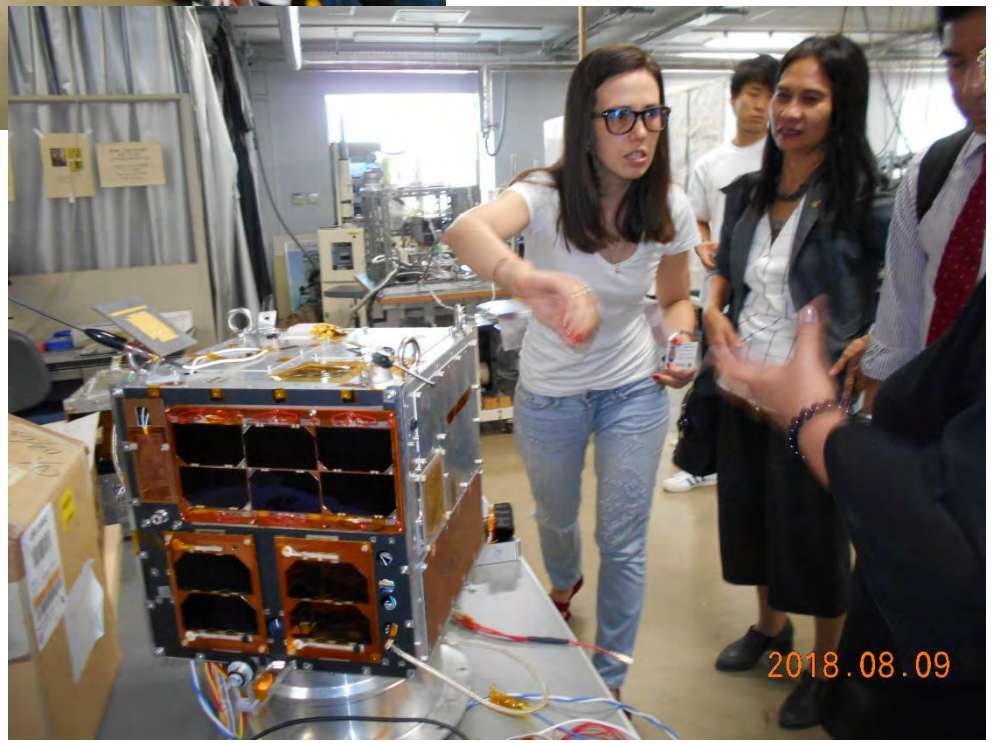


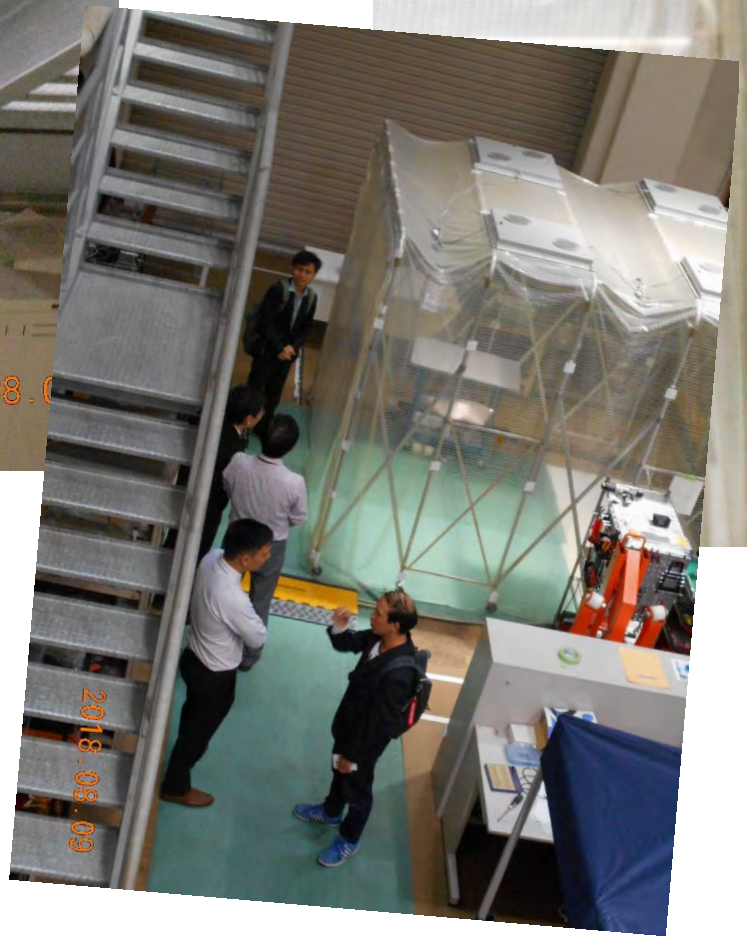
The First Floor of Nakamura Memorial Hall

Fruitful discussions between LaSEINE staff and DOST+UPD

Kate delivered a dynamic tour of the 4th floor facilities of LaSEINE.







Adrian and Joven did the tour of the test facilities in SVBL building.

Lunch at Café Rouge Blanc of Kyutech Tobata Campus, 12:30 til 13:30. We thank the guests for visiting Kyutech.

End of this article.

23. JAXA hosts PV (Public Viewing) of BIRDS-2 deployment at Tsukuba Space Center

JAXA's Tsukuba Space Center (north of Tokyo)

Space Dome (exhibition hall)

JAXA (the space agency of Japan) hosted the Public Viewing of the deployment of the BIRDS-2 satellites of Bhutan, Malaysia, and the Philippines on 10 August 2018. It was a fabulous evening for all concerned.

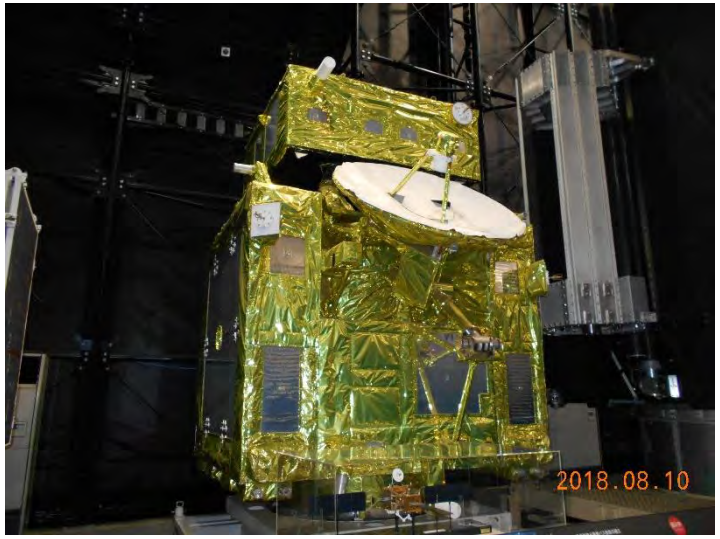
Delegation from the Philippines

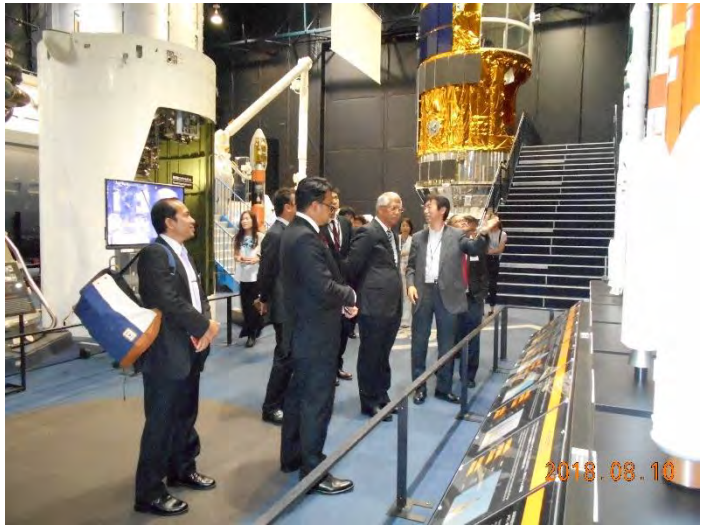
Delegation from Bhutan

Delegation from Malaysia

Visit to the JAXA exhibition hall

(Between 5:00 PM and 5:45 PM, 10 August 2018)





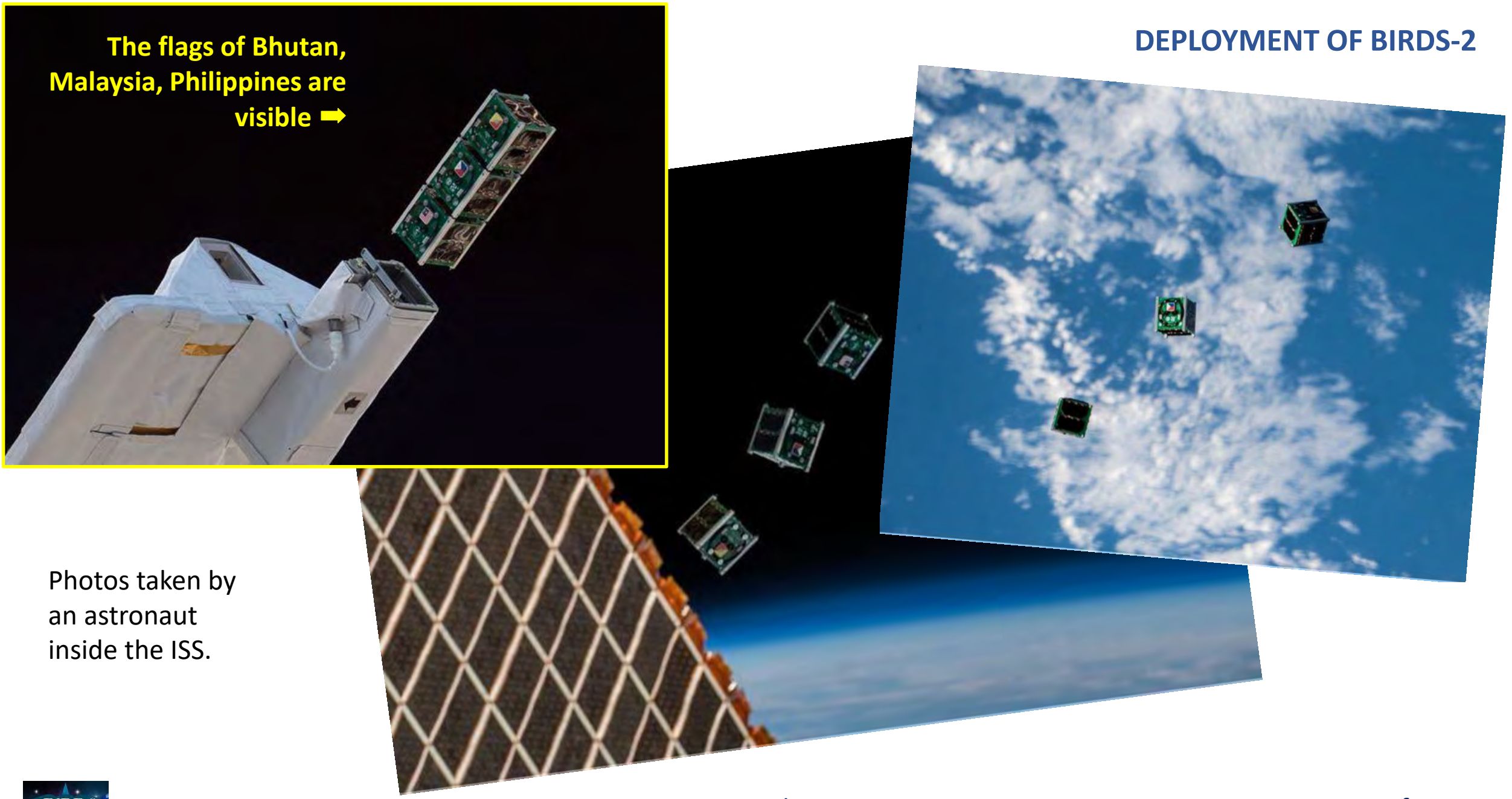
Lots of space hardware to see

Pre-deployment meeting (opening remarks by all parties)

A) Emeritus Professor Dato' Dr. Hassan Said, Vice Chancellor, Universiti Technoligi MARA of Malaysia
B) H.E. Tshewang C Dorji, Bhutan's Ambassador to Thailand
C) Dr. Rowena Cristina L. Guevara, Under-secretary, DOST, of the Philippines
D) Prof. Y. Oie, President of Kyutech, Japan

They are facing the Mission Control Room

Viewing the deployment from the VIP room

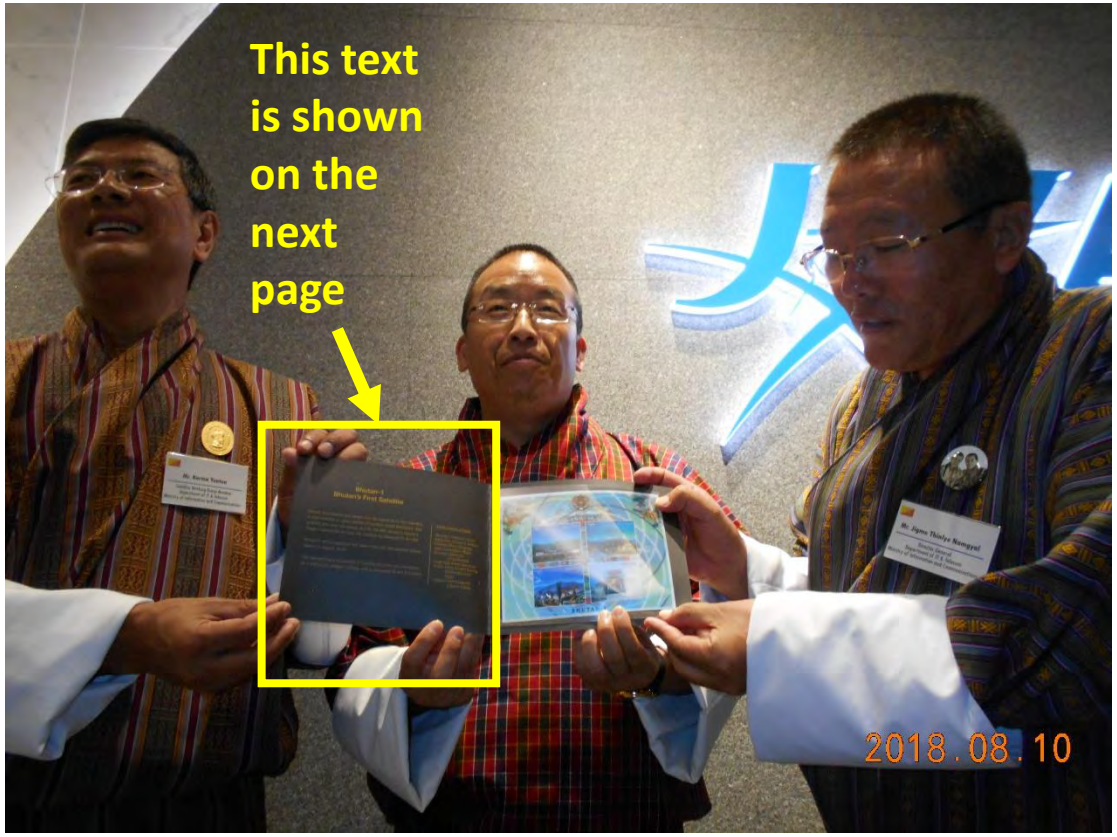


Photos taken by an astronaut inside the ISS.

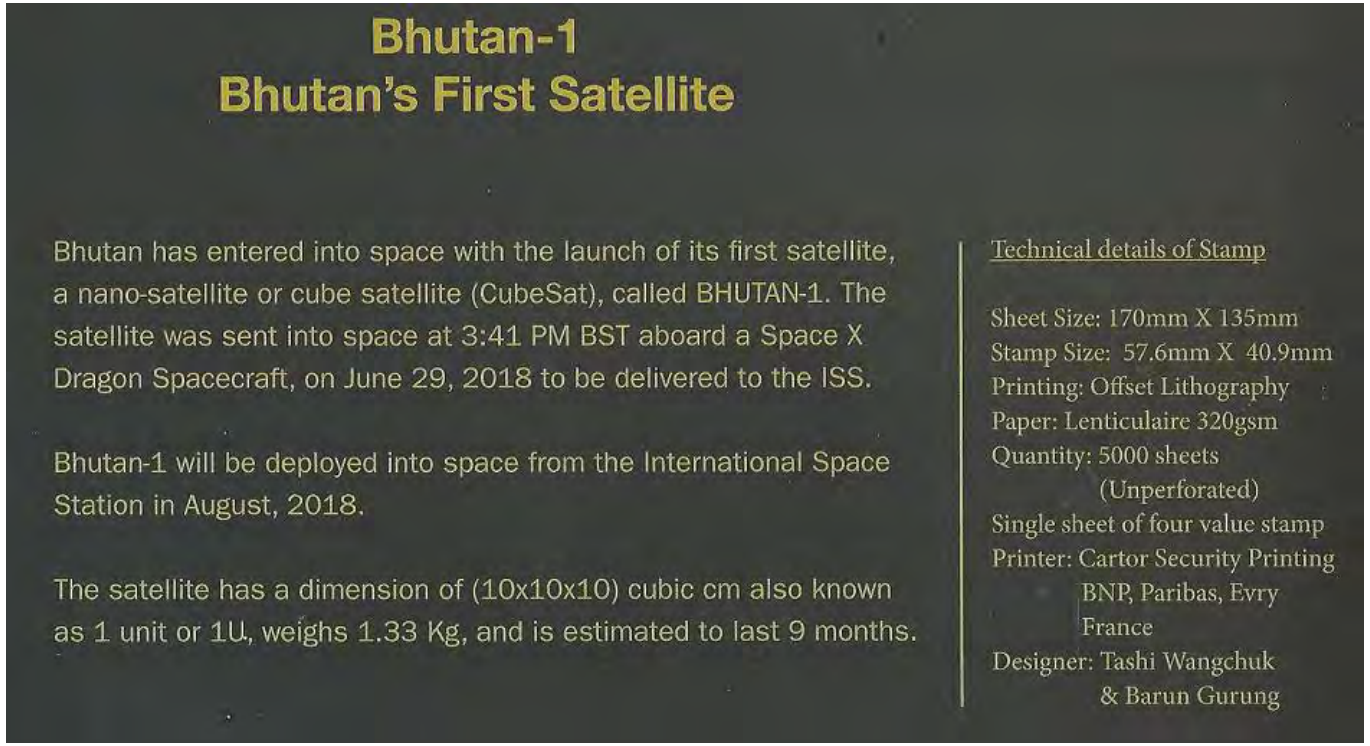
Group photo after deploy-ment

Mini press conference

Around 7 PM a special treat:
Viewing the ISS sail overhead - *"I can see it ! ! !"*



Bhutan Postal Corporation issues special stamps to commemorate Bhutan's first satellite into space.



Cover page

Bhutan's first satellite CubeSat Bhutan-1 was deployed from International Space Station (ISS) into the low earth orbit Friday. This comes after the release of Bhutan-1 along with CubeSats of the Philippines and Malaysia.
Officials of the information and communications ministry gathered once again at the ministry's conference hall on Friday. [for the rest, see the link below]

For more news about these stamps see:
http://southasianmonitor.com/2018/08/12/bhutan-1-deployed-into-low-earth-orbit/

Toast by Kyutech president Prof Oie

JAXA offered an elegant reception to conclude the BIRDS-2 deployment PV.

Delegation from the Philippines

Delegation from Bhutan

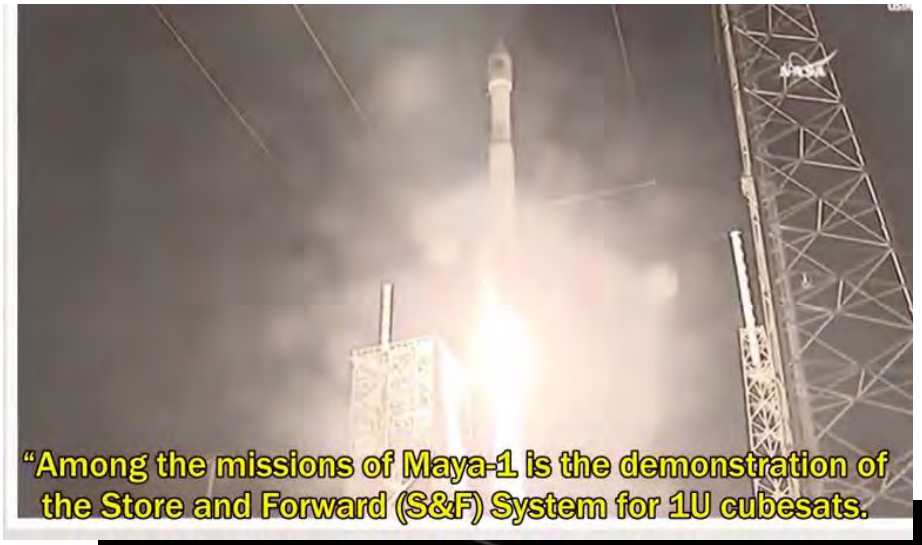
Delegation from Malaysia

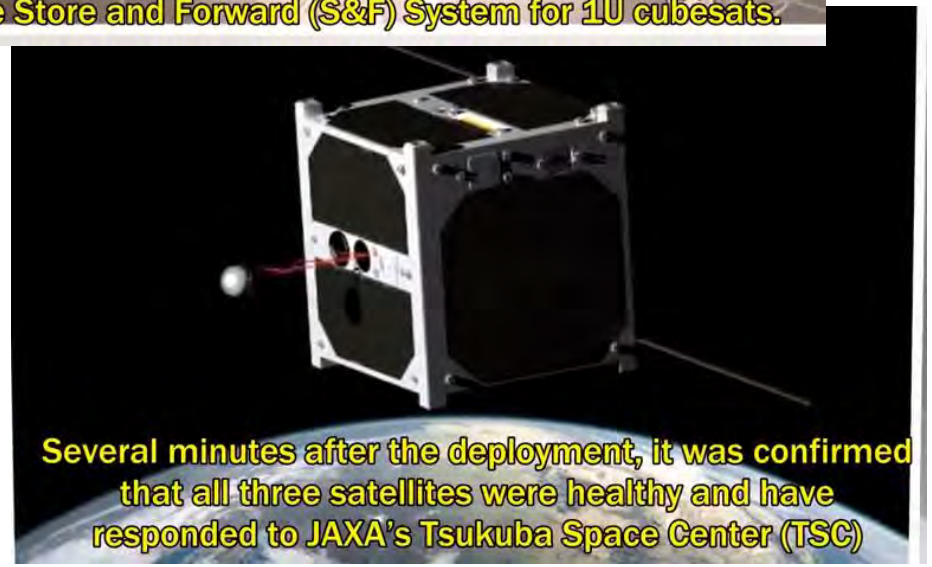
Ms. Shiho Ogawa (Director, JEM Utilization Center) presented each delegation with a certificate. It certifies that their satellite was successfully deployed from the ISS on 10 August 2018 (JST).

JEM (also known as "Kibo") is *Japanese Experiment Module*. This is the JAXA website for JEM: http://iss.jaxa.jp/en/kibo/

END OF ARTICLE ABOUT THE PV AT TSUKUBA

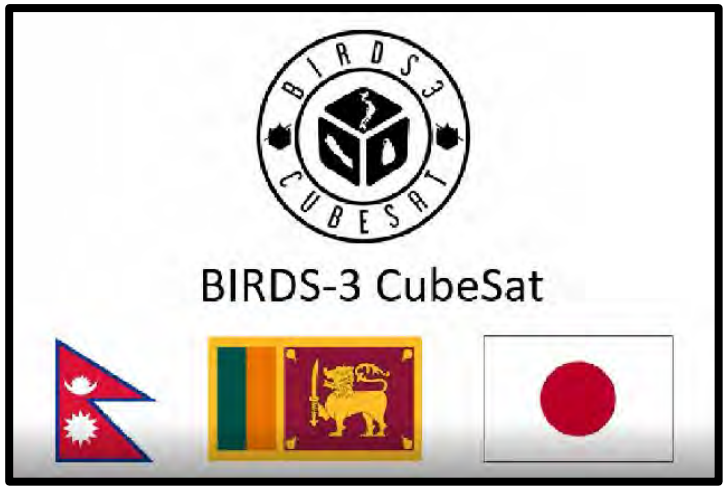
24. Video about MAYA-1 – BIRDS-2 satellite of the Philippines



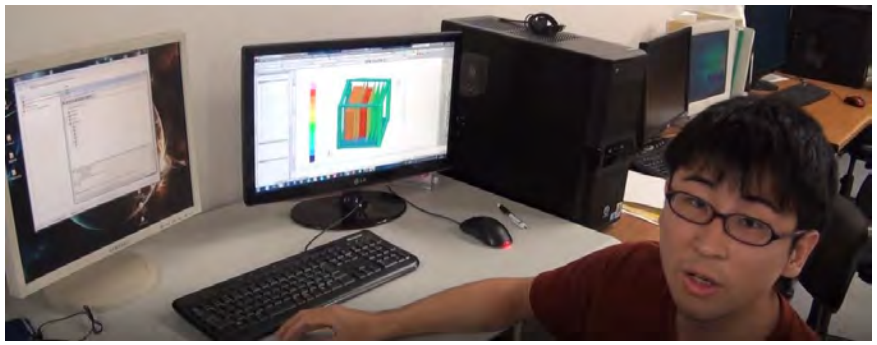


View the video about the deployment of MAYA-1:
https://www.youtube.com/watch?v=KqpnnIIs82U

25. Video by the students of BIRDS-3 team



This is what we do: https://www.youtube.com/watch?v=HRg_Hq-Q524



26. Public viewing of BIRDS-2 deployment at Tobata Campus of Kyutech

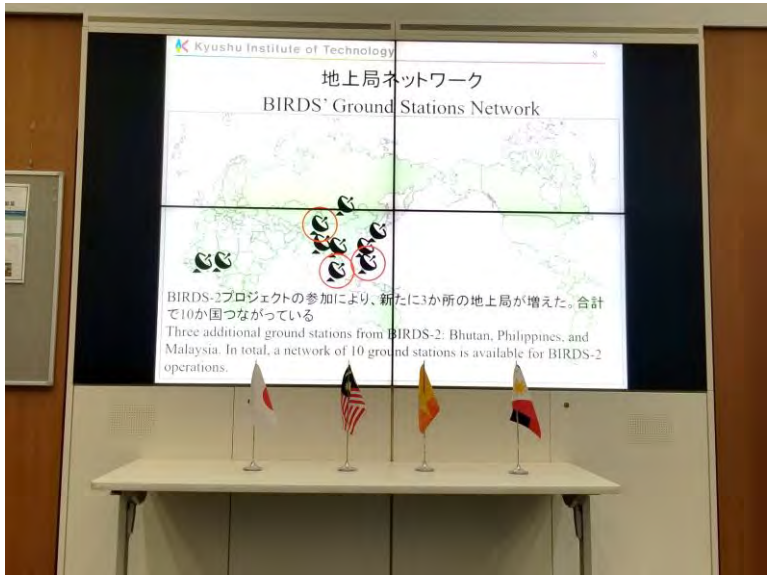
BIRDS-2 Satellite Deployment PV Event at Kyutech

PV=Public Viewing
10th August 2018

Report by: Syazana (UiTM) on 11th August

BIRDS-1 and BIRDS-3 team members also joined in the celebration of the deployment event in Nakamura Hall. Some students of Cho Lab were also spotted during the event to give support.

Prof. Mengu Cho gave a speech for introduction session and his hope for the current and future BIRDS Project.



Presentations about BIRDS-2 and BIRD-3 projects by BIRDS-2 and BIRDS-3 representatives (Yamaguchi and Kakimoto, respectively)

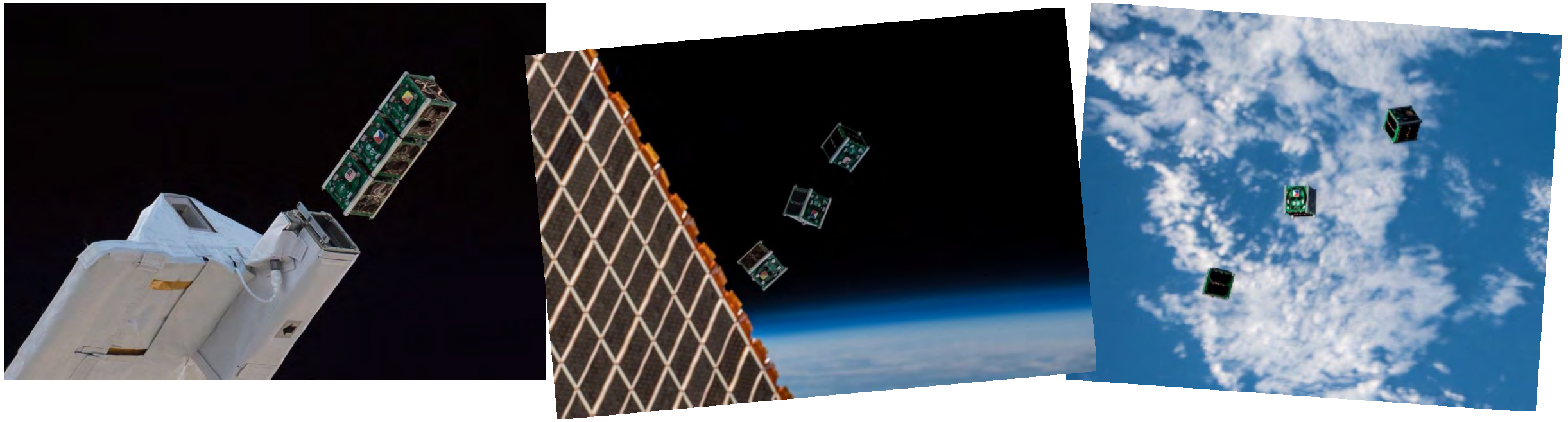
The most exciting and nervous moment was while waiting for the countdown. After the 10th second countdown point, everyone in Nakamura Hall counted down the final seconds together.

UiTM (Malaysia)

After all three BIRDS-2 satellites were successfully deployed, we watched and listened to **a live video feed from JAXA**. A representative of each nation (Malaysia, Bhutan, and the Philippines) offered a congratulatory speech.

Gov't of Bhutan

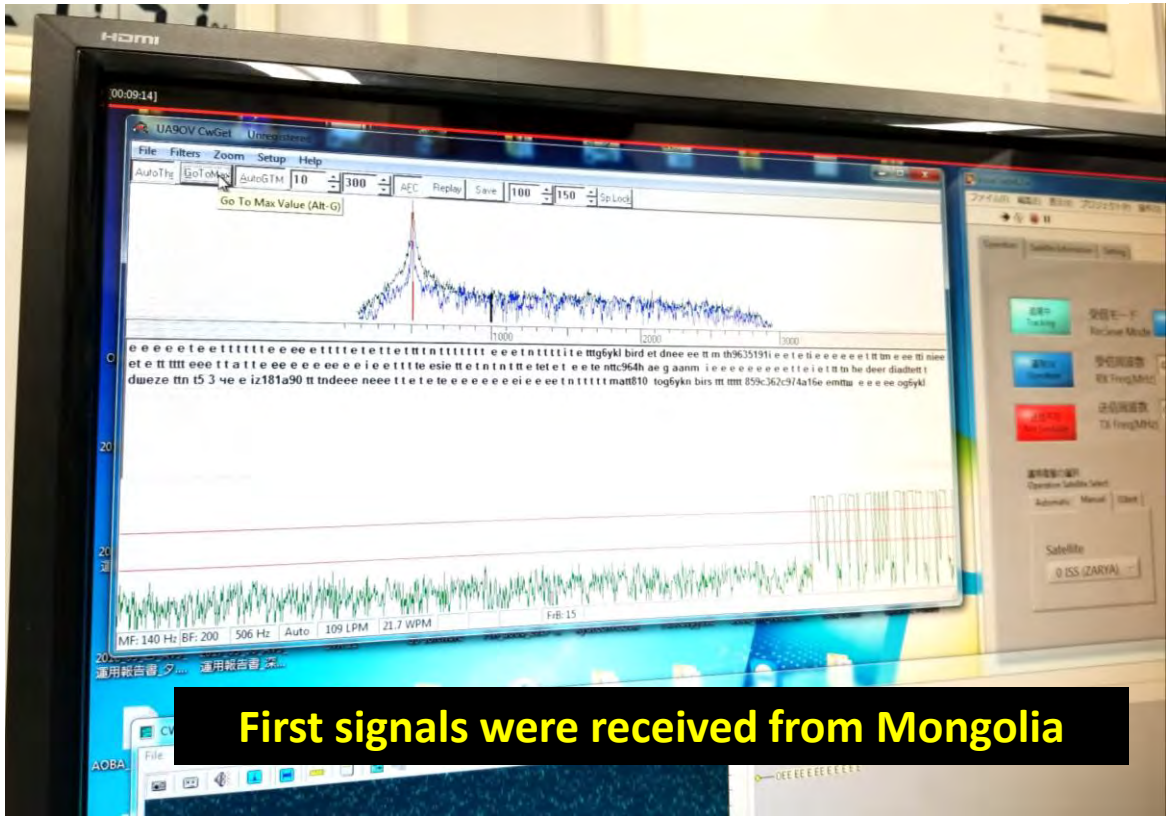
UPD-DOST (Philippines)

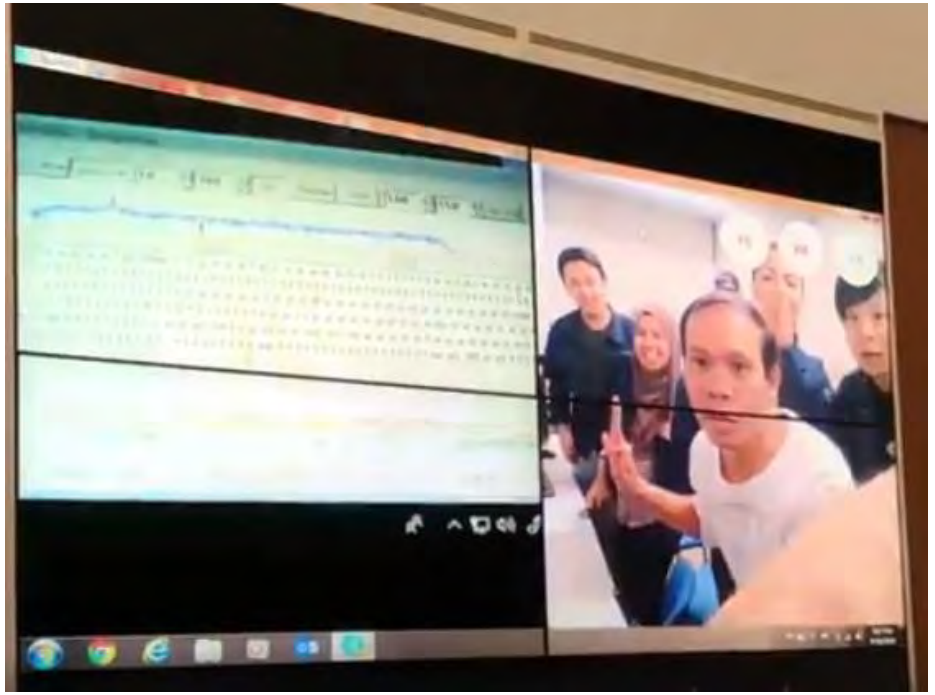


On August 10th, 2018 (18.45 pm JST) the historical event of BIRDS-2 Satellite Deployment from ISS was recorded. These high-resolution photos were taken by ISS astronaut Alexander Gerst.

See his FB link:
https://www.facebook.com/ESAAlexGerst/

Skype broadcasting from ground station to Nakamura Hall. BIRDS-2 member were at the ground station while the audience watched us from Nakamura Hall. We had the first signal acquisition from Mongolia ground station conducted by Erka. Finally, everyone was very excited to hear the first beacon by UiTMSAT-1.





The next CW beacon was tracked by Kyutech ground station. It was a very strong signal.

After operating the ground station, we gathered at Seminar Room on 4F to have small dinner (snacks and drinks) to celebrate the successful of BIRDS-2 Deployment. Prof. Cho gave a short speech and congratulated everyone for the achievement. It was a very precious moment and memorable event for us.

END OF KYUTECH PV ARTICLE BY SYAZANA

27. Photo of the BIRDS-3 Engineering Model (EM)

This photo was received on 11 August 2018 from Abhas, BIRDS-3 Project Manager. Note the names of team members on the PCB.

28. If you have a chance to view a H-IIA rocket launch at Tanegashima, take it

SPATIUM will be launched from Tanegashima on 11 September, and it is your chance to watch it happen. Kyutech students Apiwat and Meemak went down there to view the launch of Flight #38 – check out their Photo Report: Issue No.26 of the BIRDS Project Newsletter, pages 78-81.

H-IIA Rocket Launch Flight #38 at Tanegashima Space Center

- Text by Apiwat Jirawattanaphol
- Photos by P. Meemak

The article at the right is about the Space Science and Technology Museum
https://www.tripadvisor.jp/Attraction_Review-g1121599-d6816970-Reviews-Tanegashima_Space_Center_Space_Science_and_Technology_Museum-Kumage_gun_Minamita.html


飛んで 遊って 日本の島旅
JAL Inflight Magazine AUG-2018 種子島 = Tanegashima, F.Y.I.

科学技術がもたらされる最先端の島

九州の南に浮かび、鹿児島空港から飛行機で40分ほど、鹿児島港から高速船に乗り約1時間半で行ける島です。黒潮の影響を受ける温暖な気候により豊かな自然に恵まれ、歴史の舞台となった景勝地と最新の科学技術を備えた、個性あふれる風土が魅力です。

基礎知識

29. Japan Government provides info about Japan once per month via newsletter

Shown above are the issues thus far for Year 2018

This online magazine highlighting Japan is published once a month by the Japanese government to help readers better understand Japan today.

https://www.gov-online.go.jp/eng/publicity/book/hlj/

30. HOW TO RECEIVE AND REPORT BIRDS-2 SATELLITE SIGNALS

AMATEUR RADIO

BIRDS-2 CubeSat Name and Call Sign

The name of the three CubeSats of BIRDS-2 project and the call sign allocated to them as as follows:

Country	Satellite ID	Satellite Name	Call Sign
Bhutan	BIRD-BT	BHUTAN-1	JG6YKL
Philippines	BIRD-PH	MAYA-1	JG6YKM
Malaysia	BIRD-MY	UiTMSat-1	JG6YKN

Updated TLE

```
UITMSAT-1
1 43589U 98067PD  18228.77659872  .00010086  00000-0  15
2 43589  51.6396  76.7211 0006849  92.4995 267.6780 15.5
MAYA-1
1 43590U 98067PE  18228.77648787  .00010199  00000-0  15
2 43590  51.6396  76.7203 0006951  93.3359 266.8427 15.5
BHUTAN-1
1 43591U 98067PF  18229.41912344  .00010390  00000-0  16
2 43591  51.6398  73.5124 0007028  96.8197 263.3593 15.5
```

For receiving BIRDS-2 signals please see this http://birds2.birds-project.com/operation/

Please use this website to submit your reception reports
http://birds2.birds-project.com/data-submission/
You shall be rewarded with a beautiful QSL card -- see the next section to see these cards.

31. The QSL cards of BIRDS-2

The ICOM transceiver of the ground station at NUM in Mongolia

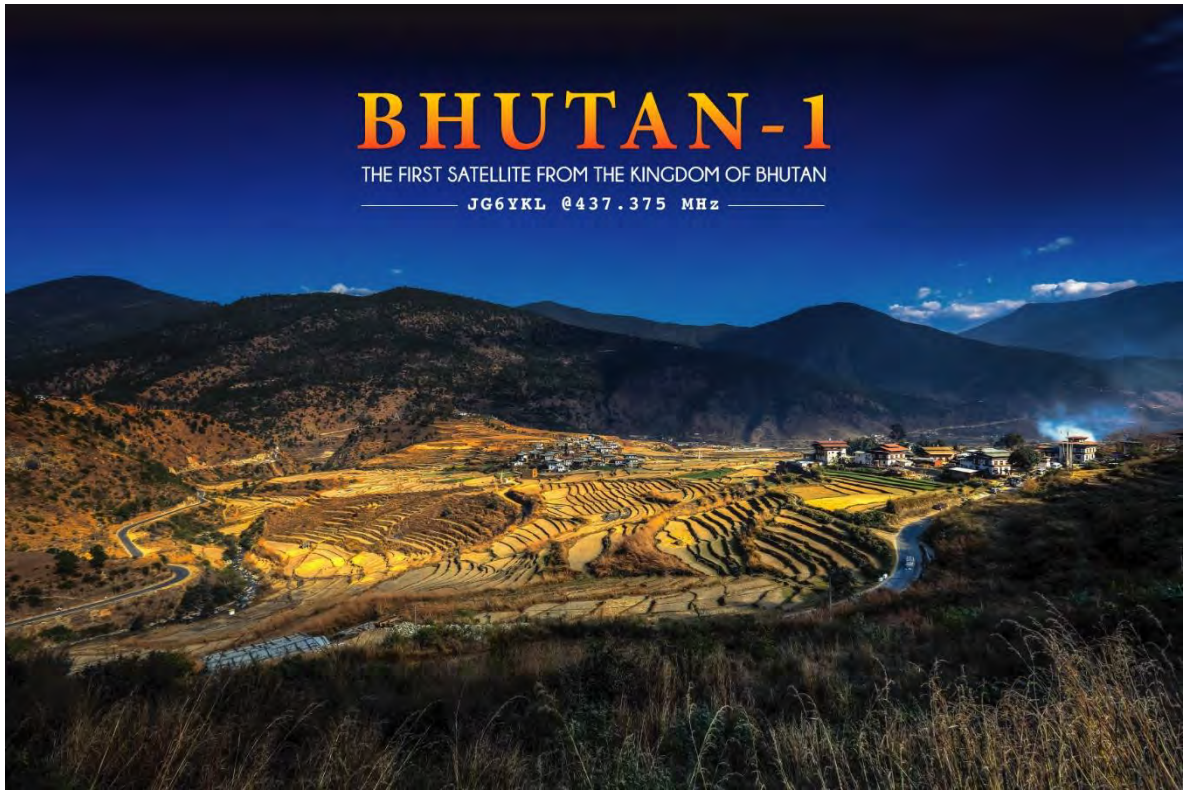
BIRDS-2 QSL Cards

(Submit a reception report to receive one)

Prepared by: Joven Javier

23 August 2018

BHUTAN QSL Card



Front

Back

PHILIPPINES QSL Card

Front

Back

MALAYSIA QSL Card

Front

To Radio: ☐☐☐☐☐☐

dd/mm/yy	Time	Band	Mode
	: UTC	437.375MHz	☐ CW ☐ APRS ☐ Telemetry

SPECIFICATION

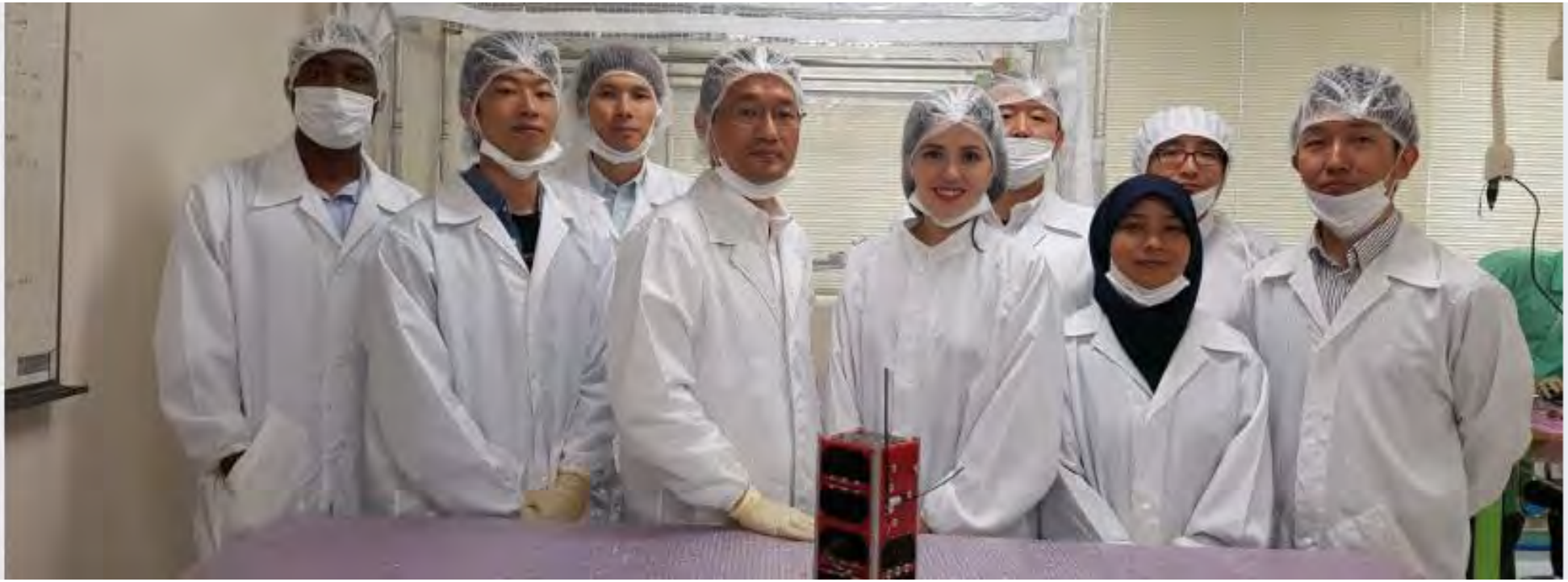
Name : UiTMSAT-1
Size : 10cm x 10cm x 10cm
Mass : 1.1kg
Orbit : LEO (400km)
Launch date : 28/06/2018
Launch vehicle: Falcon 9 - SpaceX CRS 15
Release date : 28/07/2018
Release by : Japanese Experiment Module (KIBO) - ISS
GS location : 3.073N 101.497E
URL : http://www.uitmsatellite.uitm.edu.my/
http://birds2.ele.kyutech.ac.jp/

Back

32. SPATIUM is a sister project of BIRDS

SPATIUM

Space Precision
Atomic-clock TIming
Utility Mission



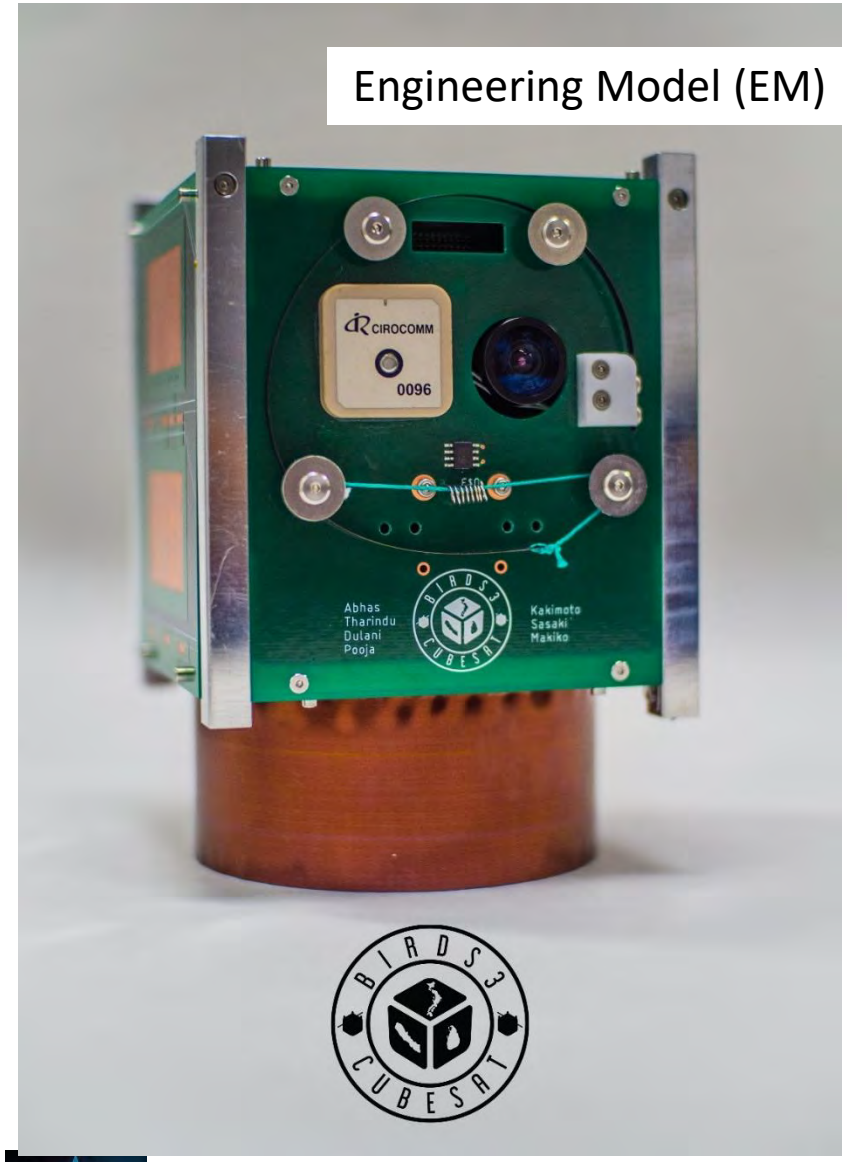
SPATIUM is on Facebook:
https://www.facebook.com/Space-Precision-Atomic-clock-TIming-Utility-Mission-293774767872332/?modal=admin_todo_tour

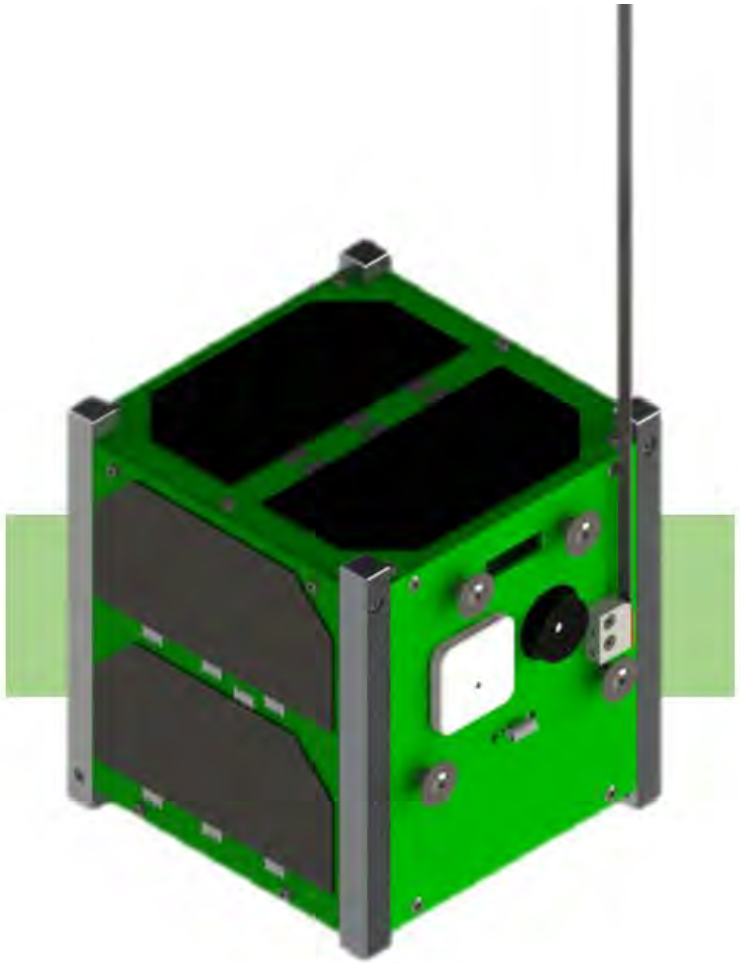
…. which mentions the following:

The project SPATIUM (Space Precision Atomic-clock TIming Utility Mission) presents a new technique for ionosphere mapping using a constellation of CubeSats equipped with Chip Scale Atomic Clock (CSAC) to provide real-time three-dimensional mapping of ionosphere plasma density at the altitudes of electron density peak (200 to 400 km above the Earth). CSAC as a main mission board, equipped with developed packaging solution for space application using a CubeSat platform and consists of two boards connected together and represents one system. The first board includes CSAC (Microsemi QuantumTM SA.45s CS) itself with a 10 MHz frequency output, and the 2nd board carries supercapacitors (4.5V 90F).

The CSAC board was developed in Nanyang Technological University, Tamasek labs. by a group of scientists leaded by prof. Li King Ho Holden.

33. BIRDS-3: Monthly activities, July-August, 2018



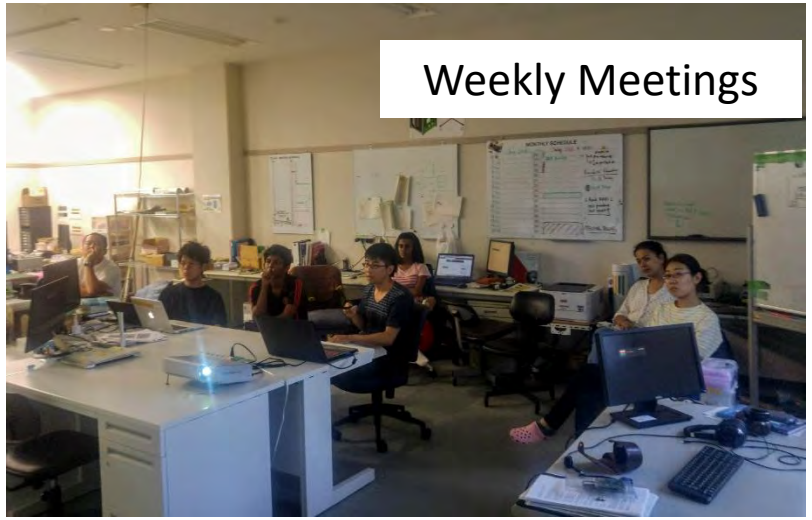


BIRDS-3 CubeSat Project July-Aug 2018

Monthly reports by each BIRDS-3 student member

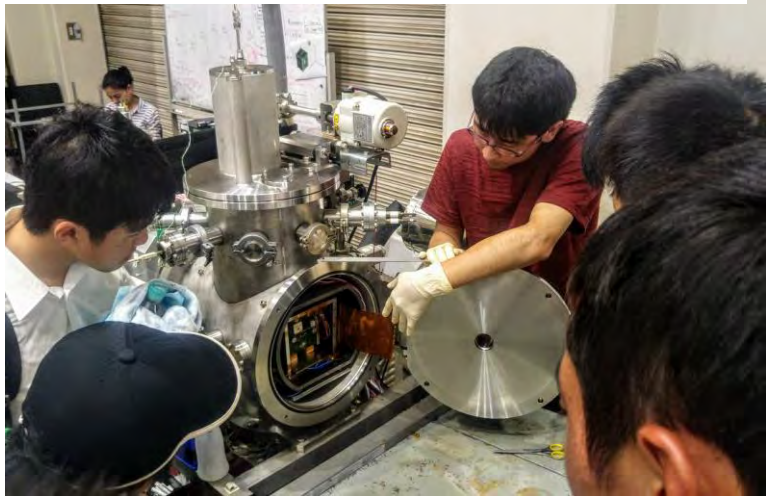
BIRDS-3 Activities on July - Aug 2018, written by Abhas

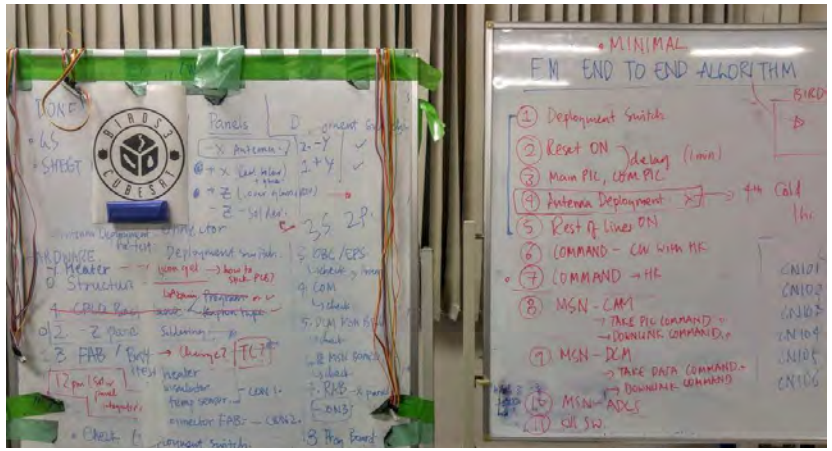
Sasaki integrates EM of BIRDS-3



Weekly Meetings

Kakimoto explains at Open Campus





Documenting steps for Thermal Vacuum Testing

Masui-sensei advising about TVT

34. BIRDS-3: Attending fireworks wearing yukata

Yukata is a summer *Kimono* (dress) . It is worn for events like fireworks festivals. We wore the *Yukata* for fireworks which was held in Kokura. Before fireworks, we joined the tea ceremony. The green tea is so sweet that I never tasted it, and was very tasty. At the fireworks, other BIRDS member also joined and we enjoyed the beautiful fireworks together. By M. Kishimoto.

Cont'd on next page

Attending fireworks wearing *Yukata!*

Fireworks in Kokura

This is Kokura castle, and fireworks was held near the iconic building.

After the fireworks, we took a group pic

This report was by
M. Kishimoto on 7 August 2018.

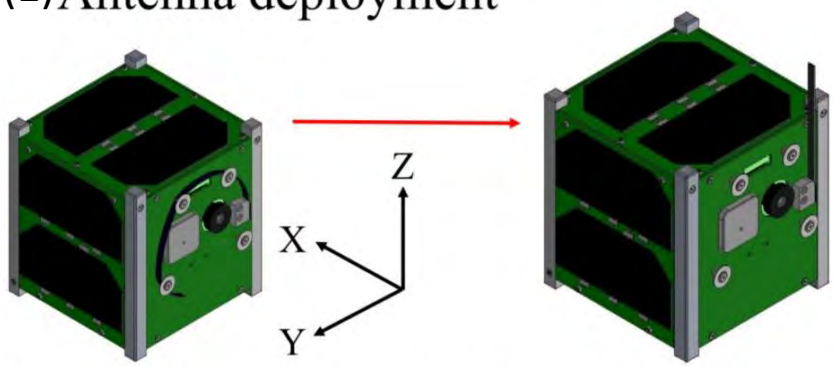
35. BIRDS-3: Support documentation for frequency application

This report was by
M. Kishimoto on 10 Aug. 2018

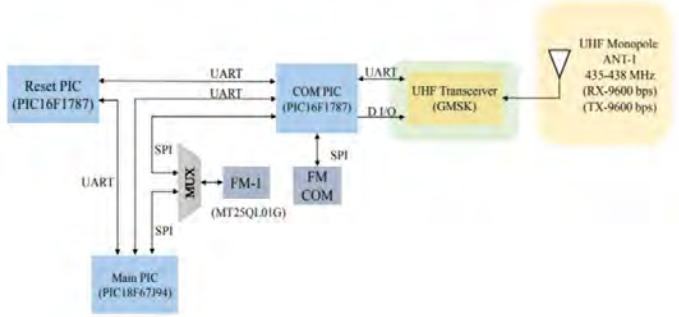
When we apply the frequency, we should show the following information to IARU :

1) CAD Drawing
   It shows the structure of BIRDS-3 satellite
2) Communication Block Diagram
   It shows the block diagram of communication subsystem
3) Communication Plan
   It shows the CW transmission plan and the CW beacon format of BIRDS-3.
   In the CW beacon, short message also include

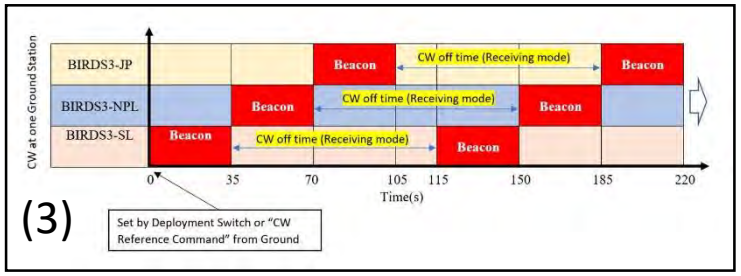
(1) Antenna deployment



(2) BIRDS-3 Communication Block Diagram
(Same for Raavana-1, Nepalisat-1, Uguisu)



(3)



Cont'd on next page

4) Link Budget
It shows whether communications is possible or not. It should have system link margin.

5) Power Budget
It shows the power consumption of BIRDS-3. The normal power consumption should be less than average energy generated.

6) Antenna Radiation Pattern

These documents are at the BIRDS-3 website: http://birds3.birds-project.com/document/amateur/
Please check our documents.

(4)

		Downlink		Uplink
	Unit	FM Telemetry/ Mission	CW Beacon	FM Command
Orbit Altitude	km	410	410	410
Distance of Elevation Angle at 10 deg	km	1466.33	1466.33	1466.33
Frequnecy	MHz	437	437	435
Bandwidth	Hz	26000	500	26000
Emission Type	-	F1D	A1A	F1D
Modulation	-	GMSK	CW	GMSK
Protocol	-	AX.25	-	AX.25
Transmitter				
Transmitter Power Output	W	0.8	0.1	14
in dBW	dBW	-0.97	-10.00	11.46
Transmission Line Losses	dB	1	1	3
Antenna Gain	dBi	1.93	1.93	18
EIRP	dBW	-0.04	-9.07	26.46
Path				
Antenna Pointing Loss	dB	3	3	1
Antenna Polarization Loss	dB	3	3	3
Path Loss	dB	148.58	148.58	148.54
Atmospheric Loss	dB	1	1	1
Ionospheric Loss	dB	0.4	0.4	0.4
Rain Loss	dB	0	0	0
Isotropic Signal Level at Receiver	dB	-156.02	-165.05	-127.48
Receiver				
Antenna Pointing Loss	dB	1	1	3
Antenna Gain	dBi	18	18	1.93

(5)

Subsystems/ Missions	Maximum Power Allocated (mW)	Safe Mode		Low Power Mode	
		Duty Cycle	Power (mWh)	Duty Cycle	Power (mWh)
OBC/EPS	200	1.5	**200***	1.5	**300**
COM-RX	160	1.05	**168**	1.05	**168**
COM-TX-CW	450	0.45	**202.5**	0.45	**202.5**
COM-TX_MISSION	4200	OFF	OFF	OFF	OFF
MTQ DRIVERS	300	OFF	OFF	OFF	OFF
CAM MSN	800	OFF	OFF	OFF	OFF
SoftCIB (CPLD)	40	OFF	OFF	OFF	OFF
GPS+ADCS Board	160	OFF	OFF	OFF	OFF
FAB Board	100	1.5	**150**	1.5	**150**
LoRa Transceiver Board	100	0	**0**	0	**0**
TOTAL		**720.5**		**820.5**	

(6)

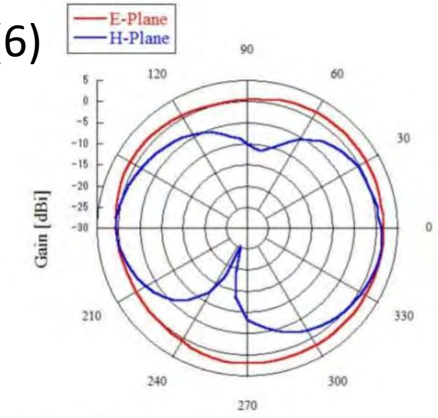


Figure1.2 2D Antenna Radiation Pattern

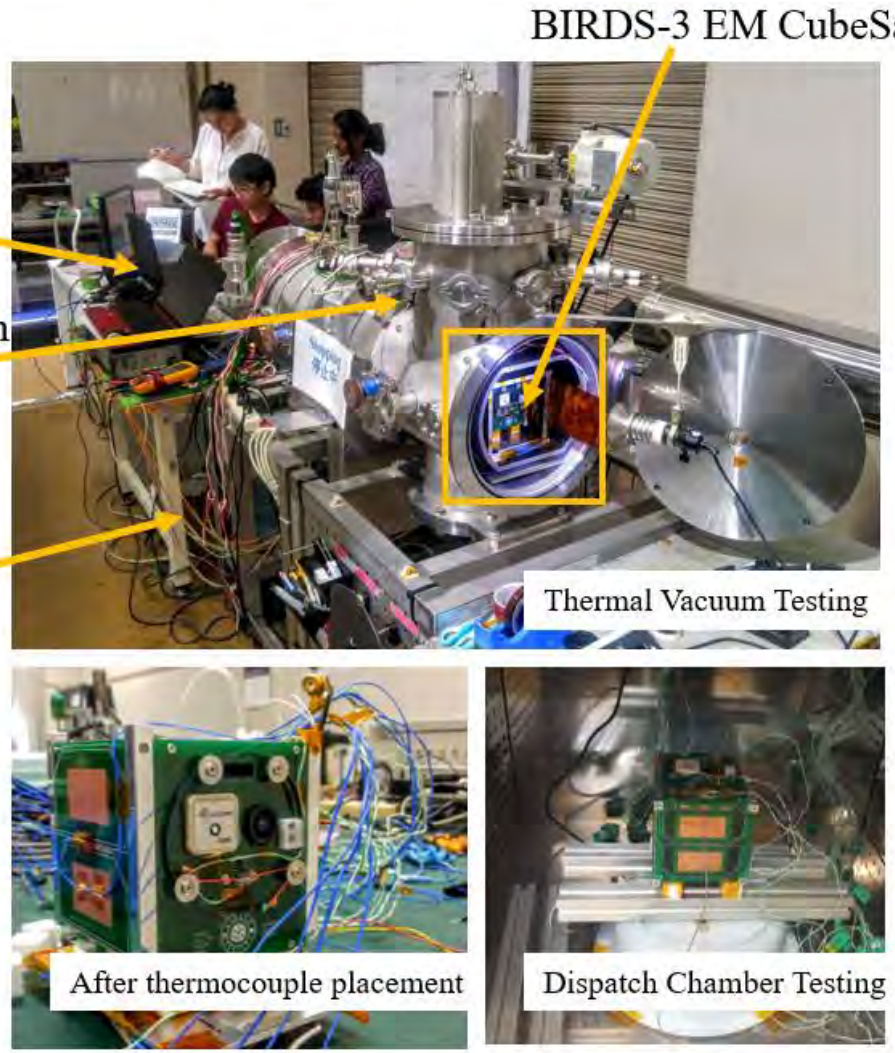
36. BIRDS-3: Thermal vacuum testing photo report

30 July – 3 Aug 2018
Thermal Vacuum Testing

9 – 10 Aug 2018
Dispatch Chamber Testing

16 – 18 Aug 2018
Vibration Testing

1 Sep 2018
Critical Design Review



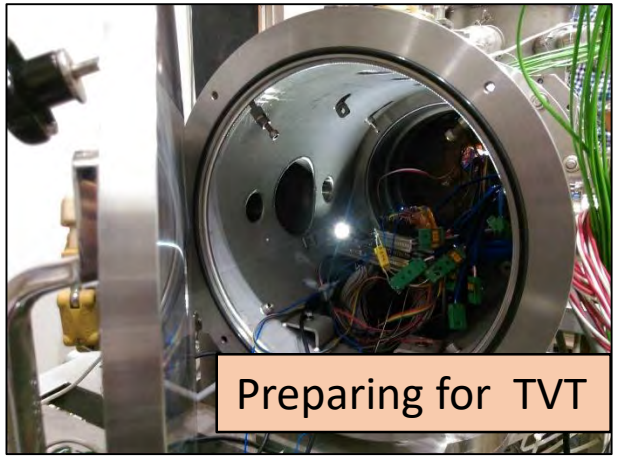
Dulani Chamika

BIRDS-3 Thermal Vacuum Testing Photo Report
10 Aug. 2018

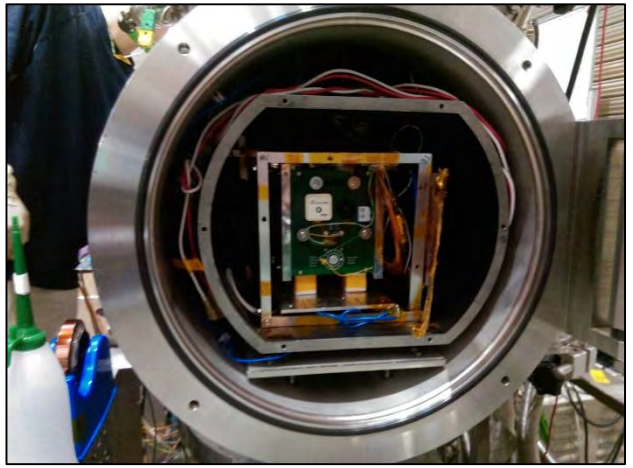
Cont'd on next page

BIRDS 3 –Thermal Vacuum Test (TVT)

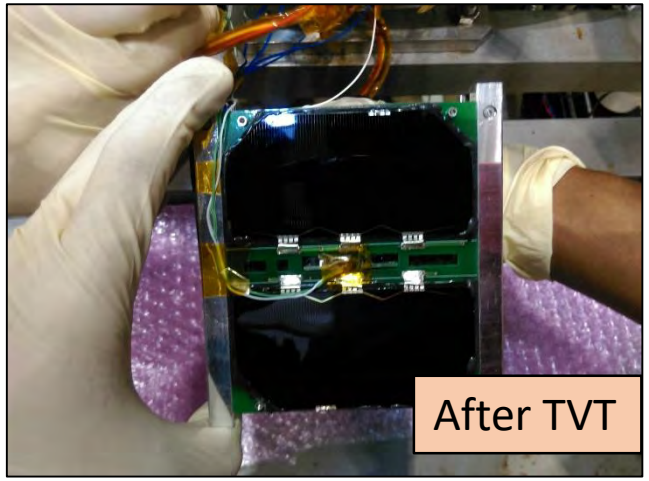
Preparing for TVT



Preparing for TVT



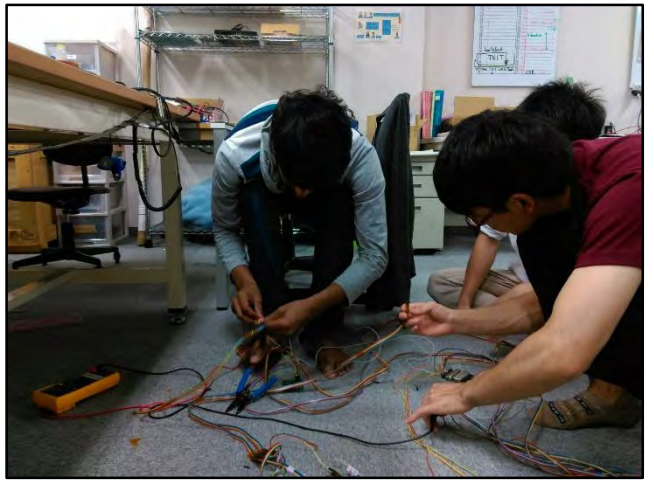
Satellite in the chamber(photo taken after the TVT)



After TVT

Tharindu,Sasaki, Kakimoto preparing cables for TVT

BIRDS 3 thermal vacuum test was done from 28th July 2018 to 31st July 2018.



End of report by Dulani

37. BIRDS-3: OBC EM testing

Yuta Kakimoto,　10 August 2018

先月の末からミッションやその他サブシステムとの統合を開始しました。

これまでは、それぞれのシステムと1対1で接続し通信をしながら、ミッションの動作確認を行ってきましたが、すべての系を接続し、統合試験を行う段階に入りました。

1対1ではうまくいっていた動作も、統合することでソフトウェア的な不具合が発生してくるので、その修正を行い、現在は全体でも基本的な動作を行うソフトウェアが完成しています。全体の流れでは、電源がONになったあと、アンテナ展開を行い、90秒おきにFABからハウスキーピングデータを受け、それをフラッシュメモリに保存していきます。また、地上局から衛星に各ミッション用のコマンド（CAM、LMD、ADCS、Glue）を送信すると、ミッションをを開始し、終了すると、また90秒おきのハウスキーピングデータ収集に戻ります。さらに、保存したデータを衛星からダウンロードしたいときは、再びダウンリンク用のコマンドを送信して、各ミッションやハウスキーピングデータを収集します。

8月に入り、これらの機能を携え、熱真空試験を行いました。いくつかソフトウェア上の問題点などが見つかったため、それらを修正し、今後は、振動試験や長期間運用の試験を行っていく予定です。

Currently we are developing EM. The subsystems are combined and integrated -- and then testing is carried out. Also we are at the stage of space environmental testing.

Monitoring of OBC operation

38. BIRDS-3: Solar Cell Integration Procedure Meeting (BIRDS I, II, III and Spatium)

by Pooja Lepcha

Members of BIRDS-1, BIRDS-2, BIRDS-3 and SPATIUM along with staff gathered in seminar room to discuss about making a common assembly procedure for similar activities carried out in all the satellite projects, one of which is solar cells assembly.

Solar cells being quite expensive are handled with much precaution however mistakes are unavoidable since it's a new person every time. Therefore, there is a tradition of "Lessons Learnt" sessions where the senior satellite teams warn the new project teams about the mistakes they made and give advice based on their expertise.

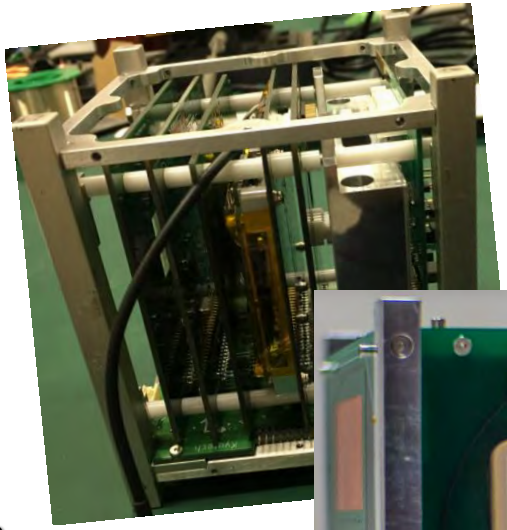
Such sessions are very helpful to avoid similar mistakes. On this day, all the satellite teams discussed about the problems related to solar panel assembly and how to avoid breaking of solar cells. It was decided that there would be a common assembly procedure for all satellite projects to follow. These tradition of learning and sharing is one of the many advantages of inheriting designs.

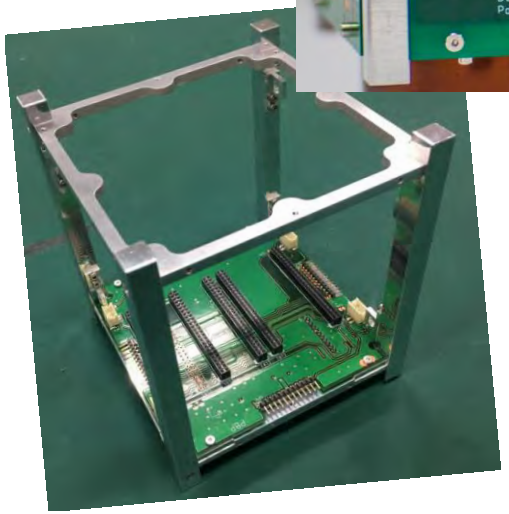
39. BIRDS-3: Engineering model

統合試験

Sasaki Yuji 10/Aug/2018

実際に宇宙に打ち上げる衛星をFlight Model (FM)と呼びます。FMを作り上げる前に現在設計している衛星が宇宙で機能するかどうかを調べる実験に使う衛星をEngineering Model (EM)と呼びます。6月に紹介した衛星の構体を使って中のバックプレーンや基盤を搭載して外面パネルも貼り付けました。写真には外面パネルに太陽電池を1つの面だけ張り付けています。これは私が担当しているGlueミッションで使う予定の接着剤を使っています。上の外面パネルにつけてあるものは宇宙用の接着剤です。貼り付け方の違いによる品質を見るために実験的につけています。これにより、より簡単で環境試験は主に熱真空試験と振動試験を行いますがその試験に間に合うように無事スケジュール通り組立られました。熱真空試験を通過したのでこれから振動試験を行う予定です。





We have completed the EM as shown in the photo. EM has passed the thermal vacuum test. We are planning to conduct a vibration test from now on at the time of this writing.

BIRDS-3
Antenna Testing in anechoic Chamber

By: Tharindu Dayarathna

23 August 2018

BIRDS-3 Antenna Testing in anechoic Chamber

- Following tests were performed

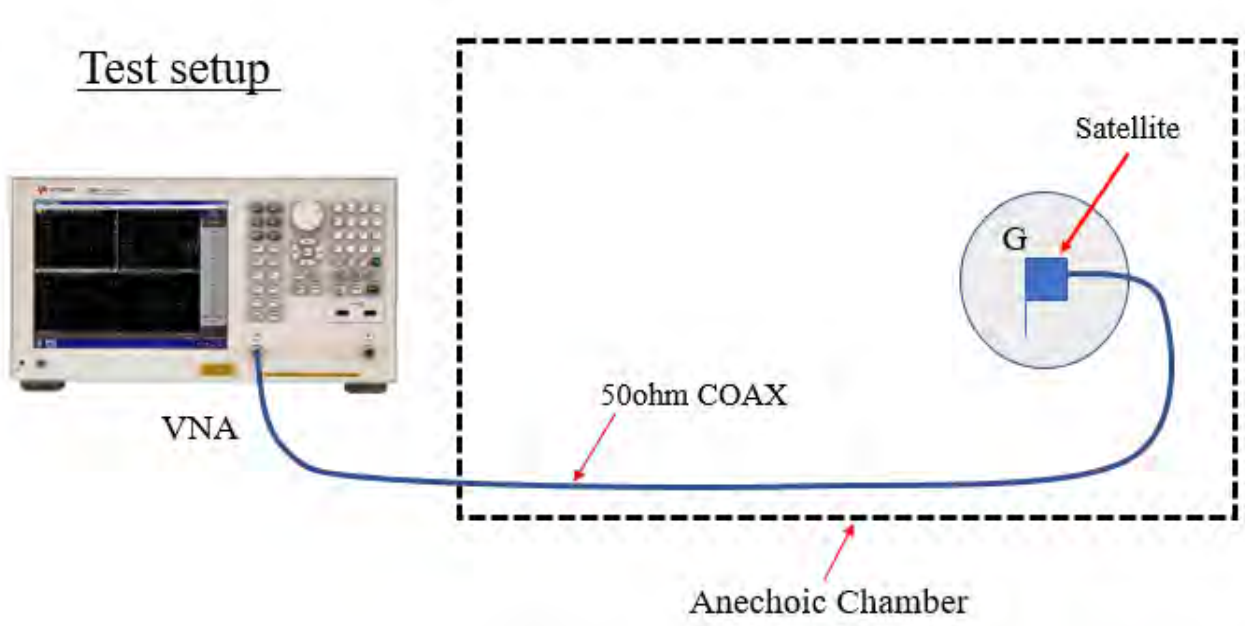
1. **Antenna reflection coefficient (S11) Measurement**

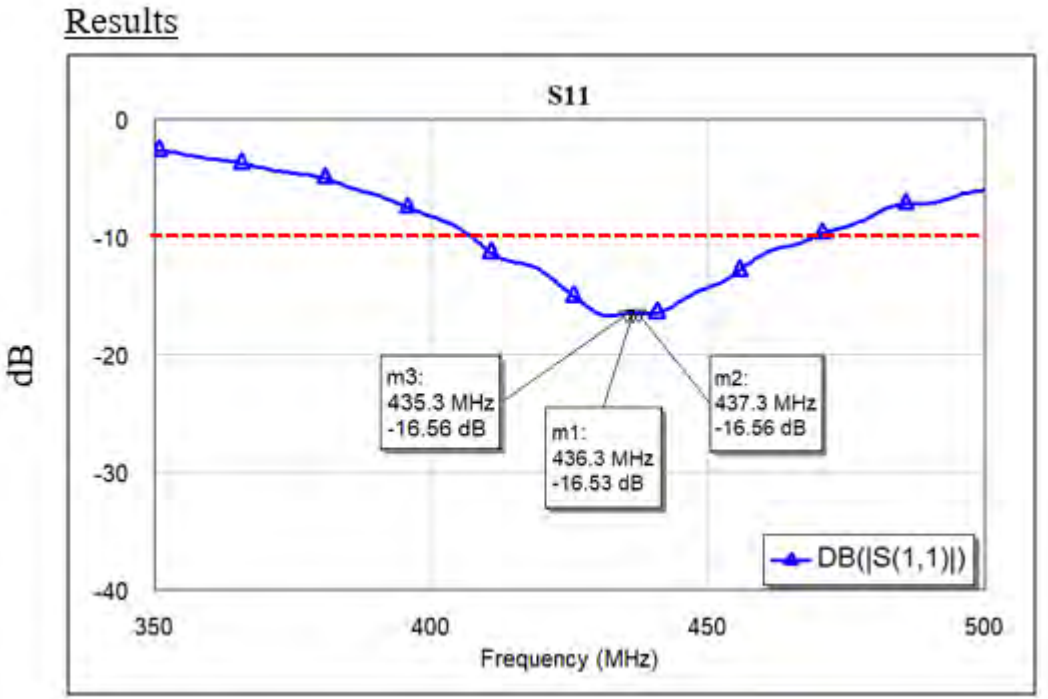
   For a better antenna theatrically S11 value should be less than -10dB. In this test main aim is to tune the BIRDS-3 monopole antenna length to have antenna's S11 value less than -10dB in target frequency range (433MHz-439MHz).

1. **Measuring Antenna Radiation Pattern**

   Knowing antenna radiation pattern is very important to understand antenna's performance because of that this test was performed

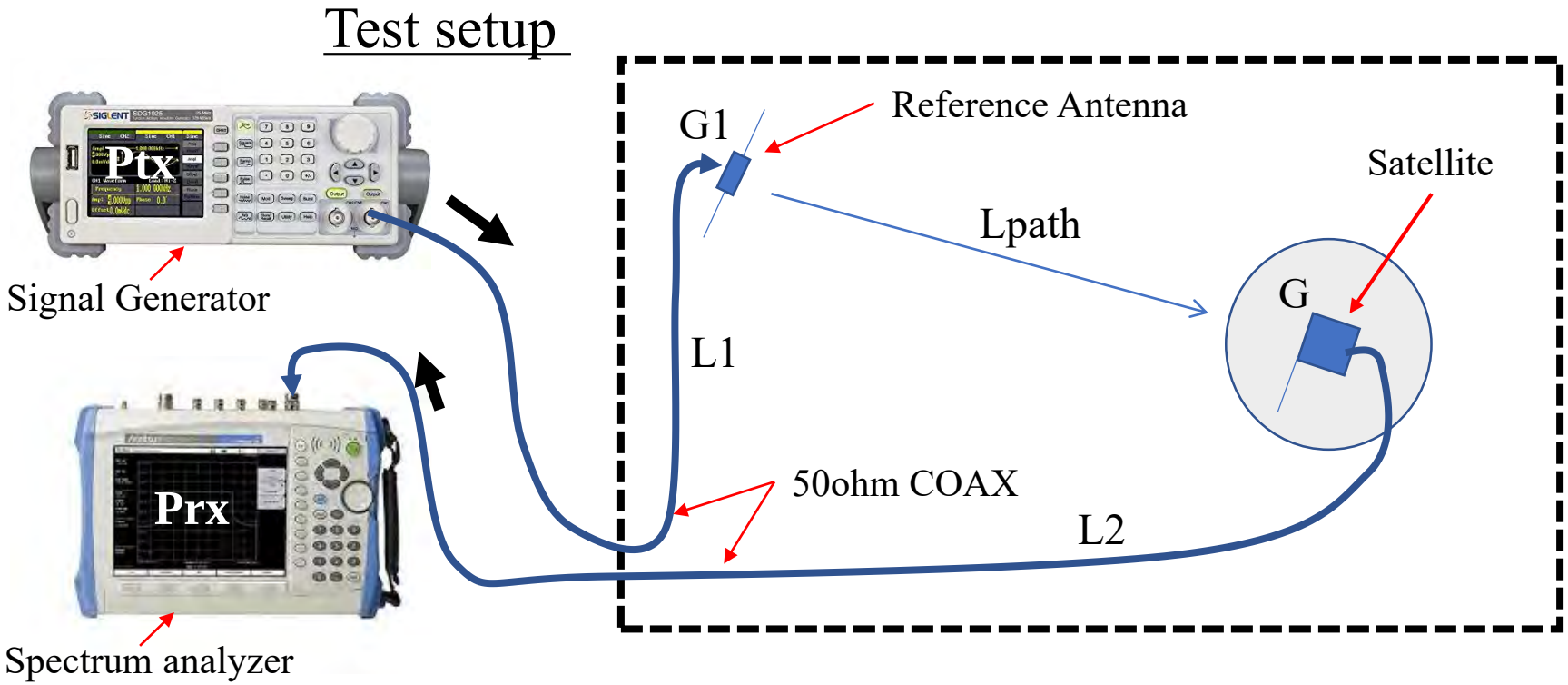
Antenna reflection coefficient (S11) Measurement





Resultant S11 value is about -16dB. This value is much better than expected value.

Measuring Antenna Radiation Pattern

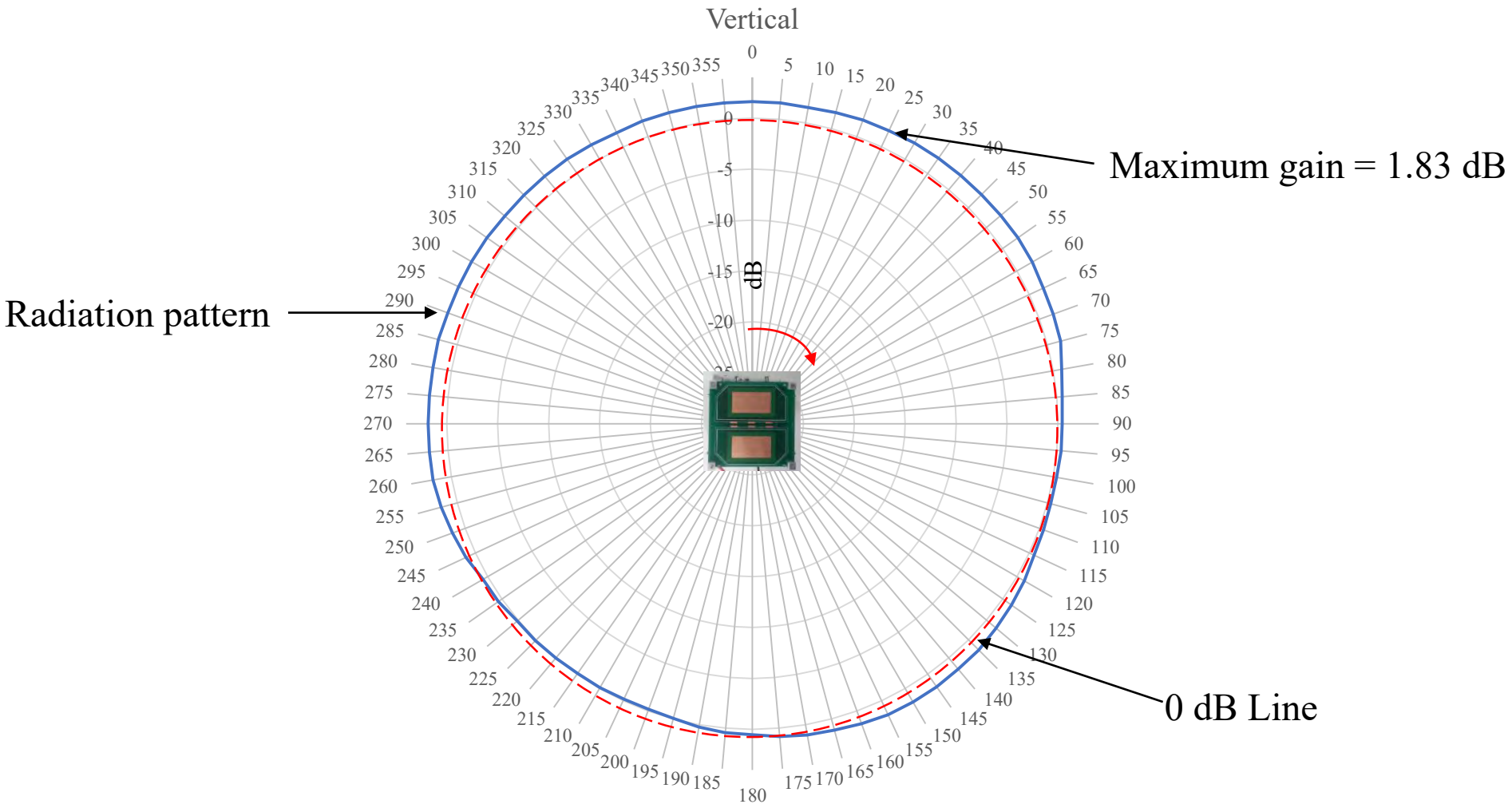


In decibel scale received power at satellite

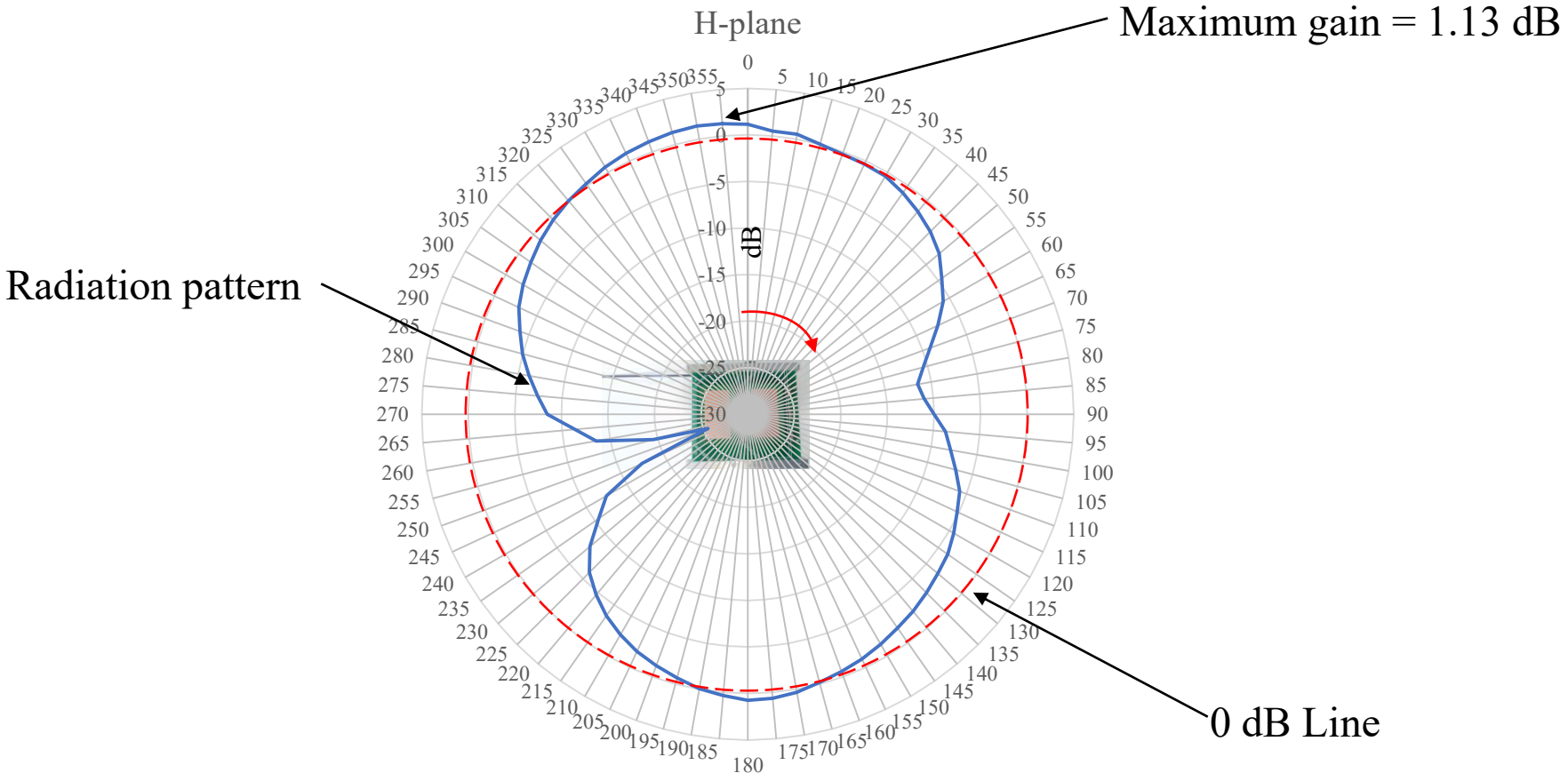
$$P_{rx} = P_{tx} - L_1 - L_2 - L_{path} + G_1 + G$$

Main aim is finding this value (antenna gain)

Measured E-plane radiation pattern



Measured H-plane radiation pattern



41. 3BIW: The 3rd BIRDS International Workshop (in Ulaanbaatar, Mongolia)

This article is nearly 50 pages.

The **Third BIRDS Int'l Workshop** was held at the National Univ. of Mongolia (NUM) during 16-19 August 2018. This section covers this workshop.

Some 3BIW participants waiting for the flight from Inchon Airport to Ulaanbaatar on 15 Aug. 2018

Photos in this report by Apiwat and G. Maeda; text by G. Maeda

Where is Ulaanbaatar?

https://i.pinimg.com/originals/c6/10/99/c6109b876baa73abb42c53d55845360.jpg

Ulaanbaatar, formerly anglicised as Ulan Bator /ˌuːlɑːn ˈbɑːtər/ (Mongolian: Улаанбаатар, [ʊɮɑːm.bɑːtʰăr], Ulaγanbaγatur, literally "Red Hero"), is the capital and largest city of Mongolia. The city is not part of any aimag (province), and its population as of 2014 was over 1.3 million, almost half of the country's total population.

Located in north central Mongolia, the municipality lies at an elevation of about 1,300 meters in a valley on the Tuul River. It is the country's cultural, industrial and financial heart, the center of Mongolia's road network and connected by rail to both the Trans-Siberian Railway in Russia and the Chinese railway system.

- from Wikipedia

Loading the aircraft at Inchon

Mongolian Airlines – inflight meal; this flight departed 3 hours late.

De-planing at Chinggis Khann Airport

Re-grouping at the airport

Checking into the hotel near NUM

DAY 1 of 3BIW

← Poster banner standing in the lobby of the venue at NUM

REGISTRATION

of 3BIW

Workshop bag contains a lot of goodies!

← GROUP PHOTO OF THE DOUBLE WORKSHOP

In front of the venue building

G. Maeda and Adolfo of TEC, Costa Rica

30-min. keynote address by Prof Cho. Title was “Overview of BIRDS Program” – see abstract on the next page.

Prof. Tsolmon presents the BIRDS-1 (Mongolia CubeSat) **RBF pin** (remove-before-flight pin) to the president of NUM. This framed memorabilia originally came from the ISS via JAXA.

Key Note address by Prof. Mengu Cho

Title: Overview of BIRDS Program

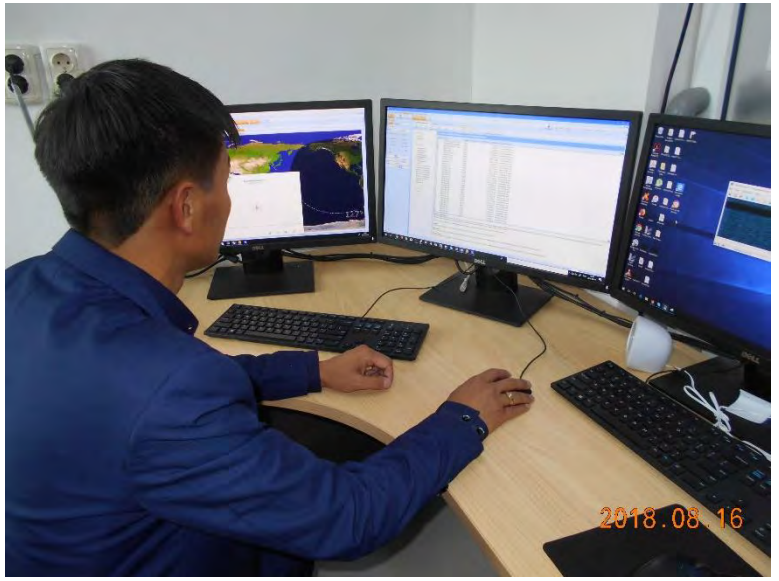
In this presentation, overview of BIRDS program including its latest update will be given. BIRDS program, originally called Joint Global Multi Nation Birds, started in 2015 as a satellite project involving 7 countries to develop five 1U CubeSats. The BIRDS program is not only making a series of satellites. It is an international program to foster cross-border inter-university collaboration on space research and education. Its mission is to make the foremost step toward indigenous space program at each nation by successfully building and operating the first national satellite.

In BIRDS-1, Mongolia, Ghana and Bangladesh launched the countries' first satellite.
In BIRDS-2, Bhutan launched it first satellites. With BIRDS-3, Nepal and Sri Lanka will make their debut in the space sector. In this presentation, an overview of BIRDS program, including its origin, status and future, will be presented.

DAY 1 cultural performance

Coffee break treats

Wonderful hospitality by NUM



This room is the lab and office of Prof. Tsolmon

NUM Ground Station (fully operational) tracks the satellites of BIRDS-2. During the workshop (DAY 1) we went to the 6th floor to observe a pass by BIRDS-2.

Thanks to the NUM team for this ground station demonstration. We could clearly hear BIRDS-2 signals.

Colonel Amarsaikhan SERDARI, at the left

Dr. Cheki Dorji, President of Royal Univ. of Bhutan, at the right

Lunch of DAY 1

BIRDS-1 Session; chaired by G. Maeda

Title: "Lessons learned from BIRDS-1 project"

Presenter: Prof. M. Cho, Kyutech, Japan

Title: "Progress and Future Perspective on All Nations University Space Activities"

By: Benjamin Bonsu and Samuel Donkor, ANU_SSTL team, Space Systems Technology Laboratory, All Nations University, Ghana

Title: "Local Capacity Building for Space Engineering Among FUTA Students"

By: Dahunsi Olurotimi Akintunde
Department of Mechanical Engineering
Federal University of Technology
P. M. B. 704, Akure, Ondo State, Nigeria

Title: “Payload sharing platform for BIRDS satellite project”

By: Raihana Shams Islam Antara
BRAC University, Bangladesh

Dinner of DAY 1 (Cont'd next page)

Vice President of NUM (above) gave a pre-dinner speech in which he declared, "This workshop is important for the following three reasons:

1. BIRDS is peaceful int'l collaboration; it gives the right non-military message to young people
2. This workshop promotes a stronger and more vibrant human network under the umbrella of BIRDS
3. BIRDS provides a bridge between countries, and a bridge between generations, too.

“Nice hot food.”

This statue stands in front of NUM.

Khorloogiin Choibalsan (Mongolian: Хорлоогийн Чойбалсан, spelled Koroloogiin Çoibalsan between 1931 and 1941 and ᠬᠣᠷᠯᠣᠭᠣᠢᠨ ᠴᠣᠶᠪᠠᠯᠰᠠᠩ before 1931), [February 8, 1895 – January 26, 1952] was the Communist leader of the Mongolian People's Republic and Marshal (general chief commander) of the Mongolian armed forces from the 1930s until his death in 1952. His rule marked the first and last time in modern Mongolian history that an individual had complete political power.

- from Wikipedia

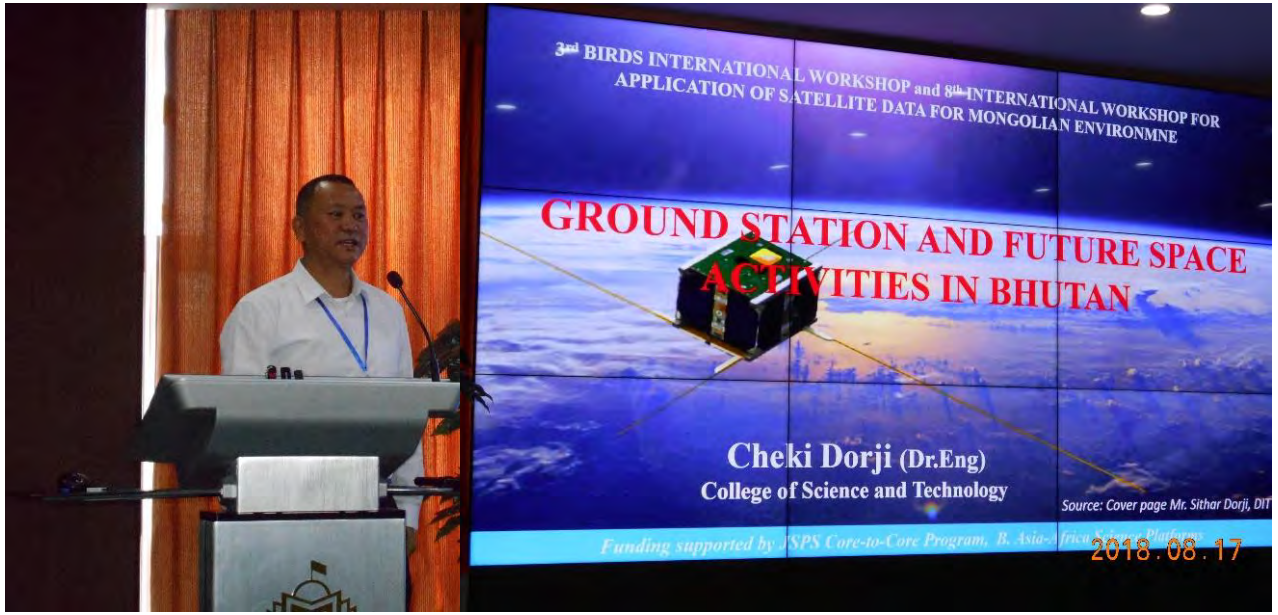
BIRDS-2 Session; chaired by S. Adrian

Title: “The STAMINA_for_Space Program: Sustained Support for Space Technology and Applications Mastery, Innovation and Advancement in the Philippines”

Joel S. Marciano, Jr.
Acting Director, Advanced Science and Technology Institute
Department of Science and Technology (DOST-ASTI)
Professor, Electrical and Electronics Engineering Institute
University of the Philippines Diliman (UPD-EEEI)
Program Leader, PHL-Microsat and STAMINA_for_Space Programs

Title: “Space-based Internet of Things (IoT) for Nano-satellite Application”

Mohamad Huzaimy Jusoh
Director, Center for Satellite Communication
Faculty of Electrical Engineering
Universiti Teknologi MARA, MALAYSIA



Title "Ground Station and Future Space Activities in Bhutan"

Cheki Dorji
President
College of Science and Technology
Royal University of Bhutan, Bhutan

Title: "Students' Experiences from the BIRDS-2 Project, Initial Operation Results and Next Steps"

ADRIAN C. SALCES
Doctoral Student
Laboratory of Spacecraft Interaction Engineering (LaSEINE), Kyutech, Japan

BIRDS-3 Session; chaired by G. Maeda

Title: "Overview of BIRDS-3 project"

Mengu Cho
Director, Laboratory of Spacecraft
Environment Interaction Engineering
Kyushu Institute of Technology, Japan

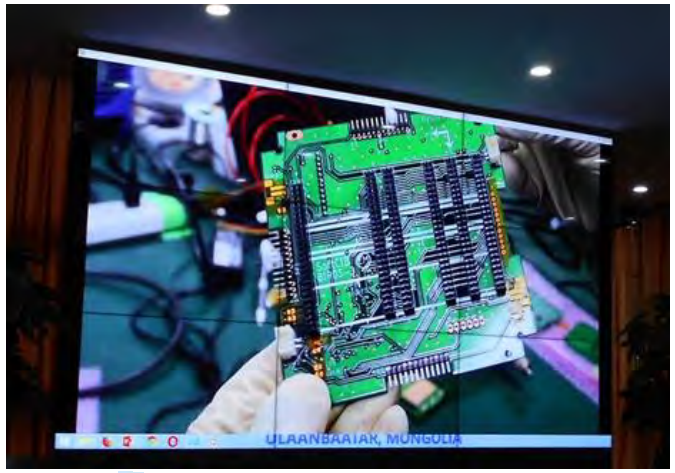
Title: "Pioneering Initiatives on Space Technology for National Capacity and Confidence Building in Nepal"

Rabindra Prasad Dhakal
Chief, Faculty of Technology
Nepal Academy of Science and Technology (NAST),
Khumaltar, Lalitpur, Nepal

Title: "National Capacity Development in Space Technologies – Sri Lanka"

Kamani Ediriweera
Deputy Director General
(Technical Operations)
Arthur C Clarke Institute for Modern Technologies (ACCIMT), Sri Lanka

VIDEO



Finally, in this session, a 21-min. video by the students of BIRDS-3 was shown to the workshop participants. Each student explained his or her work in three minutes. The video is now at YouTube:
https://www.youtube.com/watch?v=HRg_Hq-Q524

General Session; chaired by G. Maeda

Title: "A CubeSat Mission for Intelligent Remote Sensing and IoT Service"

Jyh-Ching Juang
Department of Electrical Engineering
National Cheng Kung University, Taiwan

Title: "SETEC Lab Specialization Research and Development Plan"

Adolfo Chaves-Jiménez
Coordinator, Space Systems Engineering Laboratory (SETEC Lab)
Costa Rica Institute of Technology

[He got his Mongolian visa in Havana, Cuba.]

Title: "Space science and technology related activities in Bahir Dar University Ethiopia”

Delele Worku Ayele
Bahir Dar University, Ethiopia

Title: "Space Science and Technology Development in KMUTNB; KNACKSAT Satellite Project"

Apiwat Jirawattanaphol
KMUTNB Space System Laboratory (KSSL)
King Mongkut's University of Technology North Bangkok, Thailand

Ground Station Session; chaired by Apiwat

Title: “Mongolian Ground Station Development and Current Situation”

M. Altansukh, National University of Mongolia

Title: "BIRDS Ground Station Network: Overview and Project Status"

Apiwat Jirawattanaphol
Doctoral student
Laboratory of Spacecraft Environment Interaction Engineering
Kyushu Institute of Technology, Japan

Remote Data Collection Session; chaired by S. Adrian

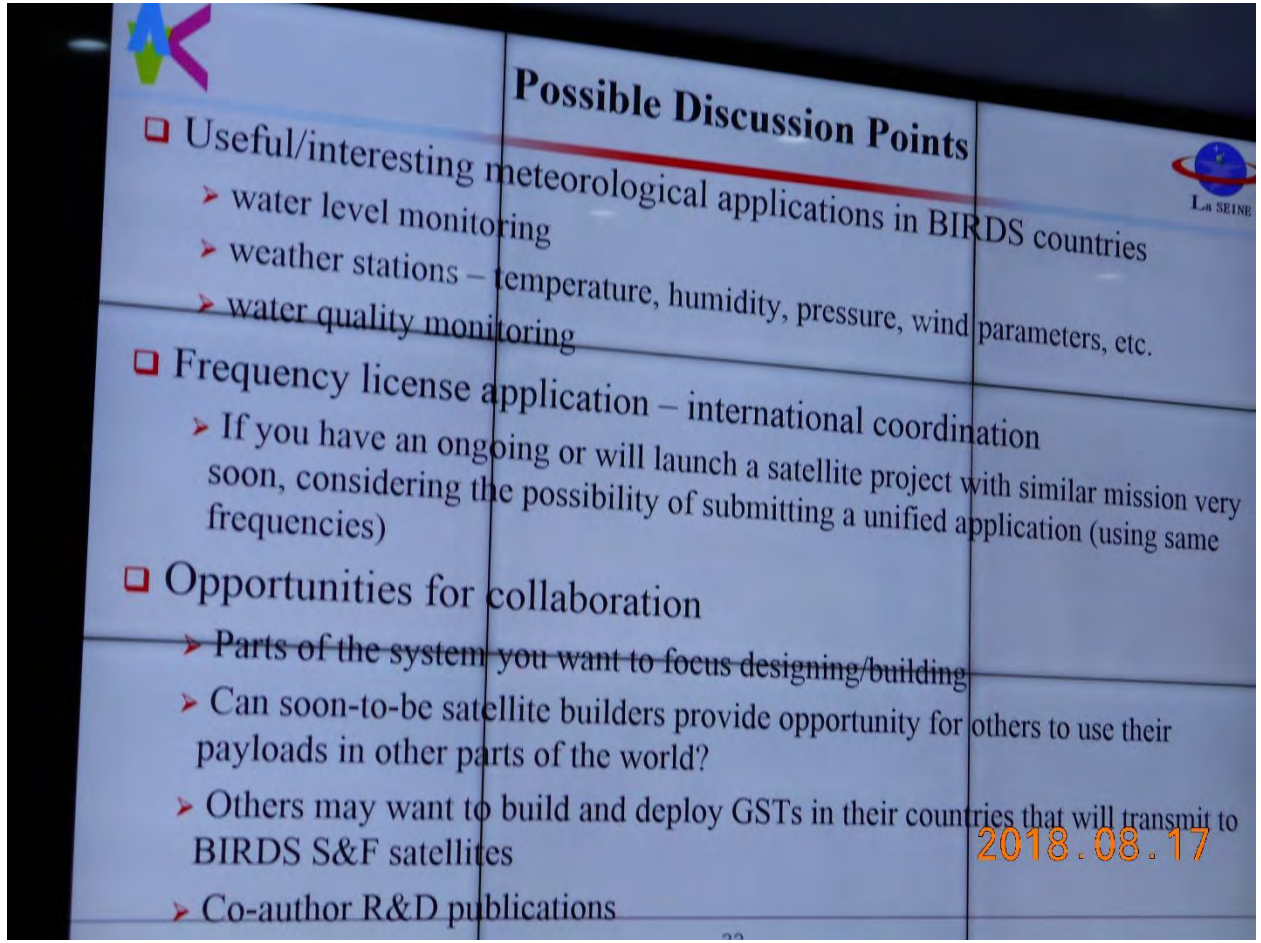
Title: "Current Developments on the BIRDS-2 Store-and-Forward (S&F) Mission and the Way Forward for an Advanced Remote Data Collection Mission in the BIRDS Network”

ADRIAN C. SALCES, Doctoral Student
Laboratory of Spacecraft Interaction Engineering (LaSEINE),
Kyutech, Japan

Title: "On-orbit Results and Lessons Learned from the Irazú Project's Store-and-Forward Mission"

Adolfo Chaves-Jiménez, Coordinator
Space Systems Engineering Laboratory (SETEC Lab)
Costa Rica Institute of Technology

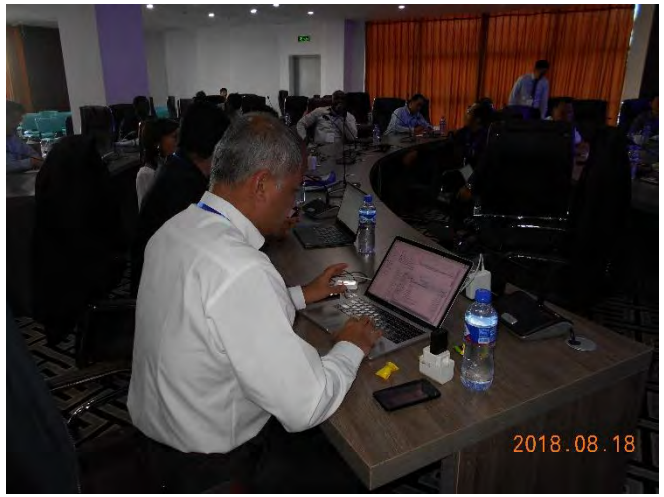
Remote data collection discussion – moderated by S. Adrian and Prof. Cho



DAY 3: Wrap Up (18 Aug)

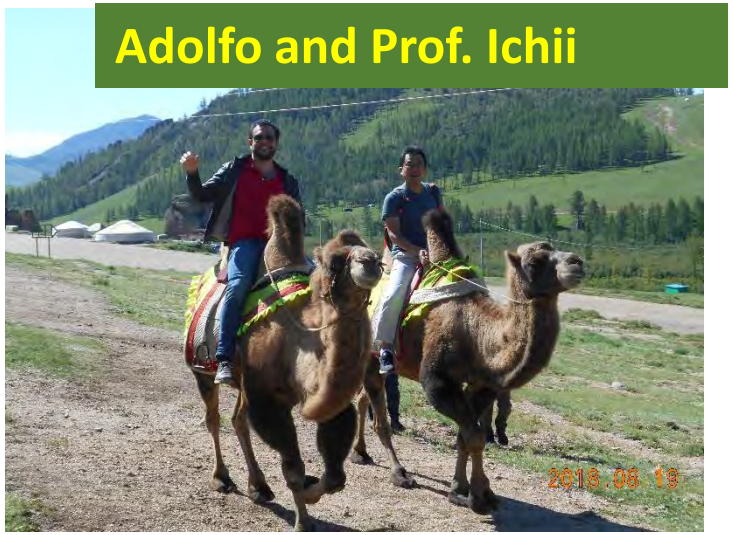
ACCIMT (Sri Lanka) and NAST (Nepal) both signed the **BIRDS Network LOI (Letter of Intent)**

Closing discussion of the 3rd BIRDS International Workshop



DAY 4: Excursion

(19 Aug)



Camel riding

Beautiful country – pristine sky, forests, mountains.

3BIW Int'l Song Festival

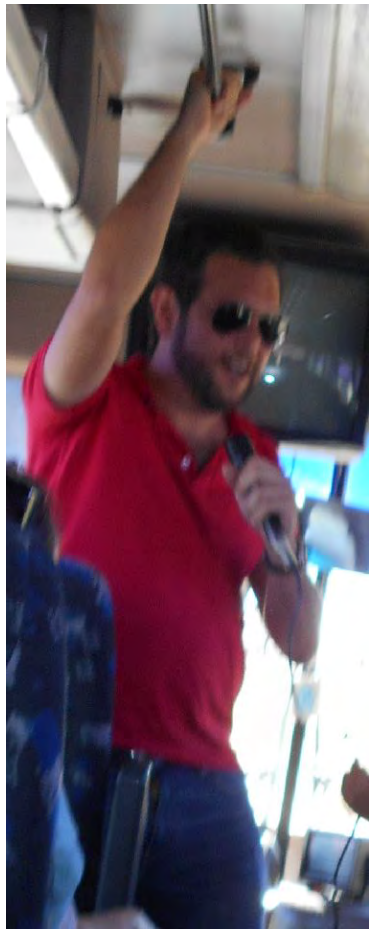
(in the bus)

Nepal

Malaysia

Ethiopia

Bangladesh



Costa Rica

Philippines

Bhutan

Belgium

Thailand

Japan

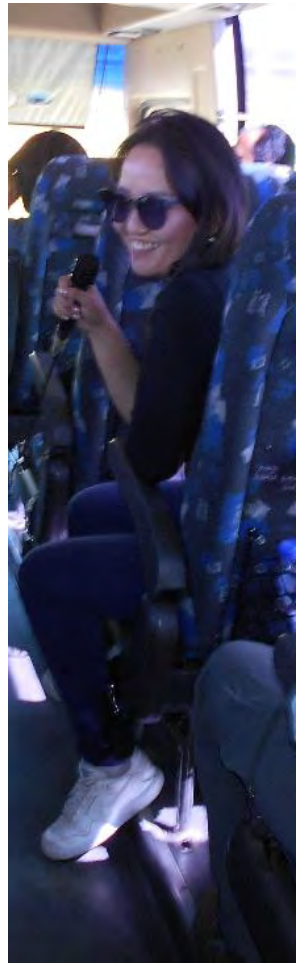
Japan

Ghana

Taiwan

Philippines

Mongolia
(NUM vice president)



Mongolia

The Genghis Khan Equestrian Statue, part of the Genghis Khan Statue Complex is a 40-metre (130 ft) tall statue of Genghis Khan on horseback, on the bank of the Tuul River at Tsonjin Boldog (54 km (33.55 mi) east of the Mongolian capital Ulaanbaatar), where according to legend, he found a golden whip. The statue is symbolically pointed east towards his birthplace. It is on top of the Genghis Khan Statue Complex, a visitor centre, itself 10 metres (33 ft) tall, with 36 columns representing the 36 khans from Genghis to Ligdan Khan. It was designed by sculptor D. Erdenebileg and architect J. Enkhjargal and erected in 2008.

Visitors walk to the head of the horse through its chest and neck, where they have a panoramic view. The main statue area will be surrounded by 200 ger (yurts), designed and arranged like the pattern of the horse brand marks that were used by the 13th century Mongol tribes. The cost of the complex is reported to be US$4.1 million, spent by The Genco Tour Bureau, a Mongolian company.

- From Wikipedia

NEXT STOP WAS HERE

Genghis Khan Equestrian Statue
Чингис хааны морьт хөшөө

360 degrees: Green and beautiful

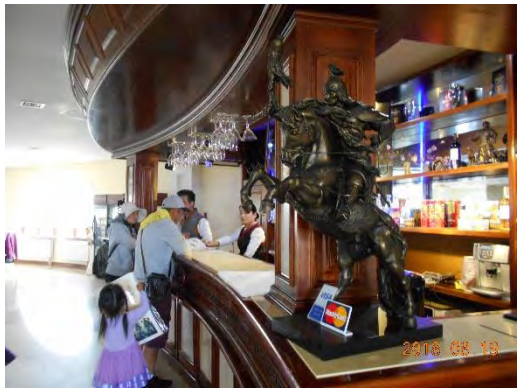
In Mongolia the sky is big

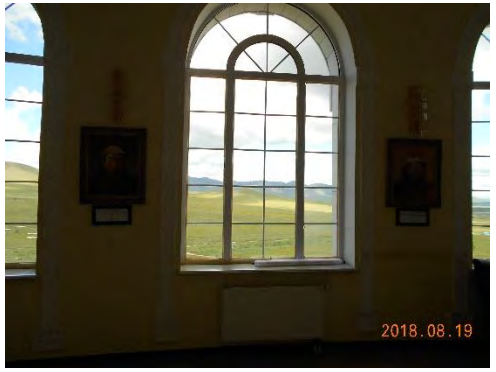
This photo (above) is courtesy of Adolfo (Costa Rica) – who used the panoramic mode of his iPhone.

. . . and the ground is big too . . .

Interior views

Dr Cheki Dorji of Bhutan

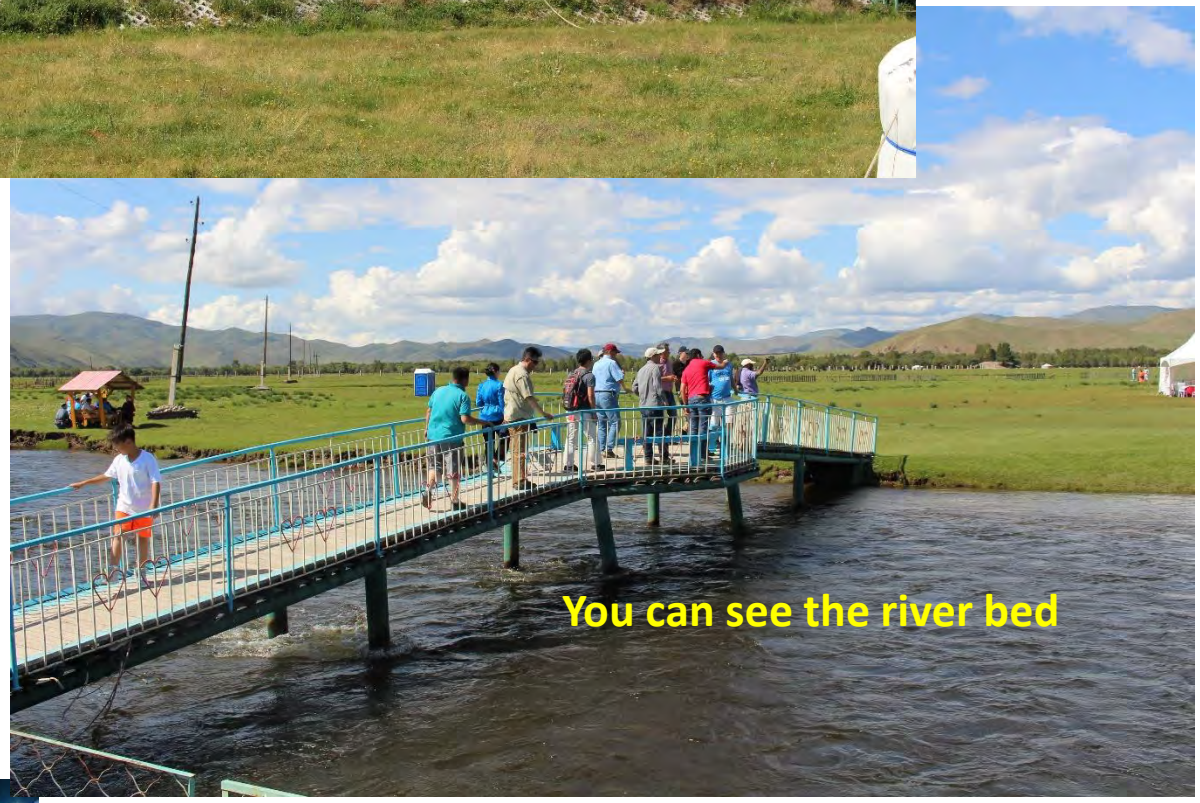




Next stop: Entertainment provided by NISS (National Institute for Security Studies)

Fermented goat milk

Moving to the next venue



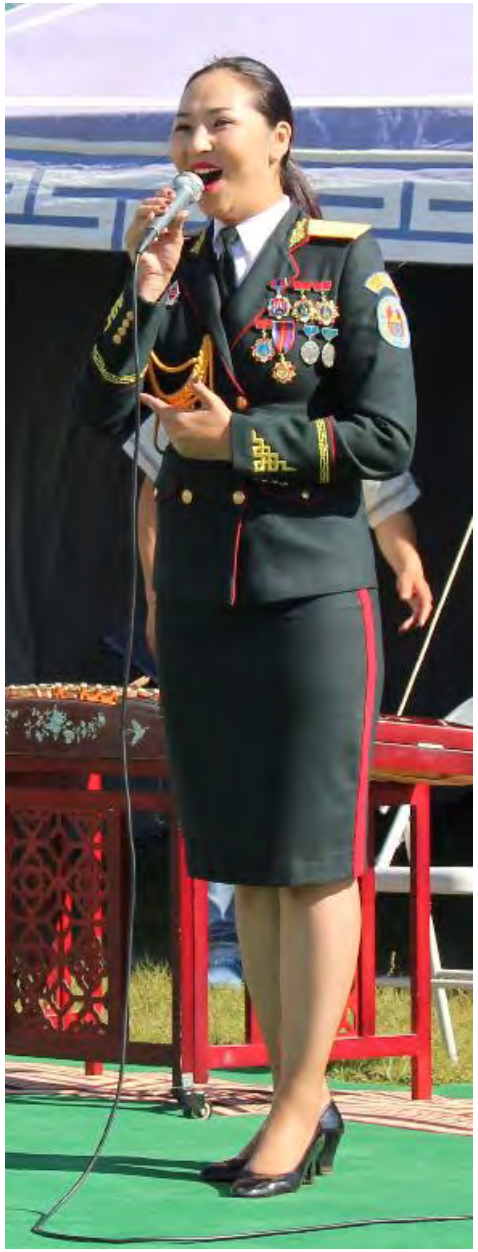
Opening dance number











Mongolian wrestling

Mongolian archery

(Right: Antara tries it)

Real Mongolian BBQ – using heated stones

Some comments received after the workshop:

Subject: Re: Useful info's for your trip to Mongolia
From: Rabindra Dhakal
Date: 2018/08/22 14:42

Prof. Tsolmon Renchin,

Thank you very much for the event, invitation, hospitality and also exposure to Mongolian culture and landscape, all in unison was perfect. I safely landed in Kathmandu yesterday and wish all of our friends have already arrived in their respective home or institutions. We are expecting official photos from you or any members of your team while you have good time to do so.

Best Regards,
Rabindra Prasad Dhakal (Dr. Eng.)
Chief, Faculty of Technology
Nepal Academy of Science and Technology,
Lalitpur, Nepal

Subject: Re: Useful info's for your trip to Mongolia
From: Delele Worku
Date: 2018/08/22 15:14

Prof. Tsolmon Renchin and your team,

Thank you so much for your invitation, and hospitality during our stay in Mongolia. We shared a lot of expercince and ideas during the event. Most unforgettable moment was the the exposure of generous and beautiful Mongolian people , culture and landscape. Today, I arrived safely Bahir Dar, Ethiopia.
I wish you all safe arrival at your home. To all of the members , please send us the photos you have when you have time as it is mentioned by Dr. rabindra Dhakal. Please keep in touch for our further activities.

Kind regards,
Delele Worku Ayele (PhD), Associate Professor, Department of Chemistry, Dean of College of Science, Bahir Dar University, Bahir Dar, Ethiopia

Subject: Re: Useful info's for your trip to Mongolia
From: "Dr. Cheki Dorji"
Date: 2018/08/22 15:19

Dear BIRDS Colleagues,

Hope most of you arrived back to your country and some still might be on their way. I arrived back safely to Bhutan yesterday night and even managed to take my lecture from 8-9am today morning. Once again thank you Prof. Tsolmon, Dr. Enkhjargal Natsaddorj and the team from NUM for your wonderful arrangements and Hospitality during the Workshop. Lets keep in contact to explore space related opportunities and other opportunities. Thank you Dr. Enkhee for the photos.

Regards.
Cheki
Royal University of Bhutan

Cont'd next page

Subject: Appreciation
From: Dahunsi Akintunde
Date: 2018/08/23 13:57

Dear All:
This is firstly to notify you and everyone that I arrived Nigeria safely, I am still in Lagos at the moment.

I wish to express my gratitude to you for a wonderful time in Mongolia. My stay was most pleasant, accommodation was outstanding, the food was great, Mongolian are so warm and the workshop was beautiful and I learnt so much. We thank you for all the time and effort put in.

I also want to appreciate all the people that worked with you, they made our stay comfortable.

I appreciate all my colleague members of the BIRDS team. It is so nice working with you. Thanks for sharing your experiences and time. Thank you everyone.

Dahunsi Olurotimi Akintunde
Department of Mechanical Engineering
Federal University of Technology, Nigeria

Subject: Re: Useful info's for your trip to Mongolia
From: huzaimy jusoh
Date: 2018/08/23 11:16

Dear Ms Enkhee, Prof Tsolmon and all 3rd BIRDS Workshop participants,

I have safely arrived Malaysia. The workshop was very successful and fruitful with excellent hospitality and excursion program. The organizer have done a good job. Congratulations and thank you.

Looking forward to see all of the BIRDS family in future.

Regards

Assoc. Prof. Ir. Dr. Mohamad Huzaimy Jusoh
Director、Center for Satellite Communication
Faculty of Electrical Engineering
Universiti Teknologi MARA (UiTM)
40450, Shah Alam, Selangor
MALAYSIA

Subject: RE: Useful info's for your trip to Mongolia
From: "Kamani Ediriweera"
Date: 2018/08/27

Dear Enkhee,

I wish to thank Prof. Tsolmon Renchin, Enkhee and all of you for the wonderful time in Mongolia. The Workshop and all other things were very well organized and even minute matters w.r.t hospitality were very well taken care of. I must specially mention that the Mongolian people are so warm and helpful and would like to thank all the people who made our stay a comfortable and a memorable one.

I also would like to thank Kyutech and JSPS for their contribution in making this Workshop a success.

Thank you,

Kamani Ediriweera
Deputy Director General (Technical Operations)
Arthur C Clarke Institute for Modern Technologies
Sri Lanka

End of comments.

The **BIRDS Network** came together for a few days in Mongolia

End of article about 3BIW (3rd BIRDS International Workshop)

Kyutech expresses its deep gratitude to all of our Mongolian hosts for this most delightful workshop. The hospitality was outstanding.

Баярлалаа!
[thank you]

End of this **BIRDS Project Newsletter**

(ISSN 2433-8818)

– Issue Number Thirty-One

This newsletter is archived at the BIRDS Project website:
http://birds1.birds-project.com/newsletter.html

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 main purpose of it is to keep BIRDS stakeholders (the owners of the satellites) informed of project developments.