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BIRDS Project Newsletter

Issue No. 72
(31 Jan 2022)

Edited by:
G. Maeda

革新的宇宙利用実証ラボラトリー
Laboratory of Lean Satellite Enterprises and In-Orbit Experiments (La SEINE)
Kyushu Institute of Technology (Kyutech)
Kitakyushu, Japan

According to Bryce Space & Technology Co., among academic operators, Kyutech is No. 1 in number of small satellites launched.

Members of BIRDS -1, -2, -3, -4 and -5, on 30-Oct-2020 in front of the lab building.

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.
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Continued on the next page
To all students of BIRDS projects:
Check out the "2022 CubeSat Prize" contest by Arizona State University -- read the details and see if you are eligible to apply. If eligible, then apply. You do not need permission from anyone. The contest article starts on Page 44.

Guest Box (from previous page)

These satellite images show the progressing construction of the Cebu-Cordova Link Expressway. As of May 2021, the construction for the 8.5-km bridge that will connect Cebu City (in mainland Cebu) to Cordova Town (in Mactan island) is 75% done¹. According to Cebu-Cordova Link Expressway Corp., target completion of the bridge is set by the end of 2021 and will be open to motorists by the first quarter of 2022¹. The groundbreaking ceremony for the Cebu-Cordova Link Expressway was held in March 2017². Both images taken by KOMPSAT-3

References:
¹ https://cclex.com.ph/updates/

Posted in FB by: PEDRO Center, DOST-ASTI, PH
**JSPS Reminder**

When you publish a paper on a topic related to BIRDS, please include this acknowledgement in the paper:

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

JSPS provides the airfare funds of BIRDS International Workshops and for Ground Station Workshops.
01. Report from the Philippines

UPDATES FROM THE PHILIPPINES

Philippine Space Agency

STAMINA4SPACE

Space Technology and Applications Hub: Innovation and Advancement (STAMINA4SPACE) Program

Funded by: DOST
Monitored by: DOST-PCARRD
Implement by: DOST-ASTI

JANUARY 2022
Astronaut Answers Questions from Pinoy Kids

What’s your favorite food in space? How do you sleep in space? What does the Earth look like from the International Space Station? These are just some of the fun and interesting questions about space that some intrepid Filipino kids asked Naoko Yamazaki, an astronaut from the Japan Aerospace Exploration Agency (JAXA).

Wrath of Typhoon Odette as seen from space

During the recent onslaught of typhoon Odette (International name: Rai)—which ravaged parts of Visayas and Mindanao in mid-December 2021—DOST-ASTI, STAMINA4Space, and PhilSA closely monitored the typhoon, and generated maps of the affected areas to provide near real-time data and information to government agencies and the general public.

Effects of Typhoon Odette

The image above is one of the satellite images showing the possible extent of flooding in some areas of Bohol and Negros Occidental following the onset of Typhoon Odette last December. Using a combination of Normalized Difference Water Index (NDWI) and thresholding technique, researchers from STAMINA4Space compared satellite images before the typhoon and images captured December 18, 2021 to estimate flooded croplands provinces.

This satellite image shows possible flooded cropland and roads in Sipalay, Negros Occidental. The post-disaster satellite image was taken by PlanetScope last December 18, 2021. Some 689.5 ha of land was flooded, with 458.8 ha of flooded cropland.

STAMINA4Space researchers used Open Street Map downloaded from Geofabrik for the road networks in the area.
Knowledge Sharing

Two of our research engineers were resource speakers for the **Electronics Engineering in Space Science & Technology** Webinar. The event was organized by the Institute of Electronics Engineers of the Philippines - Iligan Bay Chapter (IEEEP-IBC) in partnership with Mindanao State University - Iligan Institute of Technology (MSU-IIT).

The LAVOXA Group of Publications featured one of the STeP-UP scholars, Judiel Reyes, on his and the team’s journey in developing the Maya-3 and Maya-4 cube satellites. Read here: [http://lavoxa.st/](http://lavoxa.st/).
Year-end Activities and Virtual Parties

STAMINA4Space Year-end Meeting

ASP Project Year-end activity

STEP-Up Project Virtual Year-end/Christmas Party
Happy Holidays!!!
Maya-3 & Maya-4 QSL Cards

Maya-3 and Maya-4 were deployed from ISS about three months ago. Since then, we receive continuous support from the amateur radio community around the world in reception of CW and APRS beacons. As a form of gratitude and appreciation, we started sending out digital copies of QSL cards as we prepare in mailing the physical copy of the cards.

Data Collection Form: https://tinyurl.com/2pp6a8w8
Welcome 2022!

The team was able to celebrate the holidays safely with their families in their respective hometowns. The holiday season is indeed a special time for the scholars to reconnect with family especially during the pandemic.

We wish you all a very happy, prosperous, and healthy 2022!!
It’s her birthday!!!

Another year has passed. Gladys celebrated her birthday in her home province with her family last January 7. She is a member of the STeP-UP Scholars Batch 1, primarily responsible for the ground station and operations; and design of the APRS payload of Maya-3 and 4.

We wish you good health and a happy life ahead!
SPACE ENVIRONMENT

TEST RESUMPTION

PREPARED BY:

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Left: Batch 2 scholars take a group selfie over Zoom with mentor Sir Mark Puria during test break time.
Upper right: Maya-6 first antenna deployment success inside the Despatch chamber.
Lower right: Batch 2 mentors Hari Shrestha, Mark Puria, and Marlou Sejera double check the thermal vacuum chamber setup.
For the Thermal Vacuum Test, functionality tests were performed during the three cycles of cold and hot soaks. These tests are conducted to verify that the cube satellite can still perform even when subjected to extreme temperatures in space. During the preparation and TVT proper, the scholars’ mentors also gave demos on how to setup for the tests, and how to properly use the equipment inside the laboratory.
After the Thermal Vacuum Tests (TVT), Antenna Deployment Tests are also performed on Maya-6 inside the Despatch chamber. These tests are ongoing, but we currently have a success rate of 3 out of 3 deployments.
HAPPY HOLIDAYS FROM BATCH 2!
More than a change of year, may the season bring us renewed energy and confidence in our endeavors on space science and technology.

May 2022 prove to be fruitful to all of us!
Guilio Mattei is scheduled to join us in April 2022. He provides the following self introduction. He is from Sapienza University of Rome.
Hi! My name is Giulio Mattei. I was born in Terracina, Italy. In 2019 I obtained my Bachelor’s Degree in «Aerospace Engineering» at Sapienza University of Rome. Actually, I am a Master’s Degree student in “Space and Astronautical Engineering” and I will work on my final Thesis at Kyushu Institute of Technology.

I am interested in the concept of "small satellites" and their contribution in the new space era.

I will stay at Kyutech from April-2022 to the end of September-2022, as a research student. My academic advisor is Prof. Cho.

Birthday: August 17
Age: 25
Hobbies: Reading, Role-playing games(e.g. Dungeons & Dragons), Watching anime, Travelling
My academic career

I spent the last four years of my academic path at the Faculty of Engineering of La Sapienza University at San Pietro in Vincoli, a former convent. The historic fountain, probably built in the 16th century, is the symbol of the Faculty.

At Sapienza University I received the theoretical basis concerning the design of space systems, but I also had the possibility of gaining an hands-on experience thanks to the presence of academic institutions such as “Sapienza Space Systems and Space Surveillance Laboratory” (S5LAB).
In 2019, I participated in the Rexus/Bexus Programme managed by SNSA, DLR and ESA. This experience gave me the opportunity to develop, test and launch a Stratospheric experiment. In the same year I was also involved in the Launch Campaign of the experiment at Esrange Space Center in Kiruna (Sweden).
My hobbies

Hiking
(The top of Monte Calvario at 1800 m)

Role-Playing games
(In this photo I was an old wizard)

Travelling
(Photo of the Aurora at Kiruna, Sweden)
Postcards from my home town

View of San Felice Circeo, the “legendary island” in the myth of Ulysses and Circe the sorceress, told in Homer’s Odyssey.

The Temple of Jupiter Anxur is an Ancient Roman temple that was built between the mid-second and mid-first century BC. It is the most important monument of my city.

“The cathedral” is a natural formation resulting from humid karst action. It is located in Campo Soriano, near Terracina.

View of my home town and the “Coast of Ulysses”.

“La festa del mare” (Sea festival) is the most important event of my city.

“Tortolo” is a traditional dish prepared during the Eastertime.

“Tortolo” is a traditional dish prepared during the Eastertime.
Postcards from Rome

The Papal Basilica of Saint Peter in the Vatican, the universal headquarters of the Catholic Church as well as the Pope’s residence.

The Colosseum is most iconic symbol of Imperial Rome and it is also listed as one of the New Seven Wonders of the World.

The Mausoleum of Hadrian, usually known as Castel Sant’Angelo at night.

The Vittoriano is regarded as a national symbol of Italy.

“Fontana dei Quattro Fiumi” is an artistic fountain in Rome. It was designed in 1651 by Gian Lorenzo Bernini.

“Cacio e Pepe” is a typical pasta dish from the Roman cuisine.
Thank you & see you soon!
ANOTHER VISIT TO OIL PALM PLANTATION FOR GST INSTALLATION PLAN

In the previous issue, I have shared about the visit to a fig farm that is exerted by a local agriculture company for a Ground Sensor Terminal (GST) installation plan. This is a collaborative project with a local start-up company. The visit to the fig farm was continued to an oil palm plantation that is located close to the farm in Selangor.

In Malaysia, cultivation of oil palm trees and palm oil production are an essential commodity for economy growth and profit since 1960s. The crop monitoring is a vital step for oil palm fruit bunches harvesting in order to retain the higher productivity. The common measure taken for such monitoring is to scrutinize the
status of biochemical and biophysical properties of the oil palm plants including the content of Chlorophyll in ensuring and determining the healthiness and the level of nutrition requirement of the plants. The monitoring method including the process of crop care are usually performed by the personnel.

With a goal to complement the existing approach used in monitoring the oil palm trees’ health status, GST can be one of the current advancements in compensating the inadequacies especially for large and remote plantation. The oil palm trees require tons of water and sufficient nutrients for growth and production of fruits. By monitoring the level of soil moisture and nutrients in the plantation by the sensor installed in GST, the condition of the trees can be determined and monitored through the satellite technology.
Figure 3 and 4 show the team from UiTM and the representatives of local start-up company visited the oil palm plantation for the GST installation plan. The plantation was observed by the teams in order to see the potential area for ground sensor and GST installations. The size of the plantation, number of trees and their general location, condition of the plantation such as the location of the drainage, and other essential attributes were taken into account during the observation. The needs and demands of the owner of the plantation for the better growth of the trees were also considered to ensure the installation of the ground sensor and the GST succeed and could provide the beneficial data for crop monitoring.

Fig. 3: The visit in the oil palm plantation.  
Fig. 4: The oil palm plantation observation for GST installation.
Fig. 5: The discussion was continued by the UiTM team, the representation of the local start-up company, and the owner of the farm after the plantation observation.

Fig. 6: The close-up view of one of the oil palm trees at the visited oil palm plantation. In this picture, the oil palm fruit branches were not mature yet for harvesting.

End of Malaysia’s Column
The following report is from Cosmas in Kenya – he was a PNST fellow here at Kyutech. He returned to join the University of Nairobi.

This report is about "Nano-Satellite Platform for the University of Nairobi (NaSPUoN)“. It entered a competition sponsored by the Kenya Space Agency; the competition is explained.

Happily, his team won this competition. Thus, the space agency selected his team to join a 3U university consortium (the next stage in Kenya).
Nano-Satellite Platform for the University of Nairobi (NaSPUoN)

Capacity-building CubeSat Project at University of Nairobi, Kenya

By
Dr. Mutugi Kiruki
11 Jan. 2022

Dept. of Electrical & Information Engineering

University of Nairobi
Project Background

Funded by **Kenya Space Agency (KSA)** under Nanosatellite Research Grants FY 2020/2021

- 5 Kenyan Universities funded to each develop a 1U Engineering model
- Kickoff: Oct 2020

*KSA communication on 2020 Awardees*

*Prof. Mbuthia receives the grant, Oct 2020*
NaSPUoN Team
All from the Faculty of Engineering
Prof. Mwangi Mbuthia – Principal Investigator
Dr. Mutugi Kiruki – Project Manager
Ms. Betsy Mugo - Faculty

Students
- 4 from Dept. of Electrical & Electronics Eng.
- 3 from Dept. of Mechanica & Manufacturing Eng.
- 3 from Dept. of Geospatial & Space Technology
NaSPUoN Development (1/4)

Objectives, Missions & Design Concept

- Undergraduates' exposure to nanosatellites
- Two missions: LoRa and Camera missions
- 1U Engineering/Bench Model

Preparations

- Literature review on missions & subsystems
- Familiarization with software tools
  - PCB design - Eagle
  - Structure design - Solidworks

Team visit to local fabrication company

NaSPUoN Concept
PCB & Structure Designs

- 3 Boards: EPS, Comm & Mission

NaSPUoN Adapter Boards PCB Designs

Etched Adapter Boards

NaSPUoN Development (2/4)

- Structure

NaSPUoN Structure Design

3D Printed Structure panels
NaSPUoN Development (3/4)

Assembly

Populated Adapter Boards
NaSPUoN Development (4/4)

Version 1

Version 2
Testing
Comm Test on UoN Towers

XBee Ground Terminal

Comm Test from top of UoN Towers
Demo to KSA

- Held on 14th Oct 2021 at Konza City
- Practical demo on a drone
- Points awarded by a panel of judges
Winners

- NaSPUoN announced as overall winner from 5 universities on 16th Nov, 2021

Worth a celebration

UoN Team receives the Overall Winner Award
Ongoing & Future Projects

Kenya Space Agency (KSA) 3U Engineering Model Development

- NaSPUoN Team is a member of the 4 universities consortium
- Sponsored by KSA Research Grant 2021/2022
  
  [Link](https://ksa.go.ke/news/ksa-research-grant-awards-for-space-tech)

Zero-G Peace Mission 2030 (0G2030)

- Partnership between UoN, University of Arizona & Space Trust

[Image: UoN, University of Arizona and Space Trust partner in Space Peace Mission 2030 (0G2030)]

I think some of the BIRDS projects have a good chance to win this contest---so read on.

*If you want to compete, then to do so.* You do not need Kyutech’s approval. Just do it, and bring glory to your country.

ASU's Interplanetary Initiative now accepting nominations for CubeSat Delivery Prize

Award boosts underrepresented CubeSat teams

Arizona State University’s Interplanetary Initiative is now accepting nominations for its 2022 CubeSat Delivery Prize. The prize will recognize an outstanding achievement by a novice team launching a CubeSat in order to encourage new groups or underrepresented people or schools to engage in space education and promote CubeSat education.

Eligible teams may come from a school or country that does not have a track record of successful missions, have overcome adversity, have launched a mission that creates a compelling educational opportunity or have engaged a unique coalition of collaborators.

Teams may self-nominate or nominate another team. Learn more and share your story here.

Nominees will be reviewed and scored by an expert evaluation panel. The winner will be announced in May 2022.

The winning team will receive a cash prize of $7,500 and its story will be shared with the world through ASU’s communications channels, the Interplanetary Initiative’s social media channels and newsletter, reaching thousands of people, and a guest spot on the “Mission: Interplanetary” podcast.

“Delivering a working spacecraft for launch is a huge victory for any non-professional team. This award shows our appreciation for the kind of effort this represents,” said Danny Jacobs, associate director of the Interplanetary Initiative.

The award was made possible thanks to the generosity of the Shojaee Foundation.

The Interplanetary Initiative at Arizona State University engages broadly across disciplines and sectors to create an interplanetary future built upon cooperative and inclusive new structures, systems and perspectives. We study and solve the big social and systems questions that pave our future in space. The Interplanetary Initiative most recently announced a collaboration with Blue Origin and other space leaders to build Orbital Reef, a premier, mixed-use space station in low Earth orbit designed to open multiple new markets in space.

The Prize

A review panel of experts will be assembled by the Interplanetary Initiative to review nominated teams and will award $7,500 to the winning university or college.

A well-told story is often our best chance to capture the attention of the world. We will share the winning team’s story of success in space against the odds. We will also invite the winning team to do a guest spot on the Mission: Interplanetary podcast and publicize its story through ASU media channels reaching thousands of people.
Timeline

→ **February 2, 2022**
The CubeSat Delivery Prize will be announced and promoted through March 15, 2022

→ **March 15, 2022** ← **Note to Kyutech students**
Nominations due! Each valid nomination receives a score from the judges on our expert evaluation panel where the top finalist team will be selected and named the winner of the 2022 CubeSat Delivery Prize.

→ **March - May, 2022**
Interplanetary Initiative team will publicize the winning team’s story across multiple online channels and media outlets.
06. Report from Cameroon

The following report comes from Lily (of Cameroon), who has contributed several times to this newsletter in the past. She recently attended 3 space events in Africa.

- Editor
I have heard a lot of people say attending IAC is a life changing experience, but I did not know it was going to happen so soon for me. After attending the 28th UN/IAF workshop followed by the 72nd IAC in Dubai, in October 2021, a lot has changed for me and I am happy to share with you all. At IAC, not only did I get the chance to meet so many actors and young professionals within the space sector; some of whom I had been longing to meet in person like Dr. Danielle Wood and Prof. G Maeda, but also met with some leaders of the African Space Program who honored me with invitations to attend some high-level Geospatial and space events which were coming up in Africa at that time.
AFRICAGIS 2021 – 22nd to 26th November 2021
in Abidjan, Ivory Coast

Themed “Geospatial innovation and Science for Africa’s growth and sustainable development.” The AfricaGIS Conference and Exhibition contributed to the development of skills and institutional capacity in geo-information across the continent. This event served as a platform bringing key stakeholders including professionals, government officials, development agencies, policy and decision-makers to deliberate on innovations in the field of geospatial information technology and its potential contribution to development.

“Welcome to Ivory Coast” - at the airport

Myself and Monique from Cameroon posing by the event backdrop, approximately pointing at our country on the map

Myself and some amazing ladies at the event. From left to right; Angelique from Rwanda, Beza from Ethiopia, Monique from Cameroon, Ruvimbo from Zimbabwe

Photo of me by a very nice tall sculpture outside the event venue
Gala Dinner, with several cultural performances, music, food and drinks

There were several panel sessions with industry leaders which were really informative and eye opening.

One of my favorite things was breakfast at the hotel.

During this event, it was announced by the leaders in the Ivorian government that Ivory Coast plans to create a space agency. This was great news, more African countries are seeing the power of space.

Photo taken after a meeting with some officials from the African Union Commission.
Selfie of myself and Dr Minoo Rathnasabapathy from MIT. She delivered a keynote on the work they do at Space Enabled Research group.

There were several technical sessions around topics like (Innovative Satellite Missions & Technology, the Next Generation in Space, Small Satellite Projects for STEM Education and Human Capacity-Building with a focus on Africa, Technology Partnerships and Opportunities for International Collaboration, Satellite Development in an Era of Constellations. etc.)
1st IAA African Space Party, Sponsored by CUBE SPACE

Tried out Tacos for my very first time. Liked it
The objective of the forum is not only to strengthen dialogue and networking between stakeholders but also to discuss the scientific and strategic matters of the use of the Earth Observatory for Africa’s sustainable development. It is an engagement forum for various participants to enhance and incorporate earth observation services for socio-economic development.

Dr Tidiane Ouatarra
GMES and Africa Program Coordinator,
Africa Union Commission

Local Ivorian food called “Poulet Braise Attieke” which is grilled chicken and Acheke (some whitish starchy side dish made from fermented cassava)
During this event, some of the ladies including myself met for 2 days to come up with a work plan on how to make space more accessible to women on the continent irrespective of their background, under an initiative which would be called the African Women in Space, born out of GMES & Africa Forum.

Through this, we aim to increase the involvement and participation of more women in space. It was overall a great experience for me, especially knowing that my journey and success inspires so many young girls, and more women can be opened to a world of possibilities. The “She did it, so can I” mentality is one I push for with my life as a case study. Thank you for reading my article and the BIRDS Project Newsletter. Hope you read from me again soon.
Anyone can join Lean Sat Project

https://lean-sat.org/
08. Monthly virtual meeting of UNISEC-Global

You can access the data of all past meetings with this web link:
http://www.unisec-global.org/virtual-meeting.html

You are encouraged to attend this meeting each month – and network with a global academic community. You’ll have fun.

On the following pages are the meeting flyers created by SEIC student Mark of the Philippines.
7th Virtual UNISEC-Global Meeting

WELCOME & OPENING

Moderator: GEORGE MAEDA
Kyushu Institute of Technology

PRESENTATION

SHINICHI NAKASUKA
The University of Tokyo

KEN BIBA
AeroPAC

NATE TAYLOR
UNISEC-Global
(Moderator)
Topic: Competition & Collaboration

REGIONAL REPORTS

NIKHIL RIYAZ & TARUN SAI REDDY
UNISEC-India

CHAWALWAT MARTKAMJAN
UNISEC-Thailand

BREAKOUT SESSION

Topic: ARUSS
History and Future

JERRY SELLER
TSTI

CHAWALWAT MARTKAMJAN
UNISEC-Thailand

CORPORATE PRESENTATION

REI KAWASHIMA
UNISEC-Global

Acknowledgment of new members, announcements

CLOSING

Shinichi Nakasuka
The University of Tokyo

Ken Biba
AeroPAC

Jerry Seller
TSTI

Chawalwat Martkamjan
UNISEC-Thailand

Nikhil Riyaz
UNISEC-India

Tarun Sai Reddy
UNISEC-India

http://www.unisec-global.org/virtual-meeting.html

March 20, 2021
10:00pm-00:00am
(GMT+09:00)
8th Virtual UNISEC-Global Meeting

Theme: Access to space for all

April 17, 2021
10:00pm – 00:00am
(GMT +09:00)

Moderator: GEORGE MAEDA
Kyutech, UNISEC-Japan

SHINICHI NAKASUKA
The University of Tokyo

OPENING REMARKS

JORGE DEL RIO VERA
The United Nations Office for Outer Space Affairs (UNOOSA)
Topic: Access to Space for All

PRESENTATION

All the participants

Group Photo session

NATE TAYLOR
UNISEC-Global
Moderator
Topic: How to realize access to space for all

BREAKOUT SESSION

MENGU CHO
Kyushu Institute of Technology
UNISEC-Japan
Activity Report for UNISEC-Japan

REGIONAL REPORT

QUENTIN VERSPIEREN
The University of Tokyo
Topic: Investigating university-led space technology development and utilization capacity building programs

PROJECT REPORT

REI KAWASHIMA
UNISEC-Global

ANNOUNCEMENT, CLOSING

http://www.unisec-global.org/virtual-meeting.html
9th Virtual UNISEC-Global Meeting

Date: May 15, 2021
Time: 22:00 - 24:00 (JST, GMT+9)
http://www.unisec-global.org/virtual-meeting.html
10TH VIRTUAL UNISEC-GLOBAL MEETING
June 19, 2021  Time: 22:00 - 24:00 (JST)
Moderator: George Maeda, KyuTech, UNISEC-Global

OPENING REMARKS
Mengu Cho, Kyushu Institute of Technology

KEYNOTE SPEECH
Questin Verspieren, The University of Tokyo
Topic: Space Education Rating

BREAKOUT SESSION
All Participants
Moderator: Nate Taylor, UNISEC-Global
Theme: Space Education Rating

ACTIVITY REPORT: UNISEC-EGYPT
Ayman Kassem, Cairo University
http://www.unisec-global.org/ibrahim.html

ACTIVITY REPORT: UNISEC-MONGOLIA
Tsolmon Renchin, The National University of Mongolia
http://www.unisec-global.org/tsolmon.html

CLOSING
Rei Kawashima, UNISEC-Global

http://www.unisec-global.org/virtual-meeting.html
11th Virtual UNISEC-Global Meeting
July 17, 2021  Time: 22:00 - 24:00 (JST)

Moderator: George Maeda, KyuTech, UNISEC-Global

OPENING REMARKS
Prof. Martin Sweeting, SSTL and SSC

KEYNOTE SPEECH
Juan De Dalmau, International Space University
https://www.isunet.edu/mr-juan-de-dalmau/
Topic: Healthy Interdependency - ISU and Space Agencies

BREAKOUT SESSION
All Participants
Moderator: Nate Taylor, UNISEC-Global
Theme: Space Education: Scenario Study

ACTIVITY REPORT: UNISEC-NEPAL
Abhas Maskey, UNISEC-Nepal

ANNOUNCEMENT & CLOSING
Rei Kawashima, UNISEC-Global
and those who have announcements

http://www.unisec-global.org/virtual-meeting.html
12th Virtual UNISEC-Global Meeting
August 21, 2021    Time: 22:00 - 24:00 (JST)
Moderator: George Maeda, KyuTech, UNISEC-Global

**OPENING REMARKS**
Herman Steyn
Stellenbosch University

**PRESENTATION**
Yeshurun Alemayehu Adde(Kibret)
Ethiopian Space Science & Technology Institute
Topic: Overview of Space Science & Technology Development in Ethiopia

**BREAKOUT SESSION**
All Participants
Moderator: Nate Taylor, UNISEC-Global
Theme: Space Education Policy Case Study

**ACTIVITY REPORT: UNISEC-PERU**
Margarita Mondragon (TBC)

**ANNOUNCEMENT & CLOSING**
Rei Kawashima, UNISEC-Global
and those who have announcements

http://www.unisec-global.org/virtual-meeting.html
13TH VIRTUAL UNISEC-GLOBAL MEETING
Moderator: George Maeda, KyuTech, UNISEC-Global

OPENING REMARKS
Toshinori Kuwahara, Tohoku University

PRESENTATION
Michael Davis, The Andy Thomas Foundation
Topic: An Australian Space Story

BREAKOUT SESSION
All Participants
Moderator: Nate Taylor, UNISEC-Global
Theme: TBD

ACTIVITY REPORT
Kamel Besbes, UNISEC-Tunisia

ANNOUNCEMENT & CLOSING
Rei Kawashima, UNISEC-Global
and those who have announcements

Theme: Your Faith, Your Story

SEPTEMBER 18, 2021
TIME: 22:00 - 24:00 (JST)
http://www.unisec-global.org/virtual-meeting.html
14th Virtual UNISEC-GLOBAL MEETING

Welcome Speech
PROF. SHINICHI NAKASUKA
The University of Tokyo

Keynote Speech
PROF. DIDIER QUELOZ
Jacksonian Professorship of Natural Philosophy, U. Cambridge (UK)
Professor of Physics ETH-Z, Switzerland
Fellow of Trinity College, Cambridge

2019 Nobel Laureate in Physics
Topic: Lost Dark Sky

THEME:
LOST DARK SKY
and its CHALLENGES

OCTOBER 16, 2021
10:00 PM to 00:00 AM (JST)

http://www.unisec-global.org/virtual-meeting.html
15TH VIRTUAL UNISEC-GLOBAL MEETING

OPENING REMARKS & MIC7 RESULTS
Herman Steyn
Stellenbosch University

PRESENTATION
Ryu Funase, The University of Tokyo
Deep Space Exploration with nano/microsatellites

PRESENTATION
7th Mission Idea Contest Winner

BREAKOUT SESSION
All Participants
Moderator: Nate Taylor, UNISEC-Global
Theme:

ANNOUNCEMENT & CLOSING
Rei Kawashima, UNISEC-Global
and those who have announcements

Co-Organizers
The University of Tokyo,
Institute for Open Innovation

Collaborators

http://www.unisec-global.org/virtuall-meeting.html
OPENING REMARKS
Alim Rustem Aslan, Istanbul Technical University
UNISEC-TR Activities & UNISEC-Global Meeting

KEYNOTE SPEECH
Wataru Torii, ISAS/JAXA
Topic: Please help receive the UHF-band signal from the world’s smallest Moon lander, OMOTENASHI

PRESENTATION
A Year in Review - UNISEC-Global
Nate Taylor, UNISEC-Global

BREAKOUT SESSION
All Participants
Moderator: Nate Taylor, UNISEC-Global

MIC6 PROGRESS REPORT
Carlos Rodriguez, Costa Rica Institute of Technology
Topic: MUSA Project Suborbital Flight

ANNOUNCEMENT & CLOSING
Rei Kawashima, UNISEC-Global and those who have announcements

DECEMBER 18, 2021
10:00 PM to 00:00 AM (JST)
http://www.unisec-global.org/virtual-meeting.html
17th Virtual UNISEC-Global Meeting

JANUARY 22, 2022
10:00 PM to 00:00 AM (JST)

OPENING REMARKS
Shinichi Nakasuka
University of Tokyo

PRESENTATIONS
Mohammed Khalil Ibrahim, Egyptian Space Agency
Topic: EgSA achievements in Capacity Building in 2021
Maricor Soriano
National Institute of Physics, University of the Philippines-Diliman
Topic: The STAMINA4Space Program - Transitioning from State University to Space Agency

GROUP PHOTO SESSION
All Participants

UNISEC LOCAL CHAPTER EMPOWERMENT
Nate Taylor, UNISEC-Global

BREAKOUT SESSION
All Participants (MC: Nate Taylor, UNISEC-Global)

ANNOUNCEMENT & CLOSING
Rei Kawashima, UNISEC-Global
and those who have announcements

Moderator: George Maeda, KyuTech, UNISEC-Global
http://www.unisec-global.org/virtual-meeting.html
09. Laboratory group photo of January 2022

Lab Photo of 7 January 2022 – staff is seated in front, with the students behind them
10. Ground station update from Zimbabwe

The following report (next few pages) is an update of the report shown below.

10. ZIMSAT-1 Ground Station Progress

Zimbabwe National Geospatial And Space Agency

By: Tatenda G. S. Marimo
Acting Outreach Officer
13 December 2021
ZIMBABWE NATIONAL GEOSPATIAL AND SPACE AGENCY

ZIMSAT-1 GROUND STATION PROGRESS

By: Tatenda G. S. Marimo
Acting Outreach Officer
20 January 2022
The procurement status improved from the 92% in December to 95% in January 2022.

All the imported equipment has been cleared by customs and delivered to ZINGSA.

Pre-tests and checks of all Ground Station equipment is being conducted by engineers.

Administrative phase of the Control room set up is at an advanced stage.

Figure 1: Part of the procured equipment delivered to ZINGSA
ZINGSA engineers familiarized with the procured equipment.

Each procured item was checked against the Parts List in order to ascertain whether any item is missing or damaged.

Preparation of remote control cables and termination of connectors was carried out ensuring that the cables were correctly wired.

The control unit and the rotator assembly was setup for an operational check using the prescribed procedure.

Preliminary operational checks were carried out on the rotator system in preparation of the actual installation.
Figure 3: Great Zimbabwe Ruins (A tourism destination)
11. Highlighting Japan: Origami

Origami, the art of folding paper, has been enjoyed in Japan for several centuries and is now a popular pastime in many countries around the world. Origami takes on many forms, both simple and complex, and even finds application in space technologies. In this month's issue, we introduce the diverse world of origami.

ACCESS POINT:
12. The Japanese members of the IAF

INTERNATIONAL ASTRONAUTICAL FEDERATION

The IAF is an outstanding network of 433 members from 72 countries, including all leading space agencies, companies, societies, associations, museums and institutes worldwide. Being a part of it means belonging to a worldwide community that cooperates daily to promote space activities, to develop new technologies, and to promote awareness about space to government and societies, to better involve them and illustrate the benefits that might came from the utilization of space. Thanks to all its members, the IAF has been able to pursue these goals and its missions since its creation in 1951.

There are different ways in which IAF Members can get involved in the Federation activities. Scroll around these pages to find out the important role of IAF Members in creating IAF’s main events and conferences, in shaping the discussion about space, for example by joining one of IAF many Technical or Administrative committees. IAF membership is a lifelong journey, and we look forward to supporting you throughout it.

FROM:
https://www.iafastro.org/membership/
IAF Members Countries

- 78 North America
- 18 Oceania
- 22 Latin America and the Caribbean
- 97 Asia
- 202 Europe
- 16 Africa
- 1997 Countries

IAF Members Organizations

- 70 Universities
- 46 R&D
- 82 Associations & Professional Society
- 59 Space Agencies
- 169 Industries
- 433 Member Organizations

FROM:
https://www.iafastro.org/membership/
Members of the IAF (entities of Japan only – 15 in total)

https://www.iafastro.org/membership/all-members/?member_category=&contact_country=Japan&search=

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<td>3-1-6 Azukiwa, Minato-ku 105-0041 Tokyo</td>
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<td>Kisse BLDG 4F,4-1-11 Nihonbashi-muromachi, Chuo-Ku 103-0022 Tokyo</td>
<td>JAPAN</td>
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</tr>
</tbody>
</table>
The only university IAF member in Japan
13. Highlights of IAF in 2021

DOWN LOAD THE PDF:

**The IAF Highlights 2021!**

Following a very challenging year 2020 with many postponed events, 2021 provided a more optimistic outlook and more opportunities for travel and meetings in person. It was wonderful to finally be able to gather the whole space community and to meet and discuss in person at the different IAF events. The first in person conference since the start of the pandemic was GLEX 2021 in the Russian Federation, followed by IAC 2021 in the United Arab Emirates. Both conferences were successfully organized with a great international participation!

In this IAF Highlights 2021 you will be able to read more about the many interesting sessions and panels held at these events.

GLEX 2021 was hosted by ROSCOSMOS in the beautiful city of Saint Petersburg from 14 – 18 June 2021. More than 800 attendees from 34 countries gathered for the conference and another 1500 participants connected remotely. GLEX 2021 provided an important platform to exchange knowledge on the advancements in Space Exploration and was also the occasion to celebrate the 60th anniversary of Yuri Gagarin’s spaceflight.

In October, the 72nd International Astronautical Congress gathered more than 5 000 delegates from 110 countries in Dubai! IAC 2021 was organized together with the Mohammed Bin Rashid Space Centre (MBRSC) under the theme ‘Inspire, Innovate and Discover for the Benefit of Humankind’. As usual the IAC was packed with plenty of interesting events involving many space stakeholder communities. Even though we are getting more skilled to work in a virtual environment, we know it can never fully replace face to face meetings that offer global networking and multi-stakeholder attendance.

In these demanding times, we hope that the situation in 2022 will further improve worldwide and allow us to meet in person, for GLEC 2022 in Quito, Ecuador and the IAC 2022 in Paris, France!

Warmest Regards,
Pascale EHRENREUNDE
IAF President
14. Virtual meeting between UNISEC-Japan and UNISEC-Bangladesh on 27 Jan 2022

During 19:45-21:45 on 27-JAN-2022, UNISEC held a consultation session with the local chapter of UNISEC in Bangladesh. This will be repeated with several more local chapters of other nations in February.

UNISEC side consisted of
- Rei Kawashima
- Nate Taylor
- George Maeda

Sponsor of these sessions is AOTS of METI.

WHAT IS AOTS?

The Association for Overseas Technical Scholarship (AOTS; Japanese: 海外技術者研修協会) was established in 1959 with the support of the Ministry of International Trade and Industry (now the Ministry of Economy, Trade, and Industry, METI) as the first technical cooperation organization on a private basis in Japan. Its main purpose is to promote international economic cooperation and enhance mutual economic development and friendly relations between those countries and Japan.
The following sections are the BIRDS-5 articles for January 2022
(compiled by Timothy of Zimbabwe)

← BIRDS-5 units on 29 DEC 2021 (details in the first report by Victor – see the next page)
15. BIRDS-5: Status of the flight models

BIRDS 5 FLIGHT MODEL SATELLITE

BIRDS 5 PROJECT MANAGER
Victor Mukungunugwa
20/JAN/2022

ZIMBABWE
Preassemble Preparation

- Each satellite’s components were labeled.
- Sixteen permanent magnets were mounted with Araldite glue on the rails.
- Eight hysteresis dampers were also mounted on the –Z panel.
- Solar panels were manually assembled
Fit Check for 1U satellite

- JAXA provides the interface between satellite and launch rocket using a POD.
- Each satellite need to fit in the pod and for that, JAXA provides a dummy pod with exact geometrical characteristics with the launch pod
- BIRDS 5 hire a dummy pod from JAXA to see if the flight model satellites can fit in the pod
- Pod insertion has a standard procedure to follow during
- In this photo Victor Mukungunugwa cleans the rails before inserting in to the pod
Charging of BIRDS 5 Assembled Satellites
Satellite Weighing

- JAXA pod has a pod that launches satellites using spring plungers, deployment springs and deployment switches therefore there are weight restrictions for various units of satellites.
- 1U satellite should be 1.33kg; BIRDS 5 couldn’t check the weight for the 2U because it is still under integration.
- It is a relief that BIRDS 5 1U satellites are within the weight limits.
TAKA Satellite Multispectral Testing

• BIRDS 5 uses 4 multispectral image filters namely:
  • 550nm
  • 680nm
  • 720nm
  • 790nm

• The Ugandan flag was used as a test object to see how the multispectral camera articulates the different colors

• A sun simulator was used as a light source since the multispectral camera is a passive sensor
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BIRDS-5 Antenna Deployment

By: Edgar MUJUNI
Uganda

13th January 2022
I am currently assigned to Antenna Deployment Task.

BIRDS-5 Satellite Antenna Configuration is Point Symmetric UHF Point Symmetric VHF (PUPV).

The antenna elements are coiled (tied) during the final assembly of the satellite to meet the launcher’s Dimension requirements, and to avoid further damages to the delicate solar panels if kept loose.

This calls for an Antenna deployment process and system which must properly function when satellite is just deployed into the orbit to establish communications with the ground stations.
The temperatures in orbit vary widely from extreme cold in eclipse (approx. -30°C) to very hot in sunlight (approx. +60°C).

The extreme cold temperatures are very critical to the antenna deployment since we employ burner circuit deployment system. We want to ensure that even in these cold situations, the burner circuit will effectively deploy our antennas.

Kyutech has the facility to test this, it is called a Despatch Chamber.
This Despatch Chamber is supplied with Liquid Nitrogen because it has a very low boiling point (-195°C), which easily takes the chamber temperatures very low in a short time.

The chamber is then maintained at this temperature (-30°C for our tests) for a few minutes (soaking) and then antenna deployment tests are conducted.

Successful deployment is a targeted result, otherwise the antenna deployment mechanism must be revised.

These tests were conducted for BIRDS-5 Antenna Subsystem on 24th December, 2021.
16. BIRDS-5: Drone experiment for calibration purposes

Drone Experiment to Calibrate Images

Bonny OMARA
From UGANDA
January 12, 2022

From BIRDS-5 Multispectral cameras
The BIRDS-5 project is using a multispectral camera system to capture images of the member countries (Japan, Uganda, and Zimbabwe) from space to aid in the analysis of water quality, soil nitrogen/fertility, and land use and cover. However, before deployment, the outputs of these sensors must be calibrated on the ground.

The BIRDS-5 team lead by Bonny from Uganda conducted a drone experiment using their image sensors in conjunction with a standard RGB camera to correlate the sensor's output to what is on the ground.
**Experiment Setup**

Payload Setup:
Four multi-spectral sensor and one standard RGB Camera.

The team was preparing to attach the payload to the drone. Teramoto sensei was on hand to confirm the drone's safety and compliance with applicable aviation laws.

Drone Type:
DJI Matrice 600Pro

Bonny was prepping the drone and cameras for takeoff.

Victor, the day's pilot, was scheduled to depart from this location.
The optical spectrum of the BIRDS-5 Camera system will be calibrated using the reflectance characteristics of buildings, trees, tarred surfaces, grasses, and bare land observed in this shot.

The BIRDS-5 cameras captured this part and the lower sides as extrapolated in the images.
Editor’s Note: Bonny explained the drone experiment in detail during weekly BIRDS-5 ZOOM meeting of 28 Jan 2022 (these are screen shots of the editor’s laptop)
18. BIRDS-5: Anechoic chamber test updates

Anechoic Chamber Test Briefings

By: Ramson Nyamukondiwa
Date: 15/01/2022

Email: munyaradzi.nyamukondiwa-ramson769@mail.kyutech.ac.jp
Outline

Steps for Antenna Tuning

1. Use Vector Network Analyser

2. Calibrate the cables with the VNA to ensure that the effects of cables, connectors, etc are nulled out before the measurements

3. Match the length of the antenna (cut or make long) to the desired S11 parameters
   (Frequency and election coefficient)
   a) S11 represents how much power is reflected from the antenna, and hence is known as the reflection coefficient (sometimes written as gamma: or return loss
   b) Use the dB Mag Curve and/or Smith Chart
Radiation Pattern Measurement procedure

1. Measure all the cable losses for each frequency
2. Calculate ideal Path Loss
3. Measure the path loss from Spectrum Analyzer reading using Ref. Antenna
4. Compare the path loss results & confirm them to be almost equal.
5. Conduct Radiation pattern measurement of Ref Antenna
6. Replace Reference Antenna with Satellite antenna (Satellite)
7. Conduct Radiation pattern measurement of Satellite Antenna.
Steps for measuring Transceiver Sensitivity

- Calibration
  - Measure cable loses in Up and Downlink
  - Measuring the ICOM radio transmission power
  - Determine the practical antenna gains of
    - Ref Antenna and BIRDS antenna
  - Determine the path loss for Up and Downlink
  - Measure received power at the antenna
- Uplink success rate
Calibration Setup

1. Radio Transmission Output

ICOM Radio

\[ P_{RX} = P_{TX} - Att \]

2. Cable Loss

Signal Generator

\[ L_C = P_{TX} - P_{RX} \]

3. Attenuator Functionality Checked

Verify all attenuators before use

Variable Attenuations
Determining the Path Loss

1. Practical Path Loss

\[ L_{\text{path}} = P_{TX} - L_{C1} - L_{C2} + G_1 + G_2 - P_{RX} \]

2. Theoretical/Ideal Path Loss

\[ L_{\text{path}} = 20 \log \left( \frac{4\pi df}{c} \right) \]

- Where: f: Freq, c: Speed of light, d: distance between the two antennas
Measuring UHF TRX Sensitivity SetUp

ICOM-9100 Radio

Variable Attenuators

47dBm

TNC

UHF Dipole Antenna

Satellite
Measuring UHF TRX Sensitivity Test Setup

- Ground station (GS) Location
- Door-1
- Door-2
- Door-3
- Reference antenna
- Satellite
- Anechoic chamber

END
19. BIRDS-5: ADCS flight model test setup

ADCS FM Test Up

By : Timothy Kudzanayi Kuhamba
(Zimbabwe)
Date: 20 January 2022
V Engineering model

- **Validation.**
  - system meets the needs of stakeholders.

- **Verification.**
  - The evaluation of system complies requirement

https://upload.wikimedia.org/wikipedia/commons/e/e8/Systems_Engineering_Process_II.svg
Test Set Up

- Rotate the rate table
- Collect high sampling data using ground station
- Check conscience of results magnetometer gyroscope, Solar current
- Plot the data
Magnetometer Plots

Sample plots
Current Plot

High sampling data plots for 5 minutes

1U satellite

2U satellite
20. BIRDS-5: Calibration of flight model magnetometer

By: Timothy Kudzanayi Kuhamba
(Zimbabwe)
Date 20 January 2022

FM Magnetometer Calibration
What are magnetometers?

- Instruments to measure the strength and direction of magnetic field

In BIRDS 5 Magnetometer measurements will be used to calculate the attitude of the satellite

[YouTube Video](https://www.youtube.com/watch?v=c--Yiz_7_MM&t=3991s)
Magnetometers

- Used to determine the attitude of the satellite comparing measured value and calculated earth magnetic field model at the position of the satellite
Why calibrate magnetometers

- Very subject to errors
- To understand the
  - hard iron errors from permanent magnets
  - Errors from the electronic boards
- Calibration help
  - to correct errors?
  - Get true measurements of magnetic field
  - Improves accuracy determining attitude of satellite
2 Axis Helmholtz coil

Current applied to the Y coil

\[ B = \left( \frac{4}{5} \right)^{3} \cdot \frac{\mu_{0} NI}{R} \]

Where:
- radius/coil separation (R)
- magnetic field (B)
- required current (I)
- number of turns (n)

Helmholtz coil used to calibrate magnetometer

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<th>生成電磁場到達まで 0.5mT（@50Hz） or 0.1mT（@1000Hz）</th>
</tr>
</thead>
<tbody>
<tr>
<td>● 型 式</td>
<td>東洋電気工業株式会社 TCC-17222 型</td>
<td>X-Axe: Coil diameter:1100/1170mm, Coil distance:550mm, 29 or 90 turns</td>
</tr>
<tr>
<td>● 仕 様 specification</td>
<td></td>
<td>Y-Axe: Coil diameter:1200/1270mm, Coil distance:580mm, 17 or 68 turns</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Accuracy : ±0.5%, Ø200mm×200mm (center area of two coils)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Stage : 200×200mm, Movable range: 100mm downward from center</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Frequency range : DC~1000Hz</td>
</tr>
</tbody>
</table>
Methods

- Record the current values of the target magnetic field from the gauss meter
- Adjust the gauss meter with the magnetic field until you get maximum e.g
- Set to 10000nT and make sure you align the gauss meter and fix the position
- Record the ambient magnetic field with the gauss meter with 0 current
- Range of test -60000nT to 60000nT so current corresponding to the magnetic field are recorded
- The satellite is set inside and Helmholtz coil and note the axis of the satellite
- Make sure the magnetometer is at the centre of the coil
- Set the satellite aligned to the magnetic field where you get the maximum magnetic field
Gauss meter

Measurement of the ambient magnetic field with zero current

Current

Power Supply

Y Coil

Gauss meter

Generated magnetic field [μT] vs. Applied current [A]

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Experimental Set up

Power supply

Satellite

Magnetic Field readings

Helmholtz Coil

Current applied to the Y coil

Capturing PC

Current
Magnetometer Calibration

\[ y = ax + b \quad \text{Equation 1} \]

Where:

- \( x \): Input to sensor (Applied Magnetic Field):
- \( y \): Output from sensor (Measured magnetic field):
  - \( a \): gradient (slope)
  - \( b \): Offset (intercept)
- \( y'_{\text{calibrated}} = \frac{y - b}{a} = x \quad \text{Equation 2} \)

\[ y = 125.06 - 0.86557x \quad \text{Equation 4} \]

\[ y'_{\text{calibrated}} = \frac{y - b}{a} = \frac{(−287.2−125.1) \mu T}{0.87} = 62.1 \mu T \quad \text{Equation 5} \]
Sat 1 X axis

Measured field is linear with respect to the applied field
These magnetic measurements were made in Oita Prefecture at this industrial test facility.
Dishes in Oita Prefecture

Indian dish

Famous Oita beef

End of Timothy’s report
End of BIRDS-5 reports for this month
The following was received from Euroconsult on 21 Jan 2022

To start the year, Euroconsult is pleased to announce the release of the original "Space Economy Report<https://digital-platform.euroconsult-ec.com/product/space-economy-report/>" for 2021

To wish you the best for 2022, I am sharing with you some key findings of this edition:

* The global space economy is estimated at a total value of $370 billion in 2021, consisting of:

  * The space market ($337B in 2021) which includes commercial space revenues and government procurement for their space activities contracted to the private sector, and

  * Other spending from government organizations ($33B) to conduct their space activities (internal costs and R&D)

* The space economy is expected to grow by 74% by 2030 to reach $642B (6.3% CAGR) renewing its strong growth pattern following a 4% decrease in 2020 under the effect of the covid crisis impact on commercial space services

* The global space market is valued at $337B in 2021 up 6% v. 2020, i.e., market value comparable to 2019 prior to covid crisis which impacted satellite service revenues in 2020. The largest revenue drivers remain satellite navigation and communications which account for 50% and 41% of the total market value respectively, driven by B2C applications. In comparison, EO still accounts for a marginal 5% of the total value but with a much higher proportion upstream. Satnav has surpassed satcom, growing from about 37% of the total revenues in 2016 to over 50% in 2021, largely due to services enabled by GNSS services and their related devices.
End of this BIRDS Project Newsletter
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http://birds1.birds-project.com/newsletter.html

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When a new issue is entered into 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.