

# EARTH TO SPACE

INSTITUTE OF  
CLIMATE CHANGE BULLETIN  
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*Anugerah*  
BITARA UKM

Equatorial plasma bubble in Southeast Asia

6

An implication of particle number (0.25 to 34  $\mu\text{m}$ ) and mass concentrations ( $<10\mu\text{m}$ ) at a school microenvironment during haze in 2015: measurement experience

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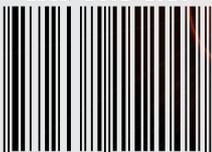
Managing Waste Bins By Using Geospatial Application

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# *Earth to Space*

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Institute of Climate Change won the highest award from UKM for excellence and best services in 2016 (2015 evaluation)

### **Published by »**

Institute of Climate Change (IPI)  
Earth Observation Centre Building,  
Universiti Kebangsaan Malaysia,  
43600 UKM Bangi, Selangor Darul Ehsan, MALAYSIA.

Tel: 03-8921 6772/6097  
Fax: 03-8921 6098  
Email: [pghikp@ukm.edu.my](mailto:pghikp@ukm.edu.my)  
Website: <http://www.ukm.my/ipi>

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*Message from*

**Prof. Dato' Dr. Sharifah  
Mastura Syed Abdullah**  
Director



Bismillahirrahmanirrahim

Assalammualaikum wbt

A warm congratulation to the editorial team members of the Earth to Space, an IPI Bulletin, for the occasion of the publication the 4<sup>th</sup> Issue. The 4<sup>th</sup> *issue of the Bulletin constitutes the summaries of the core research projects, grant secured, award received, international conference, workshops and activities organised, distinguished lectures and high impact and top-tiered publications* for the period between July 2016 to December 2016. I hope that this issue will serve as a brief docket of the key activities initiated by the Institute of Climate Change in 2016. I believe that with the support of all, IPI Bulletin will propel forward to a broad range of audience.

Thank you

**Prof. Dato' Dr. Sharifah Mastura Syed Abdullah**  
Director Institute of Climate Change (IPI)





*Message from*

**Sr. Dr. Khairul Nizam  
Abdul Maulud**  
Chief Editor



Bismillahirrahmanirrahim

Assalamualaikum warahmatullahi wabarakatuh and warm greetings!

Welcome to the 4th issue of IPI Bulletin. The main highlights of this issue is the outstanding achievement award 2016. This issue also includes all activities and programs that have been carried out from July until December 2016. Recent researches highlighted are Equatorial plasma bubble in Southeast Asia, An implication of particle number (0.25 to 34  $\mu\text{m}$ ) and mass concentrations ( $<10\mu\text{m}$ ) at a school microenvironment during haze in 2015: measurement experience, Managing Waste Bins By Using Geospatial Application, The 2016 International Conference on Science and Technology Applications in Climate Change (STACLIM 2016).

I hope that the insights presented in this bulletin will give ideas and inspiration to readers. If you have any comments or suggestions about any of the content in the IPI Bulletin, please drop us a line at [pghikp@ukm.edu.my](mailto:pghikp@ukm.edu.my).

Your feedback is always most welcome.  
Thank you.

**Sr. Dr. Khairul Nizam Abdul Maulud**  
Head of Earth Observation Center  
Institute of Climate Change (IPI)



# *Equatorial Plasma Bubble in Southeast Asia*

Suhaila M. Buhari

Space weather events such as ionospheric irregularities are natural phenomena that can have a serious impact on technological infrastructures such as radio communication and satellite navigation system. Being concerned about the effects, Space Science Centre (ANGKASA, Institute of Climate Change, Universiti Kebangsaan Malaysia) in partnership with international organizations is coordinating research activities to detect, monitor and ultimately forecast ionospheric activity in Southeast Asia (SEA) region.

The ionosphere is a part of atmospheric layer that is ionized by solar radiations during the daytime. This layer lies from 60 to more than 1000 km above the Earth's surface. The ionospheric irregularities such as equatorial spread F (ESF) or known as equatorial plasma bubble (EPB) is a low latitude phenomenon that frequently occurs near SEA region. The EPB is initiated during post sunset hours due to low solar radiations. The generation of EPB can be explained by Rayleigh-Taylor

Instability (RTI) process where low density plasma at the bottom side of ionospheric layer developed to the topside like air bubbles in water. The ionospheric irregularities inside the EPB structure ranging from few centimeters to hundreds of kilometers in scale. These irregularities may scatter radio waves and can cause rapid fluctuations (scintillations) in the amplitude and phase of radio signals as illustrated in Figure 1.

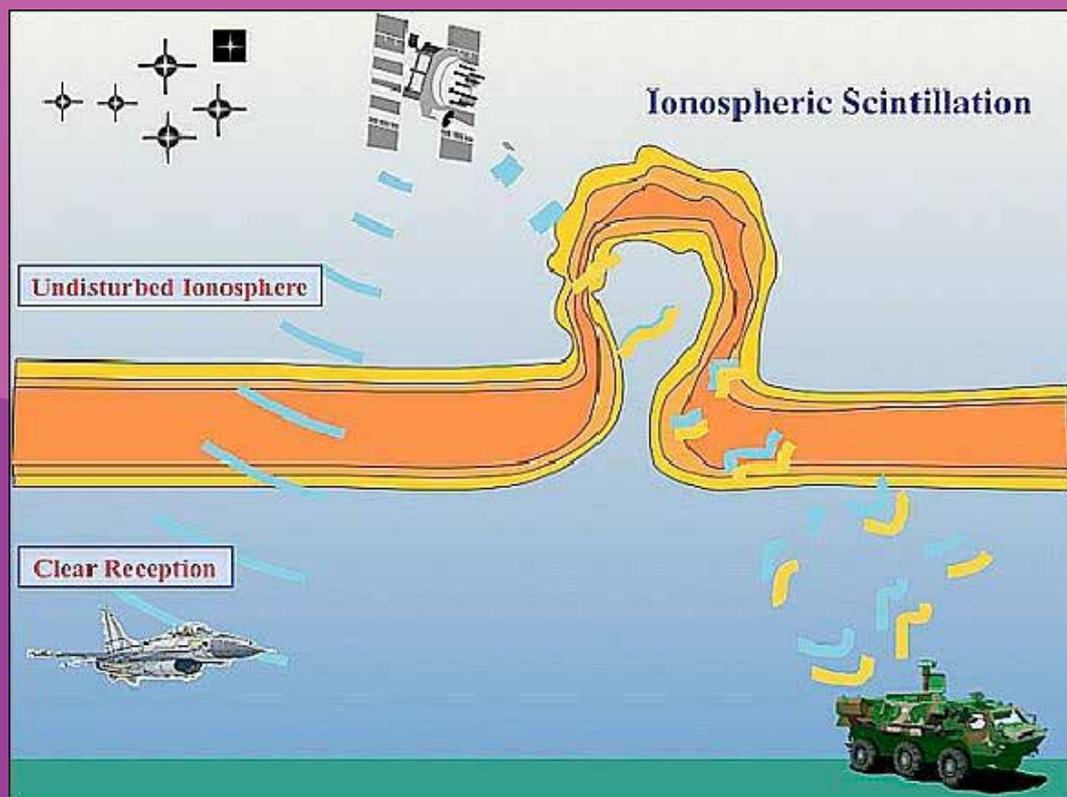


Figure 1. The development of equatorial plasma bubble (EPB)

Source: NASA

The EPB normally occur successively where one structure rises after another during the sunset period. However, the exact onset time and location of the EPB are ubiquitous because the seed of the initial perturbation is not completely understood. Although various observation systems have been developed to capture the EPB, each of the measurement has limitations with space and time resolution. The availability of high-density GPS receivers in SEA enabled time-continues monitoring of EPB over broad geographical coverage. The GPS data can be obtained from Malaysia Real-Time Kinematics GNSS Network (MyRTKnet), International Ground Station (IGS) and Sumatera GPS Array (SUGAR) network.

GPS networks in SEA have the capability to observe two-dimensional structure of the EPB. The first observation of two-dimensional structure of EPB using the high-density GPS receivers in SEA was successfully captured in 2014. The result was published in Journal of Geophysical Research Space Physics - continuous generation and two-dimensional structure of equatorial plasma bubbles observed by high-density GPS receivers in SEA by Buhari et al. (2015). The example of the two-dimensional structure of EPB using the high-density GPS receivers in SEA is shown in Figure 2. Total electron content (TEC) can be derived from the difference between two signals of GPS satellite to the receiver. The signature of the EPB was detected using rate of TEC change index (ROTI) for all the available satellites to receiver paths. The two-dimensional structure of the EPB on 17 March is plotted on geographical coordinates as shown in figure (Figure 2) below. Further studies needed to determine why this region become irregular and finally monitoring of ionospheric activity as a part of supporting space weather program.

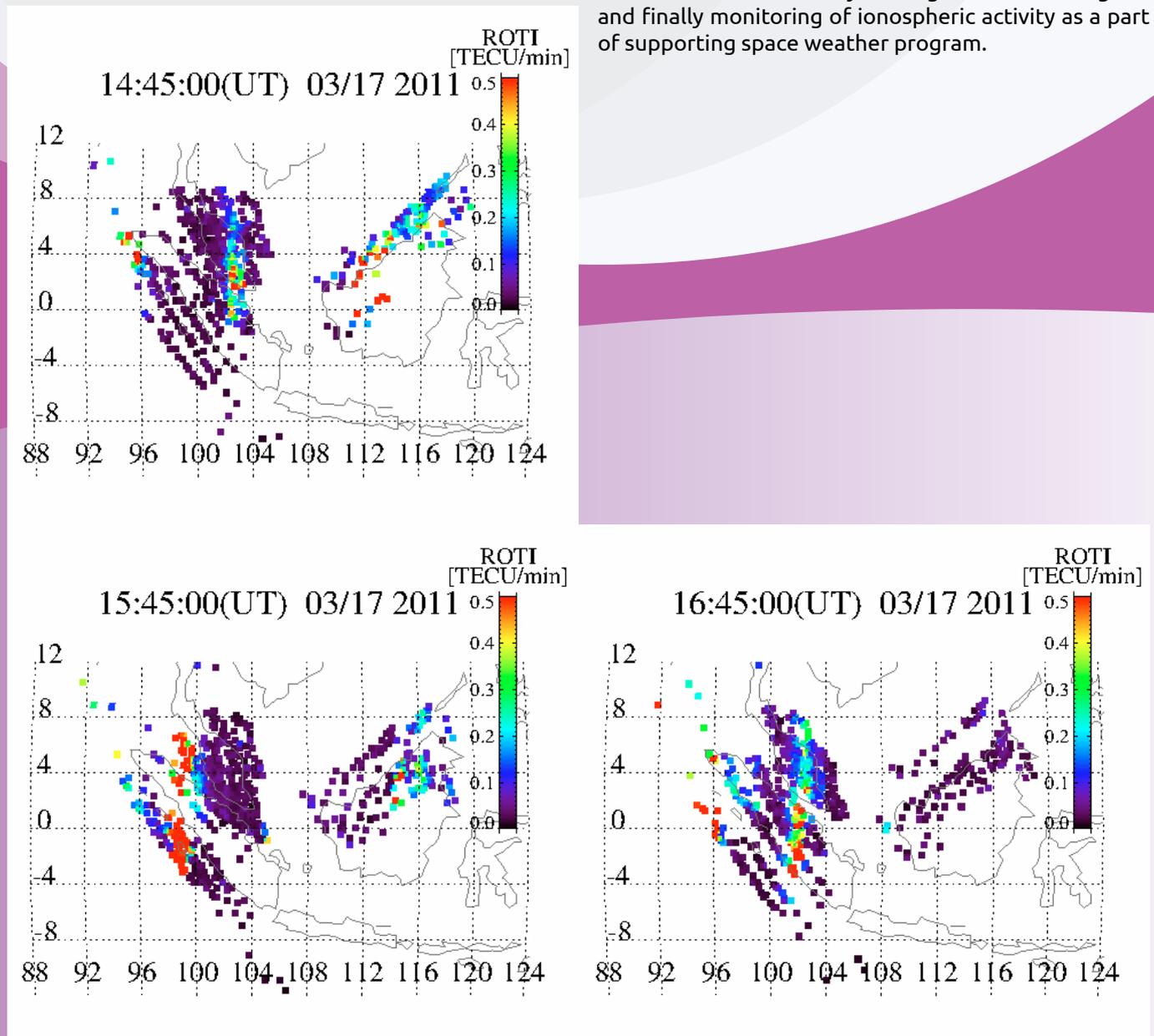


Figure 2. The observation of EPB using high-density GPS receivers in SEA



Figure 1. Discussion as part of the Project planning and indoor microenvironment at school



# An Implication of Particle Number (0.25 to 34 Mm) and Mass Concentrations (<10Mm) at A School Microenvironment During Haze in 2015: Measurement Experience

Md Firoz Khan, Mohd Shahrul Mohd Nadzir and Azwani Alias

A project on the air quality of indoor microenvironment during haze episode was launched it was funded by SHARP Electronics (M) Sdn Bhd under the MoA between Universiti Kebangsaan Malaysia (UKM) and SHARP Electronics (M) Sdn Bhd. This project focuses intensively on the compositions and the size distribution of aerosol particles during haze and non-haze period in a school microenvironment and health risk to the children. The project was conducted at SJKC Chung Kwok, a government primary Chinese school, located in the Jalan Merpati, Kuala Lumpur. This school comprised of 29 classes and out of them, each standard has 3-4 classes. About 30-50 students were registered in each class. Thus, a total of about 1,000 students and 52 teaching staffs went to this school from 7:45 am to 4 pm (8-9 hours) every day. The number of asthma patients was about 1 per 2 - 3 classes. Each of the classrooms is equipped with two air conditioners four fans and one exhaust fan for ventilation The floor of the classroom was made of cement and the windows were sliding aluminium frame. The classrooms were also equipped with a computer, overhead liquid-crystal display (LCD) projector and whiteboard

at the front of the room. The classroom selected for this study was on the second floor. The air conditioner operated at 9.00 am and it is switched off during recess. The location of the school was next to a busy road and a good number of high rise buildings. With regards to the above information, the dominant sources of air pollutant were dependent on the architecture of the indoor microenvironment, material and mode of energy use, surface of the building and floor, nearby potential stationary and mobile source outdoors and the trans-boundary transport of pollution.

The air monitoring campaign during normal condition was conducted from 20 to 28 May 2015 in the classroom. Similarly, the campaign commenced again from 28 August to 2 October 2015 in the classroom when the severe haze occurred. A depiction of the project is shown in the following Figure 2.

During the normal and haze episode, a series of instruments was employed to measure the particle number concentration (PNC), mass concentration ( $PM_{10}$ ,  $PM_{2.5}$  and  $PM_1$ ), compositions of aerosol particles (e.g. trace metals) and

volatile organic compounds (VOCs). PNC and mass of particle were simultaneously measured in two classrooms (A and B) and outdoor. One of the classrooms was used as control room for sampling purpose and a plasma cluster ion (PCI) based air filter was deployed in the other classroom. PNC and mass concentration ( $PM_{10}$ ,  $PM_{2.5}$  and  $PM_1$ ) were measured by an in-situ aerosol sampler (Grimm 1.109, Germany).  $PM_{10}$  was collected on a Teflon membrane filter (0.47  $\mu m$  pore size, 47 mm in diameter, PallFlex, USA), using a low volume air sampler (LVS) (Airmetrics MiniVol, USA). Air sampling is shown in the following Figure 3.

In parallel to the campaign of air monitoring during haze and non-haze period, the school children participated in their health risk assessment using spirometry test and questionnaires. Spirometry is the most frequently used measure of lung function and is a measure of volume against time. Lung function measurements that were conducted include forced expiratory volume in one second (FEV1), force vital capacity (FVC) and the ratio of the two volumes (FEV1/FVC). FEV1 measures obstructive lung (mildly to severely decreased) and

restrictive lung (moderately to severely decreased). In general, children are the most vulnerable to the exposure of hazardous pollutant as they have higher breathing rate than adults.

Briefly, the major summaries of the project were:

1. The reduction of particle fractions ( $PM_{10}$ ,  $PM_{2.5}$  and  $PM_1$ ) was recorded at classroom A compared to outdoor and classroom B. On the selected dates, e.g., 22, 25, 26 and 27 May 2015, the reduction was observed as 60.0% and 12.7%  $PM_{10}$  and  $PM_{2.5}$  respectively during non-haze sampling days. On the other hand, concentration of  $PM_1$  was increased by 37.4% at classroom A.
2. During haze episode, our results showed that the average mass concentration of  $PM_{10}$  and  $PM_{2.5}$  in classroom A were lower compared to classroom B. On considering the selected dates (17, 18, 30 September and 1 October 2015), the reduction of particles was observed as 10.0%, 28.8% and 30.9% for  $PM_{10}$ ,  $PM_{2.5}$  and  $PM_1$ , respectively.
3. The percentage reduction of the concentration of trace metals comparing the data at classroom A and B by air purifier were 35%, 40%, 38%, 8%, 20%, 41% and 30% for As, Co, Pb, Cu, Cr, Ni and Mn, respectively. On the other hand, the Cd concentration was increased

by 30%. However, considering the selected days, the percentage reduction of trace metals excel to 74.9% for Cd using the data captured on 22, 25, 26 and 27 May 2015. It is noted that the indoor air is cleaner than outdoor as per common public perception. However, the results showed that indoor (classroom B) showed higher level of pollution compared to outdoor.

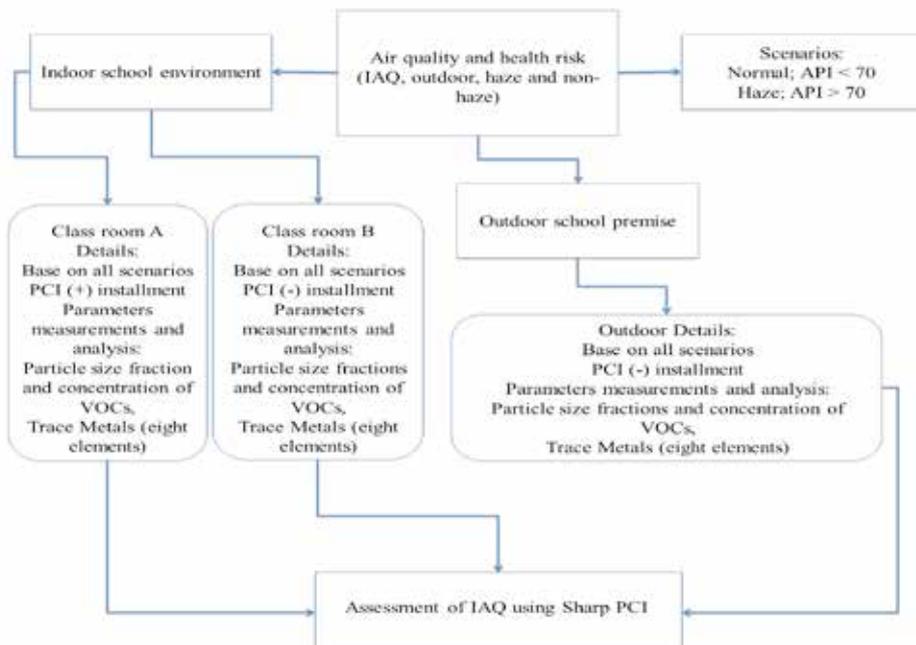
4. On considering the selected dates e.g., 17, 18, 30 September and 1 October 2015, we have noticed that there were substantial reduction of total VOCs as well as individual compound of VOCs in classroom A compared to classroom B and outdoor. 22.4% decrease of total VOC concentration was observed in classroom A. Similar to the concentration of trace metals in classroom B and outdoor, the total BTEX showed higher concentration in classroom B compared to outdoor. Thus, we can say that the pollution level at an indoor environment sometimes goes higher compared to the outdoor condition.
5. The size distribution results illustrate that the PCI effectively filtered out about 44% of fine particle mass concentration during the strong haze in September 2015. However, the effect of PCI was not noticeable during the normal days for fine mode particles.

6. Overall, this project indicated that the level of air pollution deteriorated severely at an indoor microenvironment compared to the outdoor during haze episode. However, the common perception among people was that the indoor was considerably safe with regards to the air pollution.



Figure 3. Sampling of air pollutants and a spirometry test at an indoor school environment

Figure 2. A conceptual framework of the project.



# MANAGING WASTE BINS BY USING GEOSPATIAL APPLICATION

Khairul Nizam Abdul Maulud, Muhammad Amartur  
Rahman Zainal Abidin, Mohd Aizat Saiful Bahri &  
Muhammad Aqiff Abdul Wahid

Universiti Kebangsaan Malaysia (UKM) in collaboration with Earth Observation Centre (EOC), Prasarana UKM and Khazanah UKM utilised implementation of Geographical Information System (GIS) in managing and maintaining UKM's infrastructure. The new approach is based on a systematic approach to monitor and retrieve the information of every infrastructure in UKM along with its location. GIS plays an important role in this approach as the spatial information of every detail on the surface of the earth around UKM can be accessed and view simultaneously by Departments/Faculties/Institutes just through a monitor.

Figure 1: UKM Infrastructures in ArcMap Environment

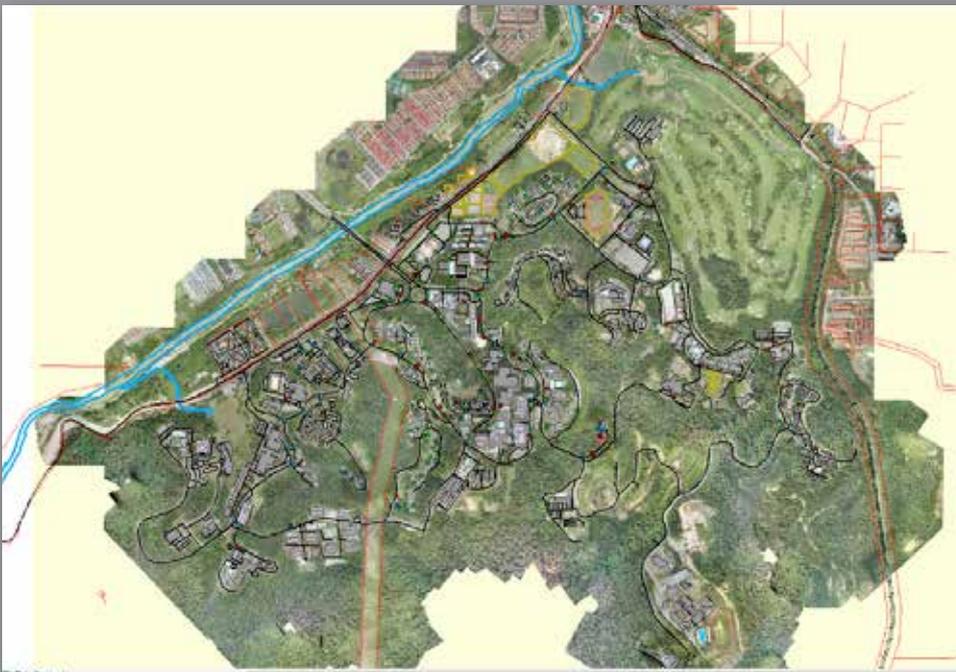
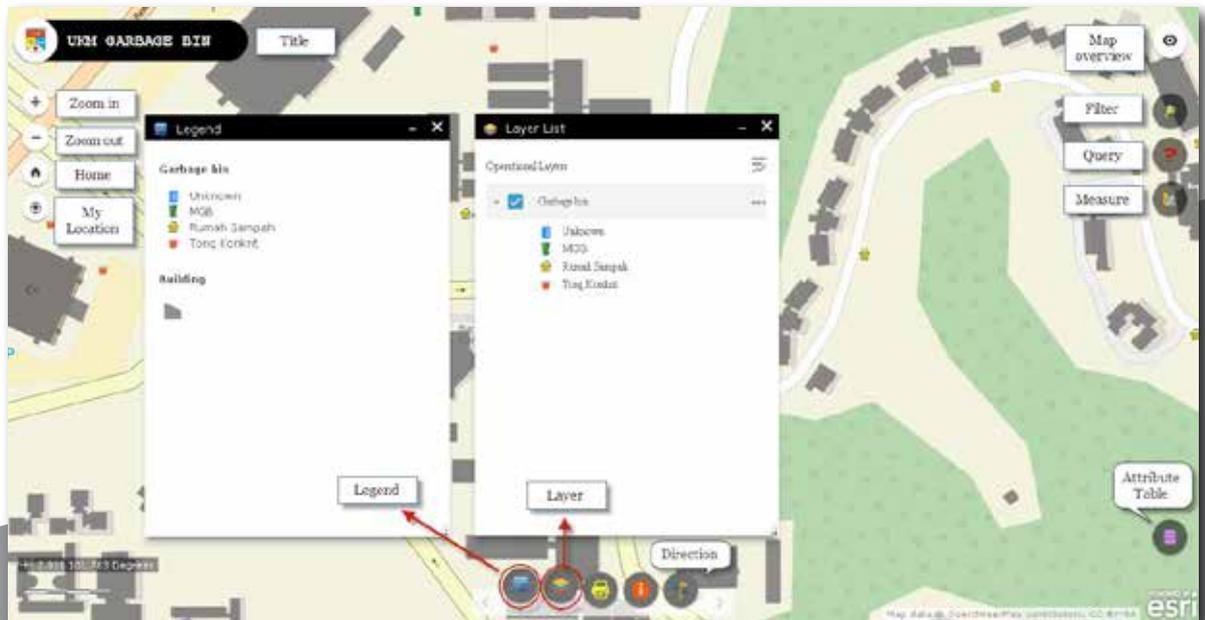


Figure 2: UKM Garbage Bin in web-based environment



The system is built on a ArcGIS platform where the ArcMap software helps to delineate all the infrastructure within UKM such as road, building, pipeline, sewerage, boundary, landscape etc. A three-step process is involved in this project and the first step was the collection of data where all the infra data being collected either through ground data collection, from existing built plan or digitizing method used and the map from Unmanned Aerial Vehicle (UAV) (Figure 1). A central data cloud was created called UKM Geodatabases where the spatial location and its attribute were stored.

During the completion of the database, the data that was already collected is simultaneously designed to be displayed in web-based environment using the platform of ArcGIS online. All the data was then exported into web map services. This allows the spatial information of each infrastructure and its

attribute can be displayed and accessed by approved user. By using ArcGIS online, approved user doesn't need to have ArcMap to display and retrieve the spatial data from the databases.

The online version of ArcGIS (web-based environment), allows the user to perform few elementary analysis such as data query and buffering. The user can query the data based on characteristics required and the result of the query will show its both the location and attribute. This is a smart system that it will help decision makers to make good decision regarding fund with regards to for managing and maintaining UKM infrastructure. The application developed in the online environment where all the bins in UKM are stored in a Geodatabases is shown in Figure 2. This application is able to query and display the relevant information (Figure 3).

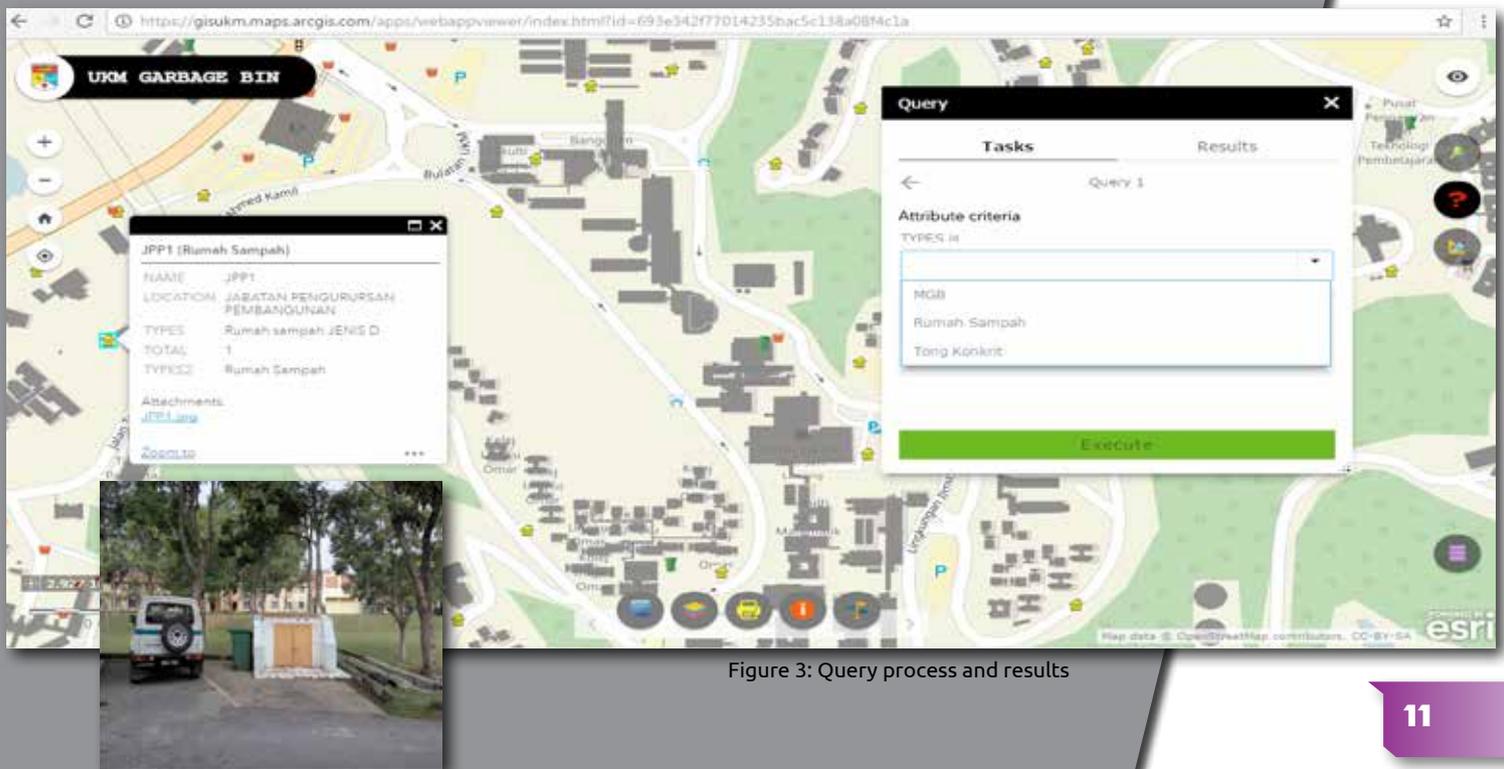


Figure 3: Query process and results

# THE 2016 INTERNATIONAL CONFERENCE ON SCIENCE AND TECHNOLOGY APPLICATIONS IN CLIMATE CHANGE (STACLIM 2016), KOTA KINABALU, SABAH, MALAYSIA, 11-12 AUGUST 2016: A SUCCESSFUL CONFERENCE

## Wayan Suparta

*General Chair of STACLIM 2016*

Space Science Centre (ANGKASA), Institute of Climate Change  
Universiti Kebangsaan Malaysia, 43600 Bangi, Selangor, Malaysia  
E-mail: wayan@ukm.edu.my

Climate change was affects every country and disrupts national economies. Their impacts influence many aspects of human life and environmental consequences, such as extreme heat waves, sea-level rise, flooding and droughts, intense hurricanes, and degrading air quality. directly and indirectly affects the physical, social, and psychological health of humans. Therefore, mitigation of climate change and its impacts issue for through many disciplines, particularly in science and technology applications.

To address various issues faced from natural phenomena, man-made activities, and the political will enforced by the government together with the major role of scientists to mitigate the impact of climate change, Space Science Centre (ANGKASA), Institute of Climate Change at the Universiti Kebangsaan Malaysia (UKM) proudly presented the 2016 International Conference on Science and Technology Applications in Climate Change (STACLIM 2016).

STACLIM 2016 with the theme “**Advancing Science and Technology Applications for Climate Change Responses**” covers the scope of Mathematic and Natural Sciences, Technology, Earth and Environmental Sciences and Others. The conference was successfully held at Pacific Sutera Harbour, Kota Kinabalu, Sabah, Malaysia on 11–12 August 2016, which gathered many scientists, engineers, policy makers and students who are related to the field of science, technology and multidisciplinary to offer their contributions in addressing climate change issues.



Opening Speech by Dr. Wayan Suparta and keynote speech by Professor Talib Latif at the STACLIM 2016



Keynote speech by Prof. Dr. Colin Woodroffe and the award given to the best paper presentation



Participants and organizers of the STACLIM 2016

The seminar was addressed by three keynote speakers from different backgrounds that covered atmospheric and environmental sciences and engineering. The talks delivered and papers presented in four brain-storming technical sessions were categorized into four scopes or tracks. There were also poster presentations by research scholars and there was a selection of best paper, best presentation, and best poster through a fair judgement by the review panel., We received 76 papers and after rigorous review, 68 papers were accepted for presentation in the seminar. We also considered publication of research articles and selected 54 articles for publication in the journal of *Advanced Science Letters*.

It is an honor to present this volume to *Advanced Science Letters* and we are pleased and hereby acknowledge the authors for their enthusiastic attendance and knowledge sharing in the

conference. We convey our sincere thanks to committee members and all those who have helped us to organize the seminar successfully and developed a very interesting conference program. Finally, we would like to extend our sincere gratitude to the following recipients for making STACLIM 2016 a tremendous success: Space Science Centre (ANGKASA), Institute of Climate Change of Universiti Kebangsaan Malaysia, Faculty of Science and Natural Resources of Universiti Malaysia Sabah (UMS), UKM Angkasa Student Association (ASA), Keynote Speakers, Reviewers, and Participants. Thanks are also extended to Malaysian Communications and Multimedia Commission (MCMC), Yayasan Pembangunan Ekonomi Islam Malaysia (YaPEIM), Seacom Process Instruments Sdn. Bhd., Rohde & Schwarz, Global-track Systems Sdn. Bhd., UKM Press, and the Pacific Sutera Hotel.

Key committee members and a parallel session at STACLIM 2016

A snap of the keynote and the poster sessions





## ANUGERAH BITARA

### **Anugerah Bitara UKM (2016)**

**Date : 1 October 2016**

**Venue : Senate Hall, Level 5, Chancellory Building**

**Organiser: Universiti Kebangsaan Malaysia**

Institute of Climate Change won the highest award from UKM in 2016. This award is for excellence and best services in 2015. IPI has been rewarded with the grant incentive of RM 10,000 and certificate. Congratulation to IPI.



# MOA Kursi Wan Fatimah

**A New Chair Professor Position In "Wan Fatimah Environmental Sustainability" at UKM**

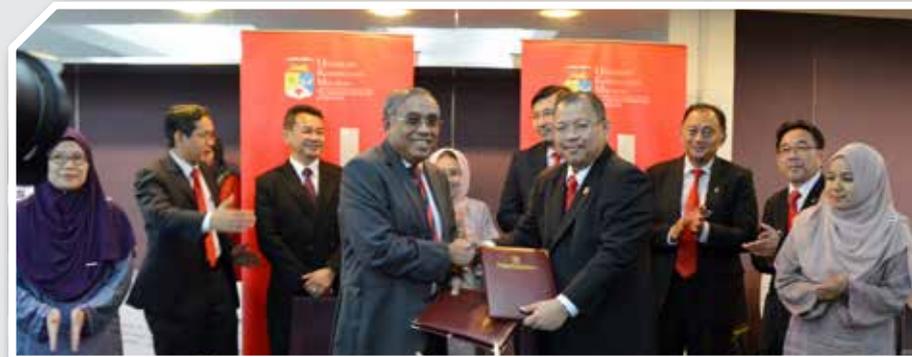
**Date: 20 July 2016**

**Venue: Puri Pujangga Hotel, UKM**

**Organiser: Institute of Climate Change (IPI), UKM**

A Memorandum of Agreement (MoA) has been signed by Universiti Kebangsaan Malaysia (UKM) and Dato' Nik & Associates Sdn Bhd (DNA Sdn Bhd) with regards to the creation of a Professor position in "Wan Fatimah Environmental Sustainability" at UKM on July 20, 2016. The chair Professor will assist in the promotion of research activities and teaching in areas related to environmental sustainability.

The sponsorship of the Professor position in "Wan Fatimah Environmental Sustainability" is indeed a great contribution to UKM as it has been offered to its first full professor with a grand contribution of RM 728,000 for a period of 2 years. YBhg. Prof. Dato' Dr. Sharifah Mastura Syed Abdullah, Director of the Institute on Climate Change, will be the first to hold the title Professor "Wan Fatimah Environmental Sustainability" at UKM.





## VISIT BY VILLA INTERNATIONAL HIGH SCHOOL, MALDIVES

**Date:** 27 July 2016  
**Venue:** Space Science Centre (ANGKASA)  
**Organiser:** International Relations Centre (UKM GLOBAL)

Representatives from Villa International High School, Maldives visited ANGKASA as part of their academic visit to Malaysia. Around 40 students and 3 teaching staffs visited the laboratories to know about facilities such as the equipment as well as research scopes in ANGKASA.

## BENKEL PEMURNIAN KERTAS KERJA PERMOHONAN GERAN YAYASAN HASANAH & YAYASAN PINTAR

**Date:** 8 August 2016  
**Venue:** Meeting Room, Institute of Climate Change  
**Organiser:** UKM-YSD Chair in Climate Change, UKM

A joint workshop was organised with the participation of UKM-YSD Chair in Climate Change, representatives from Yayasan Pintar and Yayasan Hasanah, and team members from IG-Home group. The objective of the workshop was to discuss and further strengthen the research proposal before being submitted to Yayasan Hasanah. The title of the proposed research was "Sustainability and Green Technology Through iG-Home Module". Recently, Yayasan Hasanah has agreed to give an allocation of RM 20,000 to develop a module for this research.



## 4TH ANNUAL GRAND MEETING OF ANGKASA STUDENTS' ASSOCIATION (ASA)



**Date: 16 August 2016**  
**Venue: Meeting Room, Research Complex**  
**Organiser: ANGKASA Student Association (ASA)**

The 4th Annual Grand Meeting of ASA was organized on 16 August 2016. The meeting proposed to form a new committee for Semester I and II of 2016/2017. All students of ANGKASA participated in the meeting and the former president of ASA addressed and introduced the annual report to the participants. Through an election, Kemal Maulana Alhasa was elected to lead the new ASA Committee. In the meeting, the new committee discussed several initiatives to be implemented in future such as ASA capacity building and sport activities.

# Workshop on **Hydraulic Modeling Project Development in Coastal and Offshore (Level 1)**

**Date:** 21-25 August 2016  
**Venue:** Thistle Hotel, Port Dickson,  
Negeri Sembilan  
**Organiser:** Earth Observation Centre (EOC),  
UKM

Development activities in the coastal area can cause adverse effects on the nearby area. Therefore, the study of hydraulics needs to consider the impact on corals, sea grass, mangrove forests, public beach, fisheries and aquaculture.

The major outcomes of this workshop involved briefing the participants about basic hydraulics as well as identifying the parameters that are involved in providing hydraulic modeling. The participants were also able to understand and interpret hydraulic model results and can make comparisons between hydraulic models software available in the market.



Hands-on parameter measurement

The course was jointly organized by the Earth Observation Centre, Institute of Climate Change (IPI) and Environment Institute of Malaysia (EiMAS), Department of Environment, Ministry of Natural Resources and Environment. The course was designed to teach the staffs of the Department of Environment who are responsible for the evaluation of the environmental impact assessment report related to hydraulics prepared by consultants.

Prof Dato' Sharifah Mastura explaining what are the types of development projects and activities that are subject to Study Hydraulics.





## EXHIBITION IN CONJUNCTION WITH THE SCIENTIFIC COMMITTEE ON ANTARCTIC RESEARCH (SCAR)

**Date:** 22-25 August 2016  
**Venue:** Kuala Lumpur Convention  
Centre, Kuala Lumpur  
**Organiser:** Yayasan Penyelidikan  
Antartika Sultan Mizan (YPASM)

Institute of Climate Change (IPI) participated the exhibition in conjunction with The Scientific Committee on Antarctic Research (SCAR). In this program, ANGKASA Student Association (ASA) promoted their association and ANGKASA by showing the postgraduate programs offered, as well as research and activities that were conducted in ANGKASA.

## ANGKASA PUBLIC LECTURE

**Date:** 26 August 2016  
**Venue:** Meeting Room, Level  
5, Research Complex Building,  
UKM Bangi  
**Organiser:** Space Science  
Centre (ANGKASA), UKM

ANGKASA hosted a public lecture aiming to share knowledge among the researchers. Invited speakers discussed about two very interesting topics in their respective areas. Dr. Giorgiana De Franceschi delivered a lecture entitled "Ionosphere & GNSS: INGV Activities at High And Low Latitudes" while Dr. Adriana Maria Gulisano delivered a lecture on "Space Weather Program".





## 2016 ANGKASA BOWLING CARNIVAL

**Date:** 27 August 2016  
**Venue:** Ampang Superbowl Bangi  
**Organiser:** Space Science Centre (ANGKASA) and ANGKASA Student Association (ASA)

The 2016 ANGKASA Bowling Carnival was hosted by ANGKASA as part of the recreational activities for the staffs, students and their families. More than 45 participants joined the bowling carnival. At the end of the Bowling Carnival, all winners received a prize from Prof. Ir. Dr. Mardina Abdullah.



## VISITORS FROM PERMATA PINTAR NEGARA, UKM

**Date:** 22 September 2016  
**Venue:** Space Science Centre (ANGKASA)  
**Organiser:** Space Science Centre (ANGKASA), UKM

25 students from Permata Pintar Negara visited ANGKASA as part of their Nobel Mindset program. They made a visit on 19 – 23 September 2016. During the visit, they were briefed by ANGKASA researchers and staff about ANGKASA background, postgraduate programs, activities and research.



# Workshop on Geospatial Analysis of Coastal Erosion (NCES)

**Date:** 17 – 20 October 2016  
**Venue:** Earth Observation Centre,  
Institute of Climate Change (IPI)  
**Organiser:** Earth Observation Centre (EOC),  
UKM

The main objective of the workshop was to teach basic remote sensing and geographic information system (GIS), to understand the process involved in satellite image processing. It was also conducted to enhance understanding of the physical and economic parameters in more detail, which is fundamental in determining the rate of coastal erosion. The participants also received hands-on training to use the software involved.

The participants were affiliated to the Department of Irrigation and Drainage (DID) which is involved in the implementation of projects on coastal erosion throughout Malaysia. The workshop was jointly organized by *Kursi Profesor Kelestarian Alam Sekitar Wan Fatimah*, Earth Observation Centre, Institute of Climate Change, and Dr. Nik & Associates Sdn. Bhd. (DNA).



Opening Ceremony by Dato' Ir. Dr. Nik Mohd Kamel bin Nik Hassan



Sr. Dr. Khairul Nizam giving a description of satellite image processing during the hands-on session



## **BENGKEL PEMANTAPAN PENYELIDIKAN DAN PENERBITAN ANGKASA**

**Date:** 22-24 October 2016

**Venue:** Kuantan, Pahang

**Organiser:** Space Science Centre  
(ANGKASA), UKM

*Bengkel Pemantapan Penyelidikan dan Penerbitan ANGKASA* or previously known as Seminar Penyelidikan Siswazah ANGKASA (SPSA) was hosted as a platform for postgraduate students from Space Science Centre (ANGKASA) to present and discuss current research results related to space science, space technology, and climate change. All participants presented their research outcomes and were evaluated by experienced researchers. Suhaila M. Buhari and Md. Atiqur Rahman was awarded as best presenters, respectively, for Ph.D. and Master categories. Prof. Ir. Dr. Ahmad Kamal Ariffin Bin Mohd Ihsan and Prof. Dr. Mohammad Tariqul Islam from Faculty of Engineering and Build Environment also were invited to give lectures in the Publication Workshop hosted in the program.





**EXHIBITION IN  
CONJUNCTION  
OF THE SIGNING  
CEREMONY OF  
MEMORANDUM OF  
UNDERSTANDING  
(MoU) BETWEEN  
UNIVERSITI  
KEBANGSAAN  
MALAYSIA  
(UKM) AND  
INSTITUTIONS  
FROM INDONESIA**

**Date: 25-26 Oktober 2016**  
**Venue: Dewan Tun Abdullah Mohd Salleh  
(DTAMS), UKM**  
**Organiser: The UKM Graduate Centre**

ANGKASA was invited to participate in an exhibition held in conjunction with the signing ceremony of Memorandum of Understanding (MoU) between UKM and various institutions from Indonesia. ANGKASA promoted the postgraduate programs offered, research and activities that were conducted in ANGKASA.

# Workshop on **Hydraulic Modeling Project Development in Coastal and Offshore (Level 2)**

**Date:** 7-10th November 2016  
**Venue:** Main Office Dr. Nik & Associates Sdn Bhd, Wangsa Maju, Kuala Lumpur  
**Organiser:** Earth Observation Centre (EOC) UKM, Environment Institute of Malaysia (EiMAS), Department of Environment, Ministry of Natural Resources and Environment and Dr. Nik & Associates Sdn Bhd (DNA Sdn Bhd)

Understanding current flow model Simulation Results; talk by Ir. Iwan Tan Sofian Tan



The main objective of the workshop was to provide training to the officers who are in charge of evaluating of the t environmental impact Assessment (EIA) report and sea reclamation project-related land development on the coast. The primary focus was basic knowledge of hydraulic modeling, prediction impact, mitigation, and Management Best Practices (BMPs).

Introduction to the Process of Geomorphology Beach and Hydraulic Modelling by Prof Dato' Sharifah Mastura





## SMART CONTROL HELICOPTER WORKSHOP & COMPETITION

**Date:** 24-25 November 2016  
**Venue:** Politeknik Banting  
Selangor (PBS)  
**Organiser:** Space Science Centre  
(ANGKASA), Department of  
Electrical, Electronic & Systems  
Engineering (JKEES FKAB UKM)  
and Politeknik Banting Selangor  
(PBS)



A science competition was held to inspire the students in science, technology, engineering and mathematics (STEM). A total of 11 groups from Politeknik Banting and high school near Hulu Langat District took part in this competition.

Each group was asked to control the helicopter which follows the instructions received by a microcontroller. Through this control process, participants learn the variables needed to control the helicopter using programming and suitable automation.

The competition itself was carried out on the second day where every group delivered automation presentation and programming skill. The groups were evaluated based on performing the required formation. Each group was asked to make "L" form formation as the major evaluation while the quad form was required as a bonus assessment.

A group from Sekolah Menengah Kebangsaan Taman Tasik, Ampang won and took home the challenge trophy, gift in form of cash RM300 and also participation certificate. Meanwhile the second and third place were won by Sekolah Menengah Kebangsaan Rinching Bandar, Semenyih and Sekolah Menengah Kebangsaan Empat Jalan, Bangi.

## **PUBLIC LECTURE: “CLIMATE CHANGE AND FORESTRY: INPUT FROM R&D”**

**Date:** 29 November 2016  
**Venue:** Dewan Persidangan,  
Fakulti Sains & Teknologi, UKM  
**Organiser:** UKM-YSD Chair in  
Climate Change, Institute of  
Climate Change

A public lecture was arranged and Dr. Samsudin Musa, Director of Forestry and Environment, Forest Research Institute Malaysia (FRIM) was invited to deliver a talk entitled “Climate Change and Forestry: Input from Research and Development”. Almost 100 students and researchers attended the lecture. This public lecture provides an opportunity for researchers and students to increase their knowledge and understanding about the relationship between forestry and climate change. This lecture covers greenhouse gasses, the role of



forest under United Nations Framework Convention on Climate Change (UNFCCC), Kyoto Protocol and influence of climate change on forests.



## **SEMINAR ON SUSTAINABLE SEWER SYSTEMS IN CURRENT CLIMATE SCENARIO**

**Date:** 1 December 2016  
**Venue:** Auditorium Hall,  
Faculty of Law UKM  
**Organiser:** UKM-YSD  
Chair in Climate Change,  
Institute of Climate  
Change

A seminar was organized by UKM-YSD Chair in Climate Change in collaboration with the Department of Civil and Structural Engineering, UKM and the Sewerage Services Department, Ministry of Energy, Green Technology and Water (KeTTHA). Five speakers including three invited speakers from the University of Sheffield presented their topics on sustainable sewer systems. The objective of the seminar was to introduce the participants on the latest research related to sewerage systems, including modeling and sediment transport. The seminar is expected to enhance existing relationship and networks between international and local researchers working on sewerage system and water engineering generally.

# POPULAR WRITING IN FIELD

(Popular Writing, Wanwancara Akhbar/Majalah, Wawancara TV/Radio)

NO.	POPULAR WRITING	VOL. ISSUE. PAGE	YEAR OF PUBLICATION	AUTHOR (S)
1	Penjanaan Tenaga dari Ombak <i>MajalahSains.com</i>	1-4	2016	Khairul Nizam Abdul Maulud
2	Ionospheric Flare Detection Using Raspberry Pi <i>ISWI Newsletter</i>		2016	Mardina Abdullah, Kok Beng Gan, Sabirin Abdullah, Badariah Bais, Rosadah Abd Majid
3	Raspberry Pi: Green Technology for Space Weather Monitoring <i>Impact</i>		2016	Mardina Abdullah, Badariah Bais, Rosadah Abd Majid, Gan Kok Beng, Sabirin Abdullah, Noridawaty Mat Daud, Siti Aminah Bahari, Nor Syaidah Bahri
4	Evolution of Satellite Technology for Global Communication <i>The Ingenieur</i>	-	2016	Farah Aniza Mohd Nazri, J.S Mandeep, Hafizah Hussain & Mardina Abdullah
5	Gelembungan Plasma di Angkasa <i>Dewan Kosmik</i>	-	2016	Mardina Abdullah, Suhaila M. Buhari
6	Investigation of Ionospheric Delay Forecasting using GPS TEC Measurements over Malaysia <i>Research Bulletin-Innovate</i>	-	2016	Mardina Abdullah
7	Ionospheric Flare Detection Using Raspberry Pi <i>ISWI Newsletter</i>	-	2016	Mardina Abdullah, Badariah Bais, Rosadah Abd Majid, Gan Kok Beng, Sabirin Abdullah, Noridawaty Mat Daud, Siti Aminah Bahari, Nor Syaidah Bahri
8	Bandar Mayan Hilang, Ditemui Melalui Bintang <i>Infiniti</i>	-	2016	Wayan Suparta
9	Fenomena Ekuinoks, Perubahan Iklim <i>Utusan Malaysia</i>	-	2016	Wayan Suparta
10	Gerhana Matahari Esok <i>Utusan Malaysia</i>	-	2016	Wayan Suparta
11	Lima Langkah Memajukan Pendidikan Indonesia <i>Harian Bernas: Bernas Inspirator</i>	8	2016	Wayan Suparta
12	Nyepi dan Fenomena Alam Sebuah Refleksi <i>Tribunners (Harian Tribun)</i>	-	2016	Wayan Suparta

# Awards and Recognitions

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## Appreciation Certificate from Public Work Department Malaysia

Earth Observation Centre (EOC), Institute of Climate Change has been recognized by Jabatan Kerja Raya (JKR) for their contribution in development of Batuan Tengah (buiding structure and facilities)

## Anugerah Bitara UKM

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Institute of Climate Change won the highest award from UKM for its excellence and best services for 2016. (2015 evaluation)



**Anugerah Bitara Sarjana**

Sr. Dr. Khairul Nizam Abdul Maulud has been awarded Anugerah Bitara (Sarjana Kumpulan) under group research in Climate Change Niche.



This is an excellence award bestowed by the Environmental Monitoring and Assessment, an ISI cited Journal in Springer. The editor-in-chief awarded me stating "Excellence in Reviewing" award for 2016



nature physics LETTERS

**Coalescence of magnetic flux ropes in the ion diffusion region of magnetic reconnection**

Rongzhong Wang<sup>1,2</sup>, Quanming Lu<sup>1</sup>, Rumi Nakamura<sup>1</sup>, Can Huang<sup>1</sup>, Aimin Du<sup>1</sup>, Fan Guo<sup>1</sup>, Waikeung To<sup>1</sup>, Mingyu Wu<sup>1</sup>, Sun Lu<sup>1</sup> and Shu Wang<sup>1</sup>

**Magnetic reconnection is an important process in space and laboratory plasmas that effectively converts magnetic energy into plasma kinetic energy within a current sheet. Theoretical work<sup>1</sup> suggested that reconnection occurs through the merging and annihilation of magnetic flux ropes that disperse magnetic surfaces in the current sheet and enable the diffusion of the magnetic field lines between two sides of the sheet. The current sheet also propagates as a primary mechanism for accelerating magnetic particles during reconnection<sup>2,3</sup>, but experimental evidence has remained elusive. Here, we identify a total of 10 flux ropes during reconnection in the magnetosphere. We found that the majority of the ropes are embedded in the ion diffusion region and 67% of them are coalescing. These observations show that the diffusion region is filled with flux ropes and that their interaction is intrinsic to the reconnection dynamics, leading to turbulence.**

Magnetic flux ropes (also called fluxtubes or current filaments) are localized helical magnetic structures<sup>4</sup> and are commonly associated with astrophysical magnetospheres<sup>5</sup>. Recent experimental observations reported that filamentary structures play a key role in the Sweet-Parker current sheet for a large Lundquist number<sup>6,7</sup> and in elongated current-carrying sheets<sup>8,9</sup>. However, the interaction of these filaments results in fast reconnection and magnetic diffusion<sup>10</sup>. However, the current sheet with current sheet has been observed<sup>11</sup>. Here, we present the first in situ detection of flux ropes coalescence during reconnection. The observations confirmed the coalescence of ropes and their a crucial role in energy dissipation during reconnection.

A reconnection with a single field line (S1) – S1047 was reconnected on 17 August 2016 at ~17:20 in the magnetosphere. The ion diffusion region, marked with the green bar at the top of Fig. 1, has already been identified on the basis of the calculated magnetic field of the high-speed flow in Fig. 1(a) and (b). Fig. 1(c) and the derived field quadrupole structure from the field vector (see ESM1 and 2). At this time, magnetic field data sampled at 120 Hz were available and the sequential reconnection was recorded in 201 ms, so the fine structure within the ion diffusion region could be investigated.

The topology around the reconnection region results in the Southeast Hemisphere with several arcades in the Northern Hemisphere (Fig. 2). The magnetic field directed through inside the ion diffusion region. Examining the fluctuation, a large



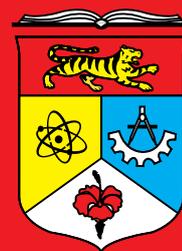
Indexed journal by Dr Teh Wai Leong has been published in the second best journal of Nature Physics



<sup>1</sup>State Key Laboratory of Earth and Planetary Sciences, Institute of Geology and Geophysics, Chinese Academy of Sciences, Beijing 100029, China; <sup>2</sup>CCAS, Laboratory of Geospace Environment, Department of Geophysics and Planetary Science, University of Science and Technology of China, Hefei 230026, China; <sup>3</sup>State Key Laboratory of Space Weather, Institute of Space and Earth Environment Research, Chinese Academy of Sciences, Beijing 100005, China; <sup>4</sup>State Key Laboratory of Space Weather, Institute of Space and Earth Environment Research, Chinese Academy of Sciences, Beijing 100005, China; <sup>5</sup>State Key Laboratory of Space Weather, Institute of Space and Earth Environment Research, Chinese Academy of Sciences, Beijing 100005, China; <sup>6</sup>State Key Laboratory of Space Weather, Institute of Space and Earth Environment Research, Chinese Academy of Sciences, Beijing 100005, China; <sup>7</sup>State Key Laboratory of Space Weather, Institute of Space and Earth Environment Research, Chinese Academy of Sciences, Beijing 100005, China; <sup>8</sup>State Key Laboratory of Space Weather, Institute of Space and Earth Environment Research, Chinese Academy of Sciences, Beijing 100005, China; <sup>9</sup>State Key Laboratory of Space Weather, Institute of Space and Earth Environment Research, Chinese Academy of Sciences, Beijing 100005, China; <sup>10</sup>State Key Laboratory of Space Weather, Institute of Space and Earth Environment Research, Chinese Academy of Sciences, Beijing 100005, China; <sup>11</sup>State Key Laboratory of Space Weather, Institute of Space and Earth Environment Research, Chinese Academy of Sciences, Beijing 100005, China



# Industry Grants



UNIVERSITI  
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*The National University  
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## INTERNATIONAL RESEARCH GRANT

Grants	: Istituto Superiore Mario Boella (ISMB), Italy
Title	: Ionospheric Environment Characterization for Biomass Calibration over South East Asia (IBisCo)
Project Leader	: Prof. Ir. Dr. Mardina Abdullah
Costs	: RM 16,400.00
Date	: 06/06/2016 – 06/05/2017

## FUNDAMENTAL RESEARCH GRANT SCHEME (FRCGS)

Grant	: Fundamental Research Grant Scheme (FRGS)
Title	: Exploring Magnetic Reconnection in Space
Project Leader	: Dr. Teh Wai Leong
Costs	: RM 55,000.00
Date	: 01/08/2016 – 31/07/2018

Grant	: Fundamental Research Grant Scheme (FRGS)
Title	: Modeling of maximum useable frequency (MUF) for HF communication in Malaysia
Project Leader	: Dr. Sabirin Abdullah
Costs	: RM 58,500.00
Date	: 01/08/2016 – 31/07/2018

Grant	: Fundamental Research Grant Scheme (FRGS)
Title	: Investigation of ionospheric plasma bubbles occurrence due to wavelike structure modulation
Project Leader	: Prof. Ir. Dr. Mardina Abdullah
Costs	: RM 83,100.00
Date	: 01/08/2016 – 31/07/2018

## GERAN GALAKAN PENYELIDIK MUDA (GGPM)

Grant	: Geran Galakan Penyelidik Muda (GGPM)
Title	: Association of short-lived climate pollutants (SLCPs) emitted from forest/wild fires to the Inter-annual climatic variability during the haze strike in Malaysia
Project Leader	: Dr. Md Firoz Khan
Costs	: RM 38,000.00
Date	: 01/05/2016 – 30/04/2018



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KEBANGSAAN  
MALAYSIA  
*The National University  
of Malaysia*

**Institute of Climate Change**

Universiti Kebangsaan Malaysia,  
43600 UKM Bangi, Selangor Darul Ehsan,  
MALAYSIA.

Tel: 03-8921 6772/6097

Faks: 03-8921 6098

E-mel: [pghikp@ukm.my](mailto:pghikp@ukm.my)

Website: <http://www.ukm.my/ipi>