

PARABOLIC FLIGHT SELF EXPERIENCE – MEMOIR OF THE MALAYSIAN SPACE AGENCY OFFICER

By Mohd Helmy Bin Hashim, ANGKASA, Malaysia

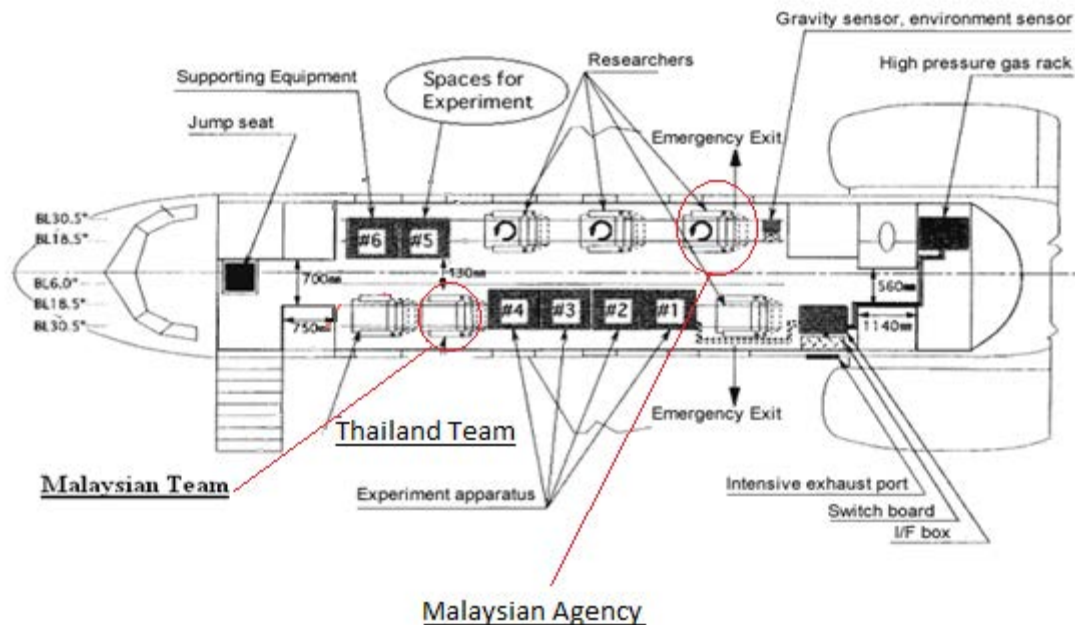
As a consequence to the participation of Malaysia and Thailand in Parabolic Flight for Asian Students Program which was organized by the Japan Space Exploration Agency (JAXA) since 2007, the agency has gotten a strong motivation to promote microgravity program to the Asian region. The program was initially opened to Asian students at higher educational level to conduct hands-on experiments in microgravity environment and now it is opened to Asian countries (Malaysia and Thailand) representatives to also experience microgravity environment themselves.

Announcement of opportunity

I have been involved in promoting the parabolic flight program and have been in charged on the program in Malaysia for 5 years since 2007 but never had the experience in microgravity environment before. This was an excellent opportunity for me since I am the first person working with the Malaysia Space Agency of Malaysia (ANGKASA) to receive this offer.

The opportunity and date of flight was tentatively announced during the 5th Asian Kibo Task Force Meeting dated in October 2011. The actual date was later decided and announced by JAXA to be on the 25th and 26th of March 2012. For this Parabolic Flight 2011 campaign, an opportunity was given to Dr. Sawat Thantipawandi and me who respectively represent the National Science and Technology Development Agency of Thailand (NSTDA) and ANGKASA. As a courtesy for seniority, Dr. Sawat was honored

for boarding on the first day flight while myself on the second day. In the meantime, we were advised by JAXA to keep and maintain our good health.



Layout of the aircraft.

Health preparation

It was about 5 months before the day of flight that I tried to take care of my daily nutrition and also do some physical exercises. Because of my working commitment, I did my physical exercises for only one hour a day for two days a week on 2 kilometers jogging. There were some difficulties and challenges in maintaining and balancing my diet due to my habit before. Furthermore, Malaysian foods are mostly containing a lot of fat and high level of carbohydrates.

Medical Report

It was 3 days before my trip to Japan. I went to hospital to do my medical check-up. I was quite suspense to know the report since it was a prior determinant of whether I could be on board or not. I was so lucky that finally the Doctor validated and confirmed my health condition was good and surpassed all conditions required by the Diamond Air Service (DAS). But, I still have to make sure that my health condition to be better since my blood pressure level was at the border line just below the high blood pressure.

Traveling days

On 22nd of March 2012, it was my flight trip to Japan through Narita International Airport before the Chubu Airport Centrair. Together with me was The Malaysian Student Parabolic Flight 2011 Team to perform the microgravity experiment with the title of “Rate of Transfer of Moisture from Bath Towel to Human Skin during 1G and Microgravity Conditions – Hygienic Purposes”. The team was led by Dr. Mohd Harridon from University of Kuala Lumpur; two students of University of Kuala Lumpur, Mr. Zaim Ismail and Mr. Zaim M. Nor. I was appointed as the technical consultant for the team due to my experience in this field since 2007 as the officer in charge of this program in Malaysia.

We took a subway from the Chubu Airport Centrair to Nagoya Station and a bus to go to Nagoya Airport. After 15 hours traveling, finally on next day we reached our destination at DAS office. The team and I were so glad since our arrival was cordially welcomed by DAS. The Thailand Team was also welcomed in which they have arrived one day earlier (on the 22nd of March 2012).



Group photo of Malaysian Team and Ms. Kogure from Japan Space Forum (JSF) who welcomed our arrival at Chubu Airport Centrair and myself.



The Malaysian Student Parabolic Flight 2011 Team – from left to right – Mr. Zaim M. Nor, Dr. Mohd Harridon, Mr. Zaim Ismail and myself.

Experiment preparation days

It was a very tiring day as we continued working on the experiment set up on the same day we arrived at DAS (23rd March 2012). The team and I had only 3 days to prepare for the experiment flight which was scheduled to be on the 26th and 27th March 2012. We were facing several complications in completing the experiment set up. One of them was the water pump failure that was used to maintain the moisture of towels. Water leakage was also detected during the experiment initial set up. The water pump (which was brought from Malaysia) failure was due to the inappropriate applied voltage. Lesson learned was that for every experiment which uses electrical devices must use an appropriate voltage that suits to the voltage supply within the aircraft. The team and I did some shopping to find an appropriate water pump including the sealant and piping materials. We also bought baby diapers – as we know that baby diapers are very good as water absorbent. The diapers were fixed on to the experiment set up as a precautionary step if there will be water leakage again. With high spirit and determination, the team and I had accomplished the set up installation and finally the experiment was ready for boarding. Thank you very much to DAS and JSF for providing transportation, advices and time spent for us. The team was finally ready, and that has given me the time for me to think about preparing myself mentally and physically.



Do it right! The Malaysian Team and me setting up the experiment



Malaysian Team , Mr. Genzo Fukushima (DAS Senior Technical Engineer) and me (at the back) doing 'microgravity dance' in the aircraft.

Flight day 1

26th of March 2012, it was the first flight day for the Parabolic Flight 2011 campaign, one countdown day before my flight day. I felt grateful since Malaysian experiment went well as planned and everything went on in a perfect condition. The flight captain, Mr. Kageyama and co-pilot, Mr. Kitahara had successfully made 13 cycles of parabolic flight. The total time of flight was about 2 ½ hours. Beside DAS, the flight crews on that day are consist of experimenters from Kurume University (KU) of Japan, Mahidol University (MU) of Thailand, University of Kuala Lumpur Malaysia (UniKL) and Dr. Sawat (NSTDA) the agency representative from Thailand. All crews returned safely.

I have also got some useful tips and advice on how to enjoy the microgravity moment and how to prevent nausea during the flight. One of them is to get enough sleep and not to eat too much before boarding. I was also advised not to do a lot of movement during the hyper gravity moment, especially movement of my head in order to avoid nausea.



“You will be the next!!”... Dr. Sawat sharing his experience and tips with me (holding the camera) while watching his video recorded during onboard. Also watching the video was Mr. Shigeki Kamigaichi, Director of KIBO Utilization Office for Asia, JAXA (wearing the grey jacket).

Flight Day 2, the day of my Parabolic Flight boarding

Finally, the time came. 27th of March 2012 was the date for me to be on board to perform parabolic flight and to experience microgravity. With 9 hours sleep and a good rest, I feel fresh and that has made me confident to be on board. I only took a banana and orange juice for my light breakfast.

The weather condition was reported well for us to fly. At about 11:20 a.m. by Gulfstream II Aircraft we left the Nagoya Airport heading towards the Japanese Sea where the location of the parabolic maneuver is going to be done. It took about 25 minutes to reach there. Along the way, there were many panoramic views that could be seen from 26000 feet above the sea level.

The aircraft was flown by Mr. Kitahara as the flight captain while Mr. Kageyama as the co-pilot. Beside DAS (as the flight attendant), the flight crews on that day consist of experimenters from Kurume University (KU) of Japan, Mahidol University (MU) of Thailand, University of Kuala Lumpur of Malaysia (UniKL) and myself.

The flight duration was about 2 ½ hours. 15 cycles of parabolic maneuvers were successfully done during the flight.



Well prepared; me before the flight



All checked! The picture of me together with the GII aircraft before the mission



Fuji Mountain

I was in microgravity!

There was a 30-second call before the aircraft did the parabolic maneuver. That was the time that I felt dull. I started to feel heavy on my shoulders and chest and experienced some difficulties to breathe as usual. I could not even raise my hand or even to move some part of my body. That was the feeling that I experienced during the hyper gravity moment when the aircraft started to ascend about 45⁰ inclinations.

I didn't feel that any longer when the aircraft was suddenly starting to descend about - 35⁰ inclinations. At that time I feel like my body was 'hurled' and then 'floating freely' and felt lighter on my chest and shoulders and easier to take a deep breath. I was in microgravity!! All of these remained for almost 20 seconds before the condition totally recovered as usual. All situations were consecutively and rapidly repeated again and again for at least 12 times during the whole boarding.

Nothing could describe my feeling at that time. It was very awesome! After 3 times of parabolic cycles, I started to get used to and adapt to the conditions. In this golden moment, several activities and demonstrations were successfully recorded and conducted during the microgravity moments which cover the elements of physical demonstrations, national pride and also arts.

I felt very proud to see Malaysian flag floating in microgravity which also reflects Malaysia's freedom and independence. It was also a historic moment when ANGKASA's flag was floating for the first time in microgravity condition. I was also glad to use this opportunity to float JAXA-KIBO flag during the microgravity moment as a special appreciation and honor to the only participating country from Asia in the International Space Station (ISS) program.



Malaysia, ANGKASA and JAXA-KIBO respectively flag was floating in microgravity

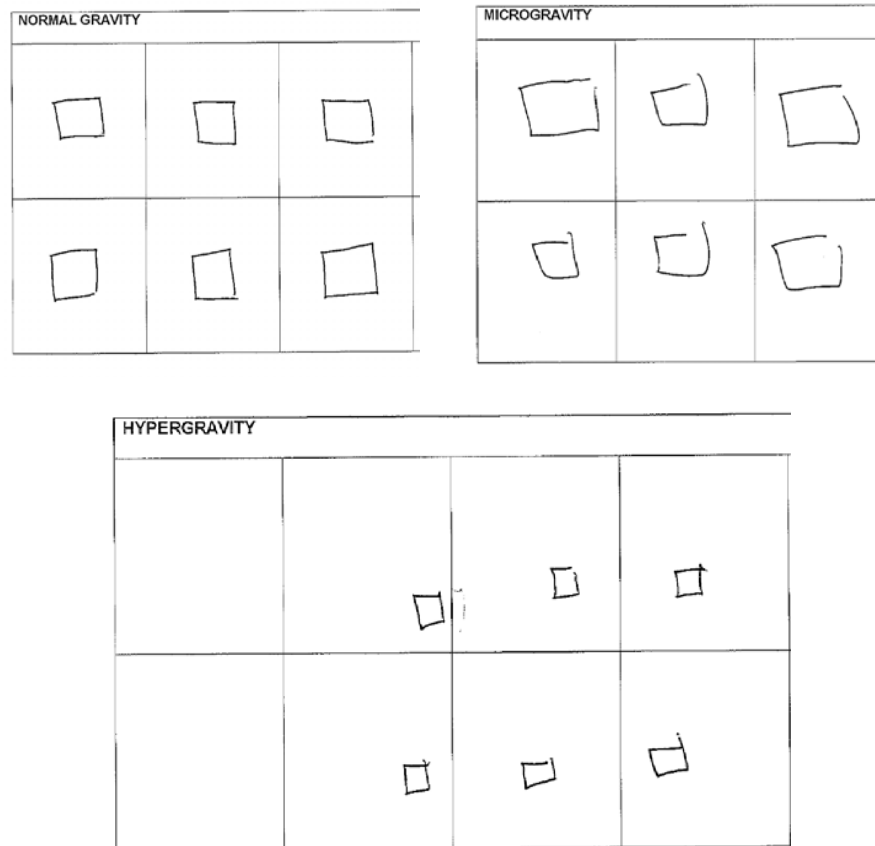
I was also feeling grateful when I got the green light from DAS to unfasten my seat belt during the microgravity conditions. That made me really floating and I could feel my body was totally light but still constrained within a narrow space and relatively short period of time before gravity returned to normal condition. I also felt a little bit confused between upside and down but the passengers' seats acted as my great useful reference.



*What a very wonderful moment;
the photos of me floating during
the microgravity. Look at the G
meter – the reading showed the
gravity was approaching almost to
zero*

I did some gravity arts!!

Just to add value to this golden experience I created some kind of gravity arts at the 7th parabolic flight cycle, I drew some rectangular shapes during my hyper gravity, microgravity and normal gravity moments during the flight. As I was gaining weight twice of my actual weight during hyper gravity (when the G meter showed the gravity was approaching to 1.88G), I couldn't do writing properly and the rectangular shapes look smaller compared to the rectangular shapes that I drew during the micro and normal gravity moments. My ball pen was still working properly even it had gone through the extreme gravity condition.



My gravity arts during the hyper, micro and normal gravity performed during the flight

The end of my parabolic flight boarding

The flight duration was about 2 ½ hours. 15 cycles of parabolic maneuvers were successfully done during the flight. My clock showed it was at 1355 JST, 10 minutes after the G-II aircraft touched the Nagoya Airport runway with a very smooth landing. It was also a sign that the Asian Student's Parabolic Flight 2011 campaign was successfully accomplished. All experiments went well. Grateful to God that all crews returned safely. When the main passenger's door was opened, I saw the rest were waiting for us. Just like an astronaut returned to the Earth, I proudly walked down the stairs of the aircraft with my blue flight suit.



Mission accomplished! From the left to right – Mr. Zaim Ismail, Dr. Mohd Harridon, Mr. Kitahara (the captain), Mr. Kageyama (the co-pilot), me and Mr. Zaim M.Nor,



Sharing the very fantastic experience during the post flight meeting

Closing Ceremony

The day of my parabolic flight was the same day of the Asian Student's Parabolic Flight 2011 official closing. I felt honored and proud when received the certificate of participation from DAS. The certificate was a proof that I was one of the lucky persons who had experience the microgravity condition by a parabolic flight. The certificate was presented by Mr. Kitahara, the captain of the flight mission. Even though they were tired but they were still happy and satisfied with their experimental data obtained from the mission and that could be witnessed from their faces. As usual, my next responsibility was

to make sure that the Malaysian team will provide the outcome report of the experiment as the result of the mission to JAXA and my 'parents' of ANGKASA.



It was proudly proven! My DAS Microgravity Certificate of award .



The Photo of me together with Malaysian and Thailand Team after the closing ceremony and last meeting for PF2011 mission

New responsibility

29th March 2012 was my trip back to Malaysia. I came back with a new spirit, confidence and sense of responsibility. With my microgravity experience, I got to strive harder to assist my agency to carry out its obligations in creating awareness on the general space science and microgravity sciences to the public in my country.



Microgravity and Parabolic Flight Public awareness programme

For the year of 2012, ANGKASA is planning to organise education and outreach activities. A series of lectures will be held by inviting external experts to explain clearly about the microgravity sciences, its benefits and methods used during the implementation of experiments during parabolic flight including the KIBO utilities and sharing personal experiences during the microgravity parabolic flight. Under the cooperation with KUOA, two JAXA's and ANGKASA's experts were planned to give talks during the 5-day outreach activity which will cover 5 zones throughout Malaysia. Young researchers, scientists, lecturers and university students will be identified as the target group.

Appreciation

Not a single part of the whole journey from Kuala Lumpur to Nagoya will be coming true unless with the full support and special care and attention from all parties involved. It is our pleasure to sincerely thanks and our heartiest appreciation to JAXA for their invaluable opportunity given to the National Space Agency of Malaysia. Nevertheless, our special appreciation also to DAS and JSF for their full support and guidance.

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Sosiopolitan

Penerbangan parabolik

uji kelembapan tubuh

NOOR AINULYAKIN MOHAMAD ISHAK
noor.ainulyakin@sinarharian.com.my

Bagaimanakah perasaan anda apabila berada di udara tanpa tarikan graviti begaikan burung terbang bebas di awang-awangan. Namun pengalaman tersebut bukanlah mudah untuk diperolehi dengan jika tiada latihan secara profesional. Namun impian anda mungkin boleh jadi kenyataan dengan menyertai penerbangan parabolik yang sebagaimana dilalui angkasawan ketika di angkasa.

Penerbangan parabolik ini berlaku apabila pesawat melakukan beberapa aksi merengkan dan hasil daripada aksi tersebut orang yang berada dalam pesawat akan mengalami keadaan hiper dan mikro graviti. Itulah yang dilalui Pasukan Parabolik Universiti Kuala Lumpur (UniKL) yang membuat penerbangan parabolik di ruang udara Nagoya, Jepun baru-baru ini untuk menyayakan Misi Penerbangan Parabolik universiti berkenaan.

Ketua pasukan, Dr Mohd Haridon

Mohamed Suffian berkata, keadaan mikro graviti membolehkan orang dalam pesawat terbang seperti burung di dalam pesawat sama keadaan yang dialami angkasawan di Stesen Angkasa Antarabangsa (ISS).

Menurutnya, pasukan ini melakukan penerbangan berkenaan bukanlah hanya untuk merasa keadaan apabila tiada tarikan graviti, tetapi lebih kepada kajian untuk menguji salah satu tindak balas tubuh badan apabila berada pada situasi penerbangan bebas graviti.

"Pasukan parabolik kami melakukan beberapa eksperimen sains ketika keadaan hiper dan mikro graviti di mana tujuan eksperimen tersebut adalah untuk mengukur kadar cerapan air pada kulit manusia.

"Eksperimen ini dapat membantu angkasawan dalam proses pembersihan diri di angkasa yang akan sehari-hari menjalankan eksperimen di angkasa," katanya kepada Penulis.

Pengalaman berharga

Mohd Haridon yang juga pembantu jurutera dalam misi tersebut berkata, pesawat yang digunakan adalah dimiliki Agensi Angkasa Jepun (JAXA) dan jet tersebut telah diubah suai.

"Dalam misi ini, pasukan parabolik UniKL juga dianggotai dua penuntut, Zaim Ismail dan Zaim M Nor yang kedua-duanya bertindak sebagai penyelidik.

"Manakala Helmy Hashim

dari Agensi Angkasa Negara Malaysia (Angkasa) bertindak sebagai konsultan untuk pasukan. Ini memandangkan pengalamannya sebagai pakar bahan aerospace dan veteran dalam eksperimen mikrograviti," jelasnya yang serti misi pertama mereka menjalankan kajian penerbangan parabolik.

Sementara Zaim Ismail berkata, pada penerbangan tersebut, mereka berjaya mengumpul beberapa bahan bacaan menarik berkaitan eksperimen dijalankan berkaitan tindak balas tubuh manusia di dalam keadaan hiper dan mikro graviti.

Menurutnya, jika normal, bacaan kelembapan tubuh manusia merupakan 1 mililiter per saat, selepas eksperimen ini mereka mencatatkan bacaan kurang 1 mililiter per saat.

"Dengan bacaan tersebut, kami dapat buat beberapa kesimpulan mengenai kadar cerapan yang boleh digunakan angkasawan.

"Bukan mudah untuk mendapat bacaan tersebut pada keadaan pesawat terumbang ambing. Tetapi kami berjaya juga. Dan untuk merasa keadaan mikro graviti adalah hebat sekali," kata pelajar tahun akhir universiti itu.

Zaim M Nor pula berkata, penglibatannya dalam program tersebut adalah satu pengalaman hebat yang tidak dilalui semua orang dan berbangga dapat melaksanakan eksperimen berkenaan dengan jayanya.

Menurutnya, semua orang memainkan peranan di dalam pasukan dan jumlanya berjaya melaksanakan peranan masing-masing.

"Saya berasa bangga mewakili Malaysia dan UniKL kerana dapat menempuh segala cabaran untuk mendapatkan bacaan eksperimen.

"Saya berterima kasih kepada UniKL atas peluang ini dan saya belajar banyak perkara

ketika misi ini dilakukan. Merasakan diri terbang adalah pengalaman yang hebat," ujarnya.

Kerja berpasukan

Mohd Haridon berbangga dengan pencapaian pasukan tersebut yang telah berjaya di dalam misi kajian dan ia membuktikan yang kerjasama berpasukan merupakan kunci segala kejayaan.

"Pencapaian ini membuktikan UniKL telah berjaya mendidik pelajarannya. Memang menakutkan mengalami keadaan mikrograviti kolaborasi di antara UniKL, Angkasa, dan JAXA dalam membangunkan sains aeroangkasa di negara ini.

"Saya berterima kasih kepada pihak UniKL, Angkasa, dan JAXA yang membantu bagi menjayakan misi tersebut," katanya.

Tambahnya, kajian yang dilakukan mereka juga adalah pertama kali dilakukan untuk kemudahan angkasawan ketika membersihkan diri di angkasa.

"Bukan mudah mendapatkan persetujuan pihak JAXA di Jepun untuk membuat penerbangan parabolik jika kajian yang mahu dijalankan tidak memberi sebarang faedah kepada angkasawan.

"Setelah diyakinkan dan eksperimen ini pertama kali mahu dijalankan, barulah mereka meluluskan penerbangan pasukan kami dan bacaan diperolehi melebihi apa yang diinginkan," ujarnya.

Mohd Haridon berkata, mungkin misi ini bukan yang terakhir mereka lakukan dan akan ada misi susulan untuk membuat kajian lebih terperinci mengenai tindak balas kelembapan tubuh manusia ketika di angkasa.

"Saya bercadang mungkin akhir tahun ini atau awal tahun hadapan, kami sekali lagi akan menjalankan penerbangan parabolik untuk kajian lebih terperinci mengenai eksperimen ini dengan pasukan berbeza," katanya.

Hasil ujian akan memudahkan angkasawan dalam proses pembersihan diri di angkasa

Zaim M Nor meneliti bacaan eksperimen ketika penerbangan parabolik.

Ekperimen mikrograviti UniKL.

Mohd Haridon gembira dengan kejayaan misi mereka.

Pasukan Parabolik UniKL dianggotai (dari kiri) Zaim M Nor (penyelidik), Mohd Haridon (pembantu jurutera), Zaim Ismail (penyelidik) dan Helmy Hashim (konsultan/penyelidik).

UNDERGRADUATE FOCUS **ENGINEERING**



Varsity's parabolic flight mission

THE Parabolic Team of Universiti Kuala Lumpur (UNKL) carried out parabolic flights recently over Nagoya, Japan. Parabolic flights are flights that simulate zero-gravity by flying more than nine kilometres, then dropping about two kilometres to achieve weightlessness for 25 seconds for every parabola. A parabolic flight usually flies between 40 and 60 parabolic manoeuvres.

panied by Helmy Hashim, an expert in material science and also a veteran of microgravity Experiment from the National Space Agency of Malaysia (ANGKASA) who acted as the team consultant.

"Performing some tasks in zero-gravity conditions were not easy but we collected vast amounts of data during hyper and microgravity conditions. We even did acrobatic moves during microgravity. Fully floating in the air is quite an experience," Zaim said.

Zaim is proud to represent UniKL and Malaysia as he and the team overcame difficulties during these flights to collect important data.

"The UniKL team had a successful mission during these flights to collect important data. Collecting data and this shows that team work will lead to success," said Dr Mohd Harridon.

The UniKL team endured hyper and micro-gravity conditions due to the extreme flight maneuvers of a modified Japanese Space Agency (JAXA) jet to collect data of the rate of transfer of moisture to the human skin.

The team was led by Dr Mohd Harridon, and consisted of two UnikL students: Zaim Ismail and Zaim M. Nor. The team was also accom-

and Zaim M. Nor. The team was also accom-

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