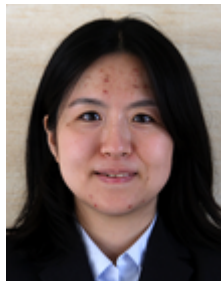


## Office for Planning and Management



Junya Terazono  
Associate Professor



Kyoko Okudaira  
Associate Professor



Tsutomu Hashida  
Associate Professor



Yasuhiro Abe  
Associate Professor

Office for Planning and Management (OPM), headed by the University President, was established at the start of the University of Aizu as an internal research organization to carry out implementing the following assignments of the University:

- General investigative research concerning university functions
- Performing general program planning and design regarding university education and research
- International exchange
- Public relations and publications
- Legal affairs
- Local arrangement of international conference
- Other necessary matters concerning administrative management

As the University develops, the expectations for the OPM have been changing from time to time. After the corporatization, in 2008, dealing with the matters of special mission given by the regents of the University was added to its functions. However, collaborating with other organizations of the University for the advancement of its education and research always remain the most important mission of the OPM.

## Centers

For education and coalition with high schools and junior high schools as well as local community, the OPM is planning and arranging “Science Cafe”, a scientific talk session with small number of general citizens (20 to 30 persons in most cases). Additionally, collaboration with several high schools, especially ones which have SSH (Super Science High School) course, has been carried out. These activities can be good opportunities for the University to increase the name recognition.

Kazuaki Yamauchi is assigned to serve as Director-General of Department for Student Affairs. His main work is to recruit prospective students by visiting high schools all over Japan and attending career counseling meetings for high school students held in major cities in Japan. In addition, he visits various IT related companies in Tokyo metropolitan area to solicit jobs for graduating students and also invite those companies to the campus for their recruitment. He is responsible for management of entrance examinations and admissions of the university. His current research theme is “Research on admission methods to secure the superior new students in accordance with university admission policy”.

Tsutomu Hashida is mostly engaged in research of higher education policy including MEXT-funded projects and other tasks such as university evaluation and relations to the Japanese association of public universities (Kodaikyo). He gave a series of lectures on basic Japanese writing, too. He resigned at the end of August, 2014.

The main work of Kyoko Okudaira, concurrent assignment with CAIST, was personnel matters of fresh hiring and education collaboration with high schools and junior high schools. She was also involved in JSPS research application.

Junya Terazono, concurrent assignment with CAIST, worked for creating Annual Review and education linkage with high schools with Ms. Okudaira, and public affairs of the University using internet media such as Twitter and the website. Also he engaged CAIST-related business work from end of January 2015.

Yasuhiro Abe supports faculty and students to apply for external grants, especially international collaboration and research fellowship programs of the Japan Society for the Promotion of Science.

All members of OPM worked collaboratively and proactively for the realization of better University research and education.

## Refereed Journal Papers

[okudaira-01:2014] Eric Tonui, Mike Zolensky, Takahiro Hiroi, Tomoki Nakamura, Michael E. Lipschutz, Ming-Sheng Wang, and Kyoko Okudaira. Petrographic, chemical and spectroscopic evidence for thermal metamorphism in carbonaceous chondrites I: CI and CM chondrites. *Geochimica et Cosmochimica Acta*, (126):284–306, 2014.

We present a comprehensive description of petrologic, chemical and spectroscopic features of thermally metamorphosed CI-like and CM (and CM-like) chondrites. Only two such CI chondrites have so far been discovered i.e. Y-86029 and Y-82162. Thermal metamorphism in these chondrites is apparent in their low contents of H<sub>2</sub>O, C and the most thermally labile trace elements, partial dehydration of matrix phyllosilicates and abundance of thermally decomposed CaMgFeMn carbonates, which apparently resulted from heating of MgFe carbonate precursors. The CM chondrites exhibit a wide range of aqueous and thermal alteration characteristics. This alteration was almost complete in Y-86720 and Y-86789, which also escaped alternating episodes of oxidation and sulfidization experienced by the others. Thermal metamorphism in the CM chondrites is apparent in loss of thermally labile trace elements and also in partial to almost complete dehydration of matrix phyllosilicates: heating was less uniform in them than in CI chondrites. This dehydration is also evident in strength and shapes of integrated intensities of the 3  $\mu$  m bands except in PCA 91008, which experienced extensive terrestrial weathering. Tochilinite is absent in all but Y-793321 probably due to heating. Textural evidence for thermal metamorphism is conspicuous in blurring or integration/fusion of chondrules with matrix in the more extensively heated (600 ° C) CM chondrites like PCA 91008 and B-7904. TEM and XRD analyses reveal that phyllosilicate transformation to anhydrous phases proceeds via poorly crystalline, highly desiccated and disordered ‘intermediate’ phases in the least and moderately heated (400-600 ° C) carbonaceous chondrites like WIS 91600, PCA 91008 and Y-86029. These findings are significant in that they confirm that these phases occur in meteorites as well as terrestrial samples. Thermal alteration in these meteorites can be used to identify other carbonaceous chondrites that were thermally metamorphosed in their parent bodies. Combining RNAA trace element data for experimentally heated Murchison CM2 samples with petrographic and spectroscopic data, these thermally metamorphosed carbonaceous chondrites can be ordered by severity of open system heating as 400 ° C Y-793321 ; WIS91600 = EET90043 = A881655 ; PCA91008 ; B-7904 = Y-86029 ; Y-82162 ; Y-86720

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= Y-86789 700 ° C. Nearly all heated carbonaceous chondrites discovered so far have been found in Antarctica, which is known to have sampled the flux of near-Earth material for much longer than exemplified by current falls.

[okudaira-02:2014] Yuko Kawaguchi, Tomohiro Sugino, Makoto Tabata, Kyoko Okudaira, Eichi Imai, Hajime Yano, Sunao Hasegawa, Hirofumi Hashimoto, Hikaru Yabuta, Kensei Kobayashi, Hideyuki Kawai, Hajime Mita, Shin-ichi Yokobori, and Akihiko Yamagishi. Fluorescence imaging of microbe-containing particles shot from a two-stage Light-gas gun into an aerogel. *Origins of Life and Evolution of Biospheres*, 44:43–60, 2014.

We have proposed an experiment (the Tanpopo mission) to capture microbes on the Japan Experimental Module of the International Space Station. An ultra low-density silica aerogel will be exposed to space for more than 1 year. After retrieving the aerogel, particle tracks and particles found in it will be visualized by fluorescence microscopy after staining it with a DNA-specific fluorescence dye. In preparation for this study, we simulated particle trapping in an aerogel so that methods could be developed to visualize the particles and their tracks. During the Tanpopo mission, particles that have an orbital velocity of 8 km/s are expected to collide with the aerogel. To simulate these collisions, we shot *Deinococcus radiodurans*-containing Lucentite particles into the aerogel from a two-stage light-gas gun (acceleration 4.2 km/s). The shapes of the captured particles, and their tracks and entrance holes were recorded with a microscope/camera system for further analysis. The size distribution of the captured particles was smaller than the original distribution, suggesting that the particles had fragmented. We were able to distinguish between microbial DNA and inorganic compounds after staining the aerogel with the DNA-specific fluorescence dye SYBR green I as the fluorescence of the stained DNA and the autofluorescence of the inorganic particles decay at different rates. The developed methods are suitable to determine if microbes exist at the International Space Station altitude.

[terazono-01:2014] Terazono J., Sakamoto S., Yoshikawa M., Wakabayashi N., Watanabe J., and The Moon Station staff group. Outreach in Lunar and Planetary exploration in the Internet - 16 years experience in The Moon Station. *Journal of The Japanese Society for Planetary Sciences*, 23(4):337–346, 2014.

Lunar and Planetary exploration uses huge amount of tax and this fact shows that the result must be resolved to the citizens. In this viewpoint, we established a website called “The Moon Station” in 1998, with primary purpose

of promotion of Japanese lunar exploration program “SELENE” (later named “Kaguya”). After 16 years since the foundation, the website still effuses vast amount of lunar and planetary exploration information, both domestic and overseas. During this period, we experienced “Apollo Hoax” problem and inclusion of planetary exploration in contents, and independence of management from JAXA. This paper describes the history of the website from the birth to current prosperity, and denotes knowledge and lessons obtained through management and enforcement of the web contents. Also, the paper describes the remaining tasks and future direction of the website and outreach in lunar and planetary exploration domain. Paper in Japanese.

### Refereed Proceeding Papers

[okudaira-03:2014] H. Yano, A. Yamagishi, H. Hashimoto, S. Yokobori, K. Kobayashi, H. Yabuta, H. Mita, M. Tabata, H. Kawai, M. Higashide, K. Okudaira, S. Sasaki, E. Imai, Y. Kawaguchi, Y. Uchibori, S. Kodaira, and The Tanpopo Project Team. Tanpopo Experiment for Astrobiology Exposure and Micrometeoroid Capture onboard the International Space Station JEM-Exposed Facility. In *Proceedings of 45th Lunar and Planetary Science Conference*, page 2934.pdf, 2014.

The Tanpopo astrobiology experiment will conduct microbe and bio-organics exposure and organic-bearing micrometeoroid capture on ISS for three years from 2014 to 2015.

[terazono-02:2014] Terazono J., Nakamura R., Kodama S., Yamamoto N., Demura H., Hirata N., and Ogawa Y. Recent Advancement of System Development of WISE-CAPS: A WebGIS-Based Lunar and Planetary Data Collaboration System. In *The 46th Lunar and Planetary Science Conference*, page 1725, The Woodlands, Texas, United States, March 2015.

WISE-CAPS (Web-based Integrated Secure Environment for Collaborative Environment in Planetary Science) is a Web-GIS based environment for collaboration and communication promoting lunar (and planetary) science and analysis of exploration data, developed by the members and located in The University of Aizu. Since the start of development in 2008, the system evolved merging several unique and essential functions required for analysis of lunar exploration data and communication between researchers. The thought underlying this system is “researcher-centric”, “web-centric” and “all-in-one”. We show here the

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recent implementations of new functions for WISE-CAPS: advanced data registration system through the web browser, multi-layer controlling window and voice and video chat system integrated with GIS.

[terazono-03:2014] Ito S., Tan H., Patricia R. C., Bhalla S., Vazhenin A. P., and Terazono J. Digital Data Refinement for the Area of Crater on the Moon. In *The 46th Lunar and Planetary Science Conference*, page 2052, The Woodlands, Texas, United States, March 2015.

Importance of determining topographic boundary from image data obtained by lunar and planetary data is increasing due to rapidly increase of resolution of imagers. In past days, the boundary of topographic features can be easily determined by human (visual) decision. However, we have extremely precise data, 50 cm in maximum, and it makes difficult to determine simple boundary of topographic features. In this paper, we provide possibility that we can recognize the boundary of crater by image processing technology without human subject and prejudice. The preliminary application of our original algorithm is applied to Tycho Crater on the Moon, using image and altitude data obtained by Kaguya, Japanese lunar explorer. The result is that crater boundary has very complex shape, rather than circular one that most of us has been thought. This algorithm can be applied for determination of lunar topography boundary in other cases such as Mare (Sea), Mons (Mountains) and Craters.

## Unrefereed Papers

[terazono-04:2014] Ogawa Y., Hayashi Y., Hirata N., Terazono J., Demura H., Matsunaga T., Yamamoto S., Yokota Y., Ohtake M., and Otake H. Toward more user acquisition of Web-GIS system “Gekko”, browsing and displaying system of Kaguya Spectral Profiler data. In *Autumn Assembly of The Japanese Society of Planetary Science*. JSPS (The Japanese Society of Planetary Sciences), September 2014.

[terazono-05:2014] Terazono J. Relation between recent astronomical events and interests in the Internet: the newest direction of users’ interest revealed by access analysis of The Moon Station, the website. In *Tohoku Branch Meeting, Japanese Society for Education and Popularization of Astronomy*. Japanese Society for Education and Popularization of Astronomy, October 2014.

This paper describes detailed access analysis of the website access log (The Moon Station, Japan's most popular website on lunar and planetary exploration) and users' tendency of interest from astronomical event such as autumn moon viewing and total lunar eclipse.

[terazono-06:2014] Terazono J. and Ohnuki M. The recent situation of international movement of asteroids mining. In *The 58th Joint Conference of Space Science and Technology*, Nagasaki, Nagasaki, November 2014. The Japan Society for Aeronautical and Space Sciences.

This paper describes research of the most recent international movement of asteroid mining particularly in US, both governmental and private entities.

[terazono-07:2014] Hayashi Y., Yamamoto Y., Ogawa Y., Hirata N., Demura H., and Terazono J. An proposal of data provision environment with object-oriented data handling. In *Space Data Analysis Symposium*, Sagamihara, Kanagawa, February 2015. ISAS/JAXA.

[terazono-08:2014] Saito J. and Terazono J. An approach for asteroid prospect exploration. In *The 58th Joint Conference of Space Science and Technology*, Nagasaki, Nagasaki, November 2014. The Japan Society for Aeronautical and Space Sciences.

This paper shows importance of investigation of space mining from the viepoint of terrestrial resource survey and expected deficit of resources.

## Books

[terazono-09:2014] Terazono J. *Introduction of Planetary Exploration*. Asahi Shimbun Publication, Tokyo, Japan, 2014.

## Academic Activities

[terazono-10:2014] J. Terazono, April 2014.

Vice Chairperson, Program Editor, Education and Outreach session, International Symposium on Space Technology and Science

[terazono-11:2014] J. Terazono, April 2014.

Program Committee, International Symposium on Space Technology and Science

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[terazono-12:2014] J. Terazono, April 2014.

Committee member of the Space Utilization Committee, JSASS (the 47th period)

[terazono-13:2014] J. Terazono, October 2014.

Steering Committee (Tohoku Branch)

[terazono-14:2014] J. Terazono, October 2014.

Chairperson of Tohoku Branch committee

## Ph.D and Others Theses

[okudaira-04:2014] Taku Odashima. Graduation Thesis: A viewer for microscopic images with multi-resolution for Tanpopo mission on the International Space Station, University of Aizu, 2014.

Thesis Advisor: H. Demura and K. Okudaira

[terazono-15:2014] Yusuke Owada. Implementation of Database-based Mail Management System for Mail User Agent, University of Aizu, 2015.

Thesis Advisor: J. Terazono

[terazono-16:2014] Takahito Kuriyama. Multimedia Communication and Discussion System Integrated with Lunar and Planetary GIS, University of Aizu, 2015.

Thesis Advisor: J. Terazono

[terazono-17:2014] Shota Watanabe. Development of Image Data Registration System for Lunar and Planetary GIS, University of Aizu, 2015.

Thesis Advisor: J. Terazono

[terazono-18:2014] Susumu Ito. Master Thesis (Software Development Area), University of Aizu, 2015.

Thesis Advisor: S. Bhalla and A. Vazhenin with support of J. Terazono

[terazono-19:2014] Hayano Tan. Master Thesis (Software Development Area), University of Aizu, 2015.

Thesis Advisor: S. Bhalla and A. Vazhenin with support of J. Terazono



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[terazono-20:2014] Niho Saito. Development of Modern User Interface for Lunar and Planetary GIS, University of Aizu, 2015.

Thesis Advisor: J. Terazono