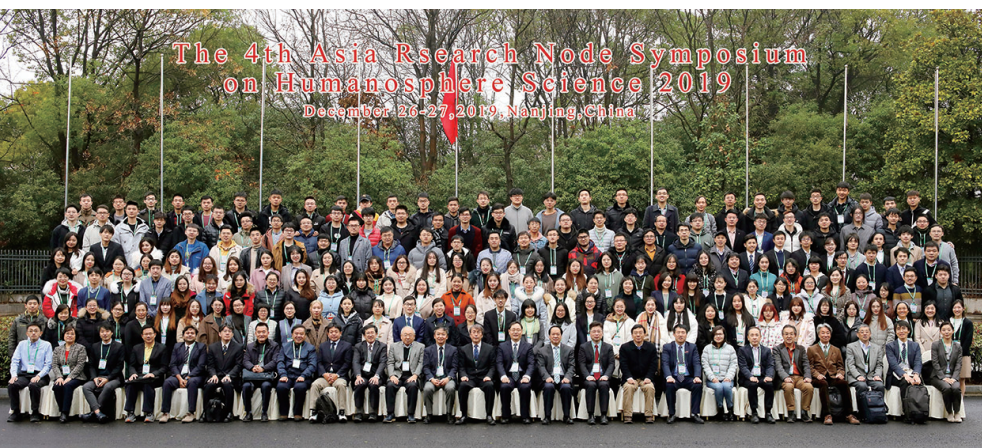# 生存圏アジアリサーチノード活動報告

Humanosphere Asia Research Node Activity Report

ARN / HSS / ISSH 2019

生存圏アジアリサーチノード
Humanosphere Asia Research Node

Table of contents

1. Preface

Director of RISH
Takashi Watanabe

The environment surrounding humans is changing rapidly with complicated interlinkages, threatening sustainable development and healthy living. There has been an increasing demand for reliable future projections based on an accurate understanding of current conditions of Humanosphere, and for the presentation of measures for solving the problems. To establish the Sustainable Humanosphere, international collaboration and expansion of Humamosphere Science on a global scale is essential.

In 2016, RISH launched a new program called the Humanosphere Asia Research Node (ARN) to strengthen its function as a hub for international collaborative research and foster innovation in the field of humanosphere science, with the ultimate goal of delivering solutions to global-scale problems. ARN's activities in the past include the following: 1) an ARN joint laboratory was founded in Indonesian Institute of Sciences (LIPI) jointly with Japan-ASEAN Science, Technology and Innovation Platform (JASTIP) project; 2) the 1st ARN Symposium on Humanosphere Science was held in Penang, Malaysia in collaboration with Universiti Sains Malaysia (USM); 3) the 2nd ARN Symposium on Humanosphere Science was held in Uji, Japan; 4) the 3rd ARN Symposium on Humanosphere Science was held in Taichung, Taiwan in collaboration with National Chung Hsing University (NCHU); 5) a number of RISH Open Seminars were delivered and broadcasted live to selected foreign research organizations via web conferencing service; 6) a server mirroring system of "Humanosphere Science Database" was installed in Indonesia; 7) and a lecture and practical training course on atmospheric science were offered. ARN also served as a co-organizer for the International Workshop on Bioresources and Biodiversity at Uji, Kyoto (with the JASTIP), and "Humanosphere Science School 2016/2017/2018" in Indonesia.

In December 26-27, 2019, RISH and Nanjing Forestry University (NFU) jointly held the 4th Asia Research Node Symposium on Humanosphere Science at Nanjing International Conference Hotel in China. ARN supported 16 and 5 master/Ph.D. course students to join the symposium from RISH and other Japanese institutes, respectively. Researchers from Thailand and Korea were invited in addition to the participants from Japan and China. A total of 237 participants, including 151 students, attended the symposium. In October 28-29, 2019, RISH and LIPI jointly held the Humanosphere Science School (HSS) together with the satellite meetings, the International Symposium for Sustainable Humanosphere (ISSH), at Bogor, Indonesia. Through all these ARN's activities, RISH pursues the integration of different research disciplines, and seeks to promote the internationalization of humanosphere science.

This booklet is a report of ARN, HSS, and ISSH meetings at China/Indonesia in 2019. Research abstracts of the 4th ARN symposium and impression by the graduate students are included. We will continue to actively expand on educational and research activities in collaboration with the Humanosphere Science community with an effort to scientifically demonstrate the landmarks in mankind's path toward the construction of a sustainable Humanosphere. We look forward to your valuable assistance, support and participation.

Director of RISH, Kyoto University
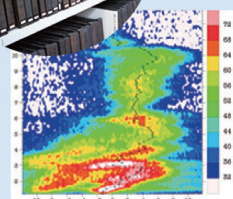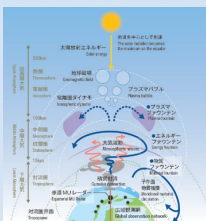**Takashi Watanabe**
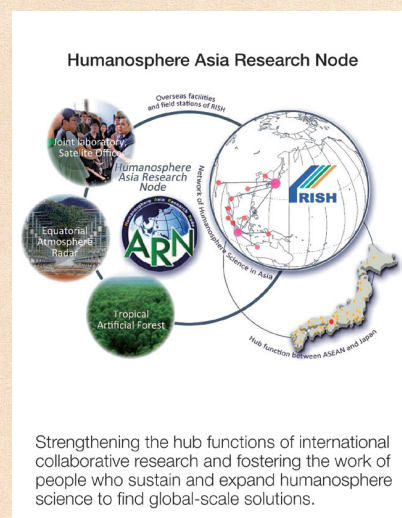
Humanosphere Asia Research Node

The 3rd JASTIP Bioresources and Biodiversity Workshop "Synergy of ASEAN Countries and Japan for Sustainable Development"

The 2nd Humanosphere Asia Research Node Workshop toward Sustainable Utilization of Tropical Bioresources

Salak Tower, Bogor - Indonesia
3rd November, 2017

Cooperative Study of the "Equatorial Fountain"

Cooperative Research on the Sustainable Production and Utilization of Tropical Biomass in Relation to Environmental Conservation

International Cooperative Studies Using the Database for Humanosphere Science

Research Institute for Sustainable Humanosphere (RISH), Kyoto University

In 2016, RISH initiated a new program named "Humanosphere Asia Research Node (ARN)", thereby strengthening the hub functions of international collaborative research and fostering innovation in Humanosphere Science with the ultimate goal of delivering solutions on a global scale. ARN's achievements included the following: 1) an ARN joint laboratory at the Indonesian Institute of Sciences (LIPI) was founded jointly with the Japan-ASEAN Science, Technology and Innovation Platform (JASTIP) project; 2) a number of RISH Open Seminars were delivered and broadcast live via web conferencing to selected foreign research organizations; 3) a server mirroring system for the "Humanosphere Science Database" was installed in Indonesia; 4) and a lecture and practical training course on atmospheric science was offered. ARN also served as a co-organizer for the International Workshop on Bioresources and Biodiversity in Uji, Kyoto (with the JASTIP), and the "Humanosphere Science School" in Indonesia. ARN held the 1st Asia Research Node Symposium on Humanosphere Science in Penang, Malaysia in February 2017, and the 2nd Symposium in Uji, Kyoto in July 2017, at which more than 30 speakers from Japan and all over the world were invited. With these ARN activities, RISH is in a perfect position to pursue the integration of different research disciplines and to promote the internationalization of Humanosphere Science.

Humanosphere Asia Research Node

Strengthening the hub functions of international collaborative research and fostering the work of people who sustain and expand humanosphere science to find global-scale solutions.

ARN & JASTIP Joint Laboratory

ARN serves as a network hub that connects research between ASEAN and Japan through joint laboratories in Indonesia and also provides an opportunity for various research institutes in Japan to access ARN's overseas facilities. In addition, ARN highly encourages overseas researchers to conduct collaborative research using domestic facilities under the joint usage platform it promotes.

Capacity Building

ARN supports the career development of young researchers and engineers by offering opportunities for collaborative research and involvement in international schools in Indonesia and other Asian countries. With ARN's support, these young scientists can grow into future leaders in various fields of Humanosphere Science.

Practical training on atmospheric science in Indonesia

The 1st ARN Symposium on Humanosphere Science (February 20-21, 2017/Penang, Malaysia)

The 2nd ARN Symposium on Humanosphere Science (July 19-21, 2017/Uji, Kyoto)

Humanosphere Science School 2017, The 7th International Symposium for Sustainable Humanosphere (November 1-2, 2017/Bogor, Indonesia)

3. 4th ARN Symposium

(The 407th Symposium on Sustainable Humanosphere)
The 4th Asia Research Node Symposium on Humanosphere Science
December 26-27, 2019
Nanjing International Conference Hotel, China

Greetings

Junji Sugiyama, RISH Chair
Changtong Mei, NFU Chair

The Humanosphere Asia Research Node (ARN) aims to strengthen its function as a hub for international collaborative research and foster innovation in the field of humanosphere science, with the ultimate goal of delivering solutions to global-scale problems. ARN integrates our various facilities and human networks in ASEAN region and Japan for consolidating the international collaborative research on "Sustainable Humanosphere". The 4th ARN symposium was realized by organization with Nanjing Forestry University (NFU) and RISH, longtime cooperative partner institutions since 1996. The symposium aimed to share the concept and recent advances of Humanosphere Science, thereby fostering students and young researchers who will sustain and expand the new science. The symposium featured 35 oral and 153 poster presentations. It covered scientific and technological advances principally in the fields of agricultural life science, wood and timber science and engineering, and radio atmospheric science and engineering together with other related sciences contributing to creating "Sustainable Humanosphere".

At the opening ceremony of the symposium, Prof. Takashi Watanabe, Director of RISH and Prof. Hao Wang, President of NFU, gave the opening addresses. After that, an elevator speech, in which poster summaries were orally presented within one minute, was conducted. Sessions were divided into four topics: Bio-Diversity; A new horizon of humanosphere science and humanity; Research of space electromagnetic environments in Asia; Cellulose Nanofibers Materials. At a banquet at the hotel, all participants enjoyed a delicious Chinese meal.

On the second day, we began with the poster session in which many students and young researchers discussed their research results. The second day of the symposium consisted of four sessions: Wood Information: climatology and Tree ring science; Bioenergy and biochemicals; Space weather in Asia; Timber architectures. In the closing ceremony, best poster awards were presented to 15 persons. The closing address was given by Prof. Changtong Mei, Dean of College of Materials Science and Engineering, NFU. Then, we visited City Wall of Ming Dynasty and Confucius Temple as an excursion, during which friendships among participants deepened.

A total of 237 participants, including 151 students, attended the symposium, which was deemed a great success. With sincere gratitude to all participants and organizers, we sincerely hope that our work can further our understanding of the differences and difficulties in the world, and accelerate the formation of a Sustainable Humanosphere.

4th ARN Symposium Organizing Committee
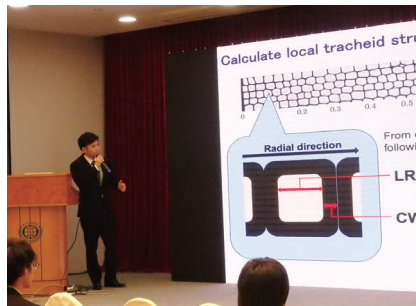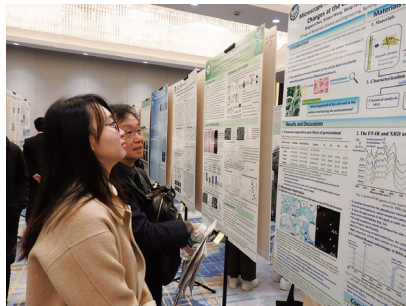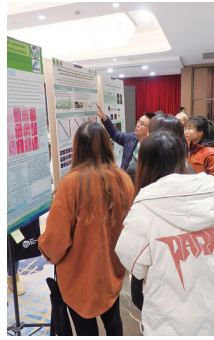
4. HSS 2019/9th ISSH

(The 409th Symposium on Sustainable Humanosphere)
Humanosphere Science School 2019
The 9th International Symposium for Sustainable Humanosphere
October 28-29, 2019
Grand Savero Hotel, Bogor, Indonesia

Indonesian Institute of Sciences (LIPI) and RISH jointly held the Humanosphere Science School 2019 (HSS 2019). HSS 2019 provides learning experience by sharing knowledge, science, and technology delivered by experts specializing in subjects related topics. HSS 2019 also held a forum for interdisciplinary researchers, practitioners and professionals to share their knowledge or results of scientific research in the 9th International Symposium for Sustainable Humanosphere (9th ISSH). It was supported by the JST-supported JASTIP (Japan-ASEAN Science, Technology and Innovation Platform), the JICA/JST-supported SATREPS (Science and Technology Research Partnership for Sustainable Development) projects, the JST-supported e-ASIA Joint Research Program, LAPAN (National Institute of Aeronautics and Space, Indonesia), DUDGS (Research Unit for Development of Global Sustainability, Kyoto University), Graduates School of Agriculture, Kyoto University and the RISH-supported ARN (Humanosphere Asia Research Node). The main theme for this year conference was "Integrated Smart Technology and Society for Sustainable Humanosphere". HSS/ISSH was held for 2 days on October 28-29, 2019, in Grand Savero Hotel, Bogor, Indonesia. The program of the conference included keynote addresses (lectures), plenary sessions, oral and poster presentations. The invited lectures were 16 expertise from Japan, France, Malaysia, Thailand and Indonesia. The seminar covered Forest science, Bioscience, Applied Science and Technology, Community-based development and socioeconomic science, and Earth science. A total of 211 participants attended the symposium, which was deemed a great success. The symposium contributed to scientific development of humanosphere science in Asia and other area.

5. 4rd ARN Symposium Reports from RISH Students

Activity report of 4th ARN symposium in Nanjing

(Laboratory of Biomass Morphogenesis and Information, RISH, Kyoto University)

Yusuke Kita

1. Experiences in 4th ARN Symposium

The symposium, Asian Research Node (ARN) held in Nanjing, aims to deepen mutual understanding and promote collaborative works among various kinds of Asian countries including Japan. We are now living in an age where global interactions and cooperation are strongly required to tackle a lot of problems like global warming, gender inequalities, poverties and so on. I am very fortunate because I can see the cutting edge of researches for finding out solutions for above-mentioned problems.

The key topic of this symposium was a sustainable material, wood, and its utilization for realization of sustainable humanosphere and comprehension of cultural background of each country. The session I presented my research was related to the latter content. The intriguing point of this session was that many researchers engaging in social science like history and archaeology introduced their works and showed the historical aspects of wood-use culture in each country. Viewpoints from scientists in these fields seemed very fascinating for me, and their presentations provided me a lot of learnings and findings for human-wood relationship in an ancient era. Perhaps, sometime we may make use of knowledge of the ancients for establishing ecofriendly and sustainable lifestyle. In addition, interactions and discussions with these participants made me realize that there are a plenty of seeds for fusion of natural and social science in my country via "wood and wooden materials". Through this experience, I would like to learn much more things of wide fields including my major for doing my research from wide vision and cultivating my mind.

Finally, I express my great appreciation to all organizers of 4th ARN for offering me precious opportunities to present my research to many researchers from Asian countries and to have a discussion with them.

2. Presentation summary

Two-dimensional MFA mapping and its potential for wood classification

Yusuke Kita[1], and Junji Sugiyama[1,2]

[1]RISH, Kyoto, University, Japan, [2]Nanjing Forestry University, China

The correct identification of frequently-used in traditional buildings and anatomically similar species, *Chamaecyparis obtusa* and *Thujopsis dolabrata*, is one of the great important tasks in terms of understanding our own wood-use cultural background. Generally, these species have been distinguished by eye-observation of cross-field pitting [1]. However, the similarities of their pitting prevent us from discriminating them smoothly. Hence, more robust and quantitative indices should be introduced for their identification. In our study, spatial information of microfibril angle (MFA) in tracheid cell walls around an early wood zone is utilized as the brand-new discriminant features.

New twelve *C. obtusa* and *T. dolabrata* specimens each and four old samples of them collected from traditional buildings stored in xylarium at the Research Institute for Sustainable Humanosphere, Kyoto University (http://database.rish.kyoto-u.ac.jp/cgi-bin/bmi/en/namazu.cgi) were used. MFA information were obtained as two-dimensional (2D) maps from transverse sections of the specimens by use of the uniaxial optical anisotropy of cellulose microfibrils. Obtained 2D MFA maps were converted into 3-channeld stratified MFA maps whose each channel corresponds to different MFA ranges. Finally, we employed convolutional neural network (CNN) called VGG16 [2] for the classification of *C. obtusa* and *T. dolabrata* based on the stratified MFA maps.

The combination of CNN and stratified MFA maps achieved almost 90% classification accuracy regardless of wood aging effects up to 300 years. This result proved the utility of MFA information as the robust and reliable classification criterion of the two anatomically similar softwood species. In addition, result interpretation techniques like channel-wise erasing and Grad-CAM heatmapping [3] (Fig.1) suggested that the spatial anisotropy of low MFA regions in tracheid cells may be the critical wood-species specific feature between them.
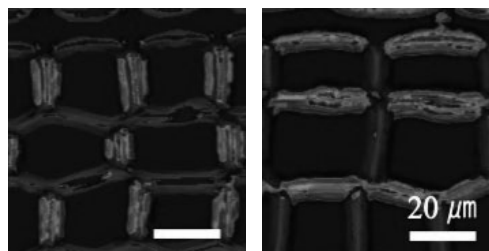
Fig.1 Grad-CAM heatmaps of *C. obtusa* (left) and *T. dolabrata* (right), respectively.

Acknowledgements

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[2] Simonyan, K., Zisserman, A.: Very deep networks for large-scale image recognition. *International Conference on Learning Representations*, 2015.
[3] Selvaraju, R. R., Cogswell, M., Das, A., Vedantam, R., Parikh, D., Batra, D: Grad-CAM: visual explanations from deep networks via gradient-based localization. *The IEEE International Conference on Computer Vision*, Venice, Italy, October, 2017, pp618-626.

Activity report of 4th ARN symposium in Nanjing

(Laboratory of Biomass Morphogenesis and Information, RISH, Kyoto University)

Takeshi Nakajima

1. Experiences in 4th ARN Symposium

I had a very fulfilling time in the 4th ARN. First of all, I had a great experience of oral presentation. How to present my research was the most important task to have a nice presentation I thought. Then I revised manuscript many times to give the best presentation in myself to audience from various field. Especially I focused on how to translate terminology and tell the importance of my research and outcomes. As a result, a lot of people were interested in my research and I had opportunities to discuss about my research with them. I got great confidence about my research and presentation skill. I was very happy to introduce the summary of 2 years at such a great symposium and appreciated for this opportunity.

In this symposium, I also have enough time to hear the presentation in other session. There are a lot of researchers from various fields and I heard the presentation of famous professors or students of around same age. Of course, I gained knowledge about some other fields but I was very interested in how to overcome each research problem. I got a lot of hints for my research from them.

Finally, Nanjing, the place of this symposium, is historical city and has a lot of attractive place. Students from Nanjing Forestry University were very active to incorporate the good point of other presenters and also very kind to invite to Nanjing. I was very inspired their activeness and hospitality. All of things I experienced in Nanjing was valuable for me, and this symposium gave precious opportunities for all of participants, I thought.

2. Presentation summary

Machine learning approaches to analyze the annual growth pattern of *Cryptomeria japonica*

Takeshi Nakajima[1] and Junji Sugiyama[2]

[1]RISH, Kyoto, University, Japan
[2]Nanjing Forestry University, China

Tree ring studies are important field of science, including dendrochronology, dendroclimatology and modeling the tree growth environmental response system. In general, softwood often used in these studies generates tracheids accurately aligned along the radial directions and their shape and size are known to be influenced by surrounding environment. In most cases analyses have been conducted using one parameter from one tree-ring, e.g. ring-width, density, ratio of stable isotopes, and so on. However, the information within a ring, i.e. intra-annual variability of anatomical characteristics, has been less considered as a parameter of tree ring analyses. Therefore, we investigated annual pattern of tracheids shape such as lumen radial diameter and cell wall thickness in *Cryptomeria japonica* from Ashiu Experimental Forest to extract possible relationships between climate and annual growth pattern using correlation analysis.

Activities Report of 4th ARN Symposium in Nanjing

(Laboratory of Structural Function, RISH, Kyoto University)

Zherui Li

1. Experiences in 4th ARN Symposium

Many overseas researchers may not very familiar with the specific research topics of our institute simply from the name "Sustainable Humanosphere". Even after studying in Kyoto University for more than 1 years, I was still astounded by the vast knowledge content and various research areas that involved in the theme of Humanosphere Science beside our own research surrounding timber architectures. The 4th ARN Symposium provided me a valuable chance to establish an accurate understanding of the current conditions of Humanosphere, from biodiversity, space electromagnetic environments to the cellulose and biochemicals, it also inspired my enthusiasm for investing in such interesting research.

Participating in this symposium means a lot to my personal learning experience. As a student who graduated from Nanjing Forestry University, and then continue the doctoral course in Kyoto University, I have enjoyed so many benefits and advantages from this platform of international cooperation. This time I was very honored to be able to give the oral presentation and share my periodical research at my alma mater as a member of RISH. A lot of encouragement and suggestions were also gained during the discussions with the professors and students. At the same time, I also had the opportunity to share my experience of studying and living abroad with many Chinese students. This experience encourages me so much to work harder to complete my research project while struggling as a bridge between China and Japan. On the other hand, as a student who has lived in Nanjing for more than seven years and deeply loves the city, I feel that this is a very good opportunity to introduce this city with long history and brilliant culture to Japanese friends. Fortunately, the venue of the conference was selected in the Purple Golden Mountain (紫金山) scenic area, which symbolizes the imperial character of Nanjing. In the limit leisure time after the conference, it was very convenient to enjoy the beautiful scenery of Nanjing. After the conference, we also invited Japanese teachers and friends to visit the Yuejiang tower (閲江樓), stood on the top of the mountain to see the magnificent Yangtze River and the whole city.

Although less than two years apart, I was also impressed by the changes in Nanjing. In addition to the great improvement of the air quality in winter, more and more people are driving the new energy vehicles on the road. I believe that with the popularization of scientific research results that across national borders, and the improvement of residents' environmental protection awareness, the living environment of Nanjing will be greatly improved, which is also in line with the purpose of the 4th ARN symposium—to establish the sustainable Humanosphere, international collaboration and expansion of Humanosphere Science on a global scale.

Finally, I would like to extend my most sincere gratitude to my supervisor Prof. Isoda and RISH, for creating such a precious exchange opportunity and the selfless support. In addition, heartfelt gratitude to Prof. Sugiyama for allowing me to participate in the preparation of this conference as a research assistant, such exercise has benefited me a lot beyond my academic life.

2. Presentation summary

Lateral performance of the frame with hanging mud wall in Japanese traditional residential houses

Zherui Li[1], Hiroshi Isoda[1], Akihisa Kitamori[1], and Yasuhiro Araki[2]

[1]RISH, Kyoto University, Japan
[2]National Institute for Land and Infrastructure Management, Japan

Facing the severe challenge from earthquakes, the lateral behavior of Japanese traditional timber structure has been highly regarded based on its long-term practical experience. In the current structural calculation method for the timber frames in Japanese traditional residential houses, the shear resistance of mud wall with column bending are mainly considered. In fact, the joints moment resistance between columns and beams also plays a significant role in the frames overall lateral performance. In order to clarify the contribution of each element in the frame, especially the moment resistance of tenon-mortise joints between columns and tie-beams, as well as improving the estimation method on the global lateral performance of frame with hanging mud wall, the typical frame with large cross-section and hanging mud wall system in Japanese traditional residential houses was selected as the research object, this article present the superposition rule of the shear resistance of the frame with mud wall that consists of the joint moment resistance, diagonal effect of the deep tie-beam, shear resistance of the mud wall and the additional rotation of the column bending through experimental study and mechanism analysis.

Firstly, the rotational behavior of timber frame coming from joints rotation and lateral resistance of the deep tie-beam were clarified. Then based on the discussion of the disruption phenomenon of the frame specimen with and without mud wall, the analysis with calculation started from the contrast with previous joint rotational performance, and expend to the estimation of the performance of the whole frame with mud wall reference with existing theoretical calculation models. It was finally confirmed that with consideration of the interaction between joints rotation and the diagonal effect of the deep tie-beam, the global shear resistance of the frame with large cross-section and hanging mud wall can be estimated by the summation of each component resistance.

Figure 1. The cyclic loading test of the frame with and without hanging mud wall

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[2] Kitamori, A., Inayama, M., Gotou, M., Isoda, H.(2018). "Bending Performance of Traditional Shear Keyed Column to Beam Joints Part 2", In Proceedings of Architectural Institute of Japan, 748, 859-867.

Activities report of 4th ARN symposium in Nanjing

(Laboratory of Space Radio Engineering, RISH, Kyoto University)

Motoyuki Kikukawa

1. Experiences in 4th ARN Symposium

First, I appreciate for giving me the valuable opportunity to attend the 4th ARN symposium in Nanjing. This conference is promoting cross-sectional research towards a better humanosphere. My research theme is about space radio engineering, which is not related to biomass conversion, atmospheric sensing and the other field of study, for all that I feel honored to be invited to the conference.

Nanjing was an impressive city. It is always foggy there; I don't confirm that it is just natural climate or urban pollution caused by industrial smoke and automobile exhaust. I was very exciting when I can't see clearly a building several hundred meters away in spite of quite fair sky. While main streets are lined with very modern buildings, there are many historic monuments like a mausoleum called Chung Shan Mausoleum, frowning walls surrounding the city and so on in Nanjing. The vivid contrast between old and new cultures is also along the same line with Japanese cities especially Kyoto, so in this respect I feel a deep kinship with them.

In the conference, I participated in one-minute speech for introduction and poster sessions. Through these experiences, I had come to realize a difficulty in communicating contents of my research to people in other fields in English. It was not only because of my lack of English ability, but also because of my weak imagination of putting myself in the other people's place. But I hope a lot of people will learn about my research because results of my research don't improve human society immediately, however eventually they will help a great adventure of humankind across the universe. For this reason, I keenly realize the need to improve my language skills of summarizing key points concisely and to get some more experience of attending international conferences.

2. Presentation summary

Development of the new device implementing high-speed current detection circuits dedicated to particle sensors on board space missions

Motoyuki Kikukawa[1], Hirotsugu Kojima[1], Kazushi Asamura[2], and Yoshifumi Saito[2]

[1]RISH, Kyoto, University, Japan
[2]Institute of Space and Astronautical Science, JAXA

Plasma filling the space is very rarefied. Ions and electrons in space plasma do not exchange their kinetic energies through their collisions but through plasma waves. This is so-called "wave-particle interaction," and it is indispensable for understanding space electromagnetic environments. WPIA (Wave-Particle Interaction Analyzer) is a new method of observing wave-particle interaction. It calculates inner product of plasma wave vectors observed by a plasma wave receiver and particle velocity vectors of each particle observed by a plasma instrument on a satellite and determines the energy conversion amount directly. The high relative time precision for detecting vectors of plasma waves and particles is essential in the WPIA. This requires a synchronous performance of plasma wave receivers and particle instruments. We introduce a system that feeds particle detection pulses of particle detectors into plasma wave receivers to achieve the synchronization. The chip we developed consists of two stages. The first stage is the current-voltage conversion circuit. It picks up each current pulse and converts into voltage signals with enough amplitude to drive the second stage. The second stage contains comparator and peak-hold circuits. They ensure picking up real signals by setting a threshold level. In this study, we designed the circuits so that it is within several nanoseconds from the arrival of a particle to the convergence of the detection signal. Conventional circuits are made of discrete electronic parts. That requires large resources in their sizes and weights. We integrate detection circuits using ASIC (Application Specific Integrated Circuit) technology. For this reason, the chip we developed is highly small and light-weight. In my presentation, I showed the details of the chip designed for the particle detection circuits including experimental results.

Good Experiences in 4th ARN Symposium

(Laboratory of Space Radio Engineering, RISH, Kyoto University)

Ryotaro Isoyama

1. Experiences in 4th ARN Symposium

Attendance at the 4th The Humanosphere Asia Research Node(ARN) Symposium in Nanjing was very meaningful to me. It was my first time to participate the ARN Symposium. I participated as a poster presenter. There were some event to communicate, for example, a banquet and a coffee-break. I enjoyed them and communicated with some researchers there. It was good experiences. The research fields were diverse and discussions between researchers were active. My specialty is space radio engineering. Therefore, there were many research presentations outside the field of specialization. Both presentations on specialized fields and those that did not were interesting for me.

In 2019, there were forest fires in the Amazon and Australia, and a lot of technological advances. The living environment of humans has changed significantly last year. I think it is very important for researchers to exchange discussions across national borders. In that sense, I think this meeting is very significant for humanity. It was also meaningful to me in two ways.

One is that I was able to know things of fields outside my specialty. The professors from another field that I met for the first time talked to me very friendly. I listened to their researches in another field and also explained my research. Discussions with professors from different fields were very fresh and meaningful for me.

Another point was that we were able to hear the opinions of experts about their specialty and we were able to discuss. I was able to have an exciting experience. However, I felt that I can't satisfactorily discuss in English. My discussions in English were worse than those in Japanese and were sometimes difficult to convey. I want to continue to practice communication in English in the future.

Finally, I would like to thank all the members of the organizing committee to give me opportunity to be a part of this excellent symposium. I wish to participate in the future ARN programs to gather more knowhow on the humanosphere science. In addition, I want to say thank you to Mr. Hirano of Tokyo University of Agriculture and Technology. I and him stayed at the same room for four days. I may have caused inconveniences for him, but he got to be close with me. My specialty and his were different, but I was stimulated. It was wonderful to meet such researchers of the same age.

2. Presentation summary

Characteristics of the Broadband Extremely Low Frequency waves through the Akebono observations with high time resolutions

Ryotaro Isoyama[1], Hirotsugu Kojima[1],Yoshiya Kasahara[2], and Shoya Matsuda[3]

[1]Research Institute for Sustainable Humanosphere, Kyoto University
[2]Advanced Research Center for Space Sci. & Tech., Kanazawa University
[3]Institute of Space and Astronautical Science, Japan Aerospace Exploration Agency

The ionized atmosphere, so-called plasma atmosphere moves out of the Earth into space in various regions. In particular, heavy ions such as oxygen ions flow out only from the polar atmosphere. The heavy ions need to gain enough kinetic energies to escape from the Earth's gravity. Since the transverse energies of ions are converted into their parallel energies as they move to a higher altitude region in the mirror-shape magnetic field lines, transverse acceleration mechanisms are important in the relation to the atmospheric escape in the polar regions. The most plausible energy source which supplies energies to heavy ions is plasma waves.

The BBELF or Broad-Band Extremely Low-Frequency waves show a good correlation of their spectral intensities with the existence of transversely accelerated ions. A lot of attempts have been made to reveal the wave modes and generation mechanisms of the BBLEF, but they are still unclear. The present paper focuses on the Akebono high time resolution data. The high time resolution data reveal the detailed spectral features of the BBELF and provide us with some clues in identifying its plasma wave mode and the related characteristics.

My impression of attending the 4th ARN Symposium

(Laboratory of Space Radio Engineering, RISH, Kyoto University)

Tomoe Taki

1. Experiences in 4th ARN Symposium

At the 4th ARN Symposium, we were able to listen to presentations from various fields, which was so interesting. While I participated in the symposium in the space electromagnetic environments field, for instance, research on Bio-Diversity and the other researches also interested me.

Seeing students from other disciplines producing results and coming to presentations, which motivated me to work more on my research. Moreover, when I talked to participants who are students studying on other disciplines, we found something in common that we were having fun and sometime having worries working on research. During the three nights and four days of staying at the same hotel, we spread relations which used to be mainly in only laboratory.

The presentation was also a valuable experience, mainly because that the presentation was mainly in English and that people who studying in a various field came to listen. First, I felt it was difficult to express my research properly in English which was not my native language. I realized the need to learn English while preparing for the presentation, and it became my task to improve my ability to speak English. Secondly, it were significantly different from conferences I have participated in, how to explain the background of the research and what are asked. Because I usually talk about my research only with people in similar research fields, this experience gave me a chance to think about how to explain my research to people in different research fields. It seems that it was a unique experience of a symposium hosted by the Research Institute for Sustainable Humanosphere, which involves various research fields.

For these reasons above, it has been a very valuable experience for me, and I am pleased to have participated in the 4th ARN Symposium.

2. Presentation summary

Isolated electrostatic potential structures observed by the Arase satellite

Tomoe Taki[1], Hirotsugu Kojima[1], Yoichi Kazama[2], Yoshiya Kasahara[3],
Yoshizumi Miyoshi[4], Iku Shinohara[5], Hideyuki Usui[6,] Wang S.-Y.[2],
Tam Sunny W. Y.[7], Ayako Matsuoka[5], and Shoya Matsuda[5]

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Some isolated potential structures are observed by Plasma Wave Experiment (PWE) onboard the Arase satellite. They are completely electrostatic. When they move in a relative velocity to the satellite, PWE can observe spatial potential variations as electric field waveforms in the time domain. One of the types of these waveforms is electrostatic solitary waves (ESW) that are discovered by the GEOTAIL spacecraft in the geomagnetic tail region in 1994. The propagation velocities of the isolated potential structures are not known. However, the Arase PWE has the function that is capable of identify the propagation velocities. The function called interferometry mode. This mode makes use of one set of the dipole antenna as two monopole antennas. Two monopole antennas observe waveforms individually, and the time lag observed between two antennas shows the propagation velocity. We analyze ESW through the two types of data observed dipole mode and interferometry mode.

Experiences Report of 4th ARN Symposium

(Laboratory of Computer Simulation for Humanospheric Sciences, RISH, Kyoto University)

Hiroki Shimamoto

1. Experiences in 4th ARN Symposium

It was the first time I attended the ARN symposium. I participated in the poster session, and there were many posters full of design and ideas, as well as easy-to-understand explanations. I was not familiar with the department of agriculture, but the explanation of the poster was very easy to understand. There was a poster titled "Exploration of effect of delignification on the mesopore structure in poplar cell wall by Nitrogen absorption method", and the method of explaining the results was very clearly. I would like to refer in my future poster or presentation. Unfortunately, I was not able to win the Best Poster Award, but since the space group has been awarded, I hope to work hard for the next ARN symposium's awards.

Also, I was able to eat a lot of traditional Chinese food, and the attendees explained the details and origin of the food, so it was a very interesting experience. In the excursion, we visited the castle walls and a restaurant with beautiful views. In the restaurant, there were also performances with traditional musical instruments, so we were able to refresh after the symposium. Through the ARN Symposium, I was able to expand my knowledge outside of my research field, and the exchange in Nanjing was very meaningful. Thanks to Nanjing Forestry University for welcoming us to Nanjing.

2. Presentation summary

Spatio-temporal distribution of growth of EMIC waves excited by protons

Hiroki Shimamoto[1], Yusuke Ebihara[1], Yoshiharu Omura[1],
Takashi Tanaka[2], and Mei-Ching Fok[3]

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As the generation and disappearance process of the radiation belt surrounding the earth, the interaction between the radiation particle, the whistler chorus mode wave, and the electromagnetic ion cyclotron (EMIC) wave is attracting attention. In previous studies, the growth rate of whistler-mode chorus waves excited by electrons and the spatio-temporal distribution in the inner magnetosphere were simulated. Our purpose is to clarify the interaction between EMIC waves.

As the first step, we reexamined the computational environment of previous research on whistler-mode chorus waves and electrons. The global electric and magnetic fields obtained by magnetohydrodynamic (MHD) simulation were given to the advection simulation, and the particle distribution function was obtained. From the distribution function, the spatio-temporal evolution of EMIC wave excited by protons and the scattering process of particles in radiation belt were calculated. The magnetic field fluctuations and velocity fields in the magnetosphere during and after the arrival of interplanetary shocks were simulated by the three-dimensional global MHD simulation. In addition, the time evolution of particle distribution in the Earth's magnetosphere were examined using advection simulation.

The 4th ARN symposium in Nanjing, China

(Laboratory of Biomass Conversion, RISH, Kyoto University)

Chihiro Kimura

1. Experiences in 4th ARN Symposium

I have been interested in China, because the country is rapidly increasing its GDP and the number of researchers. In addition, many papers are recently published by Chinese researchers in my research field, wood science. Therefore, I was very glad to visit China to experience its culture through the 4th ARN symposium. Many students from Nanjing Forestry University participated in the symposium, so I realized the expanding influence of China in the research field. The most impressive experience during my visit was Chinese food culture. Chinese foods utilize maximal parts of food stuff to reduce wastes. Thus, we enjoyed traditional foods made from various parts which are usually discarded in Japan. I think that this is a wisdom and food culture supporting the huge population and demands. Now, we live in mass consumption society surrounded with enormous stuff, which sometimes causes neglect of wastes and losses. However, if we consider the current global situation, such as rapid expansion of population and depletion of resources, we should notice that our lifestyle is outdated and we have to reconsider our Japanese society. The view points from overseas will renovate Japanese society to adapt current demand for sustainability of resources by combining its traditional culture and foreign values. As for the dietary custom, we can learn more effective use of food stuff from Chinese culture to minimize food losses. Besides food culture, atmosphere of the city was so impressed in my memory. I had imagined that cities of China were tumultuous with dense population, but actually it was different from my imagination. Moreover, almost all of payments including in a stall located on a street sifted to a cashless system, showing flexibility against innovative change rather than Japan.

Throughout the symposium program, I was attracted to the presentations of the study on cultural and climatological history by analyzing wood. Our research group investigates new applications of woody biomass to promote utilization of wood in the future. In contrast, these researchers investigated past era by analyzing wooden artifacts and tree ring. Although both topics are related to wood, research subject is so different, showing a wide range of studies are conducted in relation to wood science. Furthermore, research of RISH based on understanding and collaboration with different fields obliged me to recognize the position and situation of my own research from the vision of wide and multilateral perspectives. In my poster presentation, I had an opportunity explaining my study to the researchers specializing atmospheric science, and the discussion gave me a good opportunity to reconsider the importance of my study. In addition, advices given by the researchers of other fields were quite valuable, because we are not able to obtain them at ordinary academic meetings on a specific research field. Now, humanities are facing with the big challenges for establishment of sustainable society. There is a limitation to solve the problem by a single discipline, while Humanosphere Science, which integrates several disciplines into one frame, can offer a multilateral solution and powerfully promote development of the new society. Towards establishment of the Sustainable Humanosphere, I would like to contribute to Humanosphere Science by conducting my research through close collaboration with other scientific fields.

This is the second time for me to join ARN symposia, and the 4th ARN symposium also provided me valuable experiences through lectures, my presentation and foreign culture. These would lead to a great advances of my study and researcher life. Finally, I would like to thank to the organizing committee and all of its members for giving us the great opportunity.

2. Presentation summary

Lignin-based antiviral inhibitor produced by microwave glycerolysis from sugarcane bagasse

Chihiro Kimura[1], Ruibo Li[1], Ryota Ouda[1,2], Hiroshi Nishimura[1],
Takashi Fujita[2] and Takashi Watanabe[1]

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[2]IFLMS, Kyoto University, Japan

Viruses cause severe damage to human and animal health, and the threat is rapidly increasing by global warming and globalization of transportation. Thus far, natural bioactive compounds including antiviral substances have been studied extensively. Although intense attention has been paid to natural bioactive metabolites from plants, plant cell wall components composed of cellulose, hemicelluloses and lignin have not been expected as a raw material to obtain bioactive agents. Generally, lignocellulosic biomass is regarded as resources for energy, bio-fuels and platform chemicals. However, in this study, we first found a chemical reaction producing antiviral lignin from sugarcane bagasse, one of the most abundant lignocellulosic agricultural residues. The antiviral lignin was produced by microwave acidic aqueous glycerolysis. The degraded lignin strongly inhibited replication of encephalomyocarditis virus by direct contact with the virion. Furthermore, we revealed that severe alteration of the native lignin structure triggered emerging the antiviral activity. Our finding should maximize the value of lignocellulosic biomass and offer a great contribution towards societal implementation of lignocellulosic biorefinery.

The report of 4th[h] ARN symposium in Nanjing

(Laboratory of Biomass Conversion, RISH, Kyoto University)

Yumi Okabe

1. Experiences in 4th ARN Symposium

Participation in 4th ARN symposium was meaningful for me, because I recognized the importance of cooperation with the experts of different fields to create better environments, society and industrial systems.

Last April I started my PhD study in RISH. Since then I have been learning how to develop new systems and values, because I have been gradually realizing that many factors around the world are connected strongly, but sometimes invisibly. It means, if we could change a factor, even if it is small, the factor may give a strong impact towards whole world. In addition, it is essential to overstep any borders. Therefore, the discipline of RISH, studying a wide range of fields and collaborating with various countries, companies and organizations is very attractive.

There were a lot of impressive studies dealing with various topics in the ARN symposium. The most surprising thing for me was the number of studies developing new materials from biomass. In my study, I focus on lignin to develop antitumor substances from the natural polymer. So, it was my first time to understand that many studies targeted cellulose, and huge information had been accumulated. Especially, I was really overwhelmed by CNV (cellulose nanofiber vehicle), because so many companies and organization work together, complete one symbol product and show the utility of biomass to the society. It was my precious experience to know the scale of cellulose nanofiber project, and I was encouraged.

Moreover, I learned not only the research content but also how to present the study orally or by poster. Compared with the presentations by others, I put more information in my poster, and this made it difficult to understand the research at a glance. In order to collaborate with the people having different backgrounds, I need to explain my study more simply and clearly to attract their interest. Thus, I try to improve my explanation skills including English.

Lastly, I appreciate everyone supporting and discussing with me. Thank you so much.

2. Presentation summary

The Development of Microwave Solvolysis Lignin for Antitumor Activity and Structure Analysis

Yumi Okabe [1], Eriko Ohgitani [2], Osam Mazda [2] and Takashi Watanabe [1]

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Our society is facing serious problems threatening human life and the environment. The excessive use of fossil fuels has caused energy crisis and global warming, which triggers the expansion of infectious diseases and extreme weather such as heavy regional rain. In order to overcome these problems towards establishment of sustainable society, it is essential to replace the fossil resources to a renewable carbons source, thereby decreasing the negative effects of carbon dioxide emission from fossil fuels.

Lignocellulosic biorefinery has attracted a great deal of attention due to its abundance and non-competitiveness to food supply. The production of bioactive substances from lignocelluloses increases feasibility of the biorefinery system and directly contributes to the health of humans and animals.

Based on this concept, we started the research on the production of bioactive substances from lignocelluloses by chemical reactions, and found that microwave solvolysis lignin possessed a high potential as an anti-tumor substance. To clarify the mechanism for antitumor activity and structure of the lignin, we further studied new microwave reactions and extraction methods. The newly separated lignin fractions were subjected to cell viability tests using twelve human tumor cell lines such as osteosarcoma and cervical carcinoma cells. From this screening test, a fraction inhibiting proliferation of tumor cells was found. The structural analysis and the further purification of the anticancer substance are now in progress.

Activities report of 4th ARN symposium in China

(Laboratory of Metabolic Science of Forest Plants & Microorganisms, RISH, Kyoto University)

Senri Yamamoto

1. Experiences in 4th ARN Symposium

The experience gained through participation in 4th ARN was very valuable, since it was my first time to attend an international conference and present my research by poster in English.

In the one-minute speech session, I learned the difficulty to explain my research in English within just one minute. I was very nervous when I gave my speech in English. From the other presenter's speeches, I also learned points to be improved in my speech and presentation. In the poster session, I received several questions that I think I couldn't convey my answers well in English. I think that, although it was regrettable that I couldn't properly communicate, it was a valuable experience through which I leaned my lack of the knowledge and the importance of English communication skills. At the same time, I was very happy because many participants came to my poster to know details of my research.

By attending this symposium which uniquely covers a wide range of research fields from plants to space, I could learn where my research stands and where it should go. In addition, I also learned about how to constitute and design research presentations. It was exciting to discuss with researchers and students from various fields, and I had many good experiences which have never been obtained in Japan. I also enjoyed Chinese foods and the excursion. I thought that learning the differences in the environments and cultures in different countries is important and necessary to understand the background of my research.

Finally, I would like to express my appreciation to professors for giving me the great opportunity and supporting my research. I greatly appreciate all the organizers who coordinated ARN and provide us comfortable venue. I would like to take advantage of this experience in the future.

2. Presentation summary

Biosynthesis and Bioengineering of cell wall cross-linking ferulates in grasses

Senri Yamamoto[1], Lam Pui Ying[1], Yuri Takeda[1], Yuriko Osakabe[2], Keishi Osakabe[2], Yuki Tobimatsu[1], and Toshiaki Umezawa[1,3]

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[2]Faculty of Bioscience and Bioindustry, Tokushima University
[3]Research Unit for Development of Global Sustainability, Kyoto University, Japan

Lignocellulosic biomass represents viable resources for sustainable production of biofuels and biochemicals. Of various plant feedstocks, grasses are especially important because of their superior lignocellulose productivity and processability. Further understanding of the elusive biosynthetic pathways of grass lignocellulose may contribute to improving our capability to enhance the production of grass lignocellulose and manipulate their structure and properties for better biomass utilizations through molecular breeding approaches. In this study, we explore biosynthesis and bioengineering of cell-wall-bound ferulates which are uniquely abundant proposed to serve as important cross-linkers between polysaccharides and lignin in grass cell walls. In particular, we focus on analysis of ALDEHYDE DEHYDROGENASE (ALDH) enzymes which are postulated to catalyze a key step in the biosynthesis of ferulate-associated metabolites in angiosperms. In this presentation, we report phylogeny and expression analyses of candidate *ALDH* genes in rice, a grass model species, and preliminary attempts to generate new *ALDH*-deficient rice mutant lines through CRISPR/Cas9-mediated targeted mutagenesis.

The 4th ARN Symposium in Nanjing

(Laboratory of Metabolic Sciences of Forest Plants and Microorganisms, RISH, Kyoto University)

Keisuke Kobayashi

1. Experiences in 4th ARN Symposium

First of all, I would like to thank the organizers of this 4th ARN symposium and the professor and researchers who have always supported my research. This 4th ARN Symposium in Nanjing was the first time for me to participate in the international conference. Through symposiums in which researchers from various fields such as biomass resources, atmosphere, and ecosystems participated, I was able to deepen my understanding of researches in various fields, interact with people from various countries and learn about different cultures.

I participated in one-minute presentation and a poster presentation. In the poster presentation, I presented my research on O-methyltransferases involved in antitumor lignan biosynthesis. This research is the study of secondary metabolism biosynthesis of plant species, and there were not much researches in the same field in this symposium. However, I discussed it with researchers in fields where I don't usually interact with them, and I got ideas to further advance my research. In other research presentations, I was able to learn a lot by listening to presentations in other fields such as space research and electrical engineering. Through discussions with overseas researchers, I realized the importance of English. I decided to learn English more for meaningful discussion. To understand our research more deeply, we should interact with researchers in various fields. Therefore, the ARN symposium is a great opportunity.

On the third day, we visited Nanjing Castle in the evening to learn about the history and food culture of Nanjing. I walked through the streets of Nanjing, talked with local people, and experienced a different culture from Japan. It was a very valuable time for me. As globalization progresses, I think that it is important to learn the cultures of various countries and interact with the people of those countries. Friendly relations with researchers from other countries are also essential for future research.

The experience gained through great opportunities is valuable it to me. I would like to participate if I have such an opportunity. I will use this experience to develop my research.

2. Presentation summary

Characterization of lignan *O*-methyltransferases involved in antitumor biosynthesis in *Anthriscus sylvestris*

Keisuke Kobayashi [1], Masaomi Yamamura[1], Akira Shiraishi[2],
Eiichiro Ono[3], Safendrri Komara Ragamustari[1], Masato Kumatani[1],
Honoo Satake[2], and Toshiaki Umezawa[1,4]

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Lignans are phenylpropanoid dimers that are linked at C8-C8′ position of their propyl side chain, and are widely distributed in vascular plants. Lignan biosynthesis has been studied using several plant species, and some lignan biosynthetic pathways were proposed. Moreover, enzyme genes involved in lignan biosynthesis have been reported, and eight lignan *O*-methyltransferases (OMTs), catalyzing *O*-methylation of lignan, have been identified. Recently, our research group found four amino-acid residues, which are conserved among lignan OMTs, by comparative analysis of amino acid sequences of lignan OMTs. However, effects of these amino-acid residues on lignan OMT activity have not been examined.

In order to examine whether each amino acid residue affects lignan OMT activity or not, in this study, four mutant proteins of a lignan OMT, 5-*O*-methylthujaplicatin OMT, with single amino-acid residue substitution were prepared by site-directed mutagenesis. Then each mutant OMT was subjected to enzyme assay. As a result, the specific activity of two mutant proteins significantly decreased to 5.6−23.0% of that of original 5MTJOMT, suggesting that these two amino-acid residues might contribute to an expression of lignan OMT activity.

Activities Report of the 4th ARN Symposium in Nanjing

(Laboratory of Biomass Conversion, RISH, Kyoto University)

Chen Luo

### 1. Experiences in 4th ARN Symposium

It was the first time for me to attend an international academic meeting. Although the period of the 4th ARN symposium was only 2 days, I learned and experienced a lot. As an international symposium, the 4th ARN symposium was organized by RISH, Kyoto University and Nanjing Forestry University. The scientists and researchers gathered in Nanjing from various countries and regions, and enjoyed interactions among various scientific fields.

My research subject is analysis of microwave effects on the lytic polysaccharide monooxygenases (LPMOs) reaction. LPMO is considered as one of the important enzymes which efficiently and oxidatively breaks down cellulose at C1 or C4 position. Cellulose is the most abundant biomass resource on the earth, and can be converted to biofuels and chemicals. In addition, many studies have pointed out that microwave can not only heat up materials efficiently, but also have non-thermal effects that can accelerate chemical reactions without differences in temperature. Before attending the symposium, I didn't find any research similar to my study, but I found that the oral presentation by Prof. Matsumura about biomass is related to my study and reminded me my graduation thesis. I realized that we all are aiming at contributing to creating "Sustainable Humanosphere". In the sessions of oral and poster presentations, I learned a lot about scientific fields covered by agricultural life science, wood and timber science and engineering, radio atmospheric science and engineering. It was so beneficial for me.

Furthermore, I am Chinese and came back to my homeland as a guest this time. It was a very wonderful experience. The symposium gave us not only academic but also cultural communications. This is first time that many foreign students came to China from RISH and other organizations, and they didn't know so much about China. During the bus tour in the symposium, we enjoyed delicious Huaiyang cuisine, visited the old city wall and the beautiful Qinhuai river's night view. I tried my best to introduce Chinese culture, history and food to my foreign friends. For example, we enjoyed many foods which cannot be seen on the table in Japan, so I explained to them about the historical, cultural, regional and seasonal reasons why Chinese people eat these foods and how we make these foods delicious according to their characteristics. It was a very meaningful experience. I wish our friendship lasts forever.

Qinhuai river's night view
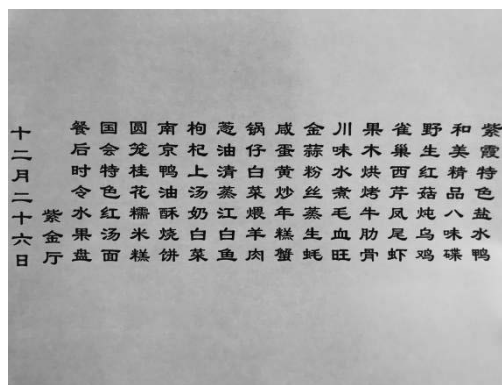
Delicious food menu

2. Presentation summary

The Effect of Microwave on
the Lytic Polysaccharide Monooxygenases (LPMOs) Reaction

Chen Luo, Naoko Kobayashi, Yu Iseki, and Takashi Watanabe

RISH, Kyoto University, Japan

Lytic Polysaccharide Monooxygenases (LPMOs) are copper-containing enzymes that oxidatively break down polysaccharides. Due to the high thermostability, LPMOs can be expected to own microwave-specific effect which was also called non- thermal effect. We compared the enzyme activity of LPMOs in the reaction with phosphoric acid swollen cellulose under oil bath and microwave heating. In order to eliminate the temperature difference between oil bath and microwave heating, the profile of the heating and cooling processes was adjusted to the same. The reaction was preformed by using both microwave and oil bath heating at 80 ℃ for 0.5, 1 and 2 h in contrast with the conventional reaction condition at 45 ℃ for 24 h. Under these conditions, The soluble carbohydrates (27 µg/ml) was detected by the phenol-sulfate method from 183.56 µg/ml phosphoric acid swollen cellulose with 1 µg/ml LPMOs after 2 h microwave heating, which was higher than the oil bath. Furthermore, to confirm the microwave influences in the enzymatic reaction, the oligosaccharide model compounds such as cellopentaose were applied. We are aiming to demonstrate the microwave effect by applying the experimental results to the Arrhneius equation kinetics.

Experiences Report of 4th ARN Symposium

(Laboratory of Computer Simulation for Humanospheric Sciences, RISH, Kyoto University)

Yuichiro Nishida

1. Experiences in 4th ARN Symposium

It was a very good experience for me to attend this 4th ARN symposium. Many of the participants were doing agriculture-related research, and for me, who usually studies electrical science, there were many interesting research themes and I was able to spend meaningful time. On the other hand, I felt that it was very difficult to explain the electrical research themes that are unfamiliar to agriculture students. In addition, I explained my research to foreigners in English and realized that my English ability was not enough.

I went to China for the first time at this symposium. Therefore, there were many uneasy things before departure, but the city was very beautiful, there were many sights, the food was very delicious, and I was able to enjoy Nanjing for 3 nights and 4 days. In particular, the Nanjing City Wall, which I visited during the excursion, was so impressive that I was very impressed with the scenery that I could not see in Japan.

Finally, thank you to Nanjing Forestry University for welcoming us. A pneumonia by Novel coronavirus is currently in a pandemic in China. I sincerely wish the health of the Chinese people and my friends of Nanjing.

2. Presentation summary

Simulation of GIC flowing through the power transmission network in Japan

Yuichiro Nishida [1], Yusuke Ebihara[1], Satoko Nakamura[1], Takashi Kikuchi[1,2],
Shinichi Watari[3], Kumiko Hashimoto[4], and Kentaro Kitamura[5]

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[5] National Institute of Technology, Tokuyama College, Japan

The energy released from the sun can enhance electric currents in Earth's magnetosphere, which induces an electric field on the ground surface. This electric field gives rise to geomagnetically induced current (GIC) flowing in a transmission line.

Japan is situated at geomagnetically low latitudes, but the potential risk is probably non-zero because a large-amplitude of GIC, as high as 129 A, was recorded in the Japanese power in October 2003. To evaluate the potential risk of the Japanese power grid properly, we modeled the Japanese power grid with high voltage class over 187 kV. The uniform GIE imposed on the model was estimated on the basis of the geoelectric field observed in April 2018 at Kakioka Magnetic Observatory. The calculated GIC is roughly in agreement with that measured at 4 substations in Japan. For the westmost substation, a disagreement was found when we considered only the highest class of the power grid (500 kV), which may imply that the lower voltage class of the grid (<500 kV) may have some contribution to the GIC in Japan. We discuss the general tendency of the GIC flowing in the Japanese power grid, and prediction capability of the currently available model.

Cyclic Loading Test of 3-story CLT Structures

(Laboratory of Timber Science and Engineering, RISH, Kyoto University)

Xiaolan Zhang

1. Experiences in 4th ARN Symposium

The 4th ARN Symposium was held in Nanjing, China, and was organized by Material Science and Engineering College, Nanjing Forestry University. This symposium covered a wide variety of research fields, such as bio-based materials, sustainable materials, biomass resources, ecosystems and wireless energy transfer, timber science and engineering, and so on. Lots of researchers from Japan, China or other countries attended this conference. Researchers gave great oral or poster presentations, and discussed with each other.

As a doctoral student of Laboratory of Timber Science and Engineering, I learned a lot not only in timber structures, but also other research fields. On one hand, some famous researchers in timber structures from China and Japan were invited and gave a lecture. For example, Prof. Komatsu Kohei showed his research results about the relationship of traditional timber structure between China and Japan. Prof. Minjuan He from Tongji University reported the recent development on timber engineering in China, including research, codes and construction projects. As a Chinese people, the development of timber building in China attracted me a lot. Prof. Minjuan He started from the history of wood structure, and then summed up the amount of companies and universities that are working at timber engineering. Modern timber building is a relative new industry in China, but there's no doubt that it's potential. Nowadays, more and more Chinese people pay attention to the environment, eco building materials will stay ahead of the competition. Therefore, more and more researchers started their research on modern timber productions and structures. Various codes and standards of timber construction have been published; the fire safety rules also lower the limitation for timber building's height. However, there are still many challenges, for example, the lack of wood resource in China, the strongly held prejudice that unsafety to fire, etc. the good news is that several companies have started the publicity of modern timber building, the production of glulam and CLT is increasing gradually. In sum, the potential for timber buildings market in China is enormous. On the other hand, I learned a lot about bio-based materials, such as nano fibre. It's really a hot topic and promised materials.

I spent my maser period in Material Science and Engineering College, Nanjing Forestry University. Thus, it was really a happy thing that I met many familiar teachers and students during the symposium. After the symposium, my doctoral supervisor Prof. Isoda and master's supervisor held a party together. Chinese students showed Prof. Isoda and his friends Nanjing style dishes and cultures. All of us had a good time.

2. Presentation summary

Cyclic Loading Test of 3-story CLT Structures

Xiaolan Zhang[1], Hiroshi Isoda[1], Kotaro Sumida[1], Yasuhiro Araki[2], Shoichi Nakashima[3], Takafumi Nakagawa[1], and Nobuhiko Akiyama[2]

[1]RISH, Kyoto, University, Japan
[2]National Institute for Land and Infrastructure Management, Japan
[3]Building Research Institute, Tsukuba, Japan

For the sake of promoting cross laminated timber (CLT) structure, Japanese government notifications (GN) on the structural design of CLT panel buildings and definition of standard strength of CLT were issued on 2016. Following the issue of the GN, the guidebook on the regulations of the GN and the manual on design and construction of CLT panel buildings were published on Jun. and Oct. 2016 respectively. In the GN and manual, three kinds of CLT structures were classified. This paper introduced the research on balloon framing CLT structure, which was not covered by GN. Compared with platform framing structure, which was clarified in GN, balloon framing structure has superiority in shortening the construction period and reducing the amount of CLT panels and metal connectors. Aiming to provide more options for GN, the seismic property of balloon framing CLT structure was studied. static cyclic loading tests were carried on four kinds of 3-storey CLT structures: ① platform framing with small size shear walls; ② balloon framing with continuous shear walls; ③ platform framing with broad panels; ④ balloon framing with continuous shear walls coupled with glulam beams.

Fig. Four specimens

Acknowledgements

Partial Compression properties of Glulam against CLT loading

(Laboratory of Structural Function, RISH, Kyoto University)

Rui LI

1. Experiences in 4th ARN Symposium

The Humanosphere Asia Research Node is a new program launched by Research Institute for Sustainable Humanosphere (RISH), aimed at strengthen RISH's function as a hub for international collaborative research and foster innovation in the field of humanosphere science, with the ultimate goal of delivering solutions to global-scale problems. As a member of RISH, I am very proud to have the opportunity to attend the 4th ARN symposium.

During the symposium, wide arrange of research topic was introduce, like biomass materials, sustainable building technologies, outer atmosphere researches etc. My topic this time is about the Glulam partial compression properties when loaded by Cross Laminated Timber (CLT). I gave one-minute oral introduction and then did the poster presentation. There is a strong academic atmosphere in the symposium venue, several persons came to my poster board to have a deep discussion with me, talking about the research purpose and the test result as well. There are also some participants who do not research in my field coming to ask for a brief introduction to them. Since this poster presentation, I have a better understanding of my topic with seriously thinking about my research purpose and how should I conduct the further research as well.

Beside the symposium itself, the conference also arranges some tour and party together with Nanjing Forestry University students and teachers. We have a good taste of Nanjing's food, beautiful sightseeing of night of Nanjing city. We have made a lot of friend and met a lot of well-known experts. All these experience made this symposium impressive to me.

2. Presentation summary

Partial Compression Properties of Glulam against CLT loading

Rui LI, Hiroshi ISODA, and Akihisa KITAMORI

RISH, Kyoto, University, Japan

Cross Laminated Timber (CLT), a new generation of engineered wood-based products, provides promising solution to the mid- and high-rise wood building. When CLT panel is constructed as a wall, a huge vertical load transferred from CLT wall may cause a significant partial compression problem on the horizontal component like Glulam floor. Thus, the structural performance of Glulam, specially the strength and stiffness of Glulam, against CLT partial loading become very important for structural design. In this case two compression directions with two CLT products was investigated in this paper. The test configuration is shown as Figure 1.

All the Glulam and CLT products are in same size and Glulam was compressed at the central of the top surface. Steel plate compression was set as control group.

From the result, the effective strength of CLT compression, $f_{c,90,eff}$, is 1.3~2.0 times higher than the strength compressed by steel. DIC analyze result shows that the stress is more concentrated in steel compression. The differences of load supporting layer inside glulam between steel and CLT compression need to be investigated in further study.
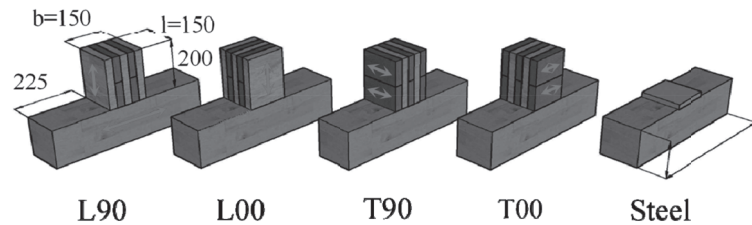

Figure 1: Partial Compression Test arrangement

Table 1: Compression strength and MOE of Glulam

No.	Group	$f_{c,90,y}$ [N/mm²]	$f_{c,90,y,eff}$ [N/mm²]	$E_{c,90}$ [N/mm²]
1	L00	5.65	9.41	568.73
2	L90	5.81	9.69	604.78
3	T00	5.56	13.90	535.09
4	T90	5.66	14.16	566.92
5	steel	6.65	6.65	600.35

Acknowledgements

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My experience in the 4th ARN Symposium

(Laboratory of Biomass Conversion, RISH, Kyoto University)

Yuichi Tanida

1. Experiences in 4th ARN Symposium

I had a great opportunity to meet scientists and researchers from different cultural backgrounds in various fields of science such as tree ring science, electromagnetics in space, physics in wood. It was my first experience to take a one-minute presentation in English. I could learn good English presentations from others. I could understand them easily, since the arrangement of pictures and sentence in their slide was organized very well and the English was very clear. In the poster session, I explained my research to researchers in different fields. One asked me, "What is the goal of this research?" and the other asked me, ''How useful of this research in the future?''. I couldn't answer these questions because I have not seen my perspective on my research goal and the influence on our society yet. But after discussing with them, I considered my research thoroughly. My research relates to the transfer of lignin-degrading enzymes and metabolites in white-rot fungi. I think conversion and utilization of plant biomass resources are essential for a sustainable future. For the new biorefinery, I would like to work on white-rot fungi and developing the separation of the lignin and cellulose and contribute to the Humanosphere science.

In the oral session, I impressed the presentation of Dr. Tsurugi about changes in wood supply from the Jomon period (approximately B.C 14000- 3000) to the Yayoi period (approximately B.C 1000- A.D 300). In Yayoi period, the consumption of wood had increased dramatically. Therefore it had become necessary to acquire a large amount of wood efficiently. This research supported that people established the technique to produce longer boards in the Yayoi period. I learned the ancient wood usage and supply through the presentation. I also interested in the presentations of Dr. Han, Dr. Chen, Dr. Yano, and Dr. Usuki about cellulose nanofiber materials. I learned the character of cellulose nanofiber and the concept of the "Kyoto process" which is the integrated manufacturing process of modified lignocellulose nanofiber and resin. Some cellulose nanofibers produced by the "Kyoto process" were utilized as materials for shoes and cars. I realized wood is essential for a sustainable society. Finally, I would like to appreciate for giving me the great opportunity to notice the critical scientific perspective of my research by discussing at the poster presentation and learn the forefront researches of different fields.

2. Presentation summary

Roles of extracellular metabolites produced by selective white-rot fungi

Yuichi Tanida, Hiroshi Nishimura and Takashi Watanabe

Research Institute for Sustainable Humanosphere, Kyoto University, Japan,

Conversion and utilization of plant biomass resources are essential for a sustainable future. Lignin is a hard-to-decompose aromatic polymer with a rigid structure. In nature, white-rot fungi have the ability to degrade lignin. The white-rot fungus, *Ceriporiopsis subvermispora*, degrades lignin in preference to cellulose. We have demonstrated that secreted extracellular metabolites have critical roles in lignin degradation in addition to lignin-degrading enzymes. Ceriporic acids (CAs) have been shown to attenuate cellulose degradation by inhibiting the Fenton reaction. We also demonstrated an effective lignin degradation reaction with a combination of CAs and manganese peroxidase. However, little is known about the mass transfer of enzymes, metabolites, and lignin decomposed fragments, between the mycelium and substrates. Recently, extracellular vesicles (EVs) secreted outside the hyphae have been reported in basidiomycetes. We investigated EVs in selective white-rot fungi and now trying to study their relationship with lignin degradation.

6. Japanese Summary of the 4th ARN Symposium Reports

生存圏研究所より参加した日本人大学院生レポートの和訳

喜多祐介 (Yusuke Kita)

　今回は，ARN シンポジウムというまたとない貴重な機会を提供してくださり大変ありがとうございました。様々な分野において研究の深度化が進み，お互いを理解するのが難しくなっている中で，人文科学と自然科学が一堂に会したセッションで発表することができたのは大変嬉しく学ぶことが多かったと存じます。今回の経験や交流を糧に，今後の研究活動は幅広い視野をもって取り組んでいく所存です。

中島健志 (Takeshi Nakajima)

　第 4 回 ARN は，私にとって非常に充実した体験になりました。何よりもまず，オーラルセッションで発表させていただいたことは自分にとって貴重な財産となりました。発表をするにあたり，何よりも意識したのは伝え方です。多岐にわたる専門分野の学生や先生方にも理解していただくため，専門用語の言い回しはもちろん研究の意義や得られた結果の重要性をいかに伝えられるか，発表直前まで考え抜きました。その結果，多くの方に評価していただき，研究について議論する機会を得られたのは自分の中で大きな自信につながりました。修士課程の 2 年間の集大成をこのような場で発表できることは研究者冥利に尽きることであり，一学生にこのような機会を与えてくださった先生方に感謝申し上げます。

　また，他セッションの発表を聞く時間が十分に用意されてあることも魅力に感じました。海外の著名な先生方の発表を聞くことや同年代の研究者と意見を交わす中で,単に研究成果だけではなく，それに至るプロセス等多くの気づきがありました。

　最後に，今回のシンポジウムの舞台となった南京は私にとって 2 度目の訪問でした。歴史的な街並みも大きな魅力であることは間違いありませんが，現地の学生の研究へのアグレッシブな姿勢に刺激を受けたと同時に，ホスピタリティ溢れる対応に心温められました。南京で経験したすべてがかけがえのない経験であり，本シンポジウムの意義を強く感じました。

菊川素如 (Motoyuki Kikukawa)

　最初に、南京にて開催された第 4 回 ARN シンポジウムに参加するという貴重な機会をいただいたことに感謝します。この学会はよりよい地球生存圏の実現に向けて、幅広い分野における研究者間の交流を促進するものです。私の研究テーマは宇宙電波工学で、これはバイオマスコンバージョンや地球大気モニタリングなどの分野とは関係がないものですが、それにも拘わらず招待していただけたことを光栄に思います。

　南京は非常に印象的な都市でした。常に霧がかかっていて、これは果たして自然の気候がそうであるのか、あるいは都市公害であるのか私には判断つきかねますが、とにかく雲一つない見事な晴天であるにもかかわらず、数百 m 先の建物がはっきりと視認できないさまは興味深いものでした。大通りの脇は無数の近代的な建物で埋め尽くされていましたが、その一方で中山陵という霊廟や都市をぐるっと囲む城壁など、歴史的建造物にも恵まれているのが南京という都市です。新旧の文化の鮮烈な対照は、日本の都市にも、とりわけ京都にも多く見受けられますから、この点においては強い親近感を覚えました。

　学会では、一分間スピーチとポスターセッションに参加させていただきました。その中で、やはり他分野の方々に英語で自らの研究内容を伝えることのむずかしさを実感しました。それはただ単に英語力が低いからというだけではなくて、説明を聞いてくださる方々の立場に立って的確な説明をする想像力に欠けていたからでもあります。しかし、私は多くの人に研究を知っていただきたいと考えています。確かにその成果が即座に人類生活の質の向上に資することはないでしょうけれども、いずれは宇宙をまたにかけた人類の偉大な冒険の一助となるであろうことを信じているのです。そのためにも、私は伝えたいことを的確に表現できるだけの英語力と、なにより国際学会という場に慣れていくことが必要であると痛感しました。

磯山 椋太郎 (Ryotaro Isoyama)

　南京で行われた ARN シンポジウムに参加したことは、私にとって非常に有意義でした。ARN シンポジウムへは今回が初めての参加であり、私はポスター発表を行った。バンケットはコーヒーブレイクなど、交

流イベントにも参加した。私はそれらのイベントで研究者達と交流することができ、非常によい経験だった。

　発表分野は多岐にわたり、研究者同士の議論が活発に行われていました。私の専門分野は宇宙電波工学である。そのため専門分野外の研究発表が多くあった。専門分野に関する発表も、そうでない発表も興味深かった。

　2019年はアマゾンやオーストラリアでの森林火災や、科学技術の発達などがありました。人類の生活環境は一年で大きく変わった。そんな中で国境を越えて研究者が意見を交わす場は非常に大事だと考える。そうした意味でも今回の会合は人類にとって非常に有意義だと考える。また私自身にとっても以下の二つの点で有意義だった。

　一つは自分の専門外の分野に触れることができた点である。初めてお会いした別分野の教授も大変仲良くしてくれた。別の分野の教授の話を聞き、逆に自分の研究の説明も行った。異なる分野の教授とも議論は非常に新鮮で有意義なものとなった。

　もう一点は、自分の専門分野について専門家の意見を聞けたことと、議論ができたことである。刺激的な経験をすることができた。しかし、自身の英語力の低さを痛感することにもなった。英語による議論は日本語でできるものよりも拙く、伝え切れないこともあった。英語によるコミュニケーションは今後も継続して練習していきたい。

　最後に、今回の素晴らしい学会に参加する機会を与えてくれた運営の皆様に感謝を伝えたい。また参加したいと考えている。また、同室となった東京農工大学の平野さんには、四日間仲良くしていただいた。専門分野は異なるが、刺激を頂いた。この様な同年代の研究者との出会いも素晴らしいと感じた。感謝を伝えたい。

滝朋恵 (Tomoe Taki)

　ARN4thシンポジウムでは、様々な分野の方の発表を聞くことができ、非常に興味深く参考になりました。私は、宇宙系で参加しましたが、木材を用いた持続可能な発展についての研究は、初めて知る内容が多く、とても興味深く感じました。他分野の同年代の学生が成果を上げて発表に来ている様子を見ることは大変な刺激となり、より研究へ励むモチベーションとなりました。加えて、他分野の同級生と話をすると、研究について同じような悩みを持ち、同じように楽しんでいることが分かりました。同じホテルに滞在した三泊四日の間に、研究に関しては研究室単位の関わりしかなかった人間関係が広がりました。

　また、発表に関しても、主に英語での発表であったことと、広い分野の方が聞きに来られたことから、貴重な経験となりました。一点目に関しては、母国語ではない英語を用いて、適切に自分の研究を表現する難しさを感じました。英語技能の研鑽は今後の課題となりました。二点目に関しては、これまで経験した学会と比較して、研究背景などの説明の仕方やいただく質問内容が大きく異なっていました。普段、似た研究分野の方のみとしか詳しい研究の話をしないことから、異なる研究分野の方への説明の仕方について考えるきっかけとなりました。様々な研究分野の方がいる生存圏研究所主催のシンポジウムならではのことだったと感じられます。以上から、非常に貴重な経験となり、ARN シンポジウムに参加できたことを嬉しく思います。

嶋本紘己 (Hiroki Shimamoto)

　ARN シンポジウムに参加したのは今回が初めてでした。私はポスターセッションに参加し、会場にはわかりやすい説明はもちろん、デザイン、アイデアの詰まったポスターがたくさんありました。私は農学系には詳しくありませんでしたが、とてもわかりやすくポスターの説明がなされていました。「Exploration of effect of delignification on the mesopore structure in poplar cell wall by Nitrogen absorption method」という題目でのポスター発表があったのですが、結果を説明する手法がとても分かりやすかったため、自分の今後のポスター作製はもちろん、研究発表にも活かそうと考えています。残念ながら、私はベストポスター賞を受賞する事ができませんでしたが、同スペースグループの方々が受賞していたため、次回の ARN シンポジウムでは賞を獲得できるよう共に研究に励みたいとかんがえています。

　また、伝統的な中国料理を沢山食べる事ができ、同席の方が料理の詳細や起源などを説明してくださったので、とても興味深い経験ができました。エクスカージョンでは、城壁や、美しい景色のあるレストラン

を訪問しました。レストランでは伝統的な楽器による演奏もあり、学会を終えた後のリフレッシュをする事ができました。ＡＲＮシンポジウムを通じて、自分が携わっている研究分野以外の知見を広げる事ができた事に加え、南京での交流はとても有意義でした。私たちを南京に迎えてくれた南京林業大学に感謝します。

木村智洋 (Chihiro Kimura)

急速な経済成長と顕著な科学者数の増加、さらには、近年、私の研究分野である木質科学においても多くの論文が中国の研究者により執筆されていることから、私は中国に対して強い関心を持っていた。そのため、今回のシンポジウムを通して、中国を実体験できたことを大変うれしく思う。また、シンポジウムには、共催である南京林業大学から非常に多くの学生が参加しており、最近の木材分野における中国の勢いも実体験できた。中国の文化に触れ、最も感銘を受けたのは、無駄なく食材を使用していたことである。日本では食用とならない部位も美味しく調理されていて、膨大な人口を支える知恵と食文化を学ぶことができた。大量生産、大量消費を背景にモノであふれた社会で暮らす我々は、「無駄」に無関心になりがちである。しかし、世界的な人口急増と資源不足を考慮すれば、我々の生活は時代遅れであるように思う。そのため、海外に目を向け、自国を見直すことで、伝統的な日本文化を基盤にしながらも、時代に適応した社会を築けるのではないだろうか。特に、世界規模での食料不足が危惧されていることから、中国を参考にすることで、日本でも今まで以上に無駄をなくした食材の使用が達成できるのではないかと考えた。また、私は中国を人口密度が高くにぎやかな街だと想像していたが、南京の市街地では自由にゆったりと過ごす人々が多かったのも印象的であった。さらに、急速にキャッシュレス化が進むなど、変化への対応の柔軟性も伺えた。

シンポジウムの発表で最も興味を惹かれたのは、木材を通して文化的または気候学的な歴史を探る研究であった。木質バイオマスの利用用途の開発により将来の木材利用を進める我々の研究とは対照的に、発掘された木製の道具や樹木の年輪を分析し過去を調査するための研究であった。これらの発表を興味深く聞きながらも、木材を対象にした研究であるにも関わらず、全く異なった研究がされていることを再認識した。生存圏研究所の研究活動は、異分野の理解と連携が求められるが、そのためには広い視点で自身の研究を見直し、分野における自身の立ち位置を常に確認しておく必要性を感じた。ポスター発表では、宇宙圏の研究をしている先生に研究内容を説明する機会があり、議論をしながら研究の意義を問い直す良い機会になった。さらに、他分野の先生方から、実験に関する意見をいただけたことは、普段の分野限定的な学会では得られない貴重なアドバイスであった。現在直面している環境問題に対しては、一分野での寄与に限界がある。従って、多分野を一つの枠組みに入れた生存圏科学が重要な役割を担うはずである。これからも、持続的な生存圏の確立に向け、広い視野で研究を進め、生存圏科学に貢献していきたい。

ARN への参加は 2 度目であるが、今回も非常に有意義な経験および研究発表ができた。これは、シンポジウムを準備して下さった皆様のおかげであり、参加させて頂けたことに深く感謝している。

岡部由美 (Yumi Okabe)

第4回 ARN への参加を通じて、より良い環境・社会・産業システムを構築するために、分野を横断することの大切さを、改めて感じることができた。

今年度から生存圏研究所の博士課程で学び始めた目的は、新しいシステムや価値観を創出する方法を学ぶことである。なぜなら、世界のあらゆる事象は強く、しかし、ときには気づきにくい形で繋がっていると実感することが多くなったからだ。言い換えれば、小さな変化が世の中に影響を与えることができるということである。そして、あらゆる垣根を超える必要があるということだ。したがって、研究分野が多岐にわたり、様々な国や企業、組織とボーダーレスに協力できる RISH の環境に魅力を感じている。

今回の ARN では、様々な分野の研究を知ることができ、刺激を受けた。最も驚いたことは、バイオマス由来の新素材開発の研究の数の多さであった。私自身、リグニン由来の抗腫瘍活性物質を研究しているのだが、セルロースをターゲットとした研究がとても充実していることを実感できた。特に、セルロースナノファイバーに関するプロジェクトの熱量を感じられたことは、これから自身の研究を進めていく上で、とても重要な経験だったと感じている。様々な組織が協力して、一つの製品として完成させ、バイオマスの有用

性を社会に提示する CNV（cellulose nanofiber vehicle）に圧倒された。

　また、色々な方の発表を聞き、内容だけではなく、伝え方についても学ぶことが多かった。私はポスターに情報を載せすぎる傾向があり、一目で理解しにくいという課題があった。様々なバックグラウンドや考えを持つ方々と協働するために、人に伝える力を向上させ、自分の研究に興味を持ってもらいたいと強く思った。そのためにも、要点をまとめて明確に伝えることや、英語力の向上を図りたい。

　最後に、渡辺先生をはじめ、事務局の皆様、ディスカッションしてくださった皆様に感謝申し上げます。ありがとうございました。

山本千莉 (Senri Yamamoto)

　国際学会の参加や英語でのポスター発表は初めてのことだったので、今回の第 4 回 ARN での経験は私にとって非常に貴重なものとなりました。

　1 分間のスピーチセッションでは、自分の研究を 1 分間にまとめ、英語で発表することの難しさを知りました。英語での発表はとても緊張しました。また、他の発表者の発表を見ることで自分の発表での改善点に気付くことができました。ポスターセッションでは、質問に対して英語で上手に答えられない場面がありました。悔しかったけれど、自分の専門知識の不足部分や英語でのコミュニケーションの重要性に気付くための貴重な経験でした。一方で自分が取り組んでいる研究に対して興味を示し、聞いていただけたことはとても嬉しかったです。

　このシンポジウムで植物から宇宙まで広範囲の研究を知ることにより、自分の研究内容の立ち位置を認識することができました。これらに加え、プレゼンテーションを行う際の構成やデザインについても学びました。様々な分野の研究者や学生と議論することは刺激的で、日本にいるだけでは得られない良い経験をたくさんしました。さらに、中国、南京での食事やエクスカーションも楽しみました。その中で、環境や文化の違いを知ることは、研究の背景を理解するために重要かつ必要なことであると思いました。

　最後に、このような機会を与えてくださり、サポートしていただいた先生、研究員の方々、第 4 回 ARN の運営や会場の設営に携わった皆様に心から感謝申し上げます。今回の経験を今後にしっかり活かしたいと思います。

小林慶亮 (Keisuke Kobayashi)

　最初に、この 4 回 ARN シンポジウムの主催者及び日々私の研究をサポートしてくださる教授、研究者の方たちに感謝します。南京で開催された ARN シンポジウムは私にとって初めて参加した国際学会であった。バイオマス資源、大気圏、エコシステムなどの様々な分野の研究者が参加したこのシンポジウムを通じて、私は様々な分野における研究への理解をより深め、様々な国の人々と交流し異なる文化を学ぶことができた。

　私は 1 分間スピーチとポスター発表に参加した。ポスター発表では、私は抗腫瘍性リグナン生合成に関わる O メチル基転移酵素の研究を発表した。この研究は植物の二次代謝の研究である。このシンポジウムでは同じ分野の研究はあまりなかった。しかしながら、普段私が交流のない分野の方々と議論し、自分の研究をさらに前進させるアイディアを得た。他の研究の発表では、その他の研究発表では、宇宙研究や電気工学など他の分野でのプレゼンテーションを聞くことで、多くのことを学ぶことができた。海外の研究者との議論を通して、英語の重要性を再認識した。有意義な話し合いのためにもっと英語を学ぼうと思う。研究をより深く理解するためには、様々な分野の研究者と交流する必要がある。したがって、ARN シンポジウムは素晴らしい機会である。

　3 日目には、夕方に南京城を訪れ、南京の歴史と食文化を学んだ。南京の街を歩き、地元の人と話をして、日本とは違う文化を体験した。とても貴重な時間だった。グローバル化が進む中で、各国の文化を学び、その国の人々と交流することが重要だと思う。今後の研究には、他国の研究者との友好関係も不可欠です。

　素晴らしい機会を通して得た経験は、私にとって貴重なものになった。そのような機会があれば参加したいと思う。この経験を活かして研究を進めていきたいと思います。

西田悠一郎 (Yuichiro Nishida)

　今回の 4thARN シンポジウムに参加できたのは、私にとって非常に良い経験になりました。今回の参加者には、農学系の研究をしている方が多く、普段電気系の研究をしている私にとっては、とても興味深い研究テーマが多く、有意義な時間を過ごす事ができました。一方で、農学系の方にとって馴染みの無い、電気系の研究テーマを説明するのは、非常に難しいと感じました。また、外国の方に自分の研究を英語で説明してて、自分の英語力がまだまだ足りないと言うことを実感しました。

　私は今回の ARN シンポジウムで、初めて中国に行きました。その為、出発前は不安な事も多かったのですが、街はとても綺麗で見所も多く、料理も非常に美味しくて、3 泊 4 日の間に南京を堪能する事ができました。特に、エクスカージョンで訪れた、南京城壁は迫力があり、日本では見ることの出来ない光景に、非常に感動しました。

　最後になりますが、我々を迎え入れてくれてくれた南京林業大学の皆さんに感謝します。現在、中国では新型コロナウイルスによる肺炎が大流行していますが、中国の方々と、南京の友人たちの健康を心から祈っています。

谷田悠一(Yuichi Tanida)

　今回のシンポジウムは異なる文化的背景の科学者や研究者たちと出会い、年輪科学、宇宙における電磁気学、木材力学といった様々な領域の研究に触れる素晴らしい機会でした。このシンポジウムの中で英語での 1 分間プレゼンテーションを初めて経験しました。他の人の発表を聞いて分かりやすい英語のプレゼンテーションを学ぶことが出来ました。彼らのプレゼンテーションはスライド内の写真と文章の配置が非常によく整理されていて、はっきりした英語がであったので簡単に理解することが出来ました。ポスターセッションでは、異なる領域の研究者に自分の研究を説明しました。その中でポスター発表を聞いていた人から「この研究の最終的な目標は何？」や「この研究は将来、どのように役に立つのか？」と質問されました。私はこれらの質問に答えることが出来ませんでした、なぜなら研究の目標や研究が社会に与える影響という視点をまだ持っていなかったからです。彼らとの議論の後で、私は自分の研究を徹底的に見直してみました。私の研究は白色腐朽菌のリグニン分解酵素及び代謝物の輸送に関係しています。私が思うに植物バイオマス資源の変換や利用は持続可能な未来には必要不可欠です。私は白色腐朽菌の研究に取り組み、新たなバイオリファイナリーの足掛かりとしてリグニンとセルロースの分離を発展させたいと思っています。この研究を通して生存圏科学に貢献したいです。

　口頭セッションでは、縄文時代から弥生時代にかけての木材供給の変化に関する Tsurugi さんの発表に感銘を受けました。弥生時代は木材の消費が劇的に増加しました。したがって、大量の木材を効率的に手に入れる必要がありました。この研究は弥生時代に長板を生産する技術が設立されたことを支持しています。この発表を通して古代の木材利用と木材供給を学びました。また、私はセルロースナノファイバー原料に関する Han さん、Chen さん、Yano さん、Usuki さんの発表に興味を持ちました。これらの発表を通してセルロースナノファイバーの性質や変性リグノセルロースナノファイバー・樹脂コンポジットの一貫製造プロセス、通称「京都プロセス」の構想を学びました。京都プロセスで生産されたセルロースナノファイバーの一部は靴や車の原料に使われています。これらの発表から持続可能な社会にとって木材が必要不可欠なものだと理解しました。最後に、ポスター発表での議論を通して研究に対する重要な科学的視点に気づきました、さらに異なる領域の最先端の研究を学びました。これらの素晴らしい機会を与えてくださり、ありがとうございました。

生存圏アジアリサーチノード活動報告

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