No. 34 February 2020

=Foreword=

International Research Activities at RISH in 2019

Professor Hirotsugu Kojima
Chair of the International Academic Exchange Committee of RISH, Kyoto University

The mission of our research institute (RISH: Research Institute for Sustainable Humanosphere) is to contribute to the sustainability of human environments through humanosphere science. Since the establishment of RISH in 2004, we have taken a number of proactive approaches to promote humanosphere science. Among them, international collaborations are a core element. Since humanosphere science covers a wide range of research fields, and requires both multidisciplinary and global perspectives, international collaborations are indispensable in fostering the research projects our institute engages in.

This fiscal year, the institute has continued extensive efforts in international collaborations. Memorandums Of Understanding (MOU) are the groundwork for international collaborations. As of today, the institute holds 26 MOUs, which are listed in Table 1. We should emphasize that five MOUs were newly signed in this fiscal year.

Visiting scientists are like the stems in our research networks. Many foreign researchers visit us to directly implement cooperative research. Direct collaborations with visiting scientists can serve as triggers to new outlooks on studies. RISH has a system of inviting foreign researchers as visiting professors or associate professors. Table 2 lists the visiting professors and associate professors in this fiscal year. The current issue of the international newsletter has had three notes contributed by visiting/associate professors. You can share the research achievements and experiences from their stay at our institute.

RISH hosts many symposiums every year. Table 3 presents the list of international symposia hosted by the institute this fiscal year. Human resource development is another important task in international collaborations. RISH holds international schools on humanosphere science every year. An international school on equatorial atmosphere was held in Indonesia in 2019. A detailed report appears in this issue as an international active report. The Humanosphere Science School (HSS) is another international school. The HSS is part of an initiative called the Humanosphere Asia Research Node (ARN) that we established to promote Asia as a significant hub for humanosphere science. HSS 2019 was held in cooperation with the LIPI (Indonesian Institute of Sciences) in Bogor, Indonesia, on October 28 and 29, 2019. The ARN initiative also holds a symposium on humanosphere science (ARN symposium). The 4th ARN symposium was held in cooperation with the Nanjing Forestry University in Nanjing, China, on December 26 and 27, 2019.

The international academic exchange committee of RISH plays a role in promoting both research collaborations and academic cooperation among outside researchers and institute members. The committee will continue to serve to vigorously forward activities at the RISH.

Opening ceremony of the 4th ARN symposium (Nanjin, China).

=International Activity Report=

International School on Equatorial Atmosphere 2019

Associate Professor Tatsuhiro Yokoyama
RISH, Kyoto University

The equatorial atmosphere generates the strongest convection in the world, affecting global atmospheric circulation, as well as local weather and climate. The strong convection generates various types of atmospheric waves that propagate upward to transport energy and momentum into the upper atmosphere. In addition, different kinds of materials originating at low- and mid-latitude regions that converge into the equatorial region are blown upward through the tropopause. They eventually reach the middle atmosphere, and from there spread out over the entire globe. While we have been studying the equatorial atmosphere for a long time, it is very important to promote education and research activity in relevant countries. To this end, we held the first International School on Equatorial Atmosphere March 18–22, 2019, at the Aerospace Research Institute (LAPAN) in Bandung, Indonesia, in partnership with Humanosphere Asia Research Node (ARN). The school was also supported by Kyoto University, the Japan Society for the Promotion of Science (JSPS), Nagoya University, LAPAN, and RISTEKDIKTI, Indonesia. One hundred and nine researchers and students from Japan, Indonesia and surrounding countries participated in the LAPAN meeting, and 61 students at three different institutes participated online, for a total of 170 participants.

RISH has been collaborating with LAPAN and conducting equatorial atmospheric research for a very long time. Since 2001, we have been successfully operating the Equatorial Atmosphere Radar (EAR) at Kototabang, West Sumatra, and long-term observations are continuing. To further strengthen the collaboration between Japan and equatorial countries such as Indonesia, we proposed the international school for study of the equatorial atmosphere. This school event was intended to benefit young scientists and researchers interested in this field by presenting a good summary of recent study techniques and topics. Also, this event helped accelerate our big research project to establish an Equatorial MU Radar (EMU) that is 10 times as sensitive as the existing EAR.

Lecture topics at the school included: (1) Introduction and basics of the Earth's atmosphere; (2) Basic and advanced atmospheric radar; (3) Equatorial rainfall and global climate; (4) Climate-biogeosphere- humanosphere interaction; (5) Atmospheric waves and coupling processes; (6) Upper atmosphere basics and observations; (7) Radio Acoustic Sounding System (RASS); (8) GNSS measurement of the atmosphere; (9) Numerical models in Japan and Indonesia; 10) Numerical simulation techniques for atmosphere; and (10) Hands-on training of IUGONET data analysis for promotion of atmospheric science. These topics are interrelated, so students were able to gain a deep understanding of the complicated processes involved in the equatorial atmosphere.

All lectures and school events were successfully completed, thanks to the great help of LAPAN staff. Participants learned the basics and research techniques of the equatorial atmosphere, and the importance of the EMU project to further understanding of overall atmospheric dynamics. We hope to hold the school regularly to maintain research activity in Southeast Asia. We also hope that leading scientists born in these countries will collaborate with us in the near future.

The 1st International School on Equatorial Atmosphere 2019 (ISQUAR) March 18–22, 2019 LAPAN Bandung, Indonesia

=Overseas Visiting Scholar=

Kinetic Alfvén Waves in the Space Plasmas

Senior Professor Satyavir Singh
Indian Institute of Geomagnetism, India

The acceleration of charged particles in space plasmas is related to the presence of parallel electric fields. The large parallel electric fields can be generated by solitons/weak double layers or direct acceleration by lower-hybrid waves. Kinetic Alfven waves (KAWs) can also accelerate charged particles. In the low β plasmas, a parallel electric field can develop due to the finite electron inertia which modifies the dispersion of shear Alfven waves. There are two types of kinetic Alfven waves depending on the electron thermal speed. When the electron thermal speed is much higher than the Alfven speed, the parallel electric field arises due to the electron pressure, and on the other hand when electron thermal speed is much lower than the Alfven speed, electron inertia creates the parallel electric field.

Observationally, kinetic Alfvén waves appear as broadband enhancements in electric and magnetic field wave power. These waves have been reported inside the plasmasphere in conjunction with, and modulated by, ultralow frequency (ULF) oscillations driven by an impulsive solar wind pressure enhancement and are identified as Doppler-shifted kinetic Alfvén waves. Further, KAWs may significantly impact particle dynamics in the inner magnetosphere through enhanced ion transport and heating. Observations carried out on-board S3-3, DE1, AUREOL 3, VIKING, CLUSTER, THEMIS, Van Allen Probes, MMS spacecrafts have given evidences for intense electromagnetic turbulence in solar wind and magnetosphere.

It has been a challenge to study the generation of KAWs using full kinetic dispersion relation. During the visit to RISH, Kyoto University, we explored the excitation of KAWs by an ion beam using full kinetic dispersion solver. In this work, we make use of the Kyoto University Plasma Dispersion Analysis Package (KUPDAP) which was made fully operational during one of my earlier visits in 2013–14 to RISH. First, we have tested the KUPDAP for two-component electron-ion plasma and could successfully obtain the published results on KAWs. Thereafter, the theoretical model was extended to include the ion beam to see the generation of KAWs in the solar wind. We have done the parametric analysis of these waves. Our analysis showed that for the relevant solar wind parameters, for low plasma β, KAWs can be excited for a beam speed larger than the Alfvén speed. The growth rate of KAWs is higher for smaller plasma β and larger ion beam density. Our results (Fig. 1) show that for larger ion beam density, smaller ion beam speed is required to generate these waves. We have scanned the 0–90^0 angle in order to measure the growth rate, ellipticity and Poynting vector directions. These waves are confined to very oblique angle of propagation ~80^0–88^0 with significant growth rate and ellipticity shows right/left handed depending on the angle of propagation. The Poynting flux is found to be confined predominantly along the direction of ambient magnetic field which is commensurate with the observations and theoretical predictions. In addition to KAWs, we also obtain non-resonant waves for angle of propagation ~0^0–50^0. These results from KUPDAP show that one can make use of full kinetic dispersion solver to delineate the characteristics of KAWs instead of relying on the two potential theory.

I also presented some of the results at Japan Geoscience Union (JpGU) Meeting, Makuhari Messe, Chiba, Japan (May 26–30, 2019). I visited ISEE, Nagoya University, Japan on June 18, 2019 and gave a "48th ISEE/CICR colloquium", on "Kinetic Alfvén waves in space plasmas".,

I am immensely thankful to Prof. Y. Omura for the support and extremely useful discussions during three months of my stay at RISH. It has been like a homecoming for me to Kyoto University. During the visit, we could jointly venture into an area of research which we wanted to explore for a long time. I am grateful to the cooperative staff at RISH who have made my stay very comfortable. Enjoyed the Cherry Blossom and the Golden Week!

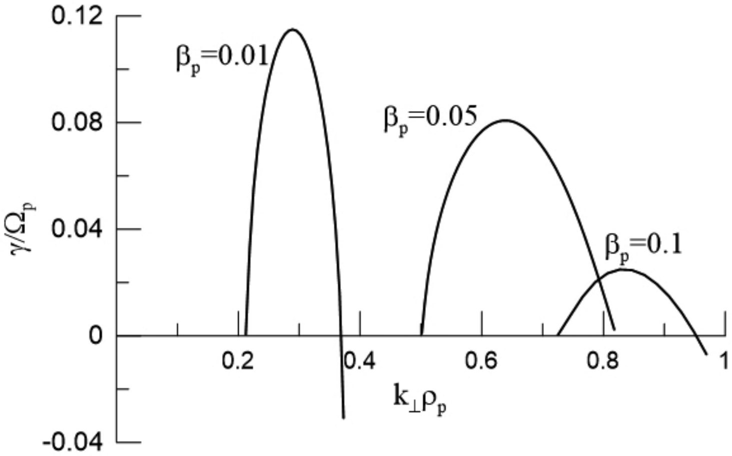


Fig. 1. The normalized growth rate of KAWs for different values of proton plasma beta for the solar wind parameters.

=Overseas Visiting Scholar=

International Research Cooperation at RISH, Kyoto University

Professor Heng-Ming Hsu
National Chung Hsing University, Taiwan

I am the first time to visit Research Institute for Sustainable Humanosphere (RISH), Kyoto University in July 2019. The school campus and dormitory environment are very interesting to me. They are well design to welcome the foreigners. It is a friendly atmosphere.

I cooperate with Prof. Shinohara to study the topic of wireless power transfer. In Shino's lab, his research is focus on wireless power transfer at radio frequency (GHz). I discuss the knowledge of wireless power transfer especially at high frequency from his lab's members. They use many techniques such as array antenna, beam forming, low loss diode among others to accomplish the whole system of wireless power transfer (WPT).

A WPT system consists of three main blocks: the power amplifier which converts DC power to RF signals, the coupling coil or antenna which delivers RF power from the transmitting to receiving side, and the rectifier which converts RF signal back to DC power. The overall efficiency (often referred to as DC-to-DC efficiency) of a WPT system is the multiplication of conversion efficiency of the power amplifier, RF-to-RF efficiency of the inductive coupling link, and conversion efficiency of the rectifier. Achieving high efficiency WPT is a challenging task which requires an integrated design taking into account all the characteristics of these system blocks.

To achieve a wireless power transfer system, it includes the power amplifier to deliver power, antenna or coupling coils to transfer power through air and the rectifier plays the role to provide DC power to load. Especially, the antenna is an important component in wireless power transfer. The array antenna is an interesting research to design the array size, spacing and antenna type to create a high efficiency antenna. The transmitter is also an important part for a wireless power transfer system. To meet a high efficiency criterion, a Class-E topology is used to implement a power amplifier. Traditionally, components of Class-E amplifiers are designed to operate at zero-voltage switching and zero-derivative switching (ZVS/ZDS) conditions, allowing near zero conversion loss even at high frequency.

To save cost, Shino's lab develops an injection-locked magnetron for high frequency transmitter. The photo picture of a 2.4 GHz wireless power transfer system in Fig.1. This is provided from Ph.D student Yang Bo in Shino's lab. It includes a magnetron to provide microwave power, circulator for phase alignment, horn antenna to deliver power via a long distance (= 3.5 m), the receiving antenna and a TV load.

I make a brief conclusion of the letter is that wireless power transfer is a promising research for future applications. As you know, the consumer electronics have been embedded the WPT part inside the device to make human convenience in daily life. The benefit for increased frequency makes WPT more compact size. When the operation frequency is increased, the challenge is need more effort to research. I am honor to visit RISH for brain storm of wireless power transfer knowledge. To establish an international cooperation and make a deep research between two groups.

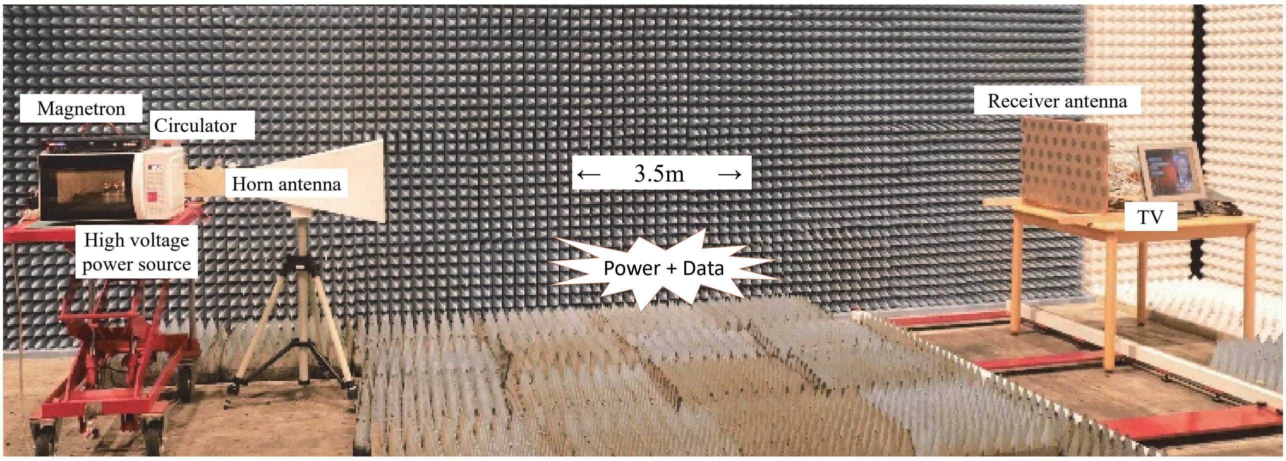


Fig. 1. Photograph of wirelessly-powered system.

=Overseas Visiting Scholar=

Research Activities at RISH on Cellulose Nanofibers and their Applications

Junior Associate Professor Supachok Tanpichai
King Mongkut's University of Technology, Thailand

Nanocellulose has grabbed more attention, and has become one of the international research fields with more than 2,500 scientific publications per year and total of 15,000 publications. Nanocellulose has a wide range of unique features such as light weight, low thermal expansion, high mechanical properties, biodegradability, biocompatibility and a high surface-to-volume ratio. Owing to its attractive properties, nanocellulose has been widely used in applications for instance, nanocomposites, coatings, packaging, filtration membranes, electronic devices and even cosmetic. Prof. Hiroyuki Yano is one of the pioneers to prepare cellulose nanofibers (CNFs) and develop cellulose nanopapers and cellulose nanopaper impregnated composites for electronic devices. It has been a great honor for me to collaborate with Prof. Hiroyuki Yano and his members and join the laboratory of active bio-based materials, where the breakthrough in preparing cellulose nanopapers was discovered, as a visiting scientist for 6 months between January and July 2019.

During my stay at Research Institute for Sustainable Humanosphere (RISH), I have worked under supervision of Prof. Hiroyuki Yano, and worked alongside with Mr. Subir K. Biswas, one of his enthusiastic PhD students. We successfully prepared optically transparent and tough composites of acrylic resin and CNFs using Pickering emulsification process without emulsifiers or coupling agents as shown in Fig 1 (a). The encapsulation of resin droplets by CNF networks plays an important role to control the emulsion stabilization. Transparent and tough composites were prepared by hot-pressing mats which were obtained from vacuum filtering the emulsions. With increasing CNF contents, the thicker layers of the CNF networks within the composites were formed, leading to the improvement in mechanical properties and toughness associated with the reduction in thermal expansion. The flexible transparent composites with superior mechanical properties and similar thermal expansion to a glass substrate could be possibly used as a promising substrate for electronic applications.

We have also focused on development of the green approach to shorten a time-consuming and repetitious procedure of the chemical and bleaching treatments for removing lignin and hemicellulose from lignocellulosic sources. Remarkably, we found that only alkaline treatment was sufficient to remove mostly lignin and hemicellulose from lignin-poor water hyacinth (*Eichhornia crassipes*) (Fig. 1 (b)), and subsequently prepare CNFs using the grinding method. Nanopapers of the water hyacinth-extracted CNFs exhibited a tensile strength of 66.6 MPa, a Young's modulus of 5.6 GPa and thermal expansion of 13.0×10^{-6} K^{-1}, which were similar to those from other lignocellulosic materials such as kenaf and bagasse. These outstanding results would possibly draw an attention to water hyacinth as an alternative cellulose source with a less lignin content, which requires the green approach with less chemical expense and shorter processing time to prepare CNFs for the large-scale production in tropical and subtropical countries. Also, this might solve the environment problems caused by water hyacinth such as irrigation, water transportation and fish population in opened water area due to its fast growing and high reproducing rate.

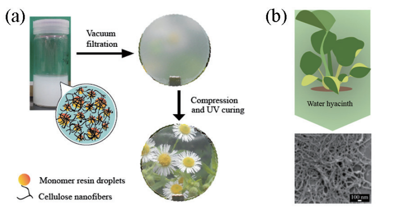


Fig. 1. (a) Fabrication of the composites by the Pickering emulsification and (b) Preparation of cellulose nanofibers from water hyacinth chemically treated with only alkaline treatment.

Last but not least, we have studied the possibility to prepare hydrophilic CNF films with hydrophobic features without any chemical modifications or use of chemical agents. We have borrowed the idea from the nature, lotus leaves where spherical water droplets flow. Simply, we made a series of the specific pattern on the surface of the TEMPO-oxidized cellulose nanofiber (TOCN) film (Fig. 2). This feature helped to improve wettability of the TOCN films, and increase the hydrophobic properties. The contact angle increased to 97.9° for the TOCN films with the pattern while the TOCN film with a clear surface had the contact angle of 83.6°. However, this was just the beginning of this work, and we require more time and techniques to effectively develop the TOCN films with superhydrophobic properties. This product would open a new era of the applications of the CNFs for medical devices and self-cleaning materials. We are preparing manuscripts based on the works I have done here, and hope to publish them in high-impact journals.

During the six-month stay, I

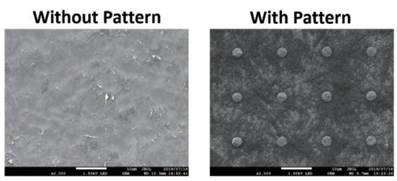


Fig. 2. Surface of the TEMPO-oxidized cellulose nanofiber films with and without modifying the pattern.

gained so much more research experiences and knowledge, and these have changed my ways to conduct research, and have solidified my academic career goals. The discussions with Prof. Hiroyuki Yano about the research and life have greatly inspired me as a researcher and a human being, guiding me to produce more high-quality and large-impact works. I also joined the annual meeting of the Japan Wood Research Society and the Cellulose Society of Japan. I would like to sincerely and gratefully thank Prof. Hiroyuki Yano for his kind invitation and warm hospitality. I would like to also express my sincere thanks to Prof. Fumiaki Nakatsubo, Assoc. Prof. Kentaro Abe, Mr. Subir K. Biswas, Mrs. Yuki Ishimaru, postgraduate students and members of the laboratory. Without them, I could not imagine my wonderful stay in Uji would be. I look forward to continuing the collaboration with RISH, and hope to have an opportunity to visit RISH again in the near future. Lastly, I would like to acknowledge RISH committee for providing this delightful visiting scientist program.

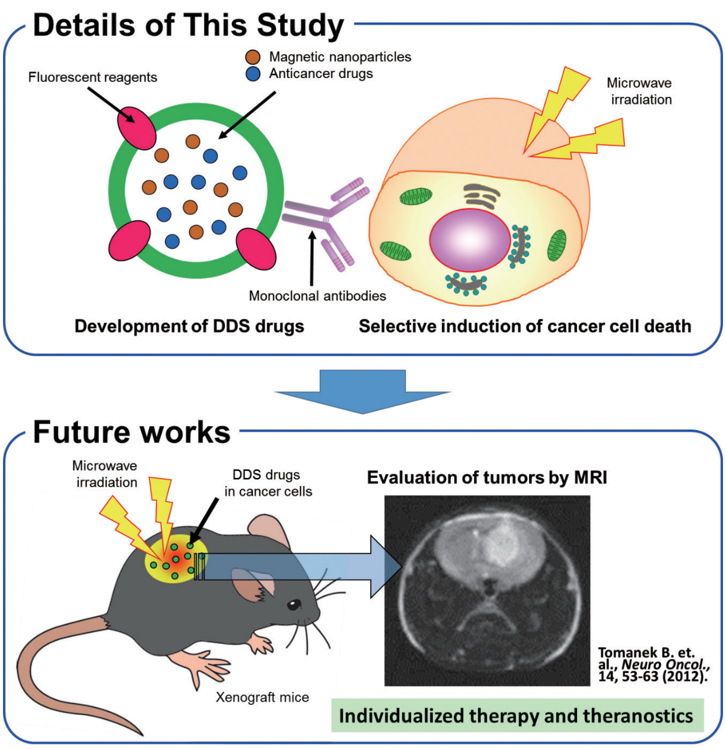
=RISH Mission Research Fellow=

Individualized Therapy and Theranostics for Cancer Using Microwave Irradiation and a Multifunctional Drug Delivery System

Dr. Mamiko Asano

Cancer is the leading cause of mortality in many countries, and it is crucial to treat cancers with a combination of various therapies. Common treatments for cancers include surgery, chemotherapy, and radiation therapy. However, these treatments generally have severe side effects, and it is difficult to administer them to some patients, such as children, pregnant women and seniors. Microwaves, a type of electromagnetic wave (frequency of 0.3–300 GHz), can efficiently generate heat in target substances. Microwaves have been utilized in cancer therapies to heat cancer cells to a high temperature. Recently, it has become possible to irradiate microwaves to substances with a precise control of temperature, output and frequency. We previously induced cancer cell death using microwave irradiation under normothermic conditions, in which the temperature of cancer cells was maintained at 37 °C. We also found that the cells were killed by microwave irradiation through heat-independent apoptosis. Moreover, microwave irradiation also induced the cell death of cancer-initiating cells (CICs) in MDA-MB-231 breast cancer cells. If this phenomenon could be applied to cancer treatments, the heat-related side effects could be avoided. We could then develop novel cancer therapies with little burden on patients' bodies.

As the first step toward achieving this goal, I develop a method that induces death only of targeted cancer cells by combining microwave irradiation and a drug delivery system (DDS) drug. Specifically, a DDS drug combining magnetic nanoparticles and an anticancer drug is localized to specific cancer cell molecules using a monoclonal antibody. If the cells are then irradiated with microwaves, they will be killed efficiently by heating the magnetic nanoparticles and treatment of the anticancer drug. In the future, I will apply the method *in vivo* to cancer-bearing mice as the first step of clinical trials. The magnetic nanoparticles could be used as a contrast agent for MRI, and tumors in a body could be detected with high sensitivity. Thus, I will be able to develop "Theranostics" to diagnose and treat cancers simultaneously.



=RISH Mission Research Fellow=

In situ Measurement of Soil Carbon Dynamics in Forest Ecosystem

Dr. Mioko Ataka

Forest soil is the largest carbon pool of all terrestrial biomes. Consequently, CO_2 efflux from soil (soil respiration) could have a large effect on carbon concentration in atmosphere, even if the fluctuations in response to climate changes were small. Therefore, we need a better understanding of soil respiration in response to environmental changes to accurately estimate its influence.

Soil respiration in forests has been widely reported. The causes of variability in soil respiration, however, remain poorly understood. In essence, this is because soil respiration is the sum of respiration by autotrophs and heterotrophs, which varies in space and time due to different sensitivities of autotrophic and heterotrophic respiration to their regulators. To accurately estimate carbon dynamics in ecosystem carbon cycle modeling, the relationships between CO_2 efflux from individual CO_2 sources and their regulators must be explicitly considered.

Here, in situ measurement of CO_2 efflux from individual sources is performed using the chamber method in combination with an infrared-gas analyzer. To measure various CO_2 sources (e.g., root, coarse woody debris, leaf litter, root litter, etc.), we designed a chamber appropriate to the size and shape of CO_2 sources (Fig. 1). Moreover, the combination of a high-frequency measurement system to control the open-close of chamber and gas flow lines enables us to measure temporal variation in CO_2 efflux from sources in response to environmental changes such as temperature and rainfall in the field.

We examined temporal variation in leaf litter and coarse woody debris respiration using the automated chamber system on a warm-temperate forest in the south of Kyoto (Yamashiro experimental forest). Both respirations showed substantial seasonal changes in association with temperature. In the short term, leaf litter respiration dynamically changed with the wetting and drying cycles of the layer (Fig. 2). Leaf litter respiration showed peaks during rainfall, and then reached almost zero within a few days because of rapid drying of the leaf litter layer. Therefore, the contribution of leaf litter respiration to soil respiration varies between 0–51% in response to the wetting and drying cycles of the leaf litter layer. Coarse woody debris respiration showed a decrease during rainfall due to waterlogging of surface debris, but after it gradually increased following moderate drying of the debris. Therefore, coarse woody debris respiration is a stable CO_2 source unless a long period of no rainfall occurs.

Overall, temporal variation in individual heterotrophic respiration sources was strongly affected by moisture dynamics of the substrate itself. Generally, in the study of soil respiration, individual trends in response to environmental changes are masked, which makes it difficult to understand the variability in soil respiration. Here, we also have tried to measure autotrophic respiration (root respiration) and to clarify forest soil carbon dynamics considering the linkage with the above- and below-ground ecosystems.

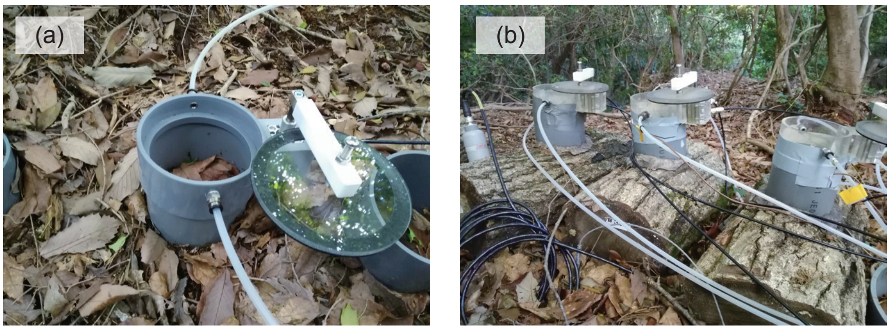


Fig. 1. Automated chamber for measurement of CO_2 efflux from (a) leaf litter and (b) coarse woody debris

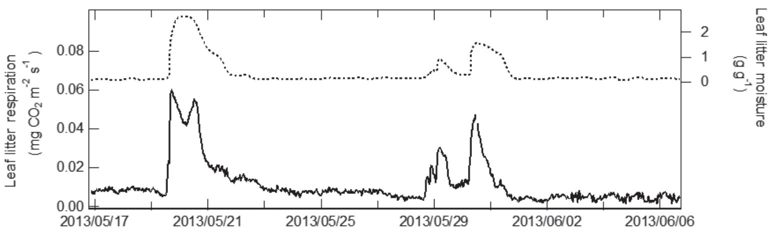


Fig. 2. Temporal variation in leaf litter respiration and moisture

Table1: List of International MOU in FY 2019

No.	Institution	Country
1	Nanjing Forestry University	China
2	Centre de Recherches sur les Macromolécules Végétales, Centre National de la Recherche Scientifique (CNRS)	France
3	National Institute of Aeronautics and Space of the Republic of Indonesia (LAPAN)	Indonesia
4	School of Biological Sciences, Universiti Sains Malaysia	Malaysia
5	VTT Technical Research Centre of Finland	Finland
6	Zhejiang A & F University	China
7	College of Atmospheric and Geographic Sciences, University of Oklahoma	U.S.A.
8	National Atmospheric Research Laboratory (NARL), Department of Space, Government of India	India
9	Institute of Mathematics and Informatics, Bulgarian Academy of Sciences	Bulgaria
10	Southwest Forestry University	China
11	College of Planning and Design, National Cheng Kung University	Taiwan
12	Faculty of Forestry, Tanjungpura University	Indonesia
13	Research Center for Biomaterials, Indonesian Institute of Sciences (LIPI)	Indonesia
14	Faculty of Science, Chulalongkorn University	Thailand
15	College of Forest and Environmental Sciences, Kangwon National University	Korea
16	Faculty of Civil Engineering and Planning, Islamic University of Indonesia	Indonesia
17	Material Science and Engineering College, Northeast Forestry University	China
18	Faculty of Mathematics and Natural Sciences, Andalas University	Indonesia
19	Indian Institute of Geomagnetism (IIG)	India
20	National Chung Hsing University	Taiwan
21	Khulna University	Bangladesh
22	National Space Organization, National Applied Research Laboratories of Taiwan	Taiwan
23	National Museum of Taiwan History	Taiwan
24	Faculty of Forestry, Faculty of Mathematics and Natural Sciences, Faculty of Agriculture, Mulawarman University	Indonesia
25	Forest Products Research and Development Center, Forestry Research, Development and Innovation Agency, Ministry of Environment and Forestry	Indonesia
26	Universiti Putra Malaysia	Malaysia

Table2: Visiting Professor of RISH in FY 2019

	Name and Affiliation	Research Title	Period
1	Supachok Tanpichai (Junior Associate Professor, King Mongkut's University of Technology, Thailand)	Preparation of anti-bacterial paper with chitin nanofibers	15 January 2019–14 July 2019
2	Satyavir Singh (Senior Professor, Indian Institute of Geomagnetism, India)	Study on kinetic Alfven waves in the solar wind and the magnetosphere	1 April 2019–30 June 2019
3	Jingquan Han (Associate Professor, College of Materials Science and Engineering, Nanjing Forestry University, China)	Study on self-healable and conductive nanocellulose hydrogels	15 June 2019–15 September 2019
4	Heng-Ming Hsu (Professor, National Chung Hsing University, Taiwan)	Multiple-Inputs and Multiple-Outputs Wireless Power Transfer Systems	1 July 2019–31 December 2019
5	Laura E. Bartley (Associate Professor, Department of Microbiology and Plant Biology, University of Oklahoma, USA)	Collaborative research on biogenesis and bioengineering of grass cell walls for biorefinery applications	16 August 2019–15 April 2020
6	Qing Huo Liu (Professor, Electrical & Computer Engineering, Duke University, USA)	Multiscale and Multiphysics Computation for Wireless Power Transmission	1 October 2019–31 January 2020
7	Sulaeman Yusuf (Professor, Research Center for Biomaterials, Indonesian Institute of Science, Indonesia)	Comparative Studies on Integrated Management of Urban Pests in Asia	1 October 2019–31 March 2020
8	Lakshmi Kantha (Professor, Aerospace Engineering Sciences, College of Engineering, University of Colorado, USA)	Studies of Turbulent Mixing in the Lower Troposphere by Synergistic Use of MU radar and UAVs	16 January 2020–15 July 2020

Table3: International Symposium and School in FY2019

Theme	Place	Period
NDACC Science Workshop in Tsukuba (412nd RISH symposium)	National Institute for Environmental Studies (Day1) Meteorological Research Institute/Aerological Observatory (Day2), Japan	17–18 October 2019
Humanosphere Science School 2019 (409th RISH symposium)	Bogor, Indonesia	28–29 October 2019
Science Meeting for Plasma and Nanobubble Research (413rd RISH symposium)	Tagajo Campus, Tohoku Gakuin University (Day1) Tokyo University (Day2), Japan	1 November 2019 / 27 December 2019
The 4th SATREPS Conference, Producing Biomass Energy and Material through Revegetation of Alang-alang (Imperata cylindrica) Fields (The 10th Flagship Symposium of Tropical Plant Biomass and 406th RISH symposium)	Uji Campus, Kyoto University, Japan	19–20 November 2019
The 4th Asia Research Node Symposium on Humanosphere Science (407th RISH symposium)	Nanjing, China	26–27 December 2019
The 9th VLF/ELF Remote Sensing of Ionospheres and Magnetospheres Workshop VERSIM 2020 (426th RISH symposium)	Uji Campus, Kyoto University, Japan	23–27 March 2020

The Committee of International Academic Exchange
Hirotsugu Kojima (Chair), Hiroyuki Hashiguchi, Kenji Umemura, Tatsuhiro Yokoyama, Chin-Cheng Yang
The Committee of Public Relations
Naoki Shinohara (Chair), Hirotsugu Kojima, Takafumi Nakagawa, Chin-Cheng Yang, Kei'ichi Baba, Suyako Tazuru, Hajime Sorimachi, Rika Kusakabe, Yoshimasa Kishimoto, Mayu Takeda
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