



International Newsletter

Research Institute for Sustainable Humanosphere, Kyoto University, Japan

= Foreword =

Further Development of International Research Activities at RISH

Professor Kazufumi Yazaki

Chair of the International Academic Exchange Committee of the RISH, Kyoto University



The Research Institute for Sustainable Humanosphere (RISH) of Kyoto University is aiming to promote academic activities and education in the field of a new humanospheric science, defined as an interdisciplinary science to conduct research concerning a humanosphere, through domestic and international collaborative research programs. Thereby RISH contributes to both academic and public societies. International collaborations play important roles in the academic activities of RISH. In fact, most members of RISH have been involved in multi-lateral collaborations with other universities or research institutes at both the domestic and international level.

One of the recent topics of international academic activities is the establishment of a new unit designated as the "Unit of Synergetic Studies for Space (USSS)" at Kyoto University and the direct commitment of RISH to the USSS. Professor H. Yamakawa of RISH introduces this new

unit as Deputy Director of USSS in this Newsletter with Assistant Professor of USSS, Dr. H. Isobe as a co-author. Another recent topic in RISH is the approval of a new international collaborative project, the Asia Africa Science Platform Program on "Ground-based atmospheric observation network in equatorial Asia," which is supported by the Japan Society for the Promotion of Science (JSPS). In this program, LAPAN (Indonesian National Institute of Aeronautics and Space) and NARL (National Atmosphere Research Laboratory) are the main counterparts that act as the coordinating organizations in Indonesia and India, respectively. Professor T. Tsuda of RISH, who is the coordinator of this JSPS program, introduces its background and activities in this Newsletter.

RISH has also been providing Humanosphere Science School. The Humanosphere Science School 2009 was held at the Biology Institute of LIPI (Indonesian Institute of Sciences) in Cibinong,

Indonesia, on March 26th and 27th in 2009. The details are reported by Associate Professor T. Hayashi of RISH. In addition, our international activities are also supported by many Visiting Professors and Visiting Scientists. As Visiting Professors, Dr. Sergey Shalimov from the Institute of Physics of the Earth in Moscow (Russia) and Dr. Yu Tian-You from the University of Oklahoma (USA) report about their visits and research activities at RISH. Among 7 Mission Research Fellows to pursue four missions at RISH, two foreign scientists, Dr. Md. Mahabubur Rahman and Dr. Sasa Sofyan Munawar, both currently working at RISH, provide reports on their research topics and experiences.

We are hoping that these international activities strongly support the establishment of a sustainable society worldwide. All Visiting Professors of RISH and International Symposia held by RISH from March to September 2009 are summarized at the end of this Newsletter.

= News Topics =

Humanosphere Science School 2009

Associate Professor Takahisa Hayashi

Humanosphere Science School (HSS) was held at the Biology Institute of LIPI (Indonesian Institute of Sciences) in Cibinong, Indonesia, on March 26 and 27, 2009. The conference was organized by the Research and Development Unit for Biomaterials at LIPI and supported by the Global Centers of Excellence (G-COE) Program at Kyoto University, in association with the Research Institute for Sustainable Humanosphere (RISH), the Center for South East Asian Studies (CSEAS), and the Graduate School of Asian and African Area Studies. Registration was open to all interested

parties (HSS 2009), and the participants included scientists and lecturers not only from universities and research institutes but also from the private sector. There were 108 attendees from Indonesia, most of whom came from areas near LIPI, though some came from Pekanbaru and Palembang on the island of Sumatra; there were also 13 attendees from Japan.

Lectures were delivered by young scientists and graduate students from Japan as well as by senior researchers from Indonesia. One topic of particular interest to this year's participants was how the exploitation of natural

resources has affected the ecosystems of Indonesia. For example, the recent flooding in the Riau Biosphere Reserve is considered to be the result of forest exploitation. The exploitation of Indonesia's forests is increasing because forest management strategies have not taken the nation's preserved areas into account. Another topic of discussion was the currently critical issue of global warming, caused by increasing levels of CO₂ in the air and the simultaneously decreasing ability of the world's forests to absorb CO₂.

Humanosphere Science School is an annual innovative intellectual endeavor where presenters and participants can share their knowledge about the latest issues related to the new field of humanosphere science. As an interdisciplinary conference, it is intended to encourage the participants to study these issues comprehensively. Future HSS conferences will explore the development of a scale allowing the humanosphere index to be rated and compared. Attendees are expected to discuss such topics as air pollution and the development of wood-based materials including composites and adhesives. As atmospheric science is becoming an important aspect of humanosphere science, HSS aims to emphasize this science both as a concept and as an area of study.



Picture 1. All the participants at HSS 2009

= News Topics =

Asia Africa Science Platform Program of JSPS on "Ground-based atmospheric observation network in equatorial Asia"

Professor Toshitaka Tsuda (Coordinator)

For the three years of FY2008-2010, we are promoting an international collaborative project, "Elucidation of ground-based atmosphere observation network in equatorial Asia," which has been selected as one of the Asia Africa Science Platform (AA-SP) programs

supported by the Japan Society for Promotion of Science (JSPS) (<http://www.jsps.go.jp/english/e-asia/e-acore/>).

Our project aims at establishing a concrete collaborative consortium among the Asian countries of groups devoted to atmosphere observations. In

particular, LAPAN (Indonesian National Institute of Aeronautics and Space) and NARL (National Atmosphere Research Laboratory) are the main counterparts serving as the coordinating organizations in Indonesia and India, respectively. The scope of this project is described on our web page (<http://www.rish.kyoto-u.ac.jp/radar-group/aaplat/index.htm>). Within this program, we are carrying out four types of collaborative research and capacity building programs: (1) intensive lecture courses, (2) on the job training (OJT), (3) exchange of scientists, and (4) workshops.

(1) Lectures: We have conducted three

series of intensive lectures by Japanese and Indonesian scientists at LAPAN in Bandung. The first lectures were held on 11-15 August 2008, with a main focus on “Cloud science and radar observation of the atmosphere,” where Prof. Y. Fujiyoshi gave “A short course in cloud science” and Dr. M. Yamamoto spoke on “Radar observation of the atmosphere.” The second lecture series was presented on 10-14 November on “Optical observation of clouds and the atmosphere,” and Dr. S. Iwasaki and Dr. T. Nakamura talked about optical observation of clouds and atmosphere. The third series of lectures on 13-17 July 2009 treated satellite observations, especially on TRMM (Tropical Rainfall Measuring Mission), GPS meteorology, and satellite radiometer. These lectures were given by Professors Y. Kodama, T. Tsuda, and M. Shiotani, respectively.

- (2) OJT: We operated OJT on 14-17 October 2008, inviting about 20 Indonesian scientists/students and Mr. P. Srinivasulu from NARL to the equatorial atmosphere radar (EAR). Basic radar techniques for wind and temperature observations with EAR were explained by Dr. Junichi Furumoto.
- (3) Exchange of scientists: The short-term exchange of scientists was promoted when Dr. V.K. Anandan and Mr. T.V.C. Sarma of NARL/ISRO (Indian Space Research Organisation) visited RISH to conduct experiments with the MU radar, and Mr. Wendi Harujupa joined a research team at Hokkaido Univer-

sity under the supervision of Prof. Y. Fujiyoshi. On the basis of interaction during the lecture in July 2009, we will invite a few Indonesian scientists to Japan in October-November 2009 for a collaborative study by using satellite data-sets.

- (4) Workshop: We held a workshop of AA-SP on 2-4 March 2009 at LAPAN in Bandung to discuss our collaborative activities. The meeting was opened with a welcome address by Dr. Bambang Teja, the deputy chairman of LAPAN, followed by three overview talks by representatives of RISH, LAPAN, and NARL (India). The oral sessions consisted of nine invited papers and four contributed talks. In addition, 47 poster papers were presented, and most of them were associated with active discussions. A total of more than 80 participants attended the workshop, including eight from Japan, two from India, and one from Vietnam. This meeting was jointly coordinated with another workshop on a JST project, “Prevention and Mitigation of Meteorological Disasters in Southeast Asia,” led by Prof. Shi-geo Yoden, Kyoto University.

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We sent some young Indian scientists to the 12th MST radar workshop held on 17-23 May 2009 in London, Ontario, Canada.

We will also organize an international symposium on “Radar and modeling studies of the atmosphere” on 10-13 November 2009 on the Uji campus of Kyoto University. This meeting is based on the mission of MOU (Memorandum of Understanding) regarding the academic exchange between the University of Oklahoma and DPRI and RISH of Kyoto University. We will take this opportunity to invite scientists from Asian countries, including India, Malaysia, Thailand, Vietnam, Indonesia, and Taiwan, to enhance mutual interactions and to establish personal relationships with these scientists.

We hope the collaborative research and education activities of AA-SP will enhance our collaboration in establishing an atmospheric community in Asia.



AA-SP Workshop participants, 2-3 March 2009, at LAPAN in Bandung

= News Topics =

Unit of Synergetic Studies for Space

Hiroshi Yamakawa (Professor, RISH, and Deputy Director, USSS) and Hiroaki Isobe (Assistant Professor, USSS)

The “Unit of Synergetic Studies for Space (USSS)” was established in April 2008. The aim of the unit is to encourage communication and collaboration of the different research fields related to space, and thus pioneer new interdisciplinary research projects through the integration and fusion of the different fields, such as astrophysics, solar phys-

ics, geophysics, astronautics, engineering, biology, medical sciences, social sciences, and the humanities.

The USSS consists of researchers from various departments and institutes of Kyoto University. There are currently about 35 members, and they are from the Research Institute for Sustainable Humanosphere (RISH), the Graduate School of Science, the Graduate School of Engineering, Yukawa Institute for Theoretical Physics, the Graduate School of Human and Environmental Studies, and The Kyoto University Museum. In addition, one assistant professor belongs exclusively to the USSS.

The members of the USSS have been conducting many outstanding research projects related to space sciences. A few recent examples are: X-ray astronomy by SUZAKU satellite, solar physics and space weather research using the HINODE satellite and ground-based telescope at Hida Observatory, the Mercury exploration project by BepiColombo/MMO spacecraft, atmospheric observation by the SMILES (Superconducting Submillimeter-Wave Limb Emission Sounder) instrument to be aboard the International Space Station, and development of a new 3.8-m telescope that will be the largest telescope in east Asia. There are also active groups working on theoretical and computational studies of astrophysical and space sciences. Collaboration of these strong but individual groups through the activities of the

USSS produces a synergetic effect that will further strengthen the space-related research taking place at Kyoto University.

In April 2008, Kyoto University and the Japan Aerospace Exploration Agency (JAXA) signed a cooperation agreement, aiming to enhance the previous cooperation in research and education between the two institutes (Fig. 1). The USSS also serves as Kyoto University's interface of the cooperation with JAXA.

To encourage communication and collaboration between researchers and students from different fields, the USSS organizes a regular seminar series in which speakers, both from inside and from outside the USSS, introduce their research. The seminar is open to everyone interested in the activities of the USSS. Furthermore, in fiscal year 2008 the USSS organized two symposiums. The first symposium was held in November 2008, in which the participants discussed the strategy and possible achievements of "synergetic studies for space." The second one was held in

March 2009, and it was a joint symposium with RISH and focused on the utilization of space.

Another interesting activity of the USSS started in January 2009, in collaboration with the Kyoto Seika University (KSU). KSU is a private university in Kyoto and has four faculties: Humanities, Art, Design, and Manga (cartoon/comic). The aims of the collaboration are (1) to pursue public outreach of space sciences with help from artists, designers, and Manga writers at KSU, (2) to provide the knowledge and outcome of space sciences, such as beautiful pictures of stars and galaxies, to the artists, designers, and Manga writers at KSU, and (3) to create a new culture by the "synergetic" collaboration of space scientists and artists. As the first product from this collaboration, the pamphlet of the USSS was produced by a designer and artist of KSU (Fig. 2). The interdisciplinary nature of the USSS was nicely explained, not by words but by artwork in the middle of the pamphlet.

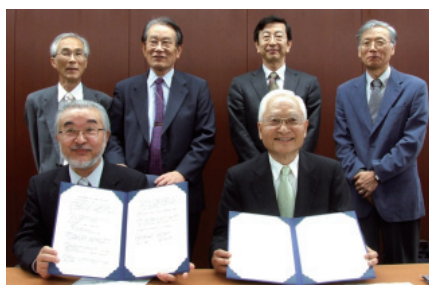


Fig. 1: At the ceremony for the signing of the cooperation agreement between Kyoto University and JAXA.



Fig. 2: The USSS pamphlet.

= Visiting Professor =

My visit and research activities at RISH

Dr. Yu Tian-You, Visiting Professor
from University of Oklahoma, USA



I am currently on sabbatical leave from the University of Oklahoma (OU), Norman, Oklahoma, U.S.A. and visiting RISH from May 1 to October 31, 2009. I am an associate professor in the School of Electrical and Computer Engineering (ECE) and adjunct associ-

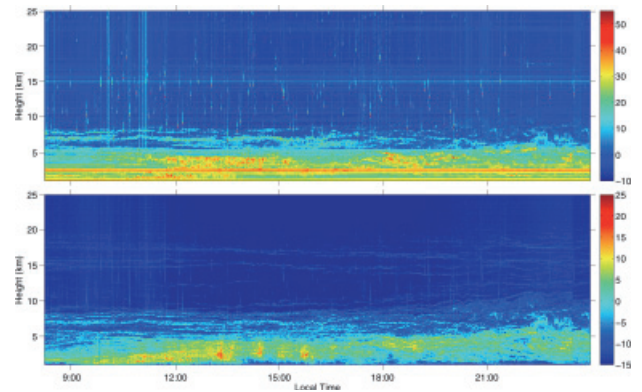
ate professor in the School of Meteorology (SoM). I am also a member of the Atmospheric Radar Research Center (ARRC), which is an interdisciplinary center at OU with 11 faculty and more than 30 students, well mixed from engineering and meteorology schools. The

topics of ARRC's research range from radar system design, signal processing and algorithm development, to applications to atmospheric and meteorological problems. More information about the ARRC can be found in the follow-

ing URL <http://arcc.ou.edu>.

One of my research interests is to develop novel techniques to improve radar performance with the goals of advancing our knowledge of the atmosphere and/or mitigating impacts of hazardous weather. During my visit, my research focuses on the development and application of imaging techniques using the Middle and Upper Atmosphere (MU) radar in Shigaraki. Unlike in-situ sensors that provide a point measurement of the quantity of interest, each radar measurement contains information integrated from a three-dimensional volume called radar resolution volume, which is often used to define the radar resolution in angle and range directions. The atmospheric radar typically has angular resolution of a few degrees and the range resolution of approximately a hundred meters. However, observations of the atmosphere with the scale finer than the typical radar resolution is important for the understanding of small-scale dynamics such as turbulent processes and atmospheric instabilities. One of the promising and effective approaches for improving resolution is the atmospheric radar imaging techniques, which can reveal the fine-scale structure within the resolution volume of the radar. Simply speaking, a snap shot of radar images of the atmosphere can be formed at high resolution. There are many different approaches for implementing atmospheric radar imaging techniques. One of the approaches termed Capon's

method is an adaptive technique that is superior at suppressing interference to achieve high-resolution performance. Recent upgrade of the MU radar to an imaging system with up to 25 digital receivers and 5 shifted frequencies provides an ideal platform to exploit imaging techniques. I have been working on the development of clutter mitigation for range imaging (RIM) or frequency domain radar interferometric imaging (FII) techniques. The RIM/FII only requires transmission of multiple frequencies to improve range resolution but is still susceptible to interference and clutter. However, by incorporating signals from multiple receivers the interference and clutter from RIM/FII processing can be significantly suppressed. The preliminary results are exemplified in the figure. The top panel is the height time intensity plot of radar echoes from a standard mode where signals from a single receiver and frequency were used. The radar image is contaminated by various sources of interference and clutter. For example, birds or airplanes echoes are manifested by strong and localized returns mostly above 5 km and spread over the entire period of observations. A strong interference is also evident at height of 3 km and other weaker interferences (shown as horizontal and vertical



stripes) are also apparent. Moreover, some layer structures can be observed but their modulation of the atmosphere is not clearly shown, due to the limitation of range resolution (150 m). On the other hand, by combining signals from 25 receivers and 5 frequencies simultaneously, interference and clutter are suppressed significantly and atmospheric layer structures can be shown more clearly due to the enhanced resolution provided by the processing technique. Quantitative assessment of developed technique is planned for the remaining period of my visit.

Specially, I want to thank Professor Yamamoto and Ms. Eto for helping myself and my family to settle in and make our living in Japan so enjoyable. I also want to express my sincere thanks to Dr. Furumoto for the fruitful discussions and the setup of MU experiments. I also like to thank my colleagues in RISH for their hospitality and have made my visit so pleasant. Finally, the sponsorship of my visit from RISH is acknowledged.

= Visiting Professor =

My visit and research activities at RISH

Dr. Sergey Shalimov, Visiting Professor from the Institute of Physics of the Earth, Moscow, Russia

I knew that there were several well-known scientific groups in Japan that investigate ionospheric plasma physics and coupling processes in the mesosphere and lower thermosphere and one of them was in the Research Institute

for Sustainable Humanosphere (RISH), Kyoto University. So I had gladly accepted the luck when Prof. M. Yamamoto kindly invited me to spend 6 months at RISH, where I arrived on the evening of May 1, 2009.



I discovered very good working and living conditions at RISH, provided by my hosts. Discussions both during regular seminars and informal showed me from the inside many interesting aspects of intensive scientific life in the laboratory headed by Prof. M. Yamamoto. This made my visit at RISH scientifically profitable and pleasant. What I actually did while I was in RISH involved theoretical studies of ionospheric E and F region coupling. A new studies that I started and finished at RISH led to 1 paper submitted for publication, and the other one that is under preparation for submission, my presentation for a RISH seminar, and participating in the Society of Geomagnetism and Earth, Planetary and Space Sciences (SGEPSS) meeting held at Kanazawa University on September 27-30, 2009.

My long-going interest is related with E and F region plasma physics and electrodynamic as well as ionosphere-neutral atmosphere interactions. Members of the Prof. M. Yamamoto's group are also involved into these research problems, which made it easy to discuss and collaborate with them. While I am basically a plasma physics theorist, my particular interest to experimental evi-

dences of plasma instabilities and E/F region coupling, sporadic E layers, QP echoes, and atmospheric wave action upon the ionospheric plasma have made it possible to understand through discussions an importance of the Es layer plasma instability process and consequences of E/F region coupling in it. During my stay I had good conditions to think and investigate these problems.

My work at RISH led to new results and a joint scientific paper, entitled Influence of mid-latitude sporadic E layer mesoscale patches upon the F region plasma density. In this paper we propose a model in which the electrical coupling between the band-like Es patch and F region depends on the presence of field-aligned closure currents and orientation of ambient electric field relative to the band, and results in corresponding F region plasma density variations caused by E region polarization process. In this way we reconcile the inconsistency between the presence of a large electric field that is responsible for the observed E region FAI drift velocity and the small value of the polarization field estimated from simultaneous airglow measurements on the same field lines in the F region (the observations were made in

STEL and RISH during simultaneous observations of VHF backscatter from FAI in the E region and MSTID in 630-nm airglow images in the F region). We showed that for typical ambient electric field values, strong (about 50%) depletions in F layer plasma density can be produced by and attributed with the presence of the sporadic E patch's polarization electric field mapped up to the F region rather than F region polarization.

During my working visit at RISH I still had an opportunity to visit with my wife Kyoto, Nara, saka, and Shirahama onsens where we enjoyed sightseeing and feeling from close culture, history, and spirit of the Japanese people. I was particularly amazed by the delicious Japanese quality of food, the technological development and prosperity, and last but not least the kindness and compassion of the Japanese people.

I am grateful to Prof. M. Yamamoto and the Committee of International Academic Exchange, RISH, Kyoto University, for their support and a big honour to be a member of Prof. M. Yamamoto's group during my visit. I wish to say thank you all those at RISH for their warm hospitality.

= Post-doctoral fellow =

Improvement of wood properties and disease resistance of tropical *Acacia* by transgenic technology

Dr. Md. Mahabubur Rahman
Mission Research Fellow (Foreign Researcher)



I am currently working as a mission researcher at the Research Institute for Sustainable Humanosphere (RISH), Kyoto University. I am pursuing my post-doctoral research entitled 'Regeneration and Genetic Transformation of *Acacia mangium*'. I came to Japan in October 2005 and enrolled in a Ph.D. course at that time. My Ph.D. degree was awarded in September 2008 from Tokyo University of Agriculture and

Technology, Japan.

The focus of my current research is the improvement of wood quality and quantity of tropical *Acacia* species through molecular breeding. Timber forests are renewable source of energy, and they can have a positive impact on the global economy. The end product of timber forest is woods, which has a wide range of commercial uses. The demand for wood is exceeding the

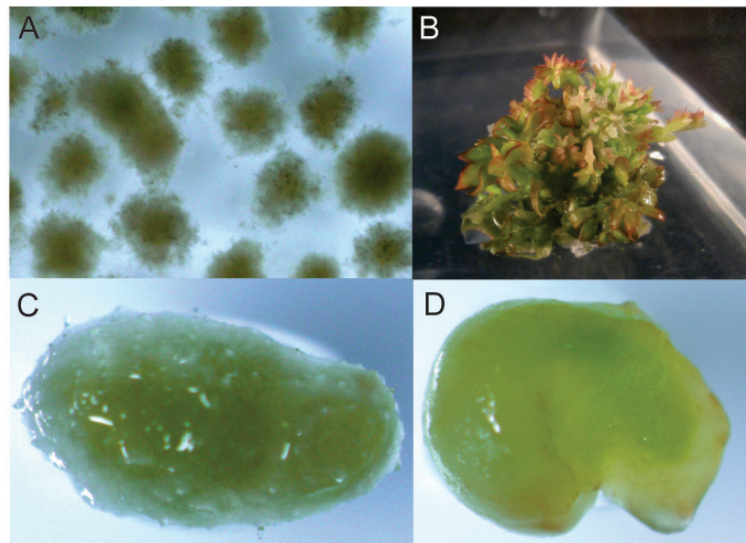
supply, and therefore the importance of reforestation is increasing. The goal of reforestation is the production of more wood within a short time, with less environmental impact. *Acacia* species are fast-growing, and they grow in tropical and temperate countries. The acacias have been used greatly as feedstock in the pulp and paper industries, and they are also used in a small-scale as construction materials. There is

recent research on the commercial production of bio-ethanol and bio-diesel from *Acacia* trees due to the desire for a reduction of dependency on fossil fuel. *Acacia* species are regarded as one of the most promising woody plants for establishing sustainable forestry. In fact, Oji Paper Company is interested in the plantation of *Acacia* species rather than that of other fast-growing trees in Asian countries such as Vietnam, Laos, and Thailand. Therefore, the following traits of *Acacia* should be improved: 1) more disease resistance for the large-scale mono-plantation, 2) chemical properties in wood such as lignin and cellulose content for reducing the production cost of wood products as well as reducing CO₂ emission, and the production of hazardous byproducts, 3) the wood properties including shape and strength suitable for construction materials. These improvements in the wood might be achieved within a short time by molecular breeding based on genetic information. The molecular breeding of *Acacia* species in the present research can change the gene expression, which may provide for the expression of desired traits, increasing wood produc-

tivity, wood quality, and disease resistance. The improvement of wood properties (reducing lignin content) and disease resistance (increasing flavonoids) would have a strong impact on the pulp and paper industries by reducing the production costs.

I would like to express my sincere thanks to my host supervisor, Professor Toshiaki Umezawa, for providing me with the opportunity to work with reputed researchers Assistant Professor Takefumi Hattori of RISH and Assistant Professor Shiro Suzuki of Institute

of Sustainability Science. I also had the pleasure of working with other staff and students of the Laboratory of Metabolic Science of Forest Plants and Microorganisms, RISH, Kyoto University. I am thankful to my Ph.D. supervisor, Professor Nobuo Yoshizawa, and other staff of the Laboratory of Forest Products, Utsunomiya University. My hope and expectation is that in the near future I will establish a novel method for the regeneration and genetic transformation of tropical *Acacia* species.



= Post-doctoral fellow =

Development of acacia mangium bark molded products reinforced with natural acids and non-wood plant fibers

Dr. Sasa Sofyan Munawar
RISH-mission Scientist from Indonesia



I am studying the development of acacia mangium bark molded products reinforced with natural acids and non-wood plant fibers. Renewable resources such as wood, bark, plant fibers, and the like offer an attractive way out of the impending economic and obvious ecological problems for the chemical sector over the next two to three decades. In recent years there has been a marked increase of interest in this research.

One of the advantages of renewable resources is that they offer the chance to utilize the synthetic power of nature.

During the production of pulp and paper or medium-density fiberboard, the raw material of wood has to be debarked, because bark decreases the pulp quality. Bark contains tannins, which have high potential as a raw material, and thus their utilization in the production of adhesives to be used

in plywood and particleboard has been studied. Moreover, some of these substances have been used for the commercial production of adhesives. However, the consumption of tannin in the production of adhesives is small, and most of the bark ends up as waste. Accordingly, the utilization of bark has become an important goal, since bark disposal has turned into a threat to the environment.

In a recent development, plant fibers with low cost, high performance, and lightweight materials have been used to replace pure synthetic polymers in the production of plastic products. To reduce synthetic polymers by incorporating more environmentally friendly products, researchers are attempting to use renewable resources (wood, bark, agriculture waste, etc) in the production of molded products.

In our research, plant fibers (ramie, pineapple, sansevieria), natural acid



(citric acid), and acacia mangium bark were used. Acacia mangium bark powder, ramie fiber, pineapple fiber, sansevieria fiber, and citric acid with various production conditions were mixed and molded at 140-200°C and 4 MPa for 10 minutes. Molded products that pressed at 180-200°C showed good values in mechanical properties and water resistance, according to the JIS standards for wood-plastic composites.

These results clarified that citric acid is a promising substitute for curing accelerator and binder when producing high-performance molded products. This is due to the carboxylic acid groups in the citric acid moieties that get bound to the hydroxyl group on the bark via esterification. Those products are expected to be used for automotive body parts, packaging materials, and building components, improv-

ing human life globally.

During my research, I have had the opportunity to present papers at several seminars. In May 2009, I and Prof. Kawai's members visited Ashiu Forest, a wonderful place north of Kyoto. We learned and discussed forest ecosystem and vegetation. We also have had the field-trip to visit some wood composite and building industries around Kansai area.

I would like to express my sincere appreciation to Prof. Shuichi Kawai, Prof. Kazufumi Yazaki, and Dr. Kenji Umemura, who gave me the opportunity to work at RISH and to present an article in this International Newsletter. In addition, I would like to express my thanks to all the professors and other members of RISH who continually helped me by giving scientific advice, valuable comments, and untiring support in my research work and also in my daily activities.

Visiting Professors of RISH from March to September 2009.

Period	Name Affiliation	Research title
15 December 2008- 15 May 2009	GRIL, Joseph, LMGC, France	Wood aging – a theoretical approach
13 January 2009- 23 April 2009	Hadi Yusuf Sudo, Institut Pertanian Bogor, Indonesia	Test methodologies to evaluate the biological resistance of wood and wood-based composites in temperate and tropical regions
1 May 2009- 31 October 2009	SHALIMOV, Sergey, Institute of Physics of the Earth Russian Academy of Science, Russia	Theoretical study of ionospheric E-region and F-region coupling
1 June 2009- 31 October 2009	Yu, Tian-You, University of Oklahoma, USA	High resolution atmospheric observations using multi-receiver and multi-frequency
15 June 2009- 14 September 2009	GUAN, Zhongwei, University of Liverpool, UK	Numerical modelling of compressed wood fasteners with compressed wood dowels
1 September 2009- 28 February 2010	SUMMERS, Danny, Memorial university of Newfoundland, Canada	Study on formation and loss processes of radiation belt electron flux in the Earth's magnetosphere

International Symposium from March to September 2009.

Period	Theme	Place
2-5 March 2009	A workshop on "Ground-based atmosphere observation network in equatorial Asia"; the Asia-Africa Science Platform (AA-SP) Program of JSPS (120th RISH Symposium)	Bandung, Indonesia
26-27 March 2009	Humanosphere Science School: "Towards Establishment of Sustainable Humanosphere" (124th RISH Symposium)	Cibinong, Indonesia
12-23 May 2009	International school for MST radars and 12th International Workshop on Technical and Scientific Aspects of MST Radar (125th RISH Symposium)	London in Ontario, Canada
4-5 August 2009	Humanosphere Science School 2009: "Scientific Exploration and Sustainable Management of Peat Land Resources in Giam Siak-Bukit Batu Biosphere Reserve of Riau, Sumatra" (128th RISH Symposium)	Cibinong, Indonesia

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 Yuji Imamura,
 Shuichi Kawai,
 Hirotsugu Kojima,
 Toshitaka Tsuda,
 Kunio Tsunoda,
 Toshiaki Umezawa,
 Mamoru Yamamoto, and
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