

Newsletter

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ICHARM

International Centre for Water Hazard and Risk Management
under the auspices of UNESCO

Message from Director

Policy & Community of Practice and Science & Technology

"Transdisciplinary" means co-design and co-production in cooperation between scientists and stakeholders. This concept is proposed as a new approach of science & technology to social and other issues based on a reflection that we have not been successful in demonstrating concrete methodologies for solving earth environmental issues and reducing disaster damage, although we have increased scientific knowledge and technology. I think, however, something important is left out of this interpretation of "transdisciplinary". With the current understanding, the term still connotes that scientists and stakeholders are different entities. We need, instead, to consider both as a single unit and develop a better capacity for handling knowledge and experience back and forth between science & technology and policy & community of practice.



Director Toshio Koike (far right) shakes hands with one of the M. Sc. course students at the graduation ceremony on September 14, 2017

Every year, over ten mid-career practitioners selected from various countries join the Disaster Management Policy (DMP) program offered by ICHARM and the National Graduate Institute for Policy Studies (GRIPS) with a strong financial support from the Japan International Cooperation Agency (JICA). There was a Malawian student in last year's class, and he graduated this September. He works at a national disaster management organization back home, and already had had basic knowledge and experience on socio-economic analysis and trans-boundary river management when he joined the program. At GRIPS and ICHARM, he improved his socio-economic understanding, and began to learn a methodology for assessing climate change impact on floods. Then, he completed excellent research to incorporate assessment results in national and transboundary flood management policy plans. Fortunately, he had an opportunity for presenting his research at home just after his graduation. In response to his report, a new international project has been decided with a strong financial support by international organizations. He is an excellent example of "skilful knowledge and experience handlers" bridging between science & technology and policy & community of practice.

It is critically important to train political and community leaders who can create societal benefits by learning science & technology and policy studies as a package. With a renewed commitment to this educational mission of ICHARM, we will step up our efforts to groom as many excellent social leaders as possible in collaboration with our great partners, GRIPS and JICA.

October 31, 2017
Toshio Koike
Director of ICHARM

政策・社会実践と科学・技術

科学者と当該問題の利害関係者が相互に協力して計画し、それを実行することを意味して、「トランスディシプリナリー」という言葉が使われています。いくら科学が進んでも地球環境問題は解決できず、災害による被害も減らないという反省に立って、新たな科学・技術のあり方として提案されている概念です。私はこの考え方は依然として不十分であると考えております。なぜなら、この概念はあくまでも社会と科学・技術を分けた考えに基づいていますが、本来は一体として捉え、科学・技術から政策・社会実践へ、また政策・社会実践から科学技術へ、知識や経験を自在に取り廻す能力を養う必要があると考えているからです。

JICAのご支援を得て ICHARM が政策研究大学院大学 (GRIPS) と共同運営している「災害管理政策プログラム」の修士課程には、各国から選抜された十数名の中堅の政府機関の実務者が集っています。今年9月に同課程を修了したマラウィ国からの学生は、社会経済分析や隣国との国際調整経験のある同国の災害管理部署の所属でした。彼は同プログラムで社会経済学的な理解を深め、気候の変化による洪水形態の変化のアクセス手法を学びはじめ、その結果を国内河川および越境河川の洪水管理政策に具体的に反映する手法についての優れた研究を行いました。帰国後すぐにその結果を発表する場を得たところ、国際機関の強い支持を得て、プロジェクト化が決まったとの連絡を頂きました。

科学・技術と政策学とを一体として習得して、社会的価値を創造する能力を有する政策立案や社会実践の指導者の育成が極めて重要であると考えます。これこそ ICHARM の教育使命として自覚を新たに、GRIPS と JICA という素晴らしいパートナーに恵まれている教育環境を十分に活かして、一人でも多くの素晴らしいリーダーの誕生に一層努力させて頂きたいと存じます。

Coming Events

ICHARM technical session to be held at World Bosai Forum

2017年11月25日から28日に仙台国際センターで開催される世界防災フォーラムにおいて ICHARM が下記のセッションオーガナイザーを務めます。水災害リスクの軽減に向けた国際的な取り組みを学術的に議論する貴重な機会ですので、皆様のご参加をお待ちしております。

水と災害に関するプラットフォーム — ICT、経済、コミュニティ、ダイナミクス —

日時：
11月28日(火) 9:00 – 10:30

会場：
仙台国際センター会議棟3階 白樺1 (Room 6) 〒980-0856 仙台市青葉区青葉山無番地

URL : <http://www.worldbosaiforum.com/>

*参加には世界防災フォーラムへの参加登録が必要です。

<セッション概要>

ICHARM は、ユネスコ (UNESCO)、世界気象機関 (WMO)、国連大学 (UNU)、国連国際防災戦略事務局 (UNISDR)、国際水文科学協会 (IAHS)、国際水理学会 (IAHR) の共同イニシアティブである国際洪水イニシアティブ (IFI) の事務局として、各国における水と災害に関するプラットフォームの構築を推進しています。セッションでは、水と災害に関するプラットフォームをテーマに、東京大学生産技術研究所の喜連川優教授、アジア開発銀行研究所所長の吉野直行教授をお招きし、ICHARM の江頭進治研究・研修指導監、大原美保主任研究員を加え、水関連災害による被害軽減に向けて、ICT、経済、コミュニティ、ダイナミクスといった多様な視点からご講演していただきます。またパネルディスカッションでは、海外から Dr. Renato U. Solidum Jr. 科学技術省次官 (フィリピン)、Dr. Asiri Karunawardena 国家建築研究所長 (スリランカ)、Dr. Manzoor Ahmad Malik パキスタン水資源調査評議会議長 (パキスタン)、Dr. Marengo Jose Antonio 国家自然災害モニタリング・警報センター研究総括コーディネーター (ブラジル) の4名の政府関係者をお招きし、水災害リスク軽減に向けた国際的な動向と各国の取り組みについて講演者と共に議論します。

ICHARM ウェブサイト : http://www.icharm.pwri.go.jp/special_topic/wbf_j.html



**World
BOSAI
Forum**

IDRC 2017 in SENDAI The World Bosai Forum will take place at the Sendai International Center on November 25-28, 2017, and ICHARM will host a technical session during the forum. The session is planned to provide a unique opportunity to have academic discussions on international efforts to flood disaster risk reduction. We hope that people around the globe will use this opportunity as a stepping stone to increase the resilience of each country to water disasters.

Platform on Water and Disaster ~ ICT, Economy, Community, Dynamics ~

Date: 9:00 – 10:30, Tuesday, 28 November 2017

Venue: Shirakashi 1 (Room 6), Conference Bldg. 3F, Sendai International Center
Aobayama, Aoba-ku, Sendai, 980-0856, Japan

<http://www.worldbosaiforum.com/english/>

Note: Prior registration is required for participation in the World Bosai Forum.

Outline of the session:

ICHARM has been promoting the establishment of the Platform on Water and Disasters in each country as the secretariat of the International Flood initiative (IFI), which is a joint initiative in collaboration with international organizations such as UNESCO, WMO, UNISDR, UNU, IAHS and IAHR. In this context, the ICHARM technical session will discuss how the Platform on Water and Disasters can contribute to reduction of water-related disaster damage from diverse perspectives such as ICT, economy, community, and dynamics by inviting speakers of different expertise (see below). The session will also be joined by four government officials from overseas (also see below) to discuss with the speakers the international trend and the effort by individual countries in water-related disaster risk reduction. For more information, visit: http://www.icharm.pwri.go.jp/special_topic/wbf_e.html.

Invited speakers:

Masaru Kitsuregawa, Professor, Institute of Industrial Science, University of Tokyo
Naoyuki Yoshino, Director, Asian Development Bank Institute
Shinji Egashira, Research and Training Advisor, ICHARM
Miho Ohara, Senior Researcher, ICHARM

Invited discussants:

Renato U. Solidum Jr., Undersecretary, Department of Science and Technology (DOST), Philippines
Asiri Karunawardena, Director General, National Building Research Organization (NBRO), Sri Lanka
Manzoor Ahmad Malik, Director, Pakistan Council of Research in Water Resources (PCRWR), Pakistan
Marengo Jose Antonio, Coordinator General, Centro Nacional de Monitoramento e Alerta a Desastres Naturais (CEMADEN), Brazil

(Written by Mamoru Miyamoto)

Special Topics

ICHARM Director Toshio Koike elected as a member of the Science Council of Japan

On October 1, 2017, the Science Council of Japan*¹, currently presided by Dr. Juichi Yamagiwa, the president of Kyoto University, officially released the list of its newly elected members for the 24th term starting on the same day. Professor Koike is among the new members who are distinguished scholars and scientists in various fields of sciences, including humanities and social sciences. The council announced the names of 105 new members this time, which is half the total number, 210, of the council members. The tenure is six years.



ICHARM Director
Toshio Koike

*1 Science Council of Japan

The council was established in January 1949 as a "special organization" under the jurisdiction of the prime minister, operating independently of the government, with the firm belief that science is the foundation upon which a civilized nation is built, and has since been serving the purpose of promoting and enhancing the field of science and having science reflected in and permeated into administration, industries and people's lives. It represents Japan's 840,000-odd scientists both domestically and internationally, consisting of 210 elected members and about 2,000 associate members, who share the responsibilities to support the organization. The following are the council's two main missions:

- To deliberate on important issues concerning science and help solve such issues
- To make coordination among scientific studies to achieve higher efficiency

(For more information, visit: <http://www.scj.go.jp/en/index.html>)

(Written by Daisuke Kuribayashi)

日本学術会議（会長：山極 壽一（やまぎわ じゅいち）（京都大学総長））（注1）は、2017年10月1日、同日から始まる第24期の会員210名の半数にあたる105名の新会員名簿を発表しました。会員には、人文・社会科学分野を含む学術の全分野から、優れた業績のある研究者が選ばれており、今回、新会員として小池センター長が選出されました。なお、任期は6年です。

注1) 日本学術会議

日本学術会議は、科学が文化国家の基礎であるという確信の下、行政、産業及び国民生活に科学を反映、浸透させることを目的として、昭和24年（1949年）1月、内閣総理大臣の所轄の下、政府から独立して職務を行う「特別の機関」として設立されました。職務は、以下の2つです。

- 科学に関する重要事項を審議し、その実現を図ること。
- 科学に関する研究の連絡を図り、その能率を向上させること。

日本学術会議は、我が国の人文・社会科学、生命科学、理学・工学の全分野の約84万人の科学者を内外に代表する機関であり、210人の会員と約2,000人の連携会員によって職務が担われています。

（日本学術会議ウェブサイトから作成）

International Flood Initiative (IFI)

INTERNATIONAL FLOOD INITIATIVE

The International Flood Initiative (IFI) is a framework to improve flood management on a global scale in collaboration with such international organizations as UNESCO, the World Meteorological Organization, the United Nations University, and the International Strategy for Disaster Reduction. ICHARM has been the secretariat for IFI since the establishment of the initiative.

In October 2016, the Jakarta Statement was adopted by the organizations participating in IFI to establish interdisciplinary cooperation for further promoting flood risk reduction and sustainable development. Based on this agreement, IFI, while keeping close ties with countries and other organizations, will proceed with activities to implement integrated flood management by incrementally moving from "Phase 1: Demonstration," to "Phase 2: Prototyping," and finally to "Phase 3: Operation."

As part of this effort, the Philippines, Sri Lanka, Pakistan and Myanmar have already decided to establish a platform for disaster risk reduction involving various government agencies, and ICHARM has been actively supporting their decision by facilitating close communication between relevant organizations, both domestically and internationally.

The following introduces the cases of Sri Lanka.

国際洪水イニシアチブ（International Flood Initiative: IFI）はユネスコ、世界気象機関、国連大学、国連国際防災戦略などの国際機関が世界の洪水管理推進のために協力する枠組みで、ICHARMは、IFIの事務局を担当しています。

2016年10月には、IFIの関係機関により、洪水リスク軽減と持続可能な開発を強固にするための学際的な協力に向けた「ジャカルタ宣言」が採択されました。これにより、各国および関係機関と協働しながら、フェーズ1の「デモンストレーション」からフェーズ2の「プロトタイピング」、フェーズ3の「オペレーション」へと展開し、統合洪水マネジメントに貢献する活動を進める予定です。

特に、フィリピン・スリランカ・パキスタン・ミャンマーにおいては、各国の関係機関により「防災プラットフォーム」を設立することになり、ICHARMは設立のためのファシリテーターとして、各国で意見交換を行っています。

以下、スリランカでの取り組みを紹介いたします。

Plenary Session for the Platform on Water and Disasters held in Sri Lanka - Support to establish IFI platform -

2017年5月下旬にスリランカ国で発生した甚大な洪水被害を受け、その復旧を支援するため、日本国政府から国際緊急援助隊が派遣され、ICHARMとしても Rasmy 主任研究員を派遣することにより協力を行いました。しかしながら、スリランカ国では、今後も更なる洪水被害の発生が懸念されるため、日本の高度かつ最新の情報科学技術を最大限に活用した、再度災害の防止と災害の応急復旧・復興に資する情報が必要とされています。

ICHARM では、衛星観測雨量データや降雨流出モデル等による気象・洪水予測や氾濫解析等の研究を行っており、これまでの研究成果を活用することによって、同国における洪水対策に資する情報提供を行うとともに、その活用のための研修や人材育成等を行うこととしています。

また、ICHARM では、国際洪水イニシアティブ (IFI) の事務局として、深刻な洪水被害を受ける各国で、洪水管理に関係する機関と協働しつつ、水と災害に関するプラットフォームの構築を支援しています。

この一環として、2017年8月24日午後、スリランカ国コロンボにて「水と災害プラットフォームに関する会議」を開催し、同国の洪水対策に関係するすべての機関が参加しました。

会議には、スリランカ国のかんがい局や災害管理センター、気象局、測量局、大都市・西部開発省から30名以上が出席し、ICHARMからは小池センター長、伊藤上席研究員、池田上席研究員、Rasmy主任研究員、津田主任研究員、山崎専門研究員の6名が出席しました。共同議長である小池センター長と大都市・西部開発省の Srikantha Herath 教授からの開会挨拶の後、2017年の洪水に関して、スリランカの各機関より発表がなされるとともに、ICHARMの各研究員から提供する洪水情報について発表が行われました。

それら発表の後、小池センター長より水と災害プラットフォームと今後の展開について発表がなされ、参加者による討議が行われました。そして、同国のプラットフォームの概念等について基本的な合意が得られ、早期警報など4つのターゲットアクションが Kalu 川など3つの河川流域で行うこととされ、それぞれのアクションについて事務局としての役割がスリランカの各機関に割り当てられました。

ICHARM では引き続きスリランカの洪水対策支援を行うとともに、今回、決定されたターゲットアクションの推進を図っていくこととしております。

When a severe flood disaster occurred in Sri Lanka in late May this year, the government of Japan dispatched the Japan Disaster Relief (JDR) Expert Team to Sri Lanka to assist in flood recovery efforts. ICHARM supported by sending Senior Researcher Mohamed Rasmy as one of the JDR experts. After the disaster, Sri Lanka is planning to implement effective measures to prevent damage to lives and property, as it anticipates more flood events in the future. To this end, the latest information on disasters and related issues is needed to plan practical prevention for recurring disasters and prepare emergency response and post-disaster restoration by maximizing Japan's advanced science and technology.



Discussion at the session

Since ICHARM conducts research on climate and flood forecasting and inundation analysis using satellite monitoring precipitation data and a rainfall runoff model, it can contribute a great deal to support Sri Lanka's effort. ICHARM is planning to provide information useful for flood management in Sri Lanka by utilizing research outputs achieved to date, and offer training and capacity development programs for local experts to learn proper utilization of information provided.

In addition, as the secretariat of the International Flood Initiative (IFI), ICHARM is supporting countries suffering from serious flood disasters in establishing a platform on water and disasters in collaboration with their organizations relevant to flood management.

As part of this support effort, the "Plenary Session for the Platform on Water and Disasters" was held on the afternoon of August 24, 2017, in Colombo, Sri Lanka, in which all organizations relevant to flood management in Sri Lanka participated.

More than 30 Sri Lankan participants attended this session from the Irrigation Department, the Disaster Management Center, the Department of Meteorology, the Survey Department, and the Ministry of Megapolis and Western Development. Six researchers participated from ICHARM: Director Toshio Koike, Chief Researcher Hiroyuki Ito, Chief Researcher Tetsuya Ikeda, Senior Researcher Rasmy, Senior Researcher Morimasa Tsuda, and Research Specialist Yusuke Yamazaki.

After the opening remarks by co-chairs, Director Koike and Professor Srikantha Herath of the Ministry of Megapolis and Western Development, each Sri Lankan institute delivered a presentation on the flood disaster in 2017. Then, ICHARM researchers presented flood information to be provided for Sri Lanka.

Following these presentations, Director Koike explained the Platform on Water and



Group photo of the session participants

Disasters in detail including its future development. Discussions followed among all the participants. A basic consensus was made on the concept of the Platform in Sri Lanka and other issues. The participants also agreed that four target actions, such as early warning, will be implemented in three river basins (e.g., Kalu River). The secretariat role of these actions was assigned to individual Sri Lankan institutes.

ICHARM will continue the support for flood management in Sri Lanka, promoting the implementation of the four target actions that have been decided at this session.

The documents and presentation materials of the session are available online at: <http://www.icharm.pwri.go.jp/index.html>

(Written by Tetsuya Ikeda)

会議資料については、以下のサイトをご参照願います。
http://www.icharm.pwri.go.jp/index_j.html

Research

Studies on Disasters Resulted from the July 2017 Rainfall Event in Northern Kyushu

In early July 2017, northern Kyusyu was hit by record heavy rainfall due to a seasonal rain front crossing the region. On July 5, the extreme rainfall triggered numerous landslides and debris flows in mountain regions around Asakura City of Fukuoka Prefecture, which is located on the right-bank side of the Chikugo River. Those sediment-related hazards eventually resulted in floods and inundations transporting a large volume of sediment and driftwoods, inflicting tremendous damage in downstream areas with 41 people either dead or missing and a huge loss of private and social assets.

In Japan, disasters such as this one are commonly known as “floods at the front gate, landslides at the back gate,” which describes a situation in which one can hardly escape a disaster. Unfortunately, there are numerous rivers that fit this description in Japan, and appropriate measures suitable for each river’s specific conditions should be implemented as soon as possible. However, hazards such as the one found in northern Kyushu often involve complex phenomena of landslides, debris flows, and flood flows with sediment transport and driftwoods. In planning a river channel, these phenomena need to be analyzed and evaluated, but because of their complexity, numbers of technical issues still remain to be studied and discussed. Other factors, such as reliable risk communication, which are required to sustain a disaster resilient society should also be further scrutinized and better understood.

ICHARM has been studying this heavy rainfall event in northern Kyushu in order to propose guidelines for river improvement and urban development. We have

2017年7月5日前線性豪雨によって筑後川右岸域の福岡県朝倉市一帯において山腹崩壊・土石流が多発して、流砂・流木を伴う洪水氾濫が引き起こされた。その結果、41人の死者・行方不明者を出すとともに、個人及び社会資産に甚大な被害が生じた。当該災害は、まさに前門の洪水災害、後門の土砂災害として特徴づけられ、この国には、このような河川は無数にあって、個々の状況に応じた適切な災害対策が待たれるところである。しかし、山腹崩壊・土石流、流砂・流木を伴う洪水流のように現象が複合していて複雑なことから、河道設計において、それらを評価するにあたっては、調査・検討すべき技術上の課題が多く、また的確なリスクコミュニケーション等、レジリエントな社会を支える様々な要素について、内容の検証・進化が求められている。

ICHARM においては、川づくりや街づくりのための指針を整備するため、当該災害を対象として現地調査、写真・地形解析および数値シミュレーション等を通じて、豪雨の機構、山腹崩壊・土石流・流木の発生と流動機構、流砂・流木を伴う洪水流等、ハザードの評価に着目した研究を推進するとともに、災害情報に係る資料解析やヒアリング調査等を通じて、効果的なリスクコミュニケーションのあり方等、災害対応施策についての研究も行っている。図1は、成果の一例として、赤谷川におけるハザードの特性を地形縦断図上に模式的に示したものであって、これは現地調査およびこれまでに蓄積されてきた知見に基づいて作成している。山腹斜面や河岸領域において勾配が30度を超える領域で多数の崩壊が起こり、その移動過程において土石流が形成され、それは、勾配4~8度の領域まで流出し堆積している。同時に崩壊を含む侵食域においては流木が生産され、土石流とともに流下し堆積する。土石流堆積土砂および流木は、洪水によって下

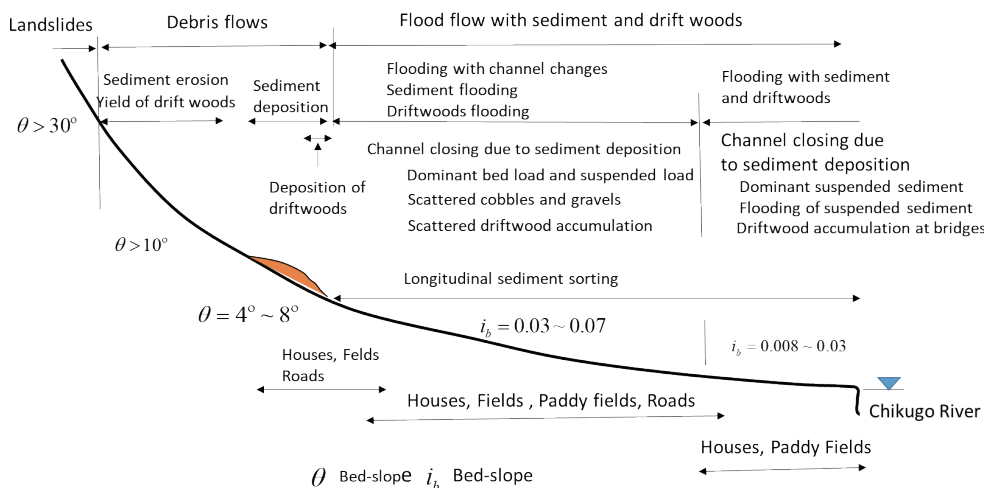


Figure 1: Characteristics of hazards resulted from the rain fall event at northern Kyusyu in July 2017

Research

流域に輸送される。洪水氾濫は、土石流堆積領域よりも下流域で顕著であり、これは流路変動、流砂の堆積による流路閉塞および流木の集積現象によって増長されている。これらの過程において流砂の縦断分級（細粒化）が顕著に起こっており、これは、洪水氾濫の増長要因である流路変動や流砂の堆積現象を評価するための重要な鍵の一つである。

現地調査は、これまでに4回、延べ50人日を要して行っている。写真1は、赤谷本川上流域の支谷においておこなった土石流侵食状況調査の一コマである。現在、上述したような事項について研究を進めており、有用な成果が得られつつある。これらは、学協会誌等を通じて適宜公表していくつもりである。

conducted on-site investigation, photographic analysis, topographic analysis, and numerical simulation, and continued performing research particularly focusing on factors needed for the assessment of hazards, such as the mechanism of the heavy rainfall, the occurrence of the landslides, the behaviors of debris flows and drift-woods, and the flood flow with sediment and drift-wood transport. We have also studied documents containing disaster information and interviewed local residents about the disaster in order to propose more effective ways for risk communication and improve disaster response measures in general.

Figure 1 is a schematic description of hazards in the Akatani River, illustrating their characteristics on a topographic longitudinal profile. The profile was created based on the on-site investigation and past research findings. The figure shows that many failures occurred on the mountain slopes and riverside areas with a slope of over 30 degrees. Soil blocks released from landslides, while going down the slope, form debris flows, which stop in the area with a slope of 4 to 8 degrees. Driftwoods are produced in the failed slopes and the eroded paths, descend downstream in the debris flow, and finally deposit. Furthermore, the sediment and driftwood carried by the debris flow are also transported further downstream by floodwaters. Inundation is more widely observable in the area downstream of where the debris flow deposits; this is because inundation was accelerated by channel deformation and channel closure due to sediment deposition and a large number of trapped drift-woods. Through all these processes, longitudinal sediment sorting (grain fining) is notably detectable, which is one of the key factors that can accelerate inundation, such as channel deformation and sediment deposition.

We have conducted four on-site investigations, spending a total of 50 man-days. Photo 1 shows a scene from the investigation of the erosion by a debris flow in a branch valley located in the upper reach of the main stream of the Akatani River. Although our research is still an ongoing event, we have already obtained some revealing findings, which we are planning to publish in journals and other publications.



Photo 1: Investigation of a torrential erosion owing to a debris flow

(Written by Shinji Egashira)

English manual for Hydrological Statistics Utility is ready by ICHARM

“Hydrological Statistics Utility” (水文統計ユーティリティ) は、「水文統計計算」を行うためのコンピュータソフトウェアで、一般財団法

“Hydrological Statistics Utility” is software for statistical analysis of hydrological data, developed by the Japan Institute of Country-ology and Engineering (JICE).

In this analysis, hydrological data such as rainfall and discharge are statistically processed to obtain the probabilities of occurrence of hydrological events. This statistical analysis is essential for the development of a flood management plan, an important part of river management conducted by river administrators of national and local governments. For example, calculating the probability of occurrence of rainfall provides the most important data as the first step in the development of a flood management plan.

The software can be downloaded from the JICE homepage for free of charge. User registration is required before the use of this product.

ICHARM has developed an English manual for international users of this software with JICE's approval in collaboration with CTI Engineering Co., Ltd. Click the link below to go to the download site, or you can also visit JICE's homepage.

[English manual for Hydrological Statistics Utility](#)

(Written by Daisuke Kuribayashi)

人国土技術研究センター (Japan Institute of Country-ology and Engineering (JICE)) により開発されました。

水文統計は雨量や流量の水文データに統計的手法を適用し、水水量の生起確率を求めるものです。国や自治体などの河川管理者が作成する河川計画の一部である「高水計画」には水文統計計算は必須であり、降雨の生起確率計算は、高水計画策定を行うための第一歩となる最も重要なデータとなります。

本ソフトウェアは JICE のホームページより、無償でダウンロードし、利用することが出来ます (利用者登録をする必要あり)。

海外での利用に資するため、ICHARM はこのほど、JICE の承認のもと、株式会社建設技術研究所 (CTI) と協力し、英語の利用マニュアルを作成しました。下記リンクからご覧ください。なお、JICE ホームページ上でも閲覧できます。

[English manual for Hydrological Statistics Utility](#)

Introduction of ICHARM research projects

ICHARM sets three principal areas of activity: research, capacity building, and information network. It plans and implements projects in these areas in order to fulfill its mission, always keeping in mind "localism", a principle with which we respect local diversity of natural, social and cultural conditions, being sensitive to local needs, priorities, development stage, etc., within the context of global and regional experiences and trends.

At present, ICHARM conducts innovative research in the following five major areas:

- (1) Data collection, storage, sharing, and statistics on water related disasters
- (2) Risk assessment on water related disasters
- (3) Monitoring and prediction of changes in water related disaster risk
- (4) Proposal, evaluation and application of policy ideas for water related disaster risk reduction
- (5) Support in constructing the applicability of water-related disaster management

This issue introduces four studies as listed below:

Miho OHARA, Senior researcher

Survey on Practice of Flood Risk Communication by Real Estate Agencies in Shiga Prefecture

Young-joo Kwak, Research specialist

2nd International Workshop on "Integrated flood risk and water management under climate change for disaster risk reduction"

Yoshihiro Shibuo, Research specialist

User!2017 - the annual international R user and developer conference in Brussels

Islam Md Khairul, Doctoral student

Use of near-real-time satellite rainfall products for hydrological forecasting in the Meghna - a transboundary river basin

ICHARM は、その使命を果たすため、世界及び地域での災害の傾向及び経験と災害対応に関する地域のニーズ、重要課題、開発段階等を踏まえつつ、自然、社会及び文化といった地域の多様性を考慮する原則というローカリズムを念頭に、研究、能力育成及び情報ネットワーク構築の 3 本柱を有機的に連携させて、現地実践活動を実施しています。

そのうち、研究としては

- (1) 水災害データの収集、保存、共有、統計化
 - (2) 水災害リスクのアセスメント
 - (3) 水災害リスクの変化のモニタリングと予測
 - (4) 水災害リスク軽減の政策事例の提示、評価と適用支援
 - (5) 防災・減災の実践力の向上支援
- の 5 つの柱のもと、革新的な研究活動を行っています。

本号では、大原美保 主任研究員の行った「滋賀県流域治水の推進に関する条例第 29 条に定める水害リスク情報の提供努力義務に関するアンケート調査」、郭栄珠 専門研究員が招へいされた「JICA-BWDB 共催の第 2 回国際ワークショップ」、渋尾欣弘 専門研究員が参加した「user!2017 ユーザーカンファレンス」、博士課程学生のイラム ムハマド カイルル氏の行っている「Use of near-real-time satellite rainfall products for hydrological forecasting in the Meghna - a transboundary river basin」の 4 つの研究を紹介します。

Research



Survey on Practice of Flood Risk Communication by Real Estate Agencies in Shiga Prefecture

滋賀県流域治水の推進に関する条例第 29 条に定める水害リスク情報の提供努力義務に関するアンケート調査

Miho Ohara, Senior researcher
大原 美保 主任研究員

人口減少が進む日本では、今後の災害リスクを踏まえた効率的な土地利用が大きな課題です。滋賀県では、2014年3月31日に公布・一部施行を行った「滋賀県流域治水推進に関する条例」の第29条において、日本で初めて、宅地建物取引時における宅地建物取引業者（宅建業者）による水害リスク情報提供の努力義務を課しました。大原美保主任研究員は、滋賀県内での水害リスク情報の提供状況や課題を把握するため、県内の宅建業者 1,010社を対象としたアンケート調査を行い、275社からの回答を得ました。この結果、回答した宅建業者の約7割が水害リスク情報をお客様に提供していることがわかりました。一方、努力義務を知らない業者や間違った情報を伝える恐れがあるなどの懸念から情報提供を行っていない業者も存在しており、更なる制度の周知や理解増進が必要であることがわかりました。調査にご協力いただきましたご関係者の皆様に感謝いたします。調査結果は、ICHARMのホームページで公表しています（日本語のみ）。

URL: http://www.icharm.pwri.go.jp/special_topic/questionnaire_risk.html

Efficient land use management presupposing disaster risks is becoming more essential as depopulation progresses in Japan. Shiga Prefecture, having low-lying areas around the country's largest lake, Biwako, issued an integrated flood management ordinance and put parts of it in effect on March 31, 2014. The ordinance enacted stipulates that real-estate agencies should make efforts to give their customers appropriate flood risk information prior to a real estate transaction. Among the 47 prefectures in Japan, Shiga Prefecture is the first to implement such an ordinance. Senior Researcher Miho Ohara conducted a questionnaire survey for 1,010 real estate agencies in Shiga Prefecture to understand the current status of the agencies' compliance with the ordinance. The analysis of 275 responses revealed that about 70% of the real estate agencies had been practicing flood risk communication with their customers. However, it also pointed out the necessity of enhancing the agencies' understanding of the ordinance, as some of them answered that they had not heard of it or had been worried about providing wrong information related to flood risk.

For more information, please visit at: http://www.icharm.pwri.go.jp/special_topic/questionnaire_risk.html (in Japanese)



2nd International Workshop on "Integrated flood risk and water management under climate change for disaster risk reduction"

JICA-BWDB*¹ 共催の第2回国際ワークショップ

Young-joo Kwak, Research specialist, Principal investigator of Grants-in-Aid for Scientific Research (B: 15H05136 oversea, KAKENHI)

郭 榮珠 (カク ヨンジュ) 専門研究員、基盤研究 (B15H05136) 海外学術調査：気候変動及び社会経済シナリオを考慮した広域河川氾濫リスク予測モデル開発 研究代表

ICHARMでは、私が研究代表となり、広域河川氾濫リスク評価に関する研究をバングラデシュ国政府水開発局（以下BWDB*¹）と共同で進めています。この研究の一環として、国際ワークショップを開催していますが、去る7月16日、JICAとBWDBの共催で、第2回ワークショップがバングラデシュ首都ダッカで開催されました。今回のワークショップは、「気候変動下の災害リスク低減を目指した統合的洪水リスク・水管理」というタイトルのもと、昨年度の研究成果の発表と今後の研究に関する意見交換を行いました。私も、BWDB長官であるMd.

I have been involved as the principal investigator in a joint research with the Bangladesh Water Development Board (BWDB) on flood risk assessment for transboundary rivers. As part of this research, international workshops are held, and on July 16, the second international workshop was convened in Dhaka, the capital of Bangladesh. It took place under the title of "Integrated flood risk and water management under climate change for disaster risk reduction," where presentations were made on research findings from the previous year and the participants shared ideas and views for future research. I was invited to this workshop by Md. Mahfuzur Rahman, the director of BWDB, and delivered a keynote speech. I also provided advice on how to organize the workshop in the planning stage.

The second workshop was even more successful than the first workshop held in April 2016, gathering over 70 participants from four countries – Bangladesh, Japan,



Main participants in the second workshop

the United States, and India – including the personnel of the Bangladesh government in disaster and flood management and other relevant areas. The participants engaged in discussions on various issues from research, administrative, policy-making and other perspectives. Diverse as their perspectives are, the participants shared the common understanding of current and future disaster risk under climate change and reached a consensus on the importance of research collaboration, river management, and effective strategy.

ICHARM Director Toshio Koike also joined the workshop through a teleconference system and made an opening speech. Dr. Sang-Ho Yun, an international research collaborator and a researcher of NASA-Jet Propulsion Laboratory, and Dr. Sanjay Kumar Sharma, a researcher of India's National Institute of Hydrology, also joined the workshop through a teleconference system and stressed the effectiveness of flood mapping in disaster risk reduction. Dr. Muhammad Masood and Dr. Robin Kumar Biswas, who earned a master's and doctoral degrees in ICHARM's graduate program, had their first opportunity to speak at an official setting about the research they conducted at ICHARM. Both of them were great examples who demonstrated that ICHARM's efforts have started bearing fruit. In this respect, the workshop was a significant occasion for ICHARM.

After the workshop, I also had a meeting with Mr. Arifuzzaman Bhuyan, executive engineering of BWDB in charge of this event, and exchanged ideas about the ongoing joint research for the rest of the research period. He hoped for training workshops for practitioners and the third international workshop.

<Program>

- Opening Address by Md. Mahfuzur Rahman, Director General, BWDB
- Opening Address by Prof. Toshio Koike, Director, ICHARM (Video Conference)
- Special Guest Mr. Kazumitsu Muraoka, Advisor, JICA
- Address by Md. Abdur Rahman Akanda, ADG (Planning), BWDB

Technical Session: Chair by A. K. Manzur Hasan, Chief Engineer, Hydrology

- Invited talk on "Flood Risk under Climate Change in GBM basin" by Dr. Youngjoo Kwak (ICHARM)
- Presentations on "Climate change impact in the Meghna basin and Implications for disaster risk reduction in the most vulnerable basin" by Dr. Muhammad Masood and "Numerical Prediction of Channel Changes in Large, Braided Rivers Dominated by Suspended Sediment" by Dr. Robin Kumar Biswas
- Invited talk on "Global Flood Mapping using SAR data" by Dr. Yun (JPL-NASA) (Video Conference)
- Invited talk on "Future cooperation with international stakeholders on International river basin Management" by Dr. Youngjoo Kwak (ICHARM) and Dr. Sanjay (NIH-India, Video Conference)
- Panel Discussion: BWDB & Invited Stakeholders (DDM*², SPARRSO*³, DAE*⁴, NASA-JPL, ICHARM, NIH-India)

Mahfuzur Rahman の招へいを受け、このワークショップに参加し、基調講演を行いました。また、計画段階からワークショップの運営に関する助言も行いました。

今回のワークショップには、バングラデシュ、日本、アメリカ、インドの4ヶ国から、バングラデシュ中央政府の防災関係者、洪水担当者、その他関連分野の専門家などを合わせて、70人余りの参加者が集まり、昨年4月に開催された第1回ワークショップよりもさらに充実したものとなりました。参加者は、研究から行政・政策に至る多面的な見地から議論を行い、気候変動下における災害リスクの実態および評価と協力研究・河川管理・対策の必要性について参加者全員の合意が得られました。

ICHARM からは小池俊雄センター長もビデオによるオープニングスピーチを行いました。またアメリカ航空宇宙局のジェット推進研究所 (NASA-Jet Propulsion Laboratory) の Dr. Sang-Ho Yun (海外協力研究者) およびインド水文研究所 (NIH: National Institute of Hydrology, India) の Dr. Sanjay Kumar Sharma もビデオによる講演で、洪水マッピングの重要性を訴えました。また、ICHARM で修士号および博士号を取得して帰国した Muhammad Masood 博士 および Robin Kumar Biswas 博士の二名も ICHARM での研究内容を初めて公の場で紹介する機会にもなりました。これは、ICHARM の活動が着実に実を結んでいることを証明しており、ICHARM にとって重要な意味を持つワークショップとなりました。

引き続き、BWDB 側のワークショップ担当者 Mr. Arifuzzaman Bhuyan と来年の研究計画について打ち合わせを行い、実務者向けのトレーニングや第3回ワークショップなどに対する期待の声が聞かれました。

Research



All participants after the workshop

- *1 Bangladesh Water Development Board (BWDB)
- *2 Department of Disaster Management (DDM) under the Ministry of Disaster Management and Relief
- *3 Bangladesh Space Research and Remote Sensing Organization (SPARRSO)
- *4 Department of Agricultural Extension Bangladesh (DAE)



UseR!2017 - the annual international R user and developer conference in Brussels

useR!2017 ユーザーカンファレンス

Yoshihiro Shibuo, Research specialist
 渋尾 欣弘 専門研究員

2017年7月4日から7日にかけて、ベルギー・ブリュッセルで開催された useR!2017 ユーザーカンファレンスに参加しました。useR! ユーザーカンファレンスは、統計生物情報学から地球環境学まで、用量反応分析、トレンド解析、機械学習といった様々な用途で R 言語を活用する科学者や技術者が一堂に会する世界最大のカンファレンスです。現在 ICHARM では、R 言語を活用した研究として、私が研究代表者となり、国土交通省下水道技術研究開発受託研究課題「河川・下水道のシームレスモデルを用いたリアルタイム浸水予測手法の開発」を実施しています。今回のカンファレンスでは、この研究成果の一端として、useR!2017 で「データベースを活用しビッグデータと水文・水理モデルを統合した課題解決アプローチ」について発表しました。発表では研究成果と合わせて、ICHARM の研究活動を社会に発信するとともに、社会課題解決における地球環境ビッグデータの可能性、機械学習技術のモデルへの活用等について、データサイエンティストやプログラマらと活発な意見交換を行いました。

また、学会に先立ち、オランダの IHE Delft Institute for Water Education にて「洪水予測実運用に向けたデータアーカイブと統合された水文モデルの開発」の題目で講演を行い、河川洪水予測や都市浸水対策について研究紹介を行いました。

I participated in the useR! 2017 conference held on July 4-7, 2017, in Brussels, Belgium. The useR! 2017 conference is the biggest conference in the world that gathers all kinds of R language users including scientists and engineers. R language has been widely used in various fields of sciences ranging from bioinformatics to earth environmental sciences in dose response analysis, trend analysis, machine learning and for many other purposes.

As I have been conducting research on the "Development of a real-time inundation forecast method by using the seamlessly integrated river and sewerage network model" under the sewerage innovation research development fund, I made a presentation on the "Development of Data Base Integrated Hydrological and Hydraulic Modeling for River-Flood and Urban-Inundation Forecast" at the conference. It was a good opportunity for me to share recent findings from our research, as well as to introduce other activities of ICHARM. I also had discussions with data scientists and programmers on the possibilities of big data in earth sciences to tackle social issues and the applications of machine learning techniques to model simulation.

Prior to the conference, I was invited to a seminar held at IHE Delft Institute for Water Education in the Netherlands, and presented my research under the title of "Development of Data Archive Integrated Hydrological Modeling for Making Flood Forecasting in Action". Afterward, I was asked a lot of questions regarding methodology to evaluate uncertainties in precipitation of numerical weather prediction and



Poster presentation room, useR!2017




Alumni network map, IHE Delft

pseudo-global warming methods, which was a fresh reminder of their high interest in this field.

After delivering the talk, I had a meeting with Prof. Dimitri Solomatine, the head of the Integrated Water Systems & Governance department, and other faculty members, and had a great time discussing various scientific topics and also the possibility to future collaboration between ICHARM and IHE Delft in research and education.

質疑では、気象数値予測降水に関わる不確実性の評価方法、疑似温暖化手法などに関する質問を受け、この分野の関心の高さをあらためて認識しました。続くディスカッションでは Integrated Water Systems & Governance 研究科長 Dimitri Solomatine 教授らと研究テーマについて活発な議論を行うと共に、ICHARM と IHE Delft の共同研究や教育の可能性等についても意見交換を行いました。



Use of near-real-time satellite rainfall products for hydrological forecasting in the Meghna - a transboundary river basin

Islam Md Khairul, Doctoral program student (D2) and Research assistant
 ইসলাম মুহাম্মদ কায়রুল 博士課程 (2 回生)・リサーチアシスタント

1. Introduction

Near-Real-Time Satellite Rainfall Products (NSRPs) are often seen as a suitable alternative to ground rainfall estimates in poorly gauged basins, such as the Meghna- an inaccessible transboundary river basin originated in India and extends to the north-eastern part of Bangladesh. Bangladesh suffers floods almost every year in the Meghna having no controls over the hydro-meteorology in the upstream of the basin (about 60% of the basin falls in India). The lack of this hydro-meteorological information in the Meghna basin makes flood management quite challenging for Bangladesh. This study thus aims to investigate the applicability of NSRPs on simulated streamflows in the Meghna river basin. Four widely available NSRPs (GSMaP, TMPA, CMORPH, and PERSIANN) are used as forcing data for daily streamflow simulations driven by Rainfall-Runoff-Inundation (RRI) hydrological model.

2. Methods

Before performing streamflow simulations with each NSRP, the two-dimensional RRI model has been calibrated at Bhairab Bazar station (outlet of Meghna basin) by using Climate Hazards Group InfraRed Precipitation with Station data (CHIRPS). CHIRPS is a 30+ year quasi-global rainfall dataset (1981 to near-present) incorporating 0.05° and 0.25° resolution satellite imagery with in-situ station data to create gridded rainfall time series. The calibrated RRI model has then been run for each NSRP streamflow simulations. While GSMaP, CMORPH, and PERSIANN resulted in underestimation of streamflow, TMPA overestimated the same. Therefore, two bias correction methods, namely Linear Scaling (LS) and Quantile Mapping (QM) has been applied to each raw NSRP estimates to correct their biases for better streamflow simulations taking CHIRPS as reference. Both LS and QM correction methods improve the daily raw rainfall estimates showing no significant deviations with respect to the 1:1 line (Figure 1 [g~r]). According to the calculated CC, it is seen that the QM method (Figure 1 [m~r]) outperformed the LS method (Figure 1 [g~j]) in calculating the daily rainfall estimates over Meghna basin.

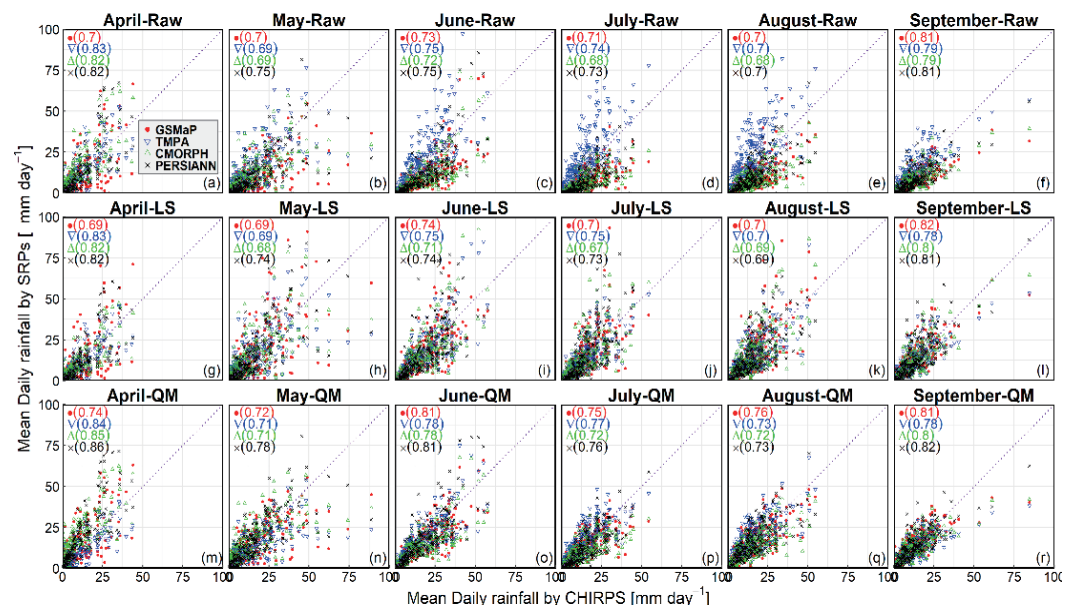


Figure 1. Scatter plots of daily raw and bias corrected NSRPs against CHIRPS for the rainy season (April~September) during 2009~2016. The correlation coefficients (CC) are included in parentheses for each product against CHIRPS

3. Results & Discussion

Table 1 shows statistical evaluation metrics used to measure the overall performance of each raw and bias corrected NSRP generated streamflows. The corrected NSRPs produce improved streamflows (Figure 2 [e~l]) both in pattern and magnitude compared to those of the raw NSRPs (Figure 2 [a~d]). The CMORPH and PERSIANN products corrected by LS method reproduce better streamflows compared to those corrected by QM method (Figure 2 [g, h] & [k, l]). On the other hand, the QM correction method outperforms the LS method in generating streamflows for GSMaP & TMPA (Figure 2 [e, f] & [i, j]).

Product name	Errors		
	NSE (-)	CC (-)	RMSE (m ³ s ⁻¹)
GSMaP-RAW	-6.44	0.72	4184
TMPA-RAW	0.88	0.97	1593
CMORPH-RAW	-2.37	0.75	3561
PERSIANN-RAW	-2.35	0.74	3717
GSMaP-LS	0.77	0.89	1882
TMPA-LS	0.91	0.96	1126
CMORPH-LS	0.88	0.95	1318
PERSIANN-LS	0.79	0.90	1797
GSMaP-QM	0.79	0.90	1680
TMPA-QM	0.92	0.97	1106
CMORPH-QM	0.72	0.88	1745
PERSIANN-QM	0.77	0.89	1790

Table 1: Streamflow performance indicators

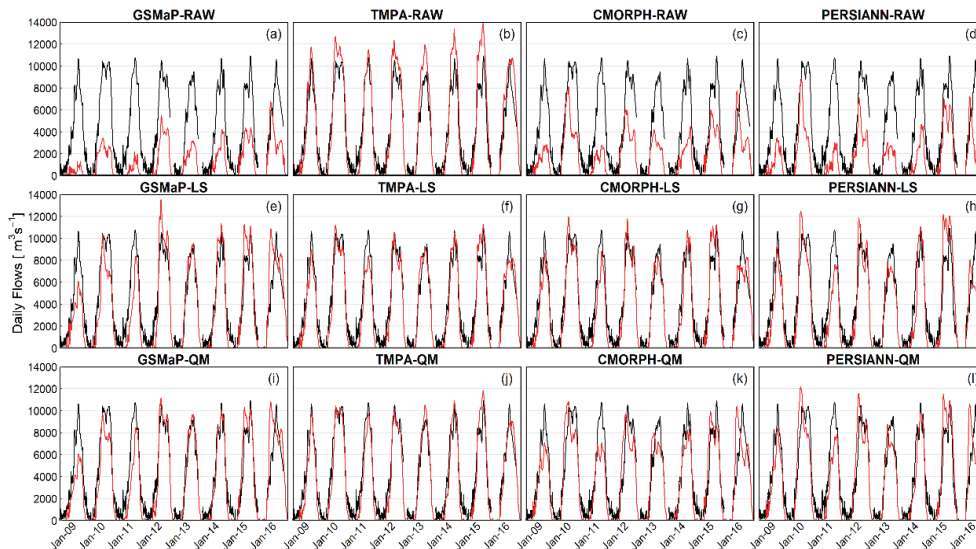


Figure 2. Comparison between simulated streamflows (red) driven by raw and bias-corrected NSRPs to the observed streamflows (black) during the period of 2009-2016 at Bhairab Bazar station

4. Conclusion

The improved hydrological forecasting performed in this study using four NSRPs employed with bias corrections allows us to overcome the lack of data issues in upstream of the Meghna basin as well as helps us to quantify the flood inflowing into Bangladesh in real-time. These real-time information will consequently make flood management over the Meghna basin less challenging for Bangladesh followed by people’s reduced vulnerability to floods.

■ Training & Education

FY2017 JICA Training Program: Capacity Development for Flood Risk Management

ICHARM における研修活動の一環として、2017年7月4日から28日にかけて JICA 研修「統合洪水解析システム (IFAS) を活用した洪水対応能力向上」を実施しました。本研修の目的としては、途上国の洪水脆弱地域における気象関係者・河川管理者・住民避難に責任を持つ者の3主体を対象として、我が国における洪水対応技術・事例及び防災・避難計画の概要を学び、アクションプランとして自国の洪水脆弱地域を対象とした地域洪水防災計画案を策定し彼らの洪水対応能力向上を図り、ひいては洪水被害軽減に資することとしています。本研修は、2015年から3ヶ年計画で実施しており本年度は最終年となっていますが、本年度はボスニアヘルツェゴビナ、インド、ケニア、ミャンマー、フィリピン及びスリランカから計10名の研

ICHARM conducted a JICA training program, “Capacity Development for Flood Risk Management with IFAS,” from July 4 to 28, 2017. The training is designed to provide opportunity for meteorologists, river administrators, and disaster managers in flood-vulnerable developing countries to learn disaster management by studying evacuation plans, flood response cases in Japan and other related issues. The program also requires them to develop an action plan for local flood management of flood-vulnerable areas in their countries. These training activities will enhance indi-



IFAS training



Disaster prevention map training in Shimotsuma City

vidual flood-coping capacities, and trained personnel will eventually contribute to flood damage mitigation in their countries.

It was the final year for this three-year training program, which started in 2015. Ten participants joined from Bosnia and Herzegovina, India, Kenya, Myanmar, the Philippines and Sri Lanka. They mainly learned how to operate the Integrated Flood Analysis System (IFAS) along with additional training, such as disaster prevention map training in Shimotsuma City and a study trip to the Shinanogawa River under the management of the Hokuriku Regional Development Bureau of MLIT. Through the training, they made a great improvement in operation of IFAS and gained useful knowledge from Japan's disaster management.

We received the following feedback from participants; "IFAS and RRI (Rainfall-Runoff-Inundation) model can be used as tool for analysis of flood hazard and risk maps. Also it can be used for in field analysis for basins with lack of ground data by use of satellite data and forecasting of flood events." and " There is a lot of work behind flood warning, and the lectures gave their best to bring it close to us to understand it better and to see how we can improve our overall system for this issue."

(Written by Takashi Shirai)

Educational Program Updates

ICHARM provides the one-year M.Sc. program, "Water-related Disaster Management Course of Disaster Management Policy Program (JICA Knowledge Co-Creation Program: Flood Disaster Risk Reduction)," as a joint program with JICA and the National Graduate Institute for Policy Studies (GRIPS). The program started its tenth year on October 4, 2016, and ended on September 14, 2017. The following is a brief report on recent activities:

On July 4, the students visited Tsukuba City to observe a flood-fighting drill held in a floodplain of the Kokai River. The drill was organized jointly by five neighboring municipalities along the Kinu River or the Kokai River. It is held annually at the beginning of July, just before the upcoming flood season.

On September 6-7, the students visited Sendai, Higasi-matsushima and Ishinomaki, cities hit by huge tsunamis following the Great East Japan Earthquake six years ago, in order to learn about the damage and the reconstruction. They found few scenes of devastation in those cities, but saw steady progress in reconstruction instead. While the traces of the terrible disaster are fading away fast from the area, the students also learned that local people are making deliberate efforts to hand down lessons they learned and experiences they had to future generations. In addition, they had a rare opportunity to listen to a person who was caught up in the tsunami but miraculously survived.



Arahama elementary school destroyed by Tsunami

On September 11, Mr. Gul Muhammad and Mr. Jamal Habib of Pakistan gave presentations of their research at the 2017 International Summer Symposium of JSCE held at Kyushu University.

On September 13, the closing ceremony of the program was held at the JICA Tsukuba office, where ICHARM Director Toshio Koike, JICA Tsukuba Director Masayuki Takahashi and GRIPS Professor Hiroki Sunohara made a congratulatory speech, and Mr. Gama Samuel Joseph of Malawi spoke in return on behalf of the students. The Excellent Research Award was presented to Mr. Mikosz Lucas of Brazil and Mr. Nguyen Van Hoang of Vietnam this year. The award is given by ICHARM and GRIPS to laud students for excellent research work based on the final presentation held on

修員が参加しました。IFAS（総合洪水解析システム）の演習を中心として、下妻市における防災マップ演習、国土交通省北陸地方整備局管轄の信濃川における現地視察などを行い、IFAS について習熟するとともに、日本における防災対策についても学びました。

研修員からは IFAS や RRI（降雨流出氾濫モデル）に関する感想が多くありました。ハザードマップやリスクマップを作るのに欠かせない分析を行う点、地上観測データを入手しにくい流域についても、衛星データや洪水予測を利用して行える点に特に有用性を感じたようです。また、一連の講義から、洪水警報ひとつを発表するにも、そこに至るまで様々な作業があることを再認識し、自国の制度の改善をどう行うかを勉強できたという感想もありました。

ICHARM は、2016 年 10 月 4 日から 2017 年 9 月 14 日まで約 1 年間、(独) 国際協力機構 (JICA) および政策研究大学院大学 (GRIPS) と連携し、10 期目の修士課程「防災政策プログラム水災害リスクマネジメントコース」(JICA 研修「洪水防災」) を実施しました。

7 月 4 日には、つくば市で開催された鬼怒・小貝水防連合体水防訓練を見学しました。この訓練は、洪水期の到来に先立ち、例年 7 月の上旬に鬼怒川及び小貝川を流れる市町によって行われる公開訓練です。

9 月 6 日から 9 月 7 日にかけては、東日本大震災の被害及びその後の復興を学ぶ為に、仙台、東松島及び石巻を訪問しました。震災から 6 年経過し、当時の悲惨な光景は消えつつあり、着実に復興が進んでいる様子を実感しました。その様な震災当時の光景が失われつつある中で、各所で震災の教訓を後世に残そうと様々な取り組みが行われていました。また、震災の際に津波に巻き込まれ流されたものの、奇跡的に助かった方からお話を聞く機会も得られました。

9 月 11 日には、Gul Muhammad 氏 (パキスタン) 及び Jamal Habib 氏 (パキスタン) が、福岡で行われた平成 29 年度土木学会全国大会で研究発表を行いました。

9 月 13 日には JICA 筑波にて閉講式が行われ、ICHARM の小池センター長、JICA 筑波の高橋所長、GRIPS の春原教授による祝辞が贈られ、研修員からは代表として GAMA Samuel Joseph 氏 (マラウイ) が答辞を行いました。8 月 4 日に実施された最終のプレゼンテーションの結果と論文を総合的に判断し、優れた研究成果を残した学生に贈られる Best research award が MIKOSZ

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Lucas 氏 (ブラジル)、NGUYEN Van Hoang 氏 (ベトナム) の 2 名に、研修中に最も参加者全体のために貢献した研修員に対して ICHARM から授与される「Sontoku Award」が GAMA Samuel Joseph 氏 (マラウイ) に、それぞれ贈られました。

また、9 月 14 日には GRIPS にて修士課程の学位授与式が行われ、修士課程の研修員 8 名に「修士 (防災政策)」の学位が授与されました。

10 月から 11 期目の修士課程が開始され、10 月 3 日に開講式を行い、JICA 筑波から高橋所長及び事務担当者、GRIPS から春原教授並びに土木研究所から西川理事長及び幹部職員が参加されました。本年度 14 名が 1 年間の研修を受けます。また、10 月には ICHARM の修士課程卒業生でバングラデシュ出身の 8 期目の博士課程 1 名も入学しました。

August 4 and the master's thesis. The Sontoku Award, which is given by ICHARM to the student who made the most contribution to the entire class during the program, was presented to Mr. Gama Samuel Joseph.

On September 14, the graduation ceremony was held at GRIPS. The eight students were finally awarded a hard-earned master's degree.

Meanwhile, a new set of 14 students have already started the eleventh year of the master's program. On October 3, the opening ceremony was held at ICHARM in the presence of JICA Tsukuba Director Takahashi, GRIPS Professor Sunohara and the PWRI president Nishikawa and its executives. Also in October, one student from Bangladesh, who graduated from our master program joined the doctoral program.



Graduation memorial photo with the graduates of the Building Research Institute course

(Written by Takashi Shirai)

Information Networking

Regional workshop on "Building Resilience to Climate Change Risk and Vulnerability to Meet Water Security Challenges"

気候変動は降水量の変化や気温の上昇などの影響をもたらし、さらに猛烈な台風や洪水・渇水といった異常気象が頻発することにつながっています。このため水文サイクルや気候変動の影響について正しく理解することが必要となっています。これらを踏まえつつ、アジア太平洋・アフリカ地域における水の安全性確保に向けた知識や優良事例について共有するため、ユネスコ国際水文計画とユネスコ・ジャカルタ・アジア太平洋地域科学局との共催により「水の安全性確保に向けた気候変動リスク及び脆弱性へのレジリエンス構築」についての地域ワークショップが 7 月 10 日から 11 日、マレーシアのランカウィで開催され、アジア太平洋・アフリカ地域から 30 名を超える専門家が参加しました。ICHARM からは池田上席研究員が出席しました。

本ワークショップは、ユネスコ国際水文計画事務局の Anil Mishra 氏とユネスコ・ジャカルタ事務所の Shahbaz Khan 教授による基調講演で始まり、気候のリスク評価と早期警報などの 6 つのセッションで構成されました。池田上席研究員は、3 つ目のセッション「渇水と洪水のリ

Climate change will affect hydrological and climatic variability. In some areas, for example, rainfall and air temperature pattern may change, resulting in more frequent hydrologic extremes, such as high-intensity storms, floods, and droughts. There is a need for an improved understanding of the hydrological cycle and the impact of climate change. In order to share knowledge and best practices for better water security in the Asia-Pacific and African regions, the regional workshop on "Building Resilience to Climate Change Risk and Vulnerability to Meet Water Security Challenges" was jointly held by the UNESCO International Hydrological Programme (IHP) and the UNESCO Jakarta Regional Science Bureau for Asia and the Pacific on July 10-11, 2017, in Langkawi, Malaysia. More than 30 professionals and experts participated from the Asia-Pacific and African region. Chief Researcher Tetsuya Ikeda participated from ICHARM.

This workshop started with the keynote presentation by Mr. Anil Mishra of the UNESCO-IHP Secretariat and Prof. Shahbaz Khan of UNESCO Office Jakarta. Six sessions followed to discuss various topics such as climate risk assessment and early warning. In Session 3 on drought and flood risk and management (including vulnerability; monitoring, prediction and early warning, and integrated drought and flood management), Ikeda made a presentation about the recent activities of ICHARM and the International Flood Initiative (IFI). He also spoke about the latest flood disaster in Japan, which occurred on July 5 in the northern part of the Kyushu region. In addition, he presented the recent press release of PWRI on "Emergency support for flood management in Sri Lanka". The presentation included the latest information on flood disasters and countermeasures, which attracted considerable

attention from the participants. In the last session on “Asia-Africa Science Policy Dialogue on Building Resilience to Climate Change Risk and Vulnerability to Meet Water Security Challenges”, the key progress addressed at the workshop was presented, and recommendations for policy makers, managers and scientists were developed as a collaboration of all the participants.

The outline of the workshop and the presentation materials are available online at:

Outline of the workshop / ワークショップの概要

http://www.unesco.org/new/en/jakarta/about-this-office/single-view/news/asia_africa_workshop_building_resilience_to_climate_change/

Presentation materials / 発表資料

<http://mucp-mfit.org/regional-workshop-building-resilience-to-cc-risk-and-vulnerability-to-meet-water-security-challenges/>

(Written by Tetsuya Ikeda)

スク管理：脆弱性、観測、予報と早期警報；濁水・洪水の統合管理」において、ICHARM や国際洪水イニシアティブの最近の活動について発表を行いました。また、7月5日の九州北部豪雨による水害など、最近の洪水被害について、そして土木研究所が記者発表を行った「スリランカの洪水管理に対する緊急支援」について紹介しました。本発表では、最近の洪水被害とその対策が盛り込まれていたことから多くの参加者が高い関心を寄せました。

「水の安全性に関する課題を解決するため、気候変動リスク・脆弱性に対するレジリエンス構築のためのアジア・アフリカ地域での科学政策対話」と題する最後のセッションでは、ワークショップでの主な成果について報告され、参加者全員によって政策決定者・管理者・科学者に対する提言が取りまとめられました。

なお、ワークショップの概要、発表資料は本記事の英文中（左記）のサイトに掲載されています。

A SAFE project by Mekong River Commission completed

The Asia-Pacific Regional Space Agency Forum (APRSAF) has been leading an initiative called the Space Application for Environment (SAFE), which aims to encourage environmental monitoring using space based technologies. ICHARM is involved in this initiative and has been a technical adviser for two projects: “Deploying GSMaP for Decision Support in Transboundary Catchments in the Lower Mekong Basin,” conducted by the Mekong River Commission (MRC), and “Developing and Implementing an Operational Prototype for Advanced Flood Forecasting, Early Warning, and Data Sharing System in the Kalu Ganga Basin, Sri Lanka,” led by Sri Lanka’s Irrigation Department.

As the MRC project ended, the final report was presented at a SAFE workshop held in Bangkok in May 2017. The project started in September 2015 to use bias-corrected satellite rainfall (GSMaP) for flood forecasting and water resources management in the transboundary catchments of the Lower Mekong Basin. ICHARM provided technical advice on bias correction of GSMaP and estimation of soil moisture.

On July 21, the closure meeting of the SAFE project was held at the MRC headquarters in Lao PDR. JAXA, RESTEC and the Japan Space Forum participated as the secretariat of the project. Chief Researcher Hiroyuki Ito and Senior Researcher Morimasa Tsuda participated from ICHARM. Researchers from the National Research Institute for Earth Science and Disaster Resilience in Japan and the Asian Institute

ICHARM は、APRSAF(アジア太平洋地域宇宙機関会議)が進める「SAFE(宇宙技術による環境監視)イニシアティブのうち、2件のプロジェクトに技術アドバイザーとして参加しています。1件はメコン河委員会の「Deploying GSMaP for Decision Support in Transboundary Catchments in the Lower Mekong Basin」で、もう1件はスリランカ灌漑局の「Developing and Implementing an Operational Prototype for Advanced Flood Forecasting, Early Warning, and Data Sharing System in the Kalu Ganga Basin, Sri Lanka」です。

このうち、メコン河委員会のプロジェクトは2017年5月に終了し、バンコクで開催されたSAFEワークショップで最終報告が行われました。本プロジェクトは人工衛星観測雨量を国際河川であるメコン河下流域の洪水予警報や水資源管理に活用することを目指し、2015年9月にスタートしました。ICHARM はメコン河下流域への人工衛星観測雨量の補正技術の適用や、土壌水分量の推定技術についての助言を行いました。

7月21日にはラオスのメコン河委員会本部でプロジェクト総括会議が行われました。この会議にはSAFE事務局であるJAXA、RESTEC、日本宇宙フォーラムのほか、技術アドバイザーとしてICHARMから伊藤上席研究員、津田主任研究員の2名、防災科学技術研究所、アジア工科大学の研究者がそれぞれ参加しました。メコン河委員会からは、CEOのほか関連部局の職員が参加しました。

この会議では、プロジェクト成果を踏まえて、今後の展開や協力関係



Closure meeting of the SAFE project in Lao PDR

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が議論されました。メコン河委員会内部でプロジェクト成果について周知が図られるとともに、本プロジェクトで構築されたネットワークを通じて、協力関係の維持を図ることが確認され、プロジェクトは幕を閉じました。

なお、これに先立つ7月20日には、メコン河委員会職員を対象に、本プロジェクトの成果の一つである人工衛星観測雨量の補正技術についての講習会を行いました。

of Technology also participated as technical supporters. The CEO of MRC and officers from relevant departments were also among the participants.

The closure meeting summarized the project's achievement and discussed future development and technical cooperation. The meeting closed with the conclusion that the outcome of the project would be shared among the MRC members, and that the partnership among participating organizations should be maintained through the network built during the project.

Additionally, follow-up hands-on training of GSMaP bias-correction technique was conducted for MRC personnel on July 20 by ICHARM and other technical supporters as one of the outcome of the project.

(Written by Morimasa Tsuda)

ICHARM's contribution to major international conferences on water issues

水は人類の生存、活動に必要な不可欠であり、人口増加と社会・産業の高度化に伴い、近年、その利用がますます厳しくなっています。このため、水に関する世界的な関心も高まりつつあり、水に関する国際会議は数多く開催されるようになってきています。

一方で、水問題といっても上水道、農業用水、水環境、統合水資源管理、水力発電、水関連災害など幅広い分野にまたがります。このように水に関する国際会議は、広範なセクター・関係者が関わることとなりますが、ここでは近々、開催が予定され、ICHARMとしても深く関わることとなるアジア太平洋水サミットと世界水フォーラムについて紹介します。

Water is essential to human lives and activities, but recently the use of water has been increasingly restricted due to population growth and socio-economic and industrial development. For this reason, more concerns have been raised on water issues internationally, and international conferences on water have been held more frequently.

Water issues include a wide variety of topics such as water supply, agricultural water, water environment, integrated water resources management, hydropower, and water-related disasters. Therefore, various sectors and people participate in international conferences on water. Among them, the Asia-Pacific Water Summit and the World Water Forum will be introduced in the following sections. ICHARM will be deeply involved in these international events scheduled in the coming several months.

Asia-Pacific Water Summit

The Asia-Pacific Water Summits (APWS) targets top-level policy and decision makers beyond the water sector, such as heads of national governments, as well as leaders from the private sector, local governments, citizens' groups, and the mass media in the region. The primary objective of the APWS is to create opportunity for the political leaders of the region to recognize the significance of water issues. APWS has been organized by the Asia-Pacific Water Forum (APWF). The first APWS was held in Beppu, Japan, in 2007, and the second in Chiang Mai, Thailand, in 2013.

The third APWF (APWS3) will take place on December 11-12, 2017, in Yangon, Myanmar. At APWS3, Parallel Thematic Sessions will be held on the first day, where thematic discussions will be made on such issues as Water Supply System in Urban Areas, Sanitation & Wastewater Management, Integrated Water Resources Management, Water and Investment. On the second day, Leaders Dialogues will be held with the participation of the heads of national governments. After these discussions, the key message and declaration will be announced.

As one of the preparatory meetings, the Governing Council met on July 31, 2017, in Singapore, to discuss the composition of the summit and the contents of the sessions. The meeting was attended by the representatives from the organizations that are expected to be the key players for APWS3, including Chief Researcher Tetsuya Ikeda of ICHARM. They discussed the concepts and ideas for APWS3, and agreed to collaborate continuously for APWS3. Based on these processes, ICHARM plans to organize a thematic session at APWS3 on water and disasters under climate change in collaboration with relevant international and regional organizations.

APWS3 is positioned as one of the regional process meetings for the eighth World Water Forum (WWF8) to be held in March 2018 in Brazil. Therefore, the outcomes of the discussions and recommendations will be the major input for WWF8 from the Asia-Pacific region.

The details of ICHARM's activities at APWS3 will be soon posted on ICHARM's website. For more information on APWS3, visit the Asia-Pacific Water Forum at: <http://apwf.org/>.

アジア太平洋水サミット

アジア太平洋水サミット (APWS) は、各地域の政府首脳、民間部門や地方政府、市民団体やメディアのリーダーなど、水分野を超えて最高レベルの政策・意思決定者を対象とし、そうした地域の政策リーダーに対して、水問題の重要性を認識していただく機会を提供することを目的としています。このアジア太平洋水サミットは、アジア太平洋水フォーラム事務局 (APWF) によって主催され、2007年に日本・別府で第1回アジア太平洋水サミットが、その後、2013年にタイ・チェンマイで第2回が開催されました。

今回、第3回アジア太平洋水サミット (APWS3) が2017年12月11日から12日までの間、ミャンマーのヤンゴンにて開催される予定です。サミットでは、初日に Parallel Thematic Session が開催され、都市部における上水道や衛生・排水管理、統合的水資源管理、水と投資問題などのテーマについての議論が行われる予定です。また、2日目には各国の首脳等が集まって Leaders Dialogue が行われる予定で、それらの議論を踏まえてキーメッセージや宣言文が発出される見込みです。

サミットの準備会合の一つとして、2017年7月31日、シンガポールでアジア太平洋水フォーラム執行審議会が開催され、サミットの構成やセッションの内容について検討しました。執行審議会には、サミットの Key Player となりうる各機関からの代表者が参加し、ICHARMからは池田上席研究員が出席しました。これら関係機関からサミットでの構想やアイデアが表明され、引き続き連携を図っていくことを確認しました。これらのプロセスを踏まえ、サミットにおいて、ICHARMは関係する国際・地域機関との協働により、気候変動下における水と災害の問題に関する Thematic Session を主催することとしております。

APWS3は、2018年3月にブラジルで開催される第8回世界水フォーラム (WWF8) での地域プロセス会合の一つとして位置づけられています。このため、サミットでの議論の結果や提言については、WWF8に対するアジア太平洋からの主要なインプットとなります。

APWS3におけるICHARMの活動の詳細については、ICHARMのホームページなどで紹介していきたいと思っております。

(※) 関連サイト：アジア太平洋水フォーラム事務局 <http://apwf.org/>

World Water Forum

The World Water Forum (WWF) is convened every three years by the World Water Council (WWC), an international NGO based in Marseille, France. It is one of the largest international events in which experts in water-related fields gather from all over the world and discuss and exhibit global water issues to find their solutions. WWF is composed mainly of a forum, in which anyone can participate, a ministerial conference attended by governmental organizations, and an exhibition on water issues.

WWF has been held seven times, starting with the first forum in Marrakesh, Morocco, in March 1997. WWF3 was held in Kyoto, Shiga and Osaka in March 2003. At the ministerial conference of WWF3, Director General of UNESCO Koïchiro Matsuura expressed the idea to establish a UNESCO centre in Japan, and as a consequence, ICHARM was established. In this respect, ICHARM is closely concerned with WWF.

As was reported on the July 2015 issue of ICHARM Newsletter Vol.37, the most recent forum, WWF7, was held in April 2015 in Daegu, Korea. About 41,000 participants from the governments and other sectors of 168 countries gathered. Nine members of ICHARM, including Director Toshio Koike, participated in 15 sessions as either chair or speaker. ICHARM played an especially important role as "Champion" (the principal coordinator) for the thematic session entitled "Adapting to change: Monitoring risk and uncertainty for resilience and disaster preparedness", which was one of the main thematic processes at WWF7. ICHARM contributed a great deal to organizing the session and wrapping up discussions successfully.



Closing ceremony at WWF7

Follow-up activity on the thematic process of WWF7 has been implemented continuously. For example, the Implementation Roadmap Review Meeting was held on September 21, 2017, during the Korea International Water Week 2017 in Gyeongju, Korea. Chief Researcher Ikeda participated and reported the follow-up activities of ICHARM and its partner organizations at WWF7.

The next conference, WWF8, will be held on March 18-23, 2018, in Brasilia, Brazil. At WWF8, discussions will take place in two different categories: the Thematic Process will deal with water issues such as water-related disaster and climate change, while the Regional Process will address the activities of each region. Progress in implementation of the actions since WWF7 will be reviewed as well. As ICHARM has been working hard on water-related disaster issues of the world, it is planning to disseminate its research output and to strengthen the partnership with relevant organizations by positively participating in the sessions at WWF8.

For further information on WWF8, visit the following sites at:

World Water Council: <http://www.worldwatercouncil.org/>

8th World Water Forum: <http://www.worldwaterforum8.org/>

世界水フォーラム

世界水フォーラム (World Water Forum : WWF) は、本部をフランス・マルセイユに置く、国際 NGO の世界水会議 (World Water Council : WWC) によって 3 年に一度、主催され、世界の水関係者が一堂に会し、地球上の水問題解決に向けた議論や展示を行う世界最大級の国際会議です。WWF では、すべての人が参加できるフォーラムと各国政府機関からの閣僚会議、水に関するエキシビションによって主に構成されています。

WWF は、1997 年 3 月にモロッコ・マラケシュで第 1 回フォーラムが開催されたのを皮切りに、これまで 7 回開催されています。このうち、WWF3 は 2003 年 3 月に京都・滋賀・大阪で開催され、その閣僚会議において、当時のユネスコ松浦事務局長が日本にユネスコセンターを設立する構想を表明し、それに基づき ICHARM が設立されるなど、ICHARM は WWF と深い関わりがあります。

2015 年 7 月のニュースレター第 37 号でお伝えしたように、2015 年 4 月には韓国・大邱で WWF7 が開催され、政府関係者を含む 168 ヶ国約 41,000 人が参加しました。ICHARM からも小池センター長はじめ計 9 名が参加、15 のセッション・イベントで運営や発表を行いました。特に、WWF7 の中でも主要な Thematic Process の一つである、Adapting to change: Monitoring risk and uncertainty for resilience and disaster preparedness について、ICHARM はその取りまとめ役である Champion の役割を果たし、セッションの成功裏の運営、議論の取りまとめに大いに貢献しました。

この WWF7 における Thematic Process については、その後も継続的なフォローアップが行われています。その一環として、2017 年 9 月 21 日、韓国・慶州で開催された韓国国際水週間 2017 の間に Implementation Roadmap Review Meeting が開催され、ICHARM から池田上席研究員が参加し、本テーマに関して、ICHARM 及び WWF7 でのパートナー機関の取り組み状況について報告を行いました。

WWF8 については、2018 年 3 月 18 日から 23 日まで、ブラジル・ブラジリアでの開催が予定されています。本フォーラムでは、Thematic Process として水災害と気候変動といったテーマごとに、また Regional Process として各地域での取り組み状況についても議論がなされ、WWF7 からの取り組みについてもレビューが行われる予定です。世界の水災害問題に取り組む ICHARM としても、WWF8 の各セッションに積極的に参画することにより、研究成果の普及、関係機関との連携強化に取り組んでいきたいと思っています。

(※) 関連サイト :

世界水会議 : <http://www.worldwatercouncil.org/>

第 8 回世界水フォーラム : <http://www.worldwaterforum8.org/>

(Written by Tetsuya Ikeda)

The International Atomic Energy Agency (IAEA) RAS/7/030 project activities: 2nd Regional Training Course (RTC) from August 14th to 18th in Sydney, Australia

8 月 14 日から 18 日の日程で、第 2 回 IAEA 地域研修コース (RTC) がオーストラリア・シドニーで開催され、Gusyev 専門研究員が日本のプロジェクトコーディネーター (ANPC) として出席しました。今回の研修は、アジア太平洋地域で、水資源、特に深層地下水資源の持続可能な管理に、同位体法の利用を推進すべく企画されたもので、IAEA 地域協力条約加盟国 16 カ国から 25 人の参加者が集まりました。

多様な環境にある水循環構成要素の特性を明らかにするのには、酸素および水素の安定同位体、トリチウム、炭素、塩素の放射性同位体トレーサーが利用できますが、研修ではこうした同位体に関する講義と実習が行われました。Gusyev 専門研究員は、Morgenstern 博士と協力して、ニュージーランドと日本の最近の事例を用いながら、トリチウム・トレーサーを利用した方法について研修を行いました。実習では、米国地質調査所の TracerLPM プログラムを利用して、トリチウムと SF6 トレーサーを使った方法を体験するという内容でした。オーストラリア原子力科学技術機構 (ANSTO) からは、Meredith、Cendon、Hughes 博士ら 3 名が講師として参加し、放射性同位体トレーサーの野外サンプリング、加速器質量分析、検出された放射線量の解釈などの講義、実習を担当し、また ANSTO の見学でも案内役を務めました。参加者からも好意的な評価を得て、大変有益な研修となりました。

On August 14-18, Research Specialist Maksym Gusyev was dispatched by Ministry of Foreign Affairs of Japan to the 2nd Regional Training Course (RTC) as an alternate national project coordinator (ANPC) of Japan of the International Atomic Energy Agency (IAEA)/Regional Cooperative Agreement (RCA) RAS/7/030 Project. The 2nd RTC was held at the Australian Nuclear Science and Technology Organization (ANSTO), Sydney, Australia, as a part of the RAS/7/030 Project activities to promote the use of isotopic techniques in the Asia-Pacific Region for sustainable water resources management.

In ANSTO, 25 participants from 16 IAEA/RCA member countries joined the 2nd RTC (Photo 1). Participants of the 2nd RTC were given lectures and hands-on exercises about the use of stable isotopes of oxygen (¹⁸O) and hydrogen (²H) and radioactive isotope-tracers such as tritium (³H), carbon (¹⁴C) and chloride (³⁶Cl) for characteriz-



Participants of the 2nd IAEA/RCA Regional Training Course of the RAS/7/030 Project in Sydney, Australia, between August 14th and 18th from Australia, Bangladesh, Cambodia, China, India, Indonesia, Japan, Malaysia, Myanmar, New Zealand, Palau, Philippines, Pakistan, Sri Lanka, Lao P.D.R., Thailand, and Vietnam. Dr. Prof. U. Morgenstern (1st row last on the right), Dr. Catherine Hughes (2nd row-top left), Karina Meredith (3rd row on the left), and Dr. M. Gusyev (3rd row - second left) gave lectures in the RTC.

ing water cycle components in various climatic and environmental settings. Dr. Uwe Morgenstern of GNS Science, New Zealand, and Dr. Maksym Gusyev of ICHARM gave lectures on tritium-tracer method and hands-on exercises with recent examples from New Zealand and Japan. The hands-on exercises focused on the estimation of mean transit times using tritium and SF6 tracers with the U.S. Geological Survey TracerLPM program. From ANSTO, Drs. Karina Meredith, Dioni Cendon, and Catherine Hughes covered various topics of field sampling methods, accelerator mass spectrometry (AMS) analysis, interpretation of analyzed tracer concentrations and laboratory visits at ANSTO. As a result, the 2nd RTC provided useful knowledge to participants judging from their feedback on the RTC and is considered a successful activity of the RAS/7/030 Project to promote sustainable use of water resources in the region.

(Written by Maksym Gusyev)

Sixth Annual Meeting of the Working Group for Hydrology (WGH) of the Typhoon Committee (TC) in Seoul, Korea

The sixth Annual Meeting of the Working Group for Hydrology (WGH) of the Typhoon Committee (TC) was held in Seoul, Korea, on September 25-27, 2017. The meeting was organized by the Han River Flood Control Office of Korea's Ministry of Land, Infrastructure and Transport, and attended by 18 participants from 7 countries (the United States, Japan, China, Thailand, Vietnam, Laos, the Philippines) and a staff member of the TC Secretariat. ICHARM Chief Researcher Yoshio Tokunaga participated as the chair of WGH.

During the meeting, the participants discussed seven "Annual Operation Plans (AOP)" presented by Japan, Korea, and China (see Table 1). Tokunaga delivered a presentation about the Japan's part of AOP including: 1) Background and Objectives, 2) Questionnaires on flood and flash flood damages, and legal framework, system and policy for disaster risk reduction, 3) collaboration with the International Flood Initiatives (IFI).

The 13th TC Integrated Workshop is to be held in Jeju, Korea, from October 30 to November 3, 2017, and the 50th TC Annual Session in Hanoi, Vietnam, from February 26 to March 3, 2018.



Presentation on the Japan's part of AOP by Chief Researcher Tokunaga

2017年9月25日～27日にかけて韓国ソウル市において台風委員会(TC)水文部会第6回年次会議が開催されました。本会議は韓国国土交通部漢江洪水制御所が主催者となり、米国、日本、中国、タイ、ベトナム、ラオス、フィリピンの7ヶ国と台風委員会事務局(TCS)から合計18名の参加がありました。日本からはICHARMの徳永上席研究員が水文部会の議長として参加しました。

会期中、参加者は韓国、日本、中国が行う7つの年間実行計画(AOP)についての議論を行いました(表1)。日本からは「地方防災力の強化のためのフラッシュフラッドリスク情報」、韓国からは「大規模洪水警報システム」、「TC地域における大規模洪水マネジメントのためのガイドライン」、「TCメンバー国の水文データ品質管理のための応用ソフトウェア」、「レーダー雨量データ及び推計技術による洪水予測信頼性の高度化」、中国からは「TCメンバー国の都市洪水予測と浸水地図作成のための手法開発」、「TCメンバー国の水資源利用に関する気候変化の影響評価」について発表が行なわれました。徳永上席研究員から日本AOPに関して、1)事業の趣旨、2)今後予定している各国の洪水・フラッシュフラッドの被災状況及び各国の制度、体制、政策調査、3)国際洪水イニシアティブ(IFI)との連携、について説明し参加者と意見交換をしました。

台風委員会の行事としては、本年10月30日～11月3日、韓国チェジュでの第13回統合部会、2018年2月26日～3月3日、ベトナム・ハノイでの第50回総会が予定されています。

Table 1: Summary of WGH AOPs in 2017 and beyond

	Projects	Organizer	Duration
AOP1	Flash Flood Risk Information for Local Resilience	Japan	2017-2019
AOP2	Extreme flood forecasting system	Korea	2012-2017
AOP3	Guidelines for extreme flood risk management in TC region	Korea	2013-2017
AOP4	Development and Application of Operational System for Urban Flood Forecasting and Inundation Mapping (OSUFFIM) for TC Members	China	2014-2017
AOP5	Application of Hydrological Data Quality Control System in TC Members	Korea	2018-2022
AOP6	Enhancement of Flood Forecasting Reliability with Radar Rainfall Data and Stochastic Technique	Korea	2018-2022
AOP7	Impact Assessment of Climate Change on Water Resource Availability in TC Members	China	2018-2020

(Written by Yoshio Tokunaga)

Awards

IFAS receives the 19th Infrastructure Technology Development Award 2017

土木研究所水災害・リスクマネジメント国際センターの開発した技術「総合洪水解析システム (IFAS)」が、「第19回国土技術開発賞」に入賞し、2017年7月27日に東京国際フォーラムで行われた授賞式で、中村英夫東京都市大学名誉総長（国土技術開発賞選考委員会委員長）より、賞状が授与されました。

「国土技術開発賞」は、建設産業におけるハードな技術のみならず、ソフトな技術も含めた広範な新技術を対象として表彰するものであり、技術開発者に対する研究開発意欲の高揚並びに建設技術水準の向上を図ることを目的として行われております。

なお、ICHARM が過去に開発した技術のうち、2013年には「降雨流出氾濫モデル (RRI モデル)」が優秀賞を受賞し、2014年には「aDcpを用いた河川の流量・土砂同時観測手法」が入賞しています。

On July 27, 2017, ICHARM was awarded with the 19th Infrastructure Technology Development Award for the development of the Integrated Flood Analysis System (IFAS) at the Tokyo International Forum in Tokyo, Japan. Chief Researcher Hiroyuki Ito and Senior Researcher Morimasa Tsuda participated in the awarding ceremony, and were presented with an award certificate by Professor Hideo Nakamura, the chair of the selection committee.

The award is to recognize excellent technologies that have recently developed and put into practice in relation to housing and social infrastructure or land management including a wide range of categories such as planning and design, construction, maintenance and management, materials and products, machinery, electronics and communications, and applications of traditional techniques.



Award ceremony (July 27, 2017)

ICHARM was awarded for its advanced technology twice in the past: in 2013 the Rainfall-Runoff-Inundation Model received the highest award and in 2014 the river and sediment discharge observation system using an acoustic Doppler current profiler was selected among the excellent technologies.

(Written by Morimasa Tsuda)

Senior Researcher Rasmy awarded by JICA for supporting Sri Lanka in last May disaster

Mohamed Rasmy 主任研究員は、今年5月にスリランカで大規模な水災害が発生した際、日本政府が派遣した国際緊急援助隊の一員として現地の緊急対応活動に携わりました。今回その活躍が認められ、JICAから感謝状が送られました。8月3日には、ICHARMの大講堂で表彰式が行われ、小池俊雄センター長から感謝状を授与されるとともに、センター一同から祝福を受けました。

【表彰の背景】

スリランカは、今年5月、これまでに経験がない豪雨のため、南部地域や西部地域では大洪水、中部地域では大規模な地すべりが発生し、深刻な被害を受けました。スリランカ国政府の発表によれば、主に地滑りにより211名が死亡、その他行方不明96名、何らかの被害を受けた者は70万人を超えるということです。日本国政府は、6月3日、スリランカ国政府の要請に応じて国際緊急援助隊を派遣しました。援助隊は、

Senior Researcher Mohamed Rasmy was awarded by JICA for his outstanding contribution as a member of the Japan Disaster Relief Expert Team dispatched to Sri Lanka when the country was devastated by extremely severe rainfall and flooding. On

August 3, 2017, an awarding ceremony was held for him at the ICHARM auditorium, where he was handed a certificate of appreciation by Director Toshio Koike and congratulated by all ICHARM colleagues.



Director Koike (right) hands over a certificate of appreciation to Senior Researcher Rasmy (left) (August 3, 2017)

<Background>

In late May 2017, Sri Lanka was hit by an unprecedented heavy rainfall event, which caused severe floods in the southern and western regions and devastating landslides in the central region. According to the Government of Sri Lanka (GOSL), 211 people lost their lives mainly in landslides, 96 people went missing, and about 704,000 people were affected during this disaster. As per the request from GOSL,

on June 3, 2017, the Government of Japan (GOJ) dispatched a Japan Disaster Relief Expert Team (The JDR Expert Team) consisting of 10 technical experts in the fields of flood control, erosion and sediment control, water resources, flood forecasting, and remote sensing to provide technical advice to GOSL on effective measures at short-, mid-, and long-term flood and landslide control. Rasmy joined the JDR Expert team as an expert on water resources management, flood forecasting, and remote sensing.

The team visited the affected sites, investigated the disaster, and held meetings with relevant ministries, organizations, and stakeholders of GOSL. Finally, they submitted a report on its findings and recommendations on future collaborations between GOJ and GOSL to the relevant ministries and government officials of Sri Lanka. The award was to reorganize and honor his services in this effort.

(Written by Mohamed Rasmy Abdul Wahid)

洪水管理、砂防・土砂管理、水資源、洪水予測、リモートセンシングの専門家 10 名で構成され、洪水および地滑りによる災害防止に向け、短期、中期、長期の対策についてスリランカ国政府に技術的な助言を行うことを目的としていました。Rasmy 主任研究員は、水資源管理、洪水予測、リモートセンシングの専門家として参加しました。

救援隊は被災地を訪れ、災害や被災状況を調査、またスリランカ国政府の関係省庁やその他の利害関係者との会合に参加しました。最終的に、調査結果やスリランカ国政府と日本政府の今後の協力に関する提言などを報告書にまとめ、提出しました。今回 Rasmy 主任研究員が表彰されたのは、こうした一連の活動に対する貢献が認められたことによります。

Others

Personnel change announcement

Leaving ICHARM

- **Morimasa TSUDA** : Senior Researcher
Japan Water Agency

○津田 守正 主任研究員
独立行政法人 水資源機構

- **Duminda PERERA** : Research Specialist
United Nations University, Institute for Water, Environment and Health
(UNU-INWEH)

○ドゥミンダ ペレラ 専門研究員
国連大学 水・環境・保健研究所
(UNU-INWEH)

Comments from summer course & internship students

ICHARM accepted two students this fall: Ms. Kaori Mamuro from Japan as a summer course student and Ms. Rosalita Mejia Barde from the Philippines as an internship student.

They contributed a short message to this volume of ICHARM Newsletter while looking back at their studying at ICHARM.



Kaori Mamuro / 間室かおり

Hiroshima University / 広島大学

Summer course period: August 21 - September 22, 2017

I have studied in ICHARM for 1 month. I have had many experiences in this one month period.

The main object in this internship was to understand what run-off analysis is while using some models, such as IFAS (Integrated Flood Analysis System), RRI (Rainfall-Runoff-Inundation model) and CommonMP. I was able to learn the way to use these model and background for development. I read some theses ICHARM member wrote as well. It helped me understand what problem happened in the world and what ICHARM members were doing to solve it. It was interesting and motivated me to study hard.

I spent time with many international students in studying, playing and sharing each culture. It was great experience for me. I would like to keep in touch with them. I hope I can see them in my job in the future.

Finally, I would like to express my special thanks to all members in ICHARM. Some people talked to me kindly and gave me information not only about research but also life in Tsukuba. Thanks to them, I had great time in Tsukuba. All researcher showed me the posture on their research and that motivated me. Kikumori san who was my supervisor took much time for me in spite of being busy. He'll keep helping my graduation thesies. I cannot thank him enough. I'm very happy to see such great people. I will utilize everything they taught me in my study and in my life.

Others



Rosalita Mejia Barde

Nagoya University / 名古屋大学

Internship period: September 22 - October 6, 2017

I would like to heartily express my gratitude and Salute to the ICHARM Family and of course for my academic adviser Prof. Shinichiro Nakamura (Nagoya University) for making this internship possible. In the earlier years of staying in my Master Course, I already heard this Institute and was hesitant to apply for an Internship because my feeling is it will be intimidating to engage with researchers in this Office. But I was wrong with my thought when I was granted by the Director Toshio Koike as one of their Intern Student.

It was really nice experience to stay in this institute because everyone was accommodating and very friendly despite their busy schedules and pressures as researchers. I also like the feeling that even if I am Student, it feels like home because of the help of Tokunaga-Sensei, Ohara-Sensei, Shrestha-Sensei who patiently guided me on developing my RRI Model for Marikina River Basin. Also thanks to assistant, Ms. Okubo who always made me feel comfortable while I am in ICHARM. Two weeks was not enough actually to learn many things in ICHARM. Learning RRI tool to start learning many things in terms of Risk Management on Water-Related Disasters. How I wish I should had a longer internship in this well-known Research Institute.

On a personal note, being part of Disaster Management research institute feels like I am also in long run will become a fast learner researcher one day. Thanks for all the staff who are also my lunch buddies at the second floor during lunch time. Even if I don't understand Japanese Language, I can see in their faces that they are always happy despite busy life in ICHARM.

My experience in ICHARM is a fulfilling one. Once again, thank you very much for accommodating me.

Awards

* July - September 2017

- July 27, 2017, IFAS receives the 19th Infrastructure Technology Development Award 2017, Developers: Morimasa Tsuda, Mamoru Miyamoto, Seishi Nabesaka (Japan Water Agency)
- August 3, 2017, Mohamed Rasmy Abdul Wahid received letter of appreciation from Japan International Cooperation Agency (JICA) for his participation to Japan Disaster Relief Expert Team (the JDR Team) for Sri Lanka floods

Business Trips

* July - September 2017

- July 3-7, Belgium, Netherlands, Yoshihiro Shibuo, (1) to attend userI2017 (2) meeting at IHE delift
- July 8-12, 2017, Beijing and Kunming in China, Toshio Koike, Third Pole Science Summit (TPSS)—TPE-CSTP-HKT Joint Conference
- July 9–12, 2017, Malaysia, Tetsuya Ikeda, UNESCO Regional Workshop "Building Resilience to Climate Change Risk and Vulnerability to Meet Water Security Challenges"
- July 11–20, 2017, Bangladesh, Malaysia, Young-joo Kwak, (1) workshop in Bangladesh, (2) meetings with BWDB and SPARRO, (3) and to visit University Putra Malaysia (Prof. Biswajeet Pradhan)
- July 17-26, 2017, Washington D.C. and New York in USA, Toshio Koike, Mamoru Miyamoto, (1) meeting with World Bank regarding drought prediction system (2) third UN Special Thematic Session on Water and Disasters
- July 19-22, 2017, Laos, Hiroyuki Ito, Morimasa Tsuda, Closure meeting of the SAFE project
- July 23-28, 2017, Fort Worth and Pasadena in USA, Young-joo Kwak, (1) to attend 2017 IEEE International Geoscience and Remote Sensing Symposium in Fort Worth (2) to have a meeting with NASA Jet Propulsion Laboratory in Pasadena
- July 30 - August 7, 2017, Pakistan, Atsuhiko Yorozuya, Hiroshi Koseki (PWRI Researcher), Daisuke Harada, Gul Ahmad Ali, UNESCO Pakistan Project Partners progress report workshop and handover ceremony, ADCP training
- July 30 – August 1, 2017, Singapore, Tetsuya Ikeda, The 21st Governing Council Meeting of the Asia-Pacific Water Forum (APWF)
- August 7-11, 2017, Singapore, Mohamed Rasmy Abdul Wahid, Mamoru Miyamoto, Young-joo Kwak, 14th Annual Meeting Asia Oceania Geosciences Society (AOGS 2017)
- August 12-18, 2017, Australia, Maksym Gusyev, International Atomic Energy Agency (IAEA) Regional Training Course on the Use of Isotope Techniques for Groundwater Dating 2017
- August 18-26, 2017, Dhaka and Bogra in Bangladesh, Atsuhiko Yorozuya, Hiroshi Koseki (PWRI Researcher), Gul Ahmad Ali, (1) field survey on Jamuna river (2) meeting with BWDB
- August 21-26, 2017, Sri Lanka, Toshio Koike, Tetsuya Ikeda, Hiroyuki Ito, Morimasa Tsuda, Mohamed Rasmy Abdul Wahid, Yusuke Yamazaki, (1) plenary Session for the Platform on Water and Disasters in Sri Lanka (2) to organize the training funded the JAXA-SAFE Sri Lanka project
- August 26-September 1, 2017, Dalian in China, Mamoru Miyamoto, To give lectures at the 44th Asia Pacific Advanced Network (APAN44)
- September 3-5, 2017, Switzerland, Mamoru Miyamoto, Advisory Committee (AC) and Management Committee (MC) mtgs of the Associate Programme on Flood Management (APFM)
- September 4-9, 2017, Leeds in UK, Toshio Koike, Badri Bhakta Shrestha, Mohamed Rasmy Abdul Wahid, Mamoru Miyamoto, the 7th International Conference on Flood Management (ICFM7)
- September 13-22, 2017, Italy, Atsuhiko Yorozuya, Daisuke Harada, (1) field survey on Taliamento river (2) to attend 10th Symposium on River, Coastal and Estuarine Morphodynamics (RCEM 2017)
- September 17-21, 2017, Hanoi in Vietnam, Toshio Koike, Mamoru Miyamoto, the 10th GEOSS Asia-Pacific Symposium (including Asian Water Cycle Initiative (AWCI) group session)

- September 21, 2017, Korea, Toshio Koike, the 10th Meeting of the High-Level Experts and Leaders Panel on Water and Disasters (HELP)
- September 19-22, 2017, Korea, Tetsuya Ikeda, 2nd Implementation Roadmap Review Meeting on the results of the 7th World Water Forum
- September 25-28, 2017, Seoul in Korea, Yoshio Tokunaga, to participate in the 6th Working Meeting of TC (Typhoon Committee) Working Group on Hydrology (WGH)

Visitors

* July - September 2017

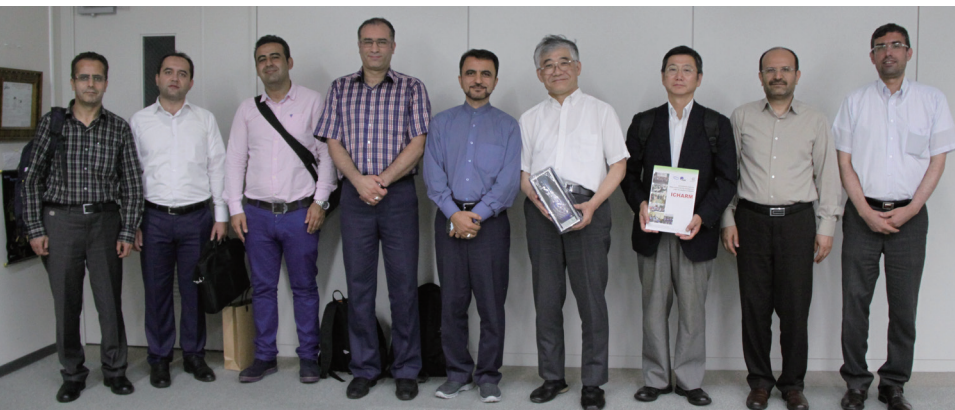
- Visited by the delegate from Agencia Espacial Mexicana (AEXA), June 27, 2017
 Purpose: Inspection of flood forecasting using GSMaP, as a part of JICA program
 - Bereniz Castaneda Talavera (Director, Innovation & Competitiveness)
 - Nahiely Flores Fajardo (Manager, Education Strategy)
 - Gustavo Arriaga Mendez (Manager, Space Applications for Civil Protection)
 - NEC staff and Japan Space Forum (JSF) staff



- Visited by ADBI Dr. Seetharam, August 9, 2017
 Purpose: Meeting on ICHARM's training & capacity building activities
 - Dr. KE Seetha Ram (Senior Capacity Building and Training Specialist, Asian Development Bank Institute (ADBI))



- Visited by the delegate from Tehran Municipality, Iran, August 10, 2017
 Purpose: Training and capacity building by visiting important infrastructures in Tokyo as well as research institutes, universities and consultant companies, etc.
 - Mohammad Reza MEMARIAN (Head of Geotechnical and Strength of Material Center of Tehran Municipality)
 - Mahdi SHARIFIAN (Director General of Planning Bureau of Tehran Municipality)
 - Yousef ALADIN (Director of R&D department of Geotechnical and Strength of Material Center of Tehran Municipality)
 - Bahram YOUSEFI (Director of Geophysics department of Geotechnical and Strength of Material Center of Tehran Municipality)
 - Mostafa LOTFI (Head of Administration Office of Deputy of Technical and Development Affairs of Tehran Municipality)
 - Alireza SHEIKHLAR (HSE expert, Tehran Municipality)
 - Ali Chavishian (Director, Regional Centre on Urban Water Management (RCUWM-Tehran) under the auspices of UNESCO)



Publications

* July - September 2017

A: Peer Reviewed Papers / 査読付論文

- Stewart M.K., U. Morgenstern, M. A. Gusyev, and P. Małoszewski (2017) Aggregation effects on tritium-based mean transit times and young water fractions in spatially heterogeneous catchments and groundwater systems, *Hydrol. Earth Syst. Sci.*, 21, 4615-4627, <https://doi.org/10.5194/hess-21-4615-2017>
- 大原美保, 澤野久弥, 馬場美智子, 中村仁, 水害に強い地域づくりへの参加意向に関する調査分析 -水害リスクを踏まえた住まい方への転換に向けて-, *自然災害科学*, Vol.36 特別号, p.91-108, 日本自然災害学会, 2017年9月, http://jsnds.org/ssk/ssk_36_s_091.pdf
- 栗林大輔, 大原美保, 佐山敬洋, 近者敦彦, 澤野久弥, 「洪水カルテ」による地区ごとの洪水脆弱性評価および対応案の検討手法の提案, *土木学会論文集F6分冊*, 土木学会, Vol.73 No.1, pp.24-42, 2017年9月
- Tong Liu, Morimasa Tsuda, and Yoichi Iwami, A Study on Flood Forecasting in the Upper Indus Basin Considering Snow and Glacier Meltwater, *Journal of Disaster Research*, Vol.12, No.4, doi: 10.20965/jdr.2017.p0793, pp. 793-805
- Young-joo Kwak, J. Park, Yoichi Iwami, Large Flood Mapping using Synchronized Water Index Coupling with Hydrodata and Time-series MODIS Images, 2017 IEEE Geoscience and Remote Sensing Symposium, IEEE Conference Publications, pp.610-611, July, 2017
- Young-joo Kwak, S. Yun, Yoichi Iwami, New Approach for Rapid Urban Flood Mapping Using ALOS-2/PALSAR-2 in 2015 Kinu River Flood, Japan, 2017 IEEE Geoscience and Remote Sensing Symposium, IEEE Conference Publications, July, 2017
- Young-joo Kwak, Nationwide Flood Monitoring for Disaster Risk Reduction Using Multiple Satellite Data, *ISPRS Int. J. Geo-Inf. ISPRS, MDPI*, Vol.6, pp.203-215, July, 2017

B: Non-peer Reviewed Papers / 査読無し論文

- 栗林大輔, 近者敦彦, 澤野久弥, 降雨流出氾濫モデルを用いた主要連絡道路の交通途絶評価について, 平成29年度土木学会全国大会 第72回年次学術講演会, 土木学会, 2017年9月11~13日
- 海野仁, Gusyev Maksym, 千田容嗣, 徳永良雄, インドネシア国ソロ川流域における濁水リスクの試算, 平成29年度土木学会全国大会 第72回年次学術講演会, 土木学会, 2017年9月11~13日
- 菊森佳幹, 気候変動がメコン川流域(東北タイ)の濁水リスクに及ぼす影響評価, 平成29年度土木学会全国大会 第72回年次学術講演会, 土木学会, 2017年9月11~13日

C: Oral Presentations / 口頭発表

- Tetsuya Ikeda, Effort for Effective Flood Management under Climate Change by ICHARM, Regional workshop: Building Resilience to Climate Change Risk and Vulnerability to Meet Water Security Challenges, UNESCO Jakarta, Langkawi, Malaysia, July 10-11, 2017
- Mohamed Rasmy, The investigation of the damages from the floods and landslides caused by the heavy rainfall in Sri Lanka, Planery on Water and Disasters, Sri Lanka, August 24, 2017
- Mohamed Rasmy, Real-time rainfall monitoring & hydrological modeling in Kalu river basin, Planery on Water and Disasters, Sri Lanka, August 24, 2017
- Mohamed Rasmy, Yuichi Iwami, Tomoki Ushiyama, Yusuke Yamazaki, Toshio koike, An Integrated Approach for Maximizing Multi-Platform Data for Enhancing Water Related Disaster Early Warning and Management in Developing Countries, ICFM7, Leeds, UK, September 5-7, 2017
- Gul Muhammad, Mohamed Rasmy, Morimasa Tsuda, Toshio Koike, Simulating hydrological response of snow and glacier melt and estimating flood peak discharge in SWAT valley river basin, JSCE 2017 Annual meeting, JSCE, Kyushu Univ., September 11-13, 2017
- Habib Jamal, Morimasa Tsuda, Tomoki Ushiyama, Trans boundary flood forecasting through downscaling of global weather forecast and hydrological model simulation, JSCE 2017 Annual meeting, JSCE, Kyushu Univ., September 11-13, 2017
- Young-joo Kwak, Flood Risk under climate change in GBM basin of Bangladesh, Integrated flood risk and water management under climate change for disaster risk reduction, BWDB-JICA, Dhaka, Bangladesh, July 16, 2017
- Young-joo Kwak, Yoichi Iwami, Economic Impacts of Flooding under Climate and Socioeconomic Scenarios in Asia-Pacific region: A pilot initiative of Bangladesh, Asia Oceania Geosciences Society (AOGS) 14th Annual Meeting, AOGS, Singapore, August 6-11, 2017

D: Poster Presentations / ポスター発表

- Badri Bhakta Shrestha, Edangodage D.P. Perera, Shun Kudo, Daisuke Kuribayashi, Hisaya Sawano, Takahiro Sayama, Jun Magome, Akira Hasegawa, Yoichi Iwami, Flood Damage Assessment in the Selected River Basins of Asian Developing Countries under Climate Change, ICFM7, Leeds, UK, September 5-7, 2017
- 南雲直子, 江頭進治, 2017年九州北部豪雨による赤谷川流域の土砂流出と被災状況, 日本第四紀学会2017年大会, 日本第四紀学会, 福岡大学, 2017年8月26~28日
- Mohamed Rasmy, Yuichi Iwami, Tomoki Ushiyama, Toshio koike, Applications of Global Satellite Mapping of Precipitation (GSMaP) Products for Enhancing Flood Forecasting and Early Warning Activities in Sri Lanka, Asia Oceania Geosciences Society (AOGS), Singapore, August 6-11, 2017
- Y.AKIYAMA, Y.SASAKI, M. HASHIBA, A.YOROZUYA: Discharge measurement and analysis of flow resistance at large-scale flood, The 10th Symposium on River, Coastal and Estuarine Morphodynamics, Trento-Padova, 15-22 September 2017, pp.148
- D. Harada, S. Egashira, A. Yorozuya and Y. Iwami: Influence of riverbed deformation on flood flow in the Omoto river flood disaster 2016, Japan, The 10th Symposium on River, Coastal and Estuarine Morphodynamics, Trento-Padova, 15-22 September 2017, pp.190
- S. Kudo, A. Yorozuya, D. Harada and T. Fueta: Influence of Flow Resistance Change on Hydrographs in a Basin, The 10th Symposium on River, Coastal and Estuarine Morphodynamics, Trento-Padova, 15-22 September 2017, pp.209
- A. Yorozuya, S. Egashira, T. Fueta: Study on Sediment Runoff in a Catchment Area, The 10th Symposium on River, Coastal and Estuarine Morphodynamics, Trento-Padova, 15-22 September 2017, pp.269
- Young-joo Kwak, J. Park, Yoichi Iwami, Large Flood Mapping using Synchronized Water Index Coupling with Hydrodata and Time-series MODIS Images, 2017 International Geoscience and Remote Sensing Symposium (IGARSS), IEEE, Fort Worth, Texas, USA, July 23-28, 2017
- Young-joo Kwak, S. Yun, Yoichi Iwami, New Approach for Rapid Urban Flood Mapping Using ALOS-2/PALSAR-2 in 2015 Kinu River Flood, Japan, 2017 International Geoscience and Remote Sensing Symposium (IGARSS), IEEE, Fort Worth, Texas, USA, July 23-28, 2017

E: Papers in technical magazines / 技術雑誌論文

None / 該当無し

F: PWRI Publications / 土木研究所刊行物

- ICHARM, 2015-2016 修士課程「防災政策プログラム 水災害リスクマネジメントコース」実施報告書, 土木研究所資料 第4355号, ISSN 0386-5878, 国立研究開発法人土木研究所 (PWRI), 2017年9月
- ICHARM, Report on 2015-2016 M.Sc. Program, "Water-related Disaster Management Course of Disaster Management Policy Program", Technical Note of PWRI No. 4365, ISSN 0386-5878, Public Works Research Institute (PWRI), September, 2017

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