

Contents

- 2 ▶ Special Topic
- 6 ▶ International Flood Initiative
- 9 ▶ Research
- 26 ▶ Training
- 28 ▶ Information Networking
- 34 ▶ Others
- 38 ▶ Publication List



Message from Director

Heart admiring cherry blossoms leads to essential flood risk reduction

In Tsukuba, where ICHARM locates, cherry blossoms are at their peak. At any rate, Japanese like cherry blossoms so much. It might be because they see the ephemeral nature of life in cherry blossoms falling graciously after full bloom for several days. People plant them in parks and school grounds and along streets. Graduates from the master and Ph.D. courses of ICHARM plant a memorial cherry blossom tree in each year.

In many small and medium-size rivers, people often planted cherry blossom trees along the both sides of river dykes. A lot of cherry blossom trees, however, were cleared due to river improvement works to accommodate a large increase in flood peak discharge associated with rapid urbanization in Japan. Local residents wanted to keep rows of cherry trees, objected to river improvement plans, and had conflicts with river managers.

As such incidents were common throughout the country, a thought-provoking solution in the case of the Mama River, not far from Tsukuba, is worthy of attention. A river improvement work plan had been proposed by river managers, and sparked a big and long debate between local residents and river managers. In the process of discussion, the Mama River flooded in 1981, causing serious damage to more than 9,000 houses. More than 150 meetings were held and then they found two solutions. One was river widening; though old cherry trees had to be cut down, the new river bank was so designed that new trees were planted. The other was really essential one. They agreed to promote Comprehensive Flood Management in the Mama River basin by constructing retarding basins and increasing urban infiltration functions.

Very beautiful cherry blossoms remind us of the importance of comprehensive dialogues among all stakeholders for getting a holistic solution.

April 28, 2017

Toshio Koike
Director of ICHARM

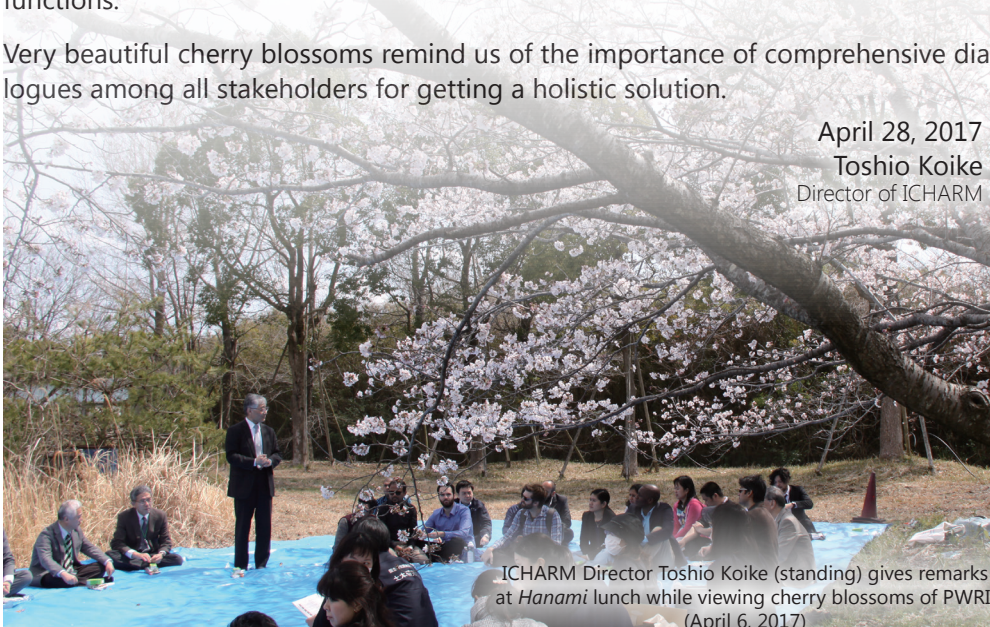
桜を愛でる心から本質的な洪水リスクの軽減へ

ICHARM が位置する筑波では桜が満開です。数日咲き誇ってパッと散る潔さが良いのでしょうか、とにかく桜は日本人に好かれています。公園や街路沿い、校庭周辺に桜が植えられ、ICHARM でも修士、博士の修了生による桜の植樹が行われております。

日本各地の中小河川でも両岸の堤防に桜が植えられてきましたが、急激な都市化に伴う洪水ピーク流量の増加に対応する河川改修工事によって、姿を消す場合も少なくありません。地域住民は桜並木の保存を願い、河川改修計画に反対し、河川管理者との間に摩擦が生じて参りました。

そのような中で、筑波から程近い真間川では、注目に値する、示唆に富んだ問題解決が図られています。河川管理者は桜並木の伐採を含む河川改修案を提示しましたが、それは住民間に反響を引き起こし、長い議論が始まりました。その最中に1981年、9,000戸以上が被害を受けるという深刻な水害が発生したのです。実に150回を超える住民と河川管理者間の協議の結果、2つの解決策が提示されました。一つは、190本におよぶ片岸の桜を伐採するものの、改築堤防のデザインを工夫し桜の植栽を可能にするというものでした。他方はより本質的で、遊水池の建設や都市化された領域での浸透能の向上による総合治水の推進を双方で合意したことです。

見事な桜の季節に当たり、諸問題の全体的な解決には多くの利害関係者の包括的な対話が重要であることを改めて教えられました。



ICHARM Director Toshio Koike (standing) gives remarks at Hanami lunch while viewing cherry blossoms of PWRI. (April 6, 2017)

Special Topic

Message from Prof. Takeuchi

ICHARM と 11 年

この3月末、大勢の方々の温かいお言葉と、心のもった送別の企画に送られ、私は土木研究所 ICHARM を退職いたしました。同僚の皆様、協力者の皆様、大変お世話になりました。ICHARM での 11 年は、私の人生で最も幸せな時でした。この間世界中の方々と一緒に仕事をし、多くのことを学び、考え、挑戦させていただきました。それが多少とも災害に苦しむ人々、リスクにさらされている人々のお役に立てているとすれば、すべて皆さまのおかげです。皆さまのおかげでここまですることができました。数え切れない多くの方々の親切や思いやり、感謝の祈りを捧げずにはいられない気持ちです。まことにありがとうございます。

ICHARM は「研究」と「研修」を車の両輪とし、「情報ネットワーク」をナビゲーターとして、行き先を「現地実践」と定め車を走らせて参りました。高い科学的知見を「現地主義」に基づいて、具体的なローカルの問題解決に生かしてこそ、ICHARM 設立の意味があるという思いです。また「国際貢献は人づくり」という信念で、政策研究大学院大学 (GRIPS) との学位コースも発足させ、各種短期コースも開いてきました。

今日までに、洪水リスクに関しては、衛星観測から気象、水文、氾濫解析、土砂解析、リスク評価から住民支援までの、一貫したリスク軽減の研究成果を挙げ、修士課程 110 人、博士課程 7 人の修了生を世に送り、フィリピン、インドネシア、カンボジア、タイ、ミャンマー、バングラデシュ、ネパール、パキスタンなどでの現地実践を通じ、科学的知見の社会実装に取り組んでできています。このためのさまざまな人々との協力体制も、国連や国際プロジェクト、学会、国、県、市町村にわたっています。

ICHARM の活動は、内外である程度知られるようになってきていますが、その役割はまだまだです。社会や環境の変化に応じて、必要性は高まる一方です。ICHARM の人と技術のネットワークが一体となって、抜群の総指揮官小池センター長の下、ICHARM のますますの世界貢献を、確信し、祈っています。

ICHARM のあるつくばは、国際研究所の立地にふさわしい、すばらしい歴史と文化の都市です。日本でも最も古い文学の舞台でもある筑波

Eleven years at ICHARM



Prof. Kuniyoshi Takeuchi
Advisor (2014.10 - 2017.3)
Director (2006.3 - 2014.9)

With many warm messages and memorable ceremonies, I retired from PWRI-ICHARM at the end of this March. All ICHARM friends and partners, I have no words to express my deep appreciation for your kind support. Eleven years at ICHARM was the best time in my life. During this time I worked, learned, thought and took challenges with many people around the world. If I have achieved anything significant at ICHARM for disaster risk reduction, it was only because of you. I felt like I could do anything because of your kind cooperation. I pray from my heart thanking for your immeasurable kindness. Thank you so much for your collaboration for such a long time.

The ICHARM vehicle has been driving with “research” and “training” as the two main wheels having “information networking” as the navigator steering it towards “local practices”. Our action has always been based on the rationale of establishing ICHARM: delivering the best practicable technology to local practices under the principle of “localism”. Also, believing that human empowerment is the only sure way for sustainable development, we have created short- and long-term training programs and doctoral and master’s courses in cooperation with the National Graduate Institute of Policy Studies (GRIPS).

Up to now, we have made a number of achievements in research covering the main areas of flood risk reduction – satellite observation, analysis in meteorology, hydrology, inundation and sediment behavior, disaster risk assessment, and disaster-related assistance for communities. In education, our graduate programs have graduated 110 students with a master’s degree and 7 with a doctoral degree. Many international projects have been conducted to implement scientific knowledge in local communities of the Philippines, Indonesia, Cambodia, Thailand, Myanmar, Bangladesh, Nepal and Pakistan. Through these activities, we have expanded a network of cooperation worldwide involving so many people, organizations like the United Nations, international projects, academic societies, nations, provinces, and towns and villages.

Although the activities of ICHARM are getting more widely known both overseas and inside Japan, there is still a long way to go for ICHARM to fulfill its role expected in the world. Expectations have been increasing ever higher as the world undergoes social and environmental changes. I have no doubt that under the superb leadership of the new director, Professor Toshio Koike, ICHARM will continue making positive contribution to the global water-related risk reduction through disaster management, effectively mobilizing the network of experts and technologies in the world.

Tsukuba City, home to ICHARM, is rich in history and culture and a great place for locating an international research center. Near the city are Mt. Tsukuba, celebrated even in Japanese ancient literature, and Lake Kasumigaura, displaying a calm and embracing water surface, both of which have seen a dramatic transition in this country. There is a lot more in this area. Sakuragawa, a local river, offers breathtaking scenery with beautiful cherry blossoms alongside it in spring, and Hojimai,



Prof. Takeuchi delivers the last presentation (March 27, 2017)

山、日本の歴史とともにある霞ヶ浦のどかな水面。美しい桜と桜川、その水で育てられたおいしい北條米、それらがサイエンス都市にふさわしい四季の移ろいを演出してくれます。この世界の文化都市が、世界の防災研究、実践教育のメッカとなるよう、ICHARMの活動の更なる発展を祈念し、退職後も甲府の地からずっと応援させていただきます。

皆様、長い間まことにありがとうございました。

a rice brand locally grown with abundant water from Sakuragawa, is a tasty pleasure in fall. Each of these contributes to the colorful seasonal transition throughout the year, which creates an excellent environment for Tsukuba Science City. I sincerely hope that ICHARM will continue growing at this international cultural city to be the world center and legacy of research and education in water-related disaster management in the 21st century, as well as for future generations. I am retiring and leaving Tsukuba for Kofu, but my heart is always with ICHARM.

Once again, I thank you very much for all your support during my tenure.

Commemorative lectures of PWRI president and ICHARM advisor

The president of the Public Works Research Institute (PWRI), Dr. Taketo Uomoto, and the advisor of the International Centre for Water Hazard and Risk Management (ICHARM), Prof. Kuniyoshi Takeuchi, retired on March 31, 2017. Dr. Uomoto was in the position for six and a half years from August 2010, and Prof. Takeuchi for about 11 years from March 2006. Both distinguished individuals made great contributions to progress of the respective research institutes. Prior to their retirement, Dr. Uomoto and Prof. Takeuchi delivered commemorative lectures on March 8 at a PWRI lecture room.

Dr. Uomoto spoke about the present and future of PWRI. He first outlined current issues related to civil engineering, such as natural disasters and deterioration of existing structures, and then analyzed PWRI by comparing other research institutes based in Tsukuba, Japan. He concluded the presentation by summarizing how research should be conducted at the national center of civil engineering research and development, pointing out the critical points for the future progress of PWRI, which are development of new seed technologies, dissemination of technologies developed by PWRI to overseas users and organizations, acquisition of knowledge and experience from other organizations.

Prof. Takeuchi shared with the audience his experience with ICHARM over the last 10 years. Looking back at the decade from the official establishment in March 2006, he explained that he became the director because of fortunate



PWRI president Uomoto delivers a presentation



ICHARM advisor Takeuchi delivers presentation

魚本健人土木研究所理事長は2010年8月から6年半、竹内ICHARM顧問は2006年3月から約11年間、それぞれ土木研究所、ICHARMの発展に尽力され、ともに2017年3月31日で退職されました。これを期に、標記記念講演会が2017年3月8日に土木研究所共用会議室で開催されました。

魚本理事長は「土木研究所の現状と将来」と題し、自然災害や既設構造物の劣化問題など土木分野に関わる諸問題を概観し、土木研究所の現状を他のつくば市内の研究所と比較しながら検証しました。さらに、今後土研としてどのように研究を行っていくべきか、新しいシーズ技術、海外への技術発信、および他機関からの学習それぞれの重要性について言及しました。

竹内顧問は「ICHARMと10年」と題し、様々な人との「縁」によりICHARMセンター長となり、強いきずなく基づく様々な方との協力によりICHARMの諸活動が実現していったことについて触れました。また、研究機関としての大学と行政機関としての国土交通省を結びつける土木研究所の役割について言及し、最後に、顧問が国内外で行うプレゼンで常に説明されてきた「居安思危（こあんしき）Be aware of risk while we are safe」のスライドで締めくくられました。

Special Topic

encounters with a diverse range of individuals, and that ICHARM could accomplished a great deal because of cooperation and guidance provided by other people and organizations based on their strong partnership with ICHARM. He also highlighted the important role played by PWRI in linking universities as research institution with the Ministry of Land, Infrastructure, Transport and Tourism as administrative institution. The professor ended his last lecture with a Chinese ancient saying that he had shared with the audience at every presentation he had made, at home and abroad: Be aware of risk while we are safe.



PWRI and ICHARM staff listen to commemorative lectures

(Written by Katsuhito Miyake)

Prof. Takeuchi's last lecture and ICHARM 10th anniversary publication ceremony

2017年3月末をもちまして、2006年3月6日のICHARM設立以来、初代センター長として、2014年10月1日からは顧問としてICHARMの活動に多大な貢献をされた竹内邦良教授が退職いたしました。

また3月中旬には、ICHARM設立10周年を機に、竹内顧問を編集委員長として進めていた記念誌も完成いたしました。

これらを記念し、2017年3月27日に、ICHARM棟講堂において標記講演会とお披露目会を開催しました。会には、ICHARM現役職員と学生の他、ICHARMに過去在籍し、現在は「ICHARM Ambassador」として各所で活躍されている皆さんにも多数ご参加いただきました。

講演会は、三宅グループ長の司会により行われ、小池ICHARMセンター長による開会挨拶の後、坂本忠彦日本工営顧問（元土木研究所理事長）、寺川陽河川情報センター研究第一部長（元ICHARMグループ長）からご挨拶を頂きました。

続いて、竹内顧問から「Stepping-Stones of ICHARM」と題して講演を行いました。講演では、ICHARMの10年間の軌跡を紹介するとともに、「持続可能な開発のためには人間の

On the afternoon of March 27, 2017, Professor Kuniyoshi Takeuchi spoke for the last time at the ICHARM Auditorium before his retirement from the institute at the end of the same month. His tenure at ICHARM started as the founding director on March 6, 2006. In October 2014, when Professor Toshio Koike assumed the director position, he became the advisor and stayed in the position until his retirement day. Prof. Takeuchi is incomparable in his dedication and achievements in the field of water-related disaster management during his 11 years at ICHARM.



Prof. Takeuchi delivers the last presentation

After the lecture by Prof. Takeuchi, a ceremony was held to celebrate the publication of the commemorative volume for ICHARM's 10th anniversary. Prof. Takeuchi led the anniversary publication team as the editor-in-chief, and the volume finally came out in the middle of March.

Many people gathered for Prof. Takeuchi's last lecture at ICHARM. The participants included not only current researchers and students but also those who once worked or studied at ICHARM and now continue their careers at other organizations with the honorable title of "ICHARM Ambassador" conferred by Prof. Takeuchi.

Moderated by Deputy Director Katsuhito Miyake, the lecture started with opening speeches by Professor Toshio Koike, the director of ICHARM, Dr. Tadahiko Sakamoto, former chief executive of PWRI and now advisor of Nippon Koei. Co., LTD.,



Prof. Takeuchi (center, with a red tie) with the lecture participants



and Mr. Akira Terakawa, former deputy director of ICHARM and now director of Research Division I at the Foundation of River & Basin Integrated Communications.

Thanking them for the speeches filled with warm words, Prof. Takeuchi started his last lecture entitled "Stepping-Stones of ICHARM." He first briefly looked back at ICHARM's growth for the last 10 years and then spoke in details about Sontoku Ninomiya, an agro-reformer and philosopher in the 19th century who was a real practitioner of the professor's belief: Human empowerment is the only sure way for sustainable development. After the lecture, a token of appreciation from ICHARM staff, a special drinking glass etched with "Millions of Thanks" and "Love from ICHARM," was handed to him with a big bundle of flowers. The students also expressed their gratitude to him with a set of a three-year diary and a pen.



(left) Prof. Takeuchi with Dr. Sakamoto; (center) with Mr. Terakawa; (right) with Prof. Tanaka

A short ceremony followed the lecture to celebrate the publication of "ICHARM 10th Anniversary." Chief Researcher Yoshio Tokunaga explained why and how the volume was produced, as well as the contents. Then Prof. Takeuchi personally presented a copy to those who played an important part in the early stage of the institute; Dr. Sakamoto, Mr. Terakawa, and Dr. Shigenobu Tanaka, former deputy director of ICHARM and now professor of the Disaster Prevention Research Institute, Kyoto University.

The event ended with a closing speech by Prof. Tanaka, in which he called Prof. Takeuchi "modern Sontoku," referring to his lecture. He then led three banzai cheers for thanking him for everything he did and wishing him a happy retirement.



Prof. Takeuchi with a token of appreciation in his hand

能力を高めることが唯一の手段である」ことを実践した江戸時代の農業者・思想家である二宮尊徳の生き方について紹介されました。

続いて、10周年記念誌お披露目会に移り、徳永上席研究員による作成趣旨説明の後、竹内顧問から、特に ICHARM 設立に尽力された坂本顧問、寺川部長、田中茂信京都大学防災研究所教授（元 ICHARM グループ長）にそれぞれ記念誌が手渡されました。引き続き、竹内顧問への記念品として、ICHARM メンバーからは「love from ICHARM」が彫り込まれたグラス、修士学生からは3年間ダイアリーと記念ペンが手渡されました。

最後に、田中教授から閉会挨拶を頂き、顧問の講演内容になぞらえて、顧問を「modern Sontoku」と称して頂いたのち、田中教授の音頭で万歳三唱を行いました。

(Written by Daisuke Kuribayashi)



International Flood Initiative (IFI)

Implementation Planning Workshop on International Flood Initiative (IFI) in Asia-Pacific

2017年1月10日に、ICHARMが事務局を務めるInternational Flood Initiative (IFI)のワークショップ「Implementation Planning Workshop on International Flood Initiative (IFI) in Asia-Pacific」がICHARMの主催により東京で開催されました。第9回 GEOSS アジア太平洋シンポジウムのサイドイベントとして位置付けられたこのワークショップには、国内外から合わせて53名が参加しました。

このワークショップでは、ICHARMの小池センター長がIFIの活動のコンセプトや仙台防災枠組みなど世界の防災の流れについて話題提供を行い、High Level Panel on Water (HLPW) シェルパの廣木謙三氏、フィリピン公共事業道路省 (DPWH) の Emil K. Sadain 次官がキーノートスピーチを行いました。また、宮本研究員がIFIの新たな実施戦略 (2016-2022) と実行計画案について説明したのち、データの収集と蓄積、総合アセスメント、気候変動を考慮したリスク情報、政策決定、コミュニティでの実践支援、の各トピックについて、小池センター長、三宅グループ長、澤野首席研究員、Rasmy 主任研究員、大原主任研究員がICHARMでの研究事例を紹介しました。さらに、フィリピン、スリランカ、パキスタン、インドネシア、マレーシア、ミャンマーからの出席者が洪水リスク軽減に関する国内の取組状況について話題提供を行なったほか、総合討論としてIFIの実行計画について活発に意見交換を行いました。

このワークショップの後、Sadain 次官、及び、フィリピン科学技術省 (DOST) の Anthony C. Sales リージョン XI 局長は、ICHARMの澤野首席研究員、大原主任研究員とともに、国土交通省京浜河川事務所及び江戸川河川事務所の協力のもと、鶴見川多目的遊水地と首都圏外郭放水路の視察を行いました。Sadain 次官及び Sales 局長は鶴見川での取組に強い関心を示され、また、外郭放水路ではシールドマシンの能力やポンプ場建設にかかった工期等、具体的な質問が次々と出るなど、日本の取組はフィリピンの治水を考える上で大変参考になるとの意見を頂きました。

As the secretariat of the International Flood Initiative (IFI), ICHARM organized an international workshop, "Implementation Planning Workshop on International Flood Initiative (IFI) in Asia-Pacific," in Tokyo, Japan, on January 10, 2017, prior to the 9th GEOSS Asia-Pacific Symposium. A total of 53 participants joined this workshop from national and international organizations.



Participants in the IFI workshop

In the workshop, ICHARM Director Toshio Koike explained the basic concept underlying the IFI activities and a global trend in disaster management, exemplifying the Sendai Framework for Disaster Risk Reduction 2015-2030. Dr. Kenzo Hiroki, sherpa of the High Level Panel on Water (HLPW), and Mr. Emil K. Sadain, undersecretary of the Department of Public Works and Highways (DPWH), the Philippines, delivered keynote speeches. ICHARM researchers also made presentations. Researcher Mamoru Miyamoto introduced IFI's new strategy (2016-2022) and draft implementation plan, and Senior Researcher Mohamed Rasmy, Director Koike, Deputy Director Katsuhito Miyake, Chief Researcher Hisaya Sawano, and Senior Researcher Miho Ohara spoke about ICHARM activities including data and statistics, integrated assessment, risk information considering climate change, policy making, support for local communities to implement plans. Additionally, participants from the Philippines, Sri Lanka, Pakistan, Indonesia, Malaysia and Myanmar introduced on-going and planning efforts in flood risk reduction in their countries, and actively joined discussions about proposed IFI's implementation plan.

After this workshop, Mr. Emil K. Sadain and Mr. Anthony C. Sales, regional director of the Department of Science and Technology (DOST) in Region XI, the Philippines, visited the Tsurumi River Multipurpose Retarding Basin and the Metropolitan Area Outer Underground Discharge Channel with ICHARM researchers. The visit was conducted in cooperation with the Keihin River Office and the Edogawa River Office of MLIT. Both Philippine officials showed keen interest in flood management in the Tsurumi River basin, and asked many questions including



Explanation at Metropolitan Area Outer Underground Discharge Channel (from left to right, Chief Researcher Hisaya Sawano, Undersecretary Emil K. Sadain, Regional Director Anthony C. Sales, and Director Hirokatsu Kanazawa from Edogawa River Office)

the ability of shield machines and the construction period for the pumping station. They said that flood control facilities and activities in Japan gave them a lot of useful hints to improve flood control in the Philippines.

(Written by Naoko Nagumo)

The 20th Governing Council Meeting of APWF at Singapore



At the 20th APWF Governing Council Meeting

ICHARM Researcher Mamoru Miyamoto attended the 20th Governing Council Meeting of the Asia-Pacific Water Forum (APWF), held at Singapore PUB on January 18, 2017.

Various topics on the 3rd Asia-Pacific Water Summit, scheduled to be held in 2017, were discussed in the meeting. Also discussed were APWF's six thematic priority issues and three interdisciplinary issues and thematic leaders for those issues. Dr. Miyamoto explained the new strategy of the International Flood Initiative (IFI) and its implementation framework and participating countries with a concrete implementation plan, and told the meeting that ICHARM will be able to contribute to a priority issue on climate and an interdisciplinary issue on capacity building.

The meeting also talked about the regional preparation for the 8th World Water Forum scheduled in 2018. ICHARM shares a common view with APWF that water and disasters is a priority theme in the region, and will closely cooperate with APWF for the success of the 8th World Water Forum by planning concrete actions based on this understanding.

(Written by Mamoru Miyamoto)

2017年1月18日にシンガポールPUBにおいて第20回アジア・太平洋水フォーラム (APWF) 運営理事会が開催され、ICHARMから宮本研究員が参加しました。会議では2017年に開催される第3回アジア太平洋水サミット (APWS) についても議論がなされ、ミャンマーがホスト国の最終候補になったことが周知されました。APWSの各議題の担当に関する議論では、6つの主要議題と3つの分野横断議題の先導的機関が検討されました。ICHARMは「気候」に関する主議題と「能力」に関する分野横断議題に貢献できることを表明した上で、ICHARMの具体的な貢献内容としてIFIの新戦略と実施枠組み、今後の具体的な対象国での展開を紹介しました。

さらに、2018年に開催される第8回世界水フォーラムに向けたアジア太平洋地域の準備・活動についても議論がなされました。ICHARMではAPWF活動における優先的分野の1つである「水と災害」に関する取り組みを行動計画に反映していくことで2018年の第8回世界水フォーラムに繋がる活動を続ける予定です。

HELP Davao Network at the Philippines

ICHARM Researcher Mamoru Miyamoto participated in a workshop hosted by the HELP Davao Network in Davao City, the Philippines, on February 14-16, 2017. "HELP" stands for "Hydrology for the Environment, Life and Policy." The network links stakeholders from the industry, government and academic sectors to work collectively for water resources management for Davao with support from UNESCO. The workshop was held to develop a proposal of a science-based plan for Davao City to improve water resources management that is sustainable for 15 years.

Dr. Miyamoto spoke at the workshop, introducing the framework and activities of the International Flood Initiative (IFI), for which ICHARM has been the secretariat, and proposing a cooperative framework between the network and IFI in flood risk management and post-disaster restoration. He also spoke about climate change impact assessment conducted by ICHARM in the Pampanga River basin of the Philippines, which drew a lot of attention from the participants. Dr. Anthony Sales, main organizer of the HELP Davao Network and regional director of the Department of

2017年2月14日から16日にフィリピンのダバオ市においてHELPダバオネットワークが主催するワークショップが開催され、ICHARMから宮本研究員が参加しました。HELPダバオネットワークとはUNESCOが支援するダバオ市における水資源に関係する産官学のステークホルダーが集まったネットワークであり、ワークショップは、ダバオ市における15年間の持続可能な水資源マネジメントに資する、科学に基づいた計画を作成することを目的としていました。ワークショップでは、ICHARMが事務局を務めるIFI(International Flood Initiative)の枠組みと活動に関する紹介と、ダバオ市における水災害および防災復興に関するIFIとの協力体制の提案を

International Flood Initiative

行いました。また ICHARM の成果であるパンパンガ川流域における気候変動影響の評価についても紹介し、参加者から高い関心が示されました。特に HELP ダバオネットワークの主催者であるフィリピン科学技術省のアソニー・サレス地域局長は、ICHARM が今年 1 月に主催した IFI ワークショップの際に招へいしており、今後のダバオ市における防災および水資源管理に関して IFI に大きな期待を寄せておられました。

さらに近年に洪水被害が発生した現地を訪ねることができたので、洪水に対する教育や避難活動のためのコミュニティセンターが活用されている現状を視察しました。今後、ICHARM による科学技術としての成果とコミュニティによる実践が結びつくことでさらなる成果の拡大につながることを期待されます。

Science and Technology (DOST), was also at the workshop and expressed high expectations to IFI for its contribution to flood and water resources management in Davao City. He also participated in an IFI workshop hosted by ICHARM in January 2017.

Besides the workshop, the HELP Davao Network visited a local community affected by a recent flood and learned that the community center there plays an important part in local disaster management as a place for educating people about floods and as shelter at the time of disaster.

ICHARM will continue providing assistance for Davao City, hoping that progress in management of flood risk and water resources will be greatly accelerated when science and technology provided by ICHARM meet committed efforts by local communities.



At the HELP Davao Network

(Written by Mamoru Miyamoto)

IFI Coordinating Meeting in the Philippines

ICHARM が事務局を務める International Flood Initiative (IFI) では、新たな実施戦略 (2016-2022) と実行計画、及び 2016 年 10 月の「第 8 回水と災害に関するハイレベルパネル (HELP)」のサイドイベントにて採択された、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」に基づき、フィリピン、スリランカ、パキスタン、インドネシア、マレーシア、ミャンマー、ベトナムの 7 か国で、洪水管理に関するナショナルプラットフォームの構築に向けた活動を進めています。2017 年 3 月 13 日には、フィリピン国内の具体的な活動について議論するため、「IFI Coordinating Meeting in the Philippines」をマニラ市およびケソン市において開催し、小池センター長、澤野上席研究員、宮本研究員、南雲専門研究員が参加しました。

この会議には、フィリピンの公共事業道路省 (DPWH)、科学技術省 (DOST)、科学技術省リージョン XI (DOST Region XI)、大気地球物理天文局 (PAGASA)、市民防衛局 (OCD)、市民防衛局リージョン XI (OCD Region XI)、フィリピン統

ICHARM has been the secretariat of the International Flood Initiative (IFI), which conducts the activities for constructing national platforms related to flood risk reduction in 7 countries of the Philippines, Sri Lanka, Pakistan, Indonesia, Malaysia, Myanmar and Vietnam, based on IFI's new strategy (2016-2022) and implementation plan and on the Jakarta Statement, which was adopted at the side event of the 8th High-level Experts and Leaders Panel (HELP) on Water and Disasters in October 2016 to call for an interdisciplinary and transdisciplinary partnership so as to consolidate flood risk reduction and sustainable development. On March 13, 2017, ICHARM organized "IFI Coordinating Meeting in the Philippines" in Quezon City, Metro Manila, to discuss specific activities that should be implemented in the country. A team of researchers participated from ICHARM, including Director Toshio Koike, Chief Researcher Hisaya Sawano, Researcher Mamoru Miyamoto and Re-



Participants in the meeting

search Specialist Naoko Nagumo.

A total of 26 participants were at the meeting, exchanging constructive opinions and suggestions for establishing a national platform in the Philippines. The participants also reviewed present activities on flood management in the Philippines, and decided to select the Pampanga River basin in Luzon Island and the Davao River basin in Mindanao Island as model sites. They agreed to continue discussions on data and role sharing at other occasions.

Prior to this meeting, ICHARM had a pre-coordinating meeting with governmental organizations such as DOST Region XI, OCD Region XI, and PAGASA, and collected information about current flood management activities in the Davao River basin and about the progress in data preparation for flood risk assessment. All the discussions and information will promote further involvement of IFI in the effort of flood risk reduction in the Philippines.

Participating organizations in the meeting on March 13, 2017:

- Department of Public Works and Highways (DPWH)
- Department of Science and Technology (DOST, Central office and Region XI office)
- Philippine Atmospheric Geophysical and Astronomical Services Administration (PAGASA)
- Office of Civil Defense (OCD, Central office and Region XI office)
- Philippine Statistic Authority (PSA)
- National Mapping and Resource Information Authority (NAMRIA)
- Davao City
- University of the Philippines (Diliman, Los Baños and Mindanao)
- JICA
- ICHARM

(Written by Naoko Nagumo)

計局 (PSA)、国土地理資源情報庁 (NAMRIA) のほか、ミンダナオ島ダバオ市と、フィリピン大学 (ディリマン校、ロスバニョス校、ミンダナオ校)、JICA 及び ICHARM から合わせて 26 名が参加し、フィリピンにおけるナショナルプラットフォームの構築に向けた議論が交わされました。

会議では、洪水管理に関するフィリピン国内の現行の取り組み状況を確認するとともに、ルソン島のパンパンガ川流域、及び、ミンダナオ島のダバオ川流域をモデル地域として活動していくこと、データ共有や各機関の具体的な役割分担等について引き続き議論を進めていくことで合意しました。また、この会議に先立ち、2017 年 3 月 10 日にはダバオにて会議を行い、科学技術省リージョン XI (DOST Region XI)、市民防衛局リージョン XI (OCD Region XI)、大気地球物理天文局 (PAGASA) の代表者らと事前打ち合わせを行うとともに、ダバオ川流域の洪水管理に関する活動状況、水害リスクアセスメントに関するデータ整備状況等について情報収集も行いました。これらより、フィリピンにおける IFI の活動が、今後より一層活発に進められることとなりました。

Research

Results of the SOUSEI program shared with participating countries



The SOUSEI program, or the Program for Risk Information on Climate Change, is a five-year research program funded by the Ministry of Education, Culture, Sports, Science and Technology of Japan from April 2012 through March 2017. In this program, ICHARM selected five flood-vulnerable river basins in the Asian region (the Pampanga River basin in the Philippines, the Solo River basin in Indonesia, the Chao Phraya River basin in Thailand, the lower Mekong River basin in Cambodia, and the Indus River basin in Pakistan), and conducted research assignments of assessing the impact of climate change on those basins in terms of risks of flood and drought.

In the final year of the program (fiscal year 2016), the project team visited the government and research organizations of each participating country to share the results of the research program.

文部科学省「創生プログラム」研究成果の各国への報告

ICHARM では 2012 年度から 2016 年度までの 5 年間、文部科学省による研究プログラム「気候変動リスク情報創生プログラム (以下、創生プログラム)」に参画し、水災害に脆弱なアジアの 5 流域 (フィリピン・パンパンガ川、インドネシア・ソロ川、タイ・チャオプラヤ川、カンボジア・メコン川下流域、パキスタン・インダス川) を対象に、気候変動下における洪水および渇水リスクの評価に関する研究を実施してきた。

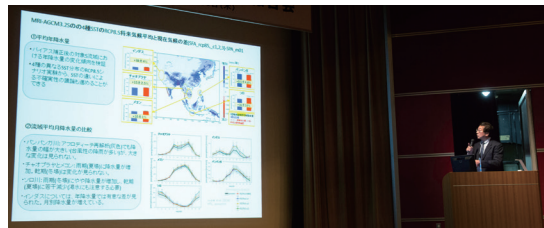
創生プログラムは 2016 年度で最終年度となるため、各流域における研究成果を各国の関係機関 (行政機関および研究機関) の関係者に対して報告し、成果を共有することとしている。以下、各国政府に対して行った報告活動である。

Annual conference on the SOUSEI program

2017年3月9日に「気候変動リスク情報創生プログラム 平成28年度研究成果報告会」が開催されました。

気候変動リスク情報創生プログラムは気候変動予測の不確実性を低減するとともに、気候変動リスクの把握や生起確率を評価する技術、気候変動リスクの影響を多角的に評価する技術に関する研究等を推進し、気候変動によって生じる多様なリスクのマネジメントに資する基盤的情報の創出を目的として研究開発を2012年度から2016年度の5年間で進めてきました。

ICHARMからは三宅グループ長が研究テーマD領域「課題対応型の精密な影響評価」の自然災害に関する気候変動リスク情報の創出の1課題である「アジアにおける水災害リスク評価と適応策情報の創生」において、パンパンガ川流域、メコン川流域、ソロ川流域の洪水リスク評価結果及び渇水リスク評価結果等、2016年度の研究成果を紹介するとともに、5年間研究結果を紹介しました。さらに、研究促進及び成果の普及のために実施した政府関係者との意見交換やワークショップの開催状況を報告しました。



Deputy Director Miyake delivers a presentation
(photo by courtesy of the secretariat of the SOUSEI program)
(写真：気候変動リスク情報創生プログラム事務局提供)

The SOUSEI program, or the Program for Risk Information on Climate Change, convened the FY2016 Research Results Presentation Meeting on March 9, 2017.

The SOUSEI program is a 5-year research program conducted between FY2012 and FY2016 in the aim of generating basic information

required for managing various risks resulting from climate change. The program promoted the research and development of technologies to reduce the uncertainty of climate change projection, identify and evaluate climate change risks and their probabilities of occurrence, and assess the impact of climate change from multiple perspectives.

ICHARM was assigned to one of the research tasks, entitled "Development of risk assessment and adaptation strategies for water-related disaster in Asia," which aimed to generate climate change risk information concerning natural disasters. This task was part of Theme D of the SOUSEI program, "Precise impact assessments on climate change."

ICHARM Deputy Director Katsuhito Miyake participated in this annual meeting and delivered a presentation on the assigned task. More precisely, he reported the results from flood and drought risk assessment conducted in three Asian river basins of Pampanga, Mekong and Solo. He also summarized this five-year research regarding the assignments given to ICHARM and explained other activities performed to facilitate the research and disseminate the research results, including meetings with government officials to exchange information and workshops held to share information with other experts and practitioners, both in Japan and overseas.

(Written by Youji Chida)

Meeting with RID, Thailand

2017年2月25日、横浜で開催された台風委員会総会に出席したタイ国 Royal Irrigation Department (RID) 関係者に対し、ICHARMが行った創生プログラムでのタイ国を対象とした研究成果をプレゼンテーションし、意見交換を行いました。

タイ側の出席者は Mr. Lertchai Srianant (Director, Office of Water Management and Hydrology)、Mr. Pakorn Sutasuntorn (Director of Hydrology Division)、Ms. Supinda Wattanakarn (Chief of Hydrological Information and Forecasting Branch) の3名でした。ICHARMからは三宅グループ長、徳永上席研究員ほか3名が出席しました。このミーティングでは、気象庁 AGCM による将来の気候実験結果に基づくチャオプラヤ川の洪水シミュレーション、チャオプラヤ川上流ダムの流況への影響、またタイ東北部における天水農業への影響について発表した後、有益な意見交換ができました。

On February 25, 2017, taking advantage of the general meeting of the Typhoon Committee held in Yokohama, Japan, a meeting was organized between ICHARM researchers and Thai officials to share the research results of the "Program for Risk Information on Climate Change (Sousei Program)". The Thai participants were all from the Royal Irrigation Department (RID): Mr. Lertchai Srianant, director of the Office of Water Management and Hydrology, Mr. Pakorn Sutasuntorn, director of the Hydrology Division, and Ms. Supinda Wattanakarn, chief of the Hydrological Information and Forecasting Branch. The counterparts from ICHARM were Mr. Katsuhito Miyake, deputy director, Mr. Yoshio Tokunaga, chief researcher, and three other members.

The meeting started with presentations on future flood simulation along the Chao Phraya River, climate change impact on the flow condition of dams in the upper Chao Phraya River basin, and climate change impact on rain-fed agriculture in the north-eastern part of Thailand, and fruitful discussions took place afterwards between the two parties. The meeting was successful in building the common ground on which both sides can cooperate more closely to address climate change issues.

(Written by Katsuhito Miyake)

Meeting with PMD, Pakistan

On March 2-3, 2017, ICHARM Chief Researcher Yoichi Iwami and Research Specialists Maksym Gusyev and Yusuke Yamazaki visited Islamabad, Pakistan, to report the results of the SOUSEI program and discuss issues regarding the International Flood Initiative (IFI). The meeting gathered about 25 officers and experts from local organizations involved in meteorology and water resources management, including Mr. Ghulam Rasul, the director-general of the Pakistan Meteorological Department (PMD).

In the meeting, Mr. Iwami delivered a presentation on future changes in precipitation over five river basins (Indus, Mekong, Chao Phraya, Solo, and Pampanga) selected for the SOUSEI program. Dr. Gusyev explained future changes in discharge volume in the upper Indus River, particularly focusing on the discharge from the mountainous area to Hindustan Plain. Dr. Yamazaki also spoke about future changes in flood inundation over the flat area in the lower Indus River basin.

Each presentation was well received by the Pakistani participants in terms of water resources management and flood management. Some also commented that the presentations provided useful insights to plan measures to address the impact of climate change.

Mr. Iwami also spoke about IFI. He stressed the importance of setting up a national platform for flood management involving multi-stakeholders. He also suggested that Pakistan should develop a new flood management project in line with the new UN water decade by maximizing the support provided in the IFI framework. The Pakistani side expressed a positive interest in Mr. Iwami's suggestion and agreed to continue discussing the matter to come up with a concrete project plan.

After the meeting, the ICHARM researchers visited the National Agricultural Research Centre and the Pakistan Council of Research in Water Resources in response to their kind invitations, which offered great opportunities to strengthen the cooperative relationship between ICHARM and Pakistani institutes.



Participants in the meeting

(Written by Yusuke Yamazaki)

2017年3月2日および3日、パキスタンのイスラマバードにおいて、岩見 上席研究員、Gusyev 専門研究員および山崎 専門研究員は、創生プログラムにおいて行ってきた研究成果報告と国際洪水イニシアチブ(IFI)についての意見交換を、ラースール気象庁長官をはじめパキスタンの気象・水資源関連機関から参加した25名を対象に行いました。

岩見 上席研究員は、創生プログラムの対象流域であるインダス川、メコン川、チャオプラヤ川、ソロ川、パンパンガ川の各河川流域における降水の将来変化の特徴について説明し、Gusyev 専門研究員は、インダス川上流域における、山岳地帯からヒンドスタン平野へ流出してくる流量の将来変化について、山崎 専門研究員は、インダス川下流域の平野部における洪水氾濫の将来変化について説明を行いました。

パキスタン側は水資源や水防災の観点から、高い関心を示していました。また、今後の気候変動影響検討の参考になったというコメントもありました。

IFIについては、岩見 上席研究員より、マルチステークホルダーの水防災ナショナルプラットフォーム構築の重要性と IFI 枠組による支援を活用し、新・国連水の10年に向けて、水防災プロジェクトを新たに構築していくことを説明しました。これに、賛同が得られ、プロジェクトを前向きに提案することに向けて、今後一層議論していくことになりました。

これに加えて、会議終了後には、National Agricultural Research Centre (NARC) および Pakistan Council of Research in Water Resources (PCRWR) に招待訪問し、より一層の友好関係の構築ができました。

Meeting with National Committee for Disaster Management, Cambodia

ICHARM Chief Researcher Hisaya Sawano visited the National Committee for Disaster Management (NCDM), Office of the Council of Ministers, Royal Government of Cambodia, on March 17, 2017. During the visit, Mr. Sawano met with Mr. Ma Norith, deputy secretary-general of NCDM, and five additional directors and deputy directors, and reported the possible impact of climate change on flood damage based

2017年3月17日にカンボジアの国家防災委員会を澤野 上席研究員が訪問し、創生プログラムのうち、メコン川下流で実施した、気候変動による洪水被害への影響評価の結果について、Deputy Secretary-General (副事務総局長) のマ・ノリス氏 (Mr.

Research

Ma Norith) 他 5 名の局長、副局長に説明しました。カンボジアでは 2015 年に新たな災害管理法が制定され、災害対策への取り組みを強化しています。マ・ノリス氏は将来の降雨量の変化による農業被害への影響評価に注目し、プログラムの報告書をカンボジア政府内部で共有していきたいとの意向が示されました。この他、今回の訪問は、自然災害に関するデータ管理を含め、災害管理に関する意見を交換する良い機会となりました。また、ミャンマーで澤野上席研究員がチームリーダーとなって、ICHARM、CTI 及び PASCO により実施した洪水リスク評価に関する ADB プロジェクトを紹介しました。マ・ノリス氏はカンボジアでも同様の取り組みを進めたいとのことで、ICHARM から今後、情報提供やアドバイスをやっていくこととしました。

on the assessment research conducted for the lower Mekong River basin as part of the SOUSEI program. Cambodia enacted a new disaster management law in 2015 in a recent effort of strengthening its disaster management measures. In the presentation by Mr. Sawano, Mr. Ma Norith took particular notice of possible agricultural damage due to prospective changes in precipitation and acknowledged the importance of sharing the results from the SOUSEI program across the government of Cambodia.



The meeting with Deputy Secretary-General Ma Norith (second from right, far-side of the table) at the National Committee for Disaster Management

The meeting was also a good opportunity for exchanging views and ideas about various issues around disaster management, including management of data on natural disasters. Mr. Sawano introduced a flood risk assessment project in Myanmar which was funded by the Asian Development Bank and conducted by ICHARM, CTI and PASCO, in which Mr. Sawano was engaged as team leader. Mr. Ma Norith was interested in this project and want to promote similar project in Cambodia, which ICHARM will support by providing information and advice.

(Written by Hisaya Sawano)

Workshop in Indonesia

2017 年 3 月 21 日、創生プログラムの研究成果報告を行うとともに、気候変動に関する日本側とインドネシア側のこれまでの取り組みを共有し、今後について意見交換するため、公共事業・国民住宅省及び JICA との共催で標記ワークショップを開催しました。ワークショップに先立ち、前日の 20 日には、公共事業・国民住宅省の Basuki 大臣に面会し、創生プログラムの研究成果を報告するとともに、ICHARM が国連組織等とともに各国政府を支援し進めている International Flood Initiative (IFI) の活動について紹介し、今後インドネシアで取り組みを進めることについて大臣の賛同を得られました。

ワークショップでは、インドネシア側、日本側からそれぞれ 4 件ずつ発表しました。インドネシア側からは、Bengawan Solo River Basin Agency (ソロ川流域事務所: 公共事業・住宅省の河川事務所) からソロ川の流域管理の現状、PUSAIR (水資源研究所) から流域内の気候変動影響評価、Jasa Tirta 1 Public Cooperation (PJT I: ソロ川の管理を担っている公社) から流域内における洪水予警報システムも含んだ洪水管理の状況、公共事業・国民住宅省水資源総局の早川 JICA 専門家から災害リスク軽減の国際的枠組みや、日本の統合洪水管理の紹介を行いました。日本側からは、澤野上席研究員から創生プログラムの全体像、工藤研究員から降雨流出氾濫モデル (RRI Model) を用いたソロ川での流量と氾濫量の将来変化分析、

On March 21, 2017, ICHARM organized a workshop entitled "Climate Change Impact Assessment in the Solo River Basin" jointly with the Ministry of Public Works and Housing (PUPR) of Republic of Indonesia and JICA to report the research results of the SOUSEI program. The workshop also provided an opportunity to exchange information on the current efforts made by Japan and Indonesia to cope with climate change and discuss directions in which they should aim their efforts in the future. ICHARM sent a team of researchers led by Chief Researcher Hisaya Sawano for this workshop.

Prior to the workshop, the researchers of ICHARM also had an opportunity to meet with Dr. Ir. M. Basuki Hadimuljono, the minister of PUPR, on the 20th. They reported the results of the SOUSEI program to the minister and explained the activities of the International Flood Initiative (IFI), in which ICHARM cooperates with other UN organizations to assist national governments in strengthening flood management. In response, the minister agreed that the initiative should be also promoted in Indonesia.



At the minister's office (from left: Ir. Adang Staf Ahmad, CES, adviser to the minister; Mr. Kudo of PWRI; Ir. Imam Santoso, M.Sc, directorate general of Water Resources; Mr. Sawano of ICHARM; Dr. Ir. M. Basuki Hadimuljono, MSC, the minister of PUPR; Dr. Shrestha of ICHARM; Mr. Hayakawa of JICA)

In the workshop, both sides delivered presentations. Those from the Indonesian side include the current situation of basin management in the Solo River basin by the Bengawan Solo River Basin Office, climate change impact assessment for the Solo River basin by PUSAIR (Research & Development Center For Water Resources), flood management in the Solo River basin including flood forecasting and warning systems by Jasa Tirta 1 Public Cooperation (PJT1; a public cooperation in charge of the management of the Solo River), and an international framework for disaster risk reduction and the integrated flood management in Japan by Mr. Jun Hayakawa, a JICA expert who is assigned to the Directorate General of Water Resources, PUPR.

The Japanese researchers also delivered four presentations: the outline of the SOUSEI program by Mr. Sawano, analysis of future changes in river discharge and flood discharge using a runoff inundation model (RRI Model) by Mr. Shun Kudo, researcher of the Public Works Research Institute, analysis of future changes in agricultural damage as flood risk by Senior Researcher Badri Bhakta Shrestha of ICHARM, and assessment of climate change impact on drought by Senior Researcher Hitoshi Umino of ICHARM.

Several questions were asked after the presentations of the Japanese side. One of them was about the validity of the runoff inundation model used for a study described in the presentations, pointing out the difference in discharge volume between observation and simulation. The Japanese researchers explained that the results came from the first application of the model to the Solo River basin for the main purpose of comparing between current and future discharge volumes by means of the same simulation model. They added that the model was tested for reproducibility only with limited data available this time, and that it will be further tested by using additional data and calibrated by tuning parameters and river channel conditions as necessary to increase its accuracy as a model. The question about the model validity was asked probably because the entirety of the research task, from model development to results, was explained for the first time in the workshop. Communication with a partner country about the purposes and procedures of a research task should start at its initial stage when the simulation model is tested for validation in order to avoid creating unnecessary discrepancy in understanding research results.

Another question was also concerning the validation of the model used for simulating future changes in agricultural damage. The Japanese side explained that the simulation model was validated by comparing the simulation results with actual damage in the case of the 2007 flood event. A question was also asked about climate change impact on drought, more specifically about adaptation measures for projected increase in ineffective discharge under future climate conditions. The Japanese researchers proposed some possible solutions such as the redevelopment of dams to increase their capacities for water use. The workshop ended while both sides agreed to continue sharing information and keeping a close tie even after the completion of the SOUSEI program.



Participants in the workshop

Shrestha 主任研究員からは氾濫解析を踏まえた洪水リスク評価として農業被害の将来変化分析、海野主任研究員からは濁水に関する気候変動影響評価の説明を行いました。

日本側の発表に関し、インドネシア側からは、流出氾濫モデルの計算流出量と実際との違い等、モデルの妥当性について質問がありました。日本側は、今回は限られたデータで再現性の検証を行っているが、今後より多くのデータで検証し、必要に応じパラメータや河道条件の設定を見直すことで、より確かなモデルとしていくこと、今回は初めての試みとして、同じモデルを使い現在と将来の比較を行う事が目的であることを説明しました。今回はワークショップでモデルの構築から結果までを一度に説明しましたが、モデルの検証段階から相手国政府と確認しながら研究を進める必要を認識しました。

農業被害の将来変化分析についても、計算モデルの検証方法について質問があり、これについては2007年洪水における実績被害との比較検証を実施していることを説明しました。濁水に関する影響評価については、将来気候における無効放流の増大に対する適応策を問われ、ダムを再開発し、利水容量を増大させることなどの適応策が考えられると説明しました。上記のような議論を踏まえて、今後引き続き情報交換していくことを確認し、創生プログラム終了後の関係継続につながるワークショップとすることができました。

(Written by Shun Kudo (Researcher of NILIM, Former researcher of PWRI))

Questionnaire survey in Shiga Prefecture, Japan

近年、これまでに経験したことがないような豪雨等が発生しており、今後は水害リスクを踏まえた土地利用や住まい方への転換をどのように進めていくのかが大きな社会的課題となっています。このことに関し、国内最大の湖である琵琶湖のほとりの低平地を有する滋賀県では、2014年3月31日に「滋賀県流域治水推進に関する条例（流域治水条例、the integrated flood management ordinance）」の公布・一部施行を行い、水害リスクを踏まえた安全な住まいづくりに向けた県独自の取り組みを行っています。流域治水条例では、県が開発した高精度の浸水予測である「地先の安全度マップ」（comprehensive flood hazard risk maps）に基づき、200年確率での降雨による浸水の危険性が高い区域を浸水警戒区域（Flood Risk Reduction Priority District）として指定し、一定の建築物の建築の制限を行います。このように、都道府県の施策として、浸水予測に基づき洪水の危険性を認定し建築制限を行うのは、国内で初めてです。

ICHARMの大原主任研究員は、国土交通省河川技術研究開発制度の一環として、国土交通省近畿地方整備局琵琶湖河川事務所及び滋賀県流域政策局流域治水政策室との連携のもと、県内の水害リスクの高い6つの地区において、これらの流域治水条例の施策に対する地域住民の意識調査を行い、その結果をホームページで公表しています。意識調査は2016年3月～4月にかけて実施し、合計449人の方からのご回答をいただきました。調査結果から、地域での説明や話し合いなどの活動によって住民の浸水リスクや施策の認知度が向上していることが確認された一方で、若い世代の理解増進や、浸水警戒区域の指定に伴う既存住宅のかさ上げ工事への助成などの支援策についての更なる認知度の向上が必要である点がわかりました。

意識調査にご協力いただきましたご関係者及び地域住民の皆様に感謝いたします。

URL: http://www.icharm.pwri.go.jp/special_topic/questionnaire_shiga.html（日本語のみ）

Japan has been experiencing intense rainfall and other extreme meteorological events in recent years. The country now faces pressing social issues regarding how to shift the conventional practice of land use and livelihood to a new practice that presupposes flood risk. Shiga Prefecture, having low-lying area around the country's largest lake, Biwako, has been addressing these issues under the prefectural initiative. In the effort of ensuring safe livelihood resilient to flood risk, the prefecture issued the integrated flood management ordinance and put parts of it in effect on March 31, 2014. This ordinance designates areas of high flood risk as Flood Risk Reduction Priority District, based on comprehensive flood hazard risk maps, which illustrate possible inundation extent predicted by the prefecture with good accuracy, and limits construction of certain types of structures in designated areas. In fact, Shiga Prefecture is the first among the 47 prefectures to implement a policy in which a local government acknowledges flood risk from inundation prediction and sets a construction limit on high-risk areas.

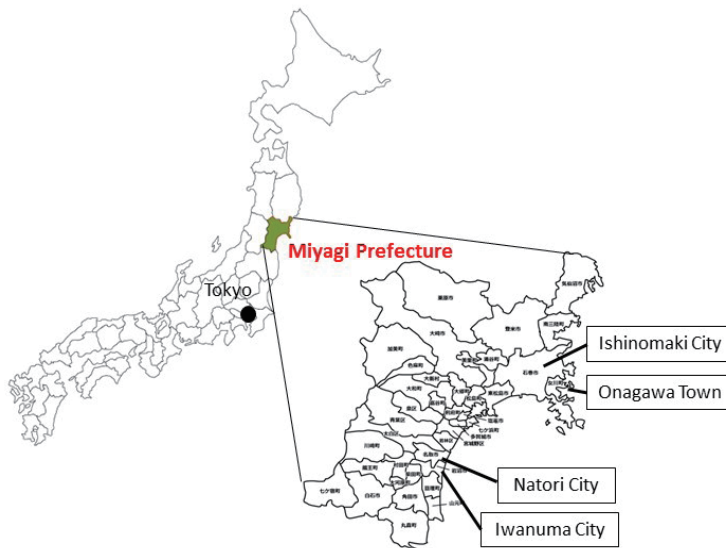
Senior Researcher Miho Ohara of ICHARM investigated the understanding of local residents about the ordinance as part of a project on research and development systems for river technology, which was organized by the Ministry of Land, Infrastructure, Transport and Tourism (MLIT). The questionnaire survey was conducted from March to April 2016 for the residents in six areas of Shiga Prefecture that were designated as districts of high flood risk in collaboration with the Biwako River Office of the Kinki Regional Development Bureau of MLIT and the River Basin Policy Bureau of Shiga Prefecture. A total of 449 responses were collected. The results confirmed that the awareness of the residents about the flood management policy and the flood risk in their areas increased through explanations, meetings and other public-relations efforts, but also revealed that more such efforts are necessary to increase the understanding of younger generations and to inform the residents of support measures such as a financial aid for land heightening of existing houses in areas of high flood risk.

(Written by Miho Ohara)

Report on reconstruction in Tohoku after the Great East Japan Earthquake

ICHARMでは東日本大震災以降、復旧・復興に関する現地調査および関係機関へのヒアリングを継続的に実施している。このたび、宮城県内の復旧・復興状況を把握するため、2017年1月19日・20日にかけて、澤野上席研究員・栗林主任研究員・大原主任研究員（2日目のみ）が国

ICHARM has been conducting field investigation and interviews with local public offices regarding restoration and reconstruction efforts since the Great East Japan Earthquake. On January 19-20, 2017, Chief Researcher Hisaya Sawano and Senior Researchers Daisuke Kuribayashi and Miho Ohara visited several cities in Miyagi Prefecture of Natori, Iwanuma, Ishinomaki, and Onagawa and two other local offices, which were the Tohoku Regional Development Bureau of the Ministry of Land,



Infrastructure, Transport and Tourism (MLIT) and the Miyagi Reconstruction Bureau of the Reconstruction Agency. The following is a report written by Mr. Kuribayashi.

Our first destination was the Miyagi Reconstruction Bureau of the Reconstruction Agency, at which we received explanations about progress in reconstruction in Miyagi Prefecture and efforts made by the bureau as follows:

1. Reconstruction of houses and communities

According to the initial reconstruction plan, around 16,000 public houses for disaster victims were scheduled to be built. As of the end of December 2016, construction had started for about 15,000 houses, out of which approximately 13,000 houses were completed. The group relocation project for disaster mitigation has also made great progress. Land development had started in all 195 planned locations, and houses became available at 184 locations as of the same time.

2. Restoration of farmland

Over 90% of the disaster-affected farmland in Miyagi Prefecture (excluding farmland converted for other uses) was restored by 2015 and became available for farming.

3. Recovery of industry

The industrial production index of Miyagi Prefecture recovered to the pre-disaster level by the mid-2012. However, the foods industry, which is one of the prefecture's key industries, is still sluggish, remaining around 65-70% of the pre-disaster level.

4. Recovery of the fisheries industry and the marine product processing industry

The fisheries industry has recovered up to 79% of the pre-disaster level in annual landing, or 93% in monetary term, at four major fishing ports (Kesenuma, Onagawa, Ishinomaki, and Shiogama) in Miyagi Prefecture.

In the marine product processing industry, 90% of the marine product processing factories that wished to resume operations have been able to do so. Among them, however, bipolarization is in progress in terms of recovery; about 30% of the companies have increased sales above the pre-disaster level, while 40% has been in struggle with sales below 80% of the pre-disaster level.

5. Use of land left after group relocation

A complex issue has been pointed out in the use of land left after group relocation. When municipalities create a plan to use tsunami-affected areas designated as disaster risk areas, it is sometimes difficult to do so because land they have purchased from citizens to facilitate group relocation is not always all in one location. To solve this problem, the registration and license tax, usually required in an exchange of

土交通省東北地方整備局・復興庁宮城復興局・名取市・岩沼市・石巻市・女川町を訪問し、担当者の方々へのヒアリングと現地調査を実施したので以下報告する。

まず、復興庁宮城復興局を訪問し、宮城県内の復興事業等の進捗状況や宮城復興局の取組についてご説明を頂いた。

復興事業等の進捗状況などは以下のとおりである。

(1) 住宅再建・復興まちづくりの状況

災害公営住宅は、約1.6万戸の整備予定のうち、1.5万戸について事業着手し、約1.3万戸が完成した。また、防災集団移転促進事業は、195地区すべてで造成工事に着手し、184地区で宅地供給を開始した(いずれも2016年12月末時点)。

(2) 農地の復旧・復興の状況

県内農地については、2015年度には9割超(ただし転用分は除く)が営農可能な状態に復旧。

(3) 鉱工業の復興状況

県内の鉱工業生産指数は、2012年半ばには震災前水準に回復。ただし、県内産業の要諦である食品工業は、いまだ震災前65~70%程度にとどまる。

(4) 水産業・水産加工業の復旧・復興の状況

漁業については、県内主要4漁港(気仙沼・女川・石巻・塩釜)の年間水揚量は、震災前年比79%、金額ベースで93%まで回復。

水産加工業については、再開を希望する県内の水産加工施設の90%が再開。震災前を上回る売上げの企業は31%である一方で、震災前の80%未満の水準にとどまる企業が40%存在するなど、再建の二極化が進行している。

(5) 防災集団移転元地(災害危険区域)の利活用

市町が災害危険区域に指定した津波被災地を有効利用しようとした場合、住居の集団移転のために市町が買い取った土地が分散している、などの課題があると認識されている。これらに対応するため、公有地と民有地の交換に伴う登録免許税免除措置の創設と、元地利活用に関する検討手順・留意点・国の支援の考え方を紹介した検討ガイドを公表している。東松島市大曲浜地区などは、土地区画整理事業などを活用し、元地を造成している。

(6) 犠牲者の追悼・教訓の伝承(震災遺構等)

1自治体1か所に限り、震災遺構の保存に必要な初期費用について復興交付金にて支援。震災遺構である南三陸町防災対策庁舎は、2013年度内の解体が決まったものの、原爆ドームと同等の価値があるとして、宮城県が2031年度までの一時県有化を提案し決定されている。庁舎の補修が完了し、周辺は2018年までに町の復興祈念公園として整備予

Research

定。また、復興の象徴となる「復興祈念公園」を1県1箇所設置することとしており、宮城県では「石巻南浜津波復興祈念公園」を計画・整備中である。

これらに関する宮城復興局の取り組みとして、

1) 自治体等のマンパワー不足への対応…国家公務員OBや青年海外協力隊帰国隊員等を85名採用し、うち52名を被災自治体へ派遣（2017年1月1日時点）

2) 地域復興マッチング『結の場』…大手企業と被災地域企業とのマッチングを目的としたワークショップとして「結の場（ゆいのば）」を開催

3) 復興・創生インターン…被災地企業での就業体験を行う「復興・創生インターン」を2016年度から実施し、学生のキャリア形成だけでなく被災地の魅力発見や、企業による雇用の環境整備や改善の機会を提供などが行われていることを伺った。

復興局訪問により、宮城県内においては、まだ途上ではあるが復旧・復興に向けて着実に歩みを進めている最新の状況を理解することが出来た。

なお、これらの取り組みを含む復興への取り組みは、復興庁のホームページでご覧できます。（<http://www.reconstruction.go.jp/>）

続いて、国土交通省東北地方整備局を訪問し、インフラの復旧状況についてお話を伺った。

直轄河川堤防（河口部）については、全体47kmのうち、約9割の区間の工事に着手し、約6割が完成。また直轄海岸堤防については、仙台湾南部で行っている復旧工事（延長29km（権限代行区間含む））では、既に95%の区間で工事完成済み。堤防で必要となる盛土材のうち、仙台市内では約7割が品質確認後の震災がれきを活用。一部区間では、自然環境に配慮し、設計変更を行ったとのことである。また、2016年6月には国土交通省都市局から、東日本大震災からの復興まちづくりから得た知見や教訓を整理し、想定される課題と事前準備を含めた対応方法についてまとめた「津波被害からの復興まちづくりガイド」が発行されている。

なお、国土交通省東北地方整備局では、ホームページ上で「震災伝承館」を掲載し、被災経験・教訓を生かすための記録集を作成している。（<http://infra-archive311.jp/>）

public and private land, has been exempted. Also, guidelines concerning land use after relocation have been publicized to show decision-making procedures, precautions, and support available from the national government. Omagarihama of Higashimatsushima City has been able to negotiate this challenge and proceed with land development, using the scheme of a land readjustment project.

6. Efforts in remembering disaster victims and passing down disaster lessons

Each municipality is allowed to preserve one place to remember the disaster, and the reconstruction subsidy will be provided to cover the initial cost for the implementation of the plan. The building of the Minamisanriku-cho Disaster Management Office, which was totally washed out by the tsunami except its steel frame, was once scheduled to be demolished, but the prefecture proposed the temporary ownership of the building by the prefecture until 2031, claiming that it has as great significance as does the atomic bomb dorm in Hiroshima. The proposal was approved. The building has been repaired, and a reconstruction memorial park is scheduled to be built in the area by 2018. In addition, as each prefecture is also requested to build a reconstruction memorial park, Miyagi Prefecture planned one at Ishinomaki-minamihama, and now the park is under construction.

The following are efforts by the Miyagi Reconstruction Bureau in step with the ongoing reconstruction projects:

1) Solutions to labor shortage at municipalities

Former national government workers and volunteers of the Japan International Cooperation Agency who returned from an overseas mission have been employed to help short-staffed municipal offices. A total of 85 people have been employed as of January 1, 2017, and 52 of them have been sent to different local offices.

2) "Yui no ba" for corporate matchmaking

A series of workshops named "Yui no ba (a place to create bonds)" have been held to provide opportunity for local businesses in the affected areas to meet major corporations.

3) Reconstruction internship

A reconstruction internship program has been set up since 2016 for college students to experience work in local businesses affected by the disaster. It is intended to help students have work experience, to find local charms with a fresh eye, and to review and improve local employment practices.

For more information on these and other reconstruction efforts by the Agency, please visit at: <http://www.reconstruction.go.jp/english/>.

We also visited the Tohoku Regional Development Bureau and interviewed about progress in restoration of infrastructure.

The river levees managed by the national government around the river mouths are a total of 47km in the Tohoku area. Construction has started for about 90% of the levees, and about 60% have been completed. The seawalls managed by the national government are 29 km in the southern part of Sendai Port, including those managed by the national government in place of local governments. About 95% of the seawalls have been restored. Disaster debris was used for about 70% of the restored levees in Sendai City, after checking its quality as embankment material. In some places, the design of levees was altered for environmental concerns. Through these and other reconstruction projects in Tohoku, practical knowledge and insightful lessons have been collected and compiled in a technical book entitled "A collection of suggestions for community building through reconstruction from tsunami damage," which published in June 2016 by the City Bureau of the MLIT. The book includes knowledge and lessons gained from the reconstruction projects in

Tohoku, and explains possible issues to arise during reconstruction and their solutions including preparation that should be made in normal times to lesson disaster damage and facilitate smooth recovery.

The Tohoku Regional Development Bureau of MLIT has created a website, "Earthquake Memorial Museum," in order to make the most of disaster experiences and lessens for future generations. See details at: <http://infra-archive311.jp/en/>.

The following part of the report is based on our visit to four municipalities located along the coastline of the Pacific side of Tohoku.

Natori city

Natori City is located about 15 minutes to Sendai City using railway. The city has been very popular as a resident-friendly place. In fact, it has occupied the top of the list of the best place to live in the Hokkaido and Tohoku areas for six consecutive years from 2011 to 2016, and came in eighth in the nationwide ranking. In the Great East Japan Earthquake, Natori was hit hard and many residents, particularly those in its Yuriage area, lost lives in the huge waves of tsunami. After the disaster, the city organized a series of meetings with residents about reconstruction, and public housing projects have been finally under way.

We went to a nearby hill called Hiyoriyama in the Yuriage area with a city worker in charge of reconstruction, who explained to us the city's reconstruction plan, especially that for the Yuriage area. The plan sets two defense lines to protect the area from tsunamis; the first defense line is the seawalls 7.2 meters high above sea level and the second defense line is set by tracing locations 5.0 meters above sea level. The area behind the second defense line has been heightened, and public houses for disaster victims are being built after land readjustment. Also, a memorial park is planned around the Hiyoriyama Park with a monument for tsunami victims, which was already installed towering as high as the height of the tsunami.

I have been to this area three times. Besides familiar scenes of many dump trucks busily at work, I noticed empty land having started being filled with public houses for disaster victims and marine products factories. I felt kind of relief at the sight of these changes in local landscape.



Public housing under construction



Memorial monument of the tsunami disaster

名取市

名取市は、JRで仙台まで約15分の距離にあり、住みよさランキング2016年度版では北海道・東北エリアで6年連続1位、全国でも第8位になるなど、まちの魅力が高く評価されている。東日本大震災では、沿岸の関上地区を中心に多くの犠牲者を出したが、複数回の住民説明会を経て住宅復興事業が進み始めている。

関上地区にある日和山の高台にて、名取市担当者から特に関上地区のまちづくり計画について説明を頂いた。海拔7.2mの海岸堤防を「第一次防御ライン」とし、海拔5.0mの「第二次防御ライン」から陸側部分をかさ上げして土地区画整理事業を行い、災害公営住宅等の建設が進められている。また、日和山公園の付近は「震災メモリアル公園」として整備される予定であり、津波と同じ高さである慰霊碑も設置されていた。

著者がこの地を訪問するのは3度目であり、ダンプトラックがひっきりなしに走る光景は変わらないが、災害公営住宅や水産企業が立地し始めていることに、感慨を覚えた。

Research

岩 沼 市

「千年希望の丘」にて、岩沼市担当者から説明を受けた。この「千年希望の丘」は、津波の減衰と住民の一時避難が可能な「丘」を含む防災公園として、計15基が計画され、延長約10kmが市の復興事業として計画されている。丘の土台等には震災廃棄物を用いており、この場所は今後、大津波の痕跡や被災者の想いを後世に伝え、さらに集落跡地等の遺構の保存による震災の記憶や教訓を国内外に発信するメモリアル公園と防災教育の場、そして未来への希望を感じる場として活用されることである。また、岩沼市では当時の浸水深の体験も可能な防災アプリを作成し、防災情報発信に努めている。(http://www.city.iwanuma.miyagi.jp/bosai/fukko/shinsaiaplili/haishin.html)

Iwanuma city

We also visited the "Sennen-kibo-no-oka" park in Iwanuma City with a city worker in charge of reconstruction. In this park, stretching about 10km along the coastline, 15 small hills have been planned for residents' temporary evacuation. The hills are also expected to decrease the impact of tsunamis. Disaster debris was used to fill the base of the hills. The city hopes that the park will help them to achieve multiple purposes. First, as a memorial park, they expect the park to pass the facts of the huge tsunamis and the feelings of victims on to future generations. The park is also intended to be the center of disaster education by preserving the remains of objects, structures and settlements and reminding people in Japan and overseas of the memories of and lessons from the disaster. The city even developed an application to digitally experience the water depth at the time of the tsunami as a tool to disseminate disaster-related information. This application is downloadable at: <http://www.city.iwanuma.miyagi.jp/bosai/fukko/shinsaiaplili/haishin.html>.



First hill built in the park



With a city worker on the top of the first hill

石 巻 市

石巻市は、沿岸自治体の中でも特に大きな被害を被った自治体の一つであり、死者・行方不明者は約3,600人(全体の2割)、全壊戸数は約2万戸(全体の16%)であった。

新蛇田地区で石巻市の担当者と合流し、車中で説明を受けた。宮城県内で最も早く被災市街地復興土地画整理事業(防災集団移転促進事業)の認可を受けたこの新蛇田地区では、すでに住宅供給が開始されており、約1,300戸が供給される。JR仙石線には新駅も開業した。平成28年には都市景観大賞特別賞を受賞している。

続いて、日和山に登り、石巻南浜津波復興祈念公園予定地を遠望した後、反対側の旧北上川を見ながら国土交通省北上川下流河川事務所涌谷出張所長から、河川堤防整備の説明を受けた。石巻市内の旧北上川は、旧来から堤防整備がなされていなかったが、震災後約140回以上の説明会を経て、現在は市の復興計画と連携しながら堤防整備を推進している。全体延長15km、約800件の用地取得を予定しており、その一部は既に完成している。

続いて、漁港地区に移動し、「魚町一丁目津波避難タワー」を視察した。津波避難タワーは、津波到達ま

Ishinomaki city



A completed section of the river levee along the Old Kitakami River

Ishinomaki City is one of the most affected among the seaside municipalities. About 3,600 (20% of the population of the time) were left dead or missing, and about 20,000 houses (16% of the total number of houses) were totally destroyed.

We met with a city worker in the Shinhebita area of Ishinomaki City, and he explained the current progress in reconstruction in the city while showing us around the city in a car. Shinhebita is the area for which the group relocation project for disaster mitigation was approved earliest among the municipalities in Miyagi Prefecture. The public houses have already started to be provided for disaster victims. Eventually, about 1,300 houses are scheduled to be available in this area. Another station has been added to those on the local JR line and is in operation. In 2016, Ishinomaki City was awarded the Special Award of the City Landscape Competition.

After that, we went to a hill called Hiyoriyama. We first overlooked a site at which the Ishinomaki-minamihama Tsunami Memorial Park is scheduled to be built, and then looked at the opposite side where the old Kitakami River flows through the plain. The director of the MLIT local office explained the city's river levee improvement project. No levees had been built there before. After the disaster, however,



Planned site for the tsunami memorial park (the buildings on the near side were built for disaster victims)

the city organized over 140 meetings with residents and other stakeholders to explain the importance of levee construction, and now the construction is under way in close coordination with the municipal reconstruction project. The levees will be 15km long in total and require land acquisitions of about 800 cases though some parts have been already completed.



Tsunami evacuation tower

After that, we visited one of the four tsunami evacuation towers. These towers are meant to provide temporary evacuation places at time of emergency when tsunamis do not allow for enough time to evacuate to higher ground. They are designed to unlock the door automatically when an earthquake with a seismic intensity of 5 lower or up occurs in the area.

でに時間がなく高台等への避難が困難な場合に緊急・一時的に避難する施設で、市内には4基整備されている。震度5弱以上の地震が発生すると、入り口のキーボックスが自動的に開錠するようになっている。

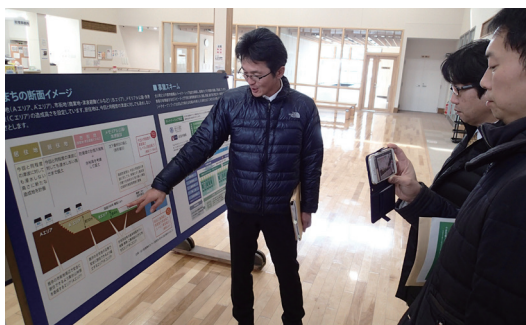
Onagawa town

Onagawa Town is also one of the most severely damaged places at the time of the earthquake and tsunamis. The town lost about 830 residents. The total population was about 10,000 at that time. After the disaster, the city has laid a plan to bring drastic changes in the community including relocating Onagawa Station. The downtown area has been heightened landward in steps and divided into four areas for different purposes: Areas A and A' for housing, Area B for businesses, and Area C for a memorial park and fishery ports.

On March 1, 2012, Onagawa Town signed a partnership agreement with the Urban Renaissance Agency, an urban development firm, and it has since been proceeding with the town reconstruction project. One example



SEAPAL-PIER



A city worker explaining the reconstruction project at an exhibition space

女川町

女川町は、人口約1万人のうち犠牲者が約830人となるなど、甚大な被害を被った町である。震災後、女川駅の移転など、まち全体を作り変えるような大規模なまちづくり事業が行われている。町中心部は階段状にかさ上げされ、A、A'エリア（居住地）、Bエリア（市街地）、Cエリア（メモリアル公園・漁港施設）として整備が行われている。

2012年3月1日にはUR都市機構とパートナーシップ協定を締結し、協働して復興まちづくり事業を推進している。そのひとつとして、陸上競技場跡地を活用した災害公営住宅がある（2014年3月入居開始）。町の中心には公共施設や商業・観光施設が集約的に整備（2015年3月21日女川駅移転開業、12月23日シーパルピア開業）された。ちなみに、駅から海へ向かう歩行者道路は、元日に初日の出が見える方向に設置されている。

Research

復興は少しずつであるが、着実に進んでいるとの印象を深く受けました。特に、住宅供給については土地の確保という大きな課題がクリアされつつあり、急速に目に見える形で復興が進んでいます。今後も引き続き復興が順調に進むことを願っています。

最後になりましたが、本視察実施にご尽力頂いた、国土交通省東北地方整備局、復興庁宮城復興局、名取市、岩沼市、石巻市、女川町の皆様には厚くお礼申し上げます。

is its public housing project for disaster victims using the empty site where a track and field stadium used to be (the houses became ready by March 2014). Other changes include centralizing business functions in the downtown area, such as public offices and commercial and tourism centers. Onagawa Station reopened at a different location on March 21, 2015, and SEAPAL-PIER ONAGAWA, a commercial facility, opened on December 23, 2015. A pedestrian path going seaward from the station is deliberately built in the direction in which people can see the rising sun on the first day of the year.

Through the two-day investigation, we were convinced that reconstruction in Tohoku has steadily progressed though the pace has not probably been what they would like to see. Housing projects have seen a particularly remarkable progress because the major challenge of land acquisition has been solved in many places. We strongly hope that reconstruction will continue smoothly without disruptions.

(Written by Daisuke Kuribayashi)

Introduction of ICHARM research projects

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、栗林主任研究員の行っている「RRIモデルを活用した地区ごとの新たな洪水リスク評価手法 - 「洪水カルテ」と「洪水ホットスポット」-」、牛山専門研究員の行っている「領域アンサンブル予報を用いた次世代の洪水予測手法の開発」と Gusyev 専門研究員の行っている「Measuring river water tritium to estimate subsurface water transit times and volumes」、博士課程学生のアシフ氏の行っている「Water Energy Budget Based Distributed Hydrological Modelling in Oi River basin with Sensitivity Analysis for Improved Calibration」の4つの研究を紹介します。

ICHARM sets three principal areas of activity: research, capacity building, and information network. ICHARM 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:

Daisuke Kuribayashi, senior researcher

New approach for district-based flood risk assessment using RRI – flood diagnostic chart and flood hot spot –

Tomoki Ushiyama, research specialist

Development of next generation flood forecasting system utilizing regional ensemble prediction system

Maksym Gusyev, research specialist

Measuring river water tritium to estimate subsurface water transit times and volumes

Naseer Asif, doctoral student

Water Energy Budget Based Distributed Hydrological Modelling in Oi River basin with Sensitivity Analysis for Improved Calibration

New approach for district-based flood risk assessment using RRI - flood diagnostic chart and flood hot spot -

RRI モデルを活用した地区ごとの新たな洪水リスク評価手法 - 「洪水カルテ」と「洪水ホットスポット」 -



Daisuke Kuribayashi, Senior Researcher
栗林 大輔 主任研究員

ICHARM has been conducting research on flood risk analysis and flood risk management, using the Rainfall-Runoff-Inundation model, which was developed at ICHARM.

As part of such research, ICHARM has been studying a new approach using the RRI model for flood risk assessment and management. Planned for Aga Town, located in the middle stream of the Agano River in Niigata Prefecture, this project aims to assist municipalities in mountainous areas in implementing effective and efficient disaster management. In this approach, we first assess the flood vulnerability of each district of the town in terms of multiple criteria. Each district is given points for each criterion based on the assessment results, and the points are recorded on a "flood diagnostic chart," from which the flood vulnerability of a district is evaluated comprehensively. Our recent effort has been mainly focused on how a flood diagnostic chart should be produced to reflect the flood vulnerability of a district with good accuracy. With a reliable flood diagnostic chart, it is possible to identify "flood hot spots," or areas

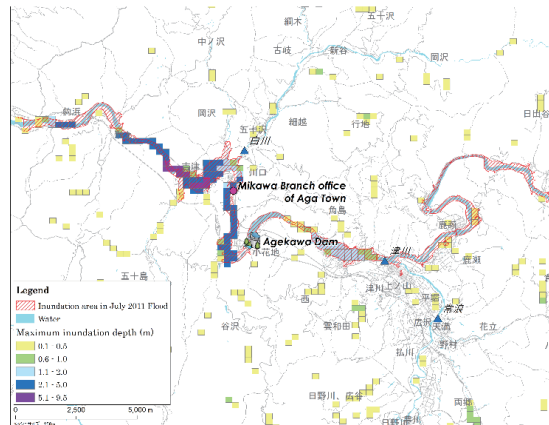


Fig. 1 Result of inundation simulation for the July 2012 flood in Aga Town using RRI

ICHARM では、ICHARM で開発した降雨流出氾濫モデル（以下「RRIモデル」という）を用いて、様々な洪水リスク解析やリスクマネジメント手法に関する研究を実施しています。

その一環として平成26年度から、阿賀野川中流域に位置する新潟県阿賀町を対象流域とし、中山間地の自治体による効果的・効率的な防災活動を支援するために、RRIモデルを活用した新たな洪水リスク評価手法およびマネジメント手法に関する研究を行っています。具体的には、洪水外力に対する各地区の洪水脆弱性を様々な評価軸で評価し、各々の結果を得点化して合計することで、地区の洪水脆弱性を総合的に評価する「洪水カルテ」の作成手法の検討を行ってきました。この「洪水カルテ」の結果を用いれば、洪水に特に脆弱な地区である「洪水ホットスポット」の特定や、各地区の詳細な防災対策の立案が可能です。

今後は、「洪水カルテ」の検討を継続するとともに、予測降雨を用いたリアルタイム氾濫解析の結果活用に関する研究を実施する予定です。本研究にご興味ある方は、以下の発表論文をご覧ください。ただければ幸いです。

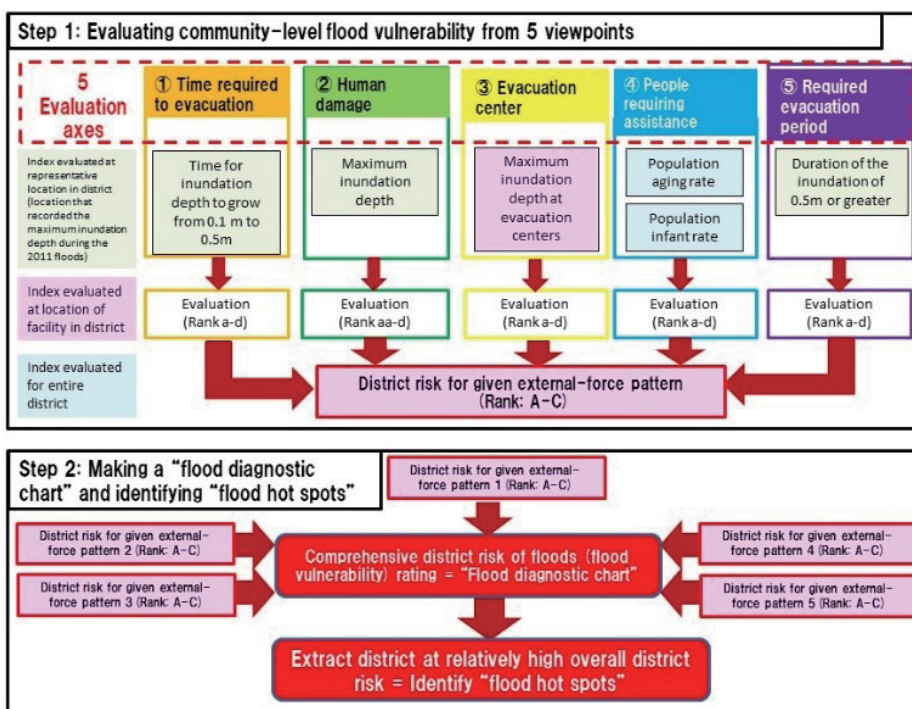


Fig. 2 Flow chart for producing flood diagnostic charts and identifying flood hot spots

with high flood vulnerability, and thus develop a disaster management plan tailored to a specific area.

We are planning another study on the effective use of results from real-time inundation analysis using predicted rainfall, as well as working on further improvement of the flood diagnostic chart. For more information, please refer to the papers below:

- 阿賀野川における降雨流出氾濫モデルの適用について、栗林大輔、佐山敬洋、近者敦彦、中村要介、工藤俊、澤野久弥、水文・水資源学会 2015 年度総会・研究発表会、平成 27 年 9 月
- 氾濫解析モデルを用いた地区レベルの洪水脆弱性把握手法の提案、栗林大輔、大原美保、佐山敬洋、近者敦彦、澤野久弥、地域安全学会 2016 研究発表会、平成 28 年 6 月
- 阿賀野川における降雨流出氾濫モデルの適用と浸水開始時刻の再現性検証について、栗林大輔、佐山敬洋、近者敦彦、中村要介、澤野久弥、平成 28 年度土木学会全国大会 第 71 回年次学術講演会、平成 28 年 9 月
- Utilization of the Flood Simulation Model for Disaster Management of Local Government, Daisuke KURIBAYASHI, Miho OHARA, Takahiro SAYAMA, Atsuhiko KONJA, and Hisaya SAWANO, Journal of Disaster Research Vol.11 No.6, 2016

Development of next generation flood forecasting system utilizing regional ensemble prediction system

領域アンサンブル予報を用いた次世代の洪水予測手法の開発



Tomoki Ushiyama, Research Specialist

牛山 朋来 専門研究員

近年、気象観測や予報技術の発展、計算機能力の進歩により、数値天気予報の精度は大きく向上しています。欧州では、既に 5 日先までの予測降水量を用いた洪水予測が行われていますが、我が国ではこのような取り組みは現業では行われていません。そこで私は、豪雨を予測するための数値天気予報を開発し、洪水予測への適用に取り組んでいます。

豪雨を定量的に予測するのは現在でも難しいため、複数の予報計算により豪雨を確率的に予報する領域アンサンブル予報を用いています。また、アンサンブルカルマンフィルターを用いて観測データを数値予報モデルに取り込み、予報精度を上げるなど、独自の改善も行っています。こうして予測された降水量を水文流出モデルに導入し、洪水予測精度を評価しました。過去 5 年間のいくつかの洪水事例に対してアンサンブル洪水予測を行なった結果、多くの場合洪水の発生を 2 日以上前に予測することができ、さらに 1 日前には洪水流量を定量的に予測できることがわかりました。

このような長いリードタイムでの流出予測が可能になれば、ダムの高度な操作が可能になり、ダムの貯水能力を洪水被害軽減のためにより有効に活用することができます。これ

Numerical weather prediction (NWP) has been considerably improved in recent years thanks to more advanced observation and forecasting techniques and increase in computer power. In European countries, flood forecasting using predicted rainfall with a 5-day lead time has been in operation. Although this type of forecasting has not yet been introduced in Japan, We have been working to do so by developing a new NWP system, i.e., a regional ensemble prediction system (EPS), to predict torrential rainfall with better accuracy in a probabilistic manner.

We also upgraded the regional EPS to assimilate observational data using an ensemble Kalman filter. Then, predicted rainfalls were applied into a hydrological forecasting model, and its feasibilities of flood forecasting were evaluated. Applications of the developed method to flood events in the past 5 years showed that they are able to predict the probability of flood occurrence 2 days ahead of the actual event, and quantitatively predict the streamflow about 1 day ahead.

Such a streamflow forecasting with a long lead time can facilitate more aggressive dam operation and more effective use of dam storage for flood disaster mitigation. Those results have been published in journal papers (*1) and presented at conferences to disseminate information about the capacity of the ensemble flood forecasting system with NWP.

In our next step, systematic errors and biases will be identified through several-month-long operations of this system, and then correction techniques for such errors and biases will be developed for more accurate forecasting. The Japan Meteorological Agency (JMA) is now testing a regional EPS with a 39-hour lead time, and it will be operational by 2018. Our research should facilitate the nationwide operation of ensemble flood forecasting by utilizing JMA EPS.

ICHARM has a graduate program and I supervise master students working on their graduation thesis. I have helped students from five different countries who used a simplified NWP instead of EPS, which needs substantial computational resources. Those students went back to their countries with the knowledge of NWP and have been playing an important role in disseminating this useful tool among local experts. The same NWP model is also used for dynamic downscaling of future climate projection for assessment of global warming effects.

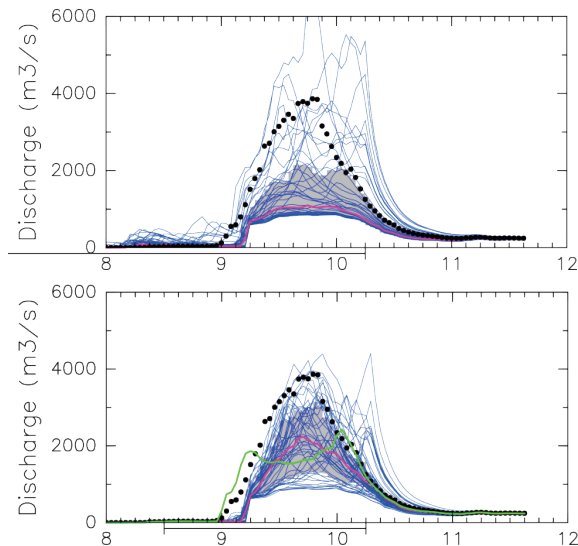


Figure: Simulation results of flood discharge during the Kinu River flood in September 2015: 54 hours (upper) and 18 hours (bottom) before the actual flood (black dots: observed discharge, blue line: ensemble predictions, grey zone: 25-75% probability discharge, red line: ensemble median, green line: discharge by JMA forecast rainfall, horizontal axis: time/date)

図. 2015年9月の鬼怒川洪水における、54時間前(上)と18時間前(下)の洪水流量予測。黒丸は観測流量、青線は各アンサンブル予測、灰色領域は25~75%の確率流量、赤はアンサンブル中央値、横軸は日付である。

らの結果は、学会や論文誌に発表し^{*1}、アンサンブル洪水予測の有効性を国内外に広めています。

今後、この手法を数ヶ月連続して運用することにより、系統的な誤差やバイアスを調べ、それらを補正する手法を開発して予測精度を高める予定です。現在気象庁では39時間先までの領域アンサンブル予報を試験運用中で、2018年には本運用が開始されます。私達の研究成果を活用することで、気象庁のアンサンブル予報を用いた洪水予測の早期実現に貢献できるものと期待しています。

この手法は大きな計算能力を必要とするため、ICHARMで行っている修士論文指導で実施することはできませんが、簡略化した方法をこれまで5カ国の学生の修士論文として指導し、洪水予測に対する数値天気予報の有効性を世界に広めています。また、同じ数値モデルを使って、気候実験の結果をダウンスケーリングすることにより、気候変動の研究にも役立てています。

*1 Ushiyama, Sayama, Iwami (2016), Ensemble flood forecasting caused by typhoons Talas and Roke at Hiyoshi dam basin. Journal of Disaster Research, Vol.11(6),1032-1039, doi: 10.20965/jdr.2016.p1032.

Measuring river water tritium to estimate subsurface water transit times and volumes



Maksym Gusyev, Research Specialist
マキシム グシエフ 専門研究員

A novel tritium study was conducted by Public Works Research Institute (PWRI) researchers to estimate subsurface water transit times and volumes with river water tritium measurements in the twelve Hokkaido catchments¹ (Fig. 1). In Japan, the PWRI tritium-based research aims to contribute for characterization of available subsurface and surface water resources on river basin scale under the 2014 "Water Cycle Act" adopted by Japanese government. Since the subsurface water storage is a main contributor of baseflow river discharge especially during droughts, the available water volume of subsurface storage can be estimated using tritium tracer sampled in river water at baseflows. As a part of water molecule, tritium (³H) is a hydrogen isotope with a half-life of 12.32 years and has been used for age dating of surface and subsurface waters. Tritium was a popular tracer in the Northern Hemisphere in the past, but it has been mostly measured with ultra-low level tritium analysis in the Southern Hemisphere due to low background levels.

Our study utilized the ultra-low level tritium analysis and measured tritium river water concentrations from 3.8 TU to 5.3 TU during baseflows of year 2014 (Fig. 1). These measured tritium concentrations, which are about two times smaller than the tritium in Hokkaido precipitation, were used to estimate groundwater mean transit times (MTTs) and subsurface water volumes in the study catchments. Six headwater catchments of the Sapporo area had similar tritium concentrations between 3.8 and 4.1 TU and these tritium values were interpreted with an exponential-piston flow model to estimate one best-fit MTT of about 14 years¹. This result is the first demonstration of the unique MTT

Research

solution allowing us to use one tritium sample at baseflow in Japan and suggests low MTT aggregation errors from similarly situated catchments¹. Using baseflow discharges with the MTTs, the subsurface water volumes of these catchments were estimated between 0.22 and 1.62 km³ and are larger than the combined water volume of 0.14 km³ of Jozankei, Hoheikyo and Izarigawa Dams, see Fig. 1. Other catchments had the range of estimated MTTs between 1 and 23 years and subsurface water volumes between 0.013 and 5.07 km³. These results indicate the importance of available subsurface water volume for downstream dams as well as the need for subsurface water characterization in view of droughts and floods such as the 2016 flood in the Ishikari River basin that caused flood inundation upstream of Kanayama Dam (Fig. 1).

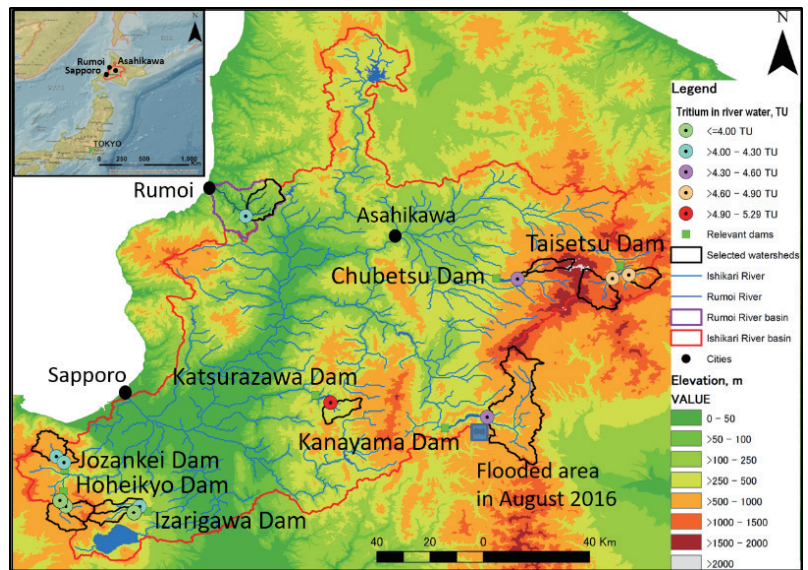


Figure 1 Measured tritium river water concentrations of twelve headwater catchments in Hokkaido (from Gusyev et al., 2016)

The PWRI novel tritium study and Hokkaido results have already been at the international and domestic spotlight. The International Atomic Energy Agency (IAEA) has recognized the PWRI expertise in water age dating research and invited PWRI’s contribution in the Regional Cooperative Agreement (RCA) RAS/7/030 Project that aims to provide critical information for water resources management in the countries of Asia-Pacific Region. In Japan, the tritium-based approach is now being applied under 3-year PWRI research project in several priority basins such as the Tone River basin, which had low precipitation, river flows and dam water volumes in the summer of year 2016. For the Tone River basin, the information of available subsurface water volume estimated with tritium river water measurements is needed for sustainable water resources management, especially during the 2020 Tokyo Olympic Games, if droughts are to occur in the Tokyo area.

*1 Gusyev M.A., Morgenstern U., Stewart M.K., Yamazaki Y., Kashiwaya K., Nishihara T., Kuribayashi D., Sawano H. and Y. Iwami (2016). Application of tritium in precipitation and baseflow in Japan: a case study of groundwater transit times and storage in Hokkaido watersheds. *Hydrol. Earth Syst. Sci.*, 20, 1-16, doi:10.5194/hess-20-1-2016, <http://www.hydrol-earth-syst-sci.net/20/3043/2016/hess-20-3043-2016.pdf>

Water Energy Budget Based Distributed Hydrological Modelling in Oi River basin with Sensitivity Analysis for Improved Calibration



Naseer Asif, Doctoral Program Student (D2) and Research Assistant
 ナシール アシフ 博士課程 (2 回生)・リサーチアシスタント

INTRODUCTION:

The objective of this study is (1) to acquire an understanding the performance of sensitive parameters by means of sensitivity analysis, and (2) development of a method for strategic calibration of physically based distributed hydrological models (DHMs). The complexity inherent in physically based DHMs is due to their emphasis on physical description of hydrological processes and large number of parameters whose values vary widely in space and time (Wang et al. 2009). Calibration authenticates applicability but calibration procedures currently in practice are manual expert and automatic. The manual expert approaches are based on judgement, expertise and practice and such modeler know how is difficult to transfer. On the other hand automatic calibration strategies involve deterministic or stochastic methods to quantify and reduce the uncertainties (Liu & Gupta 2007). A comprehensive sensitivity study was conducted by applying the water energy budget based distributed hydrological model (WEB-DHM) sensitivity study results are used to formulate understanding for sequential calibration. The model has been applied to upstream part of Oi River basin at Hatanagi-I Dam in Shizuoka Prefecture of Japan.

METHOD:

The performance of each sensitive parameter was observed by following the physical response on hydrograph by keeping all other parameters constant. For evaluation of model simulated discharge the Nash-Sutcliffe Efficiency (NSE) was used. In WEB-DHM, the critical parameters can be categorized based on characteristics of soil and surface or land use.

The soil water interaction and generation of runoff is governed by two important soil parameters i) Saturated surface hydraulic Conductivity (k_{sat}) ii) Hydraulic Conductivity Anisotropic Ratio ($anik$). Surface conditions are defined by physiological properties of vegetation and ground cover. Results were summarized for both later on utilized for calibration.

Table 1: Static and Dynamic Inputs to WEB-DHM

Data	Spatial Resolution	Temporal Resolution	Source of Data	
Static Data	Digital Elevation Map	Grid 30m	ASTER	
	Land Use Map	Grid 1km	United States Geological Survey (USGS)	
	Soil Map	Grid 9km	Food Agricultural Organization (FAO)	
Dynamic Data	Meteorological data (Shortwave and longwave radiation, wind speed, humidity, air pressure,.)	Grid (0.5625°)	3 Hourly	Japan Metrological Agency, Japan Re-Analysis 55 (JRA-55)
	Leaf Area Index (LAI)	Grid (1km)	8 day	MODIS Terra (MOD15A2)
	Fraction of Photosynthetically Active Radiation (FPAR)			
	Precipitation	Point	Daily	Chubu Electric Power Co. (2014)
Discharge				

RESULTS AND DISCUSSIONS:

Default values resulted in pronounced peaks and $NSE = -0.24$ displaying poor match (Fig 2a). Based on sensitivity study the pronounced peaks can be addressed by saturated surface hydraulic conductivity (k_{sat}) by increasing $ksat$, allowing more water to enter into soil. The value was therefore increased till peaks settled to observed peak (Fig 2b) and value was fixed for next step. The base flow was then increased by altering the anisotropic ratio ($anik$) to improve the lateral flow in subsoil with $NSE = 0.75$ (Fig 2c). In the hydrograph small gaps between observed and simulated discharge at the bottom of recessions of hydrograph were addressed by increasing the surface water storage ($sstmax$) with enhanced $NSE = 0.83$ (Fig 2d).

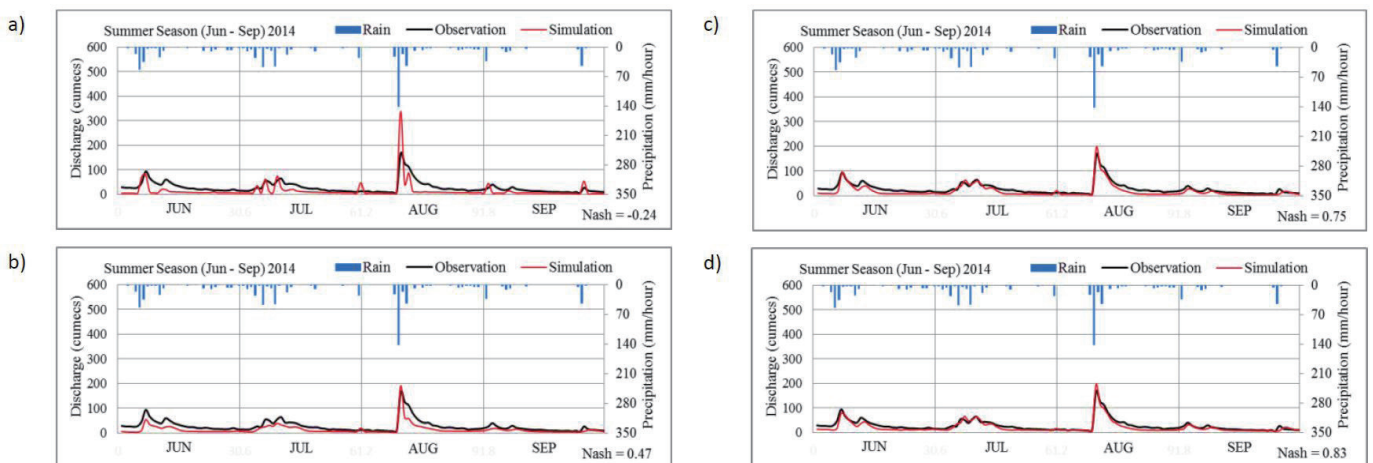


Fig 2: Model output a) default parameters b) $ksat$ 25 times c) $anik$ 4 times d) $sstmax$ 4 times

CONCLUSION:

Using such simplified approach model users can not only calibrate DHMs but also complexity involved in removal of uncertainties can be reduced in smaller time duration.

REFERENCES:

- Liu, Y. & Gupta, H. V, 2007. Uncertainty in hydrologic modeling : Toward an integrated data assimilation framework. Water Resources Research, 43(April), pp.1-18.
- Wang, L. et al., 2009. Development of a distributed biosphere hydrological model and its evaluation with the Southern Great Plains Experiments (SGP97 and SGP99). Journal of Geophysical Research, 114(D8), p.D08107.

Training

Follow-up seminar in Manila, the Philippines

フォローアップセミナーは、ICHARMで行う能力育成に関連し、2008年以降、年1回、海外の1ヶ国を選び（2016年を除く）、帰国研修員を中心とした参加者を得てワークショップ、現地見学などを行う活動です。この主なねらいは、今後のICHARMの研究テーマの検討や研修の質向上を図るとともに、関係機関とのネットワーク強化、優秀な研修生の今後のICHARM研修への参加促進です。

2016年度は1月31日から2月2日の3日間フィリピン共和国のマニラ及びパンパンガ地方において実施しました。参加者はICHARMから、江頭研究・研修指導監、徳永上席研究員、Shrestha主任研究員、フィリピンからは公共事業道路省(DPWH)、国家かんがい庁、大気地球物理天文局(PAGASA)、環境天然資源省からの帰国研修員など、また、JICA事務所及び専門家など総勢24名により行われました。

活動内容について、第1日目は、24名全員が集まり、参加各機関の最新の政策、研究、技術開発に関する発表、そして修士コースの帰国研修員5名の現在の活動及び今後のICHARMへの期待についてなど意見交換を行いました。

第2日目は、帰国研修員を含む14名とともにマニラ近郊のパンパンガ地域を訪問し、カルンピット市防災部局及び洪水常襲地区長/住民との意見交換、パンパンガ川洪水予報警報センター(PAGASA)、DPWH第3地域局及びDPWH洪水プロジェクト事務所の見学を行いました。この地域はICHARM研究対象であることから、ICHARMの有する研究、能力育成、ネットワークの3つの機能の融合が期待されています。

第3日目は、帰国研修員の1名が現在所属するDPWH地方事務所課題となっている土砂堆積が著しいアラマセン川の事業箇所を見学し、途上国の有する深刻な問題のひとつを把握しました。

ICHARM has been conducting the Follow-up Seminar in the aim of capacity building. The annual event started in 2008 and has been held in an overseas country except the one in FY2015. The seminar is attended by former students and participants in ICHARM's training and educational programs, as well as other experts, and consists of workshops and study visits to local sites. Besides providing additional assistance and advice for former students and trainees who are now working at local organizations, the Follow-up Seminar has also helped ICHARM review its current research themes, improve training programs, strengthen the network with overseas organizations, and encourage motivated individuals to join ICHARM's training and educational programs.

The FY2016 Follow-up Seminar was held in Manila and Pampanga, the Philippines, from January 31 to February 2, 2017. A total of 24 people participated: Research & Training Advisor Shinji Egashira, Chief Researcher Yoshio Tokunaga, and Senior Researcher Badri Bhakta Shrestha from ICHARM; former participants in ICHARM's training and educational programs from Pilipino government organizations such as the Department of Public Works and Highways (DPWH), the National Irrigation Administration, the Philippine Atmospheric Geophysical and Astronomical Services Administration (PASAGA), National Irrigation Administration (NIA), the Department of Environment and Natural Resources (DENR); experts from the Japan International Cooperation Agency (JICA); and other experts and practitioners.

On the first day, all 24 participants gathered and listened to presentations by participating organizations on the latest policy, research, and technological developments. Five graduates from ICHARM master's course in disaster management also spoke at the meeting about their current work and expectations they have for ICHARM.



The meeting on the first day



The meeting with a district leader in Calumpit

On the second day, 14 participants including the former students of ICHARM visited the Pampanga area near Manila. They first visited the Calmpit Municipal Bureau of Disaster Management and interviewed with the leaders and residents of flood-prone districts.

They also visited the Pampanga River Basin Flood Forecasting and Warning

Center (PRFFWC) of PAGASA, Region III office of DPWH and Flood Project Office of DPWH. Since the Pampanga area has been one of the study areas for ICHARM's research activity, local experts expect ICHARM to provide well-coordinated assistance combining ICHARM's three principal activities of research, capacity building, and information network.

On the last day, the participants visited a project site on the Almacen River. One of the graduates from ICHARM master's course is with a DPWH regional office which is responsible for the project that is taking place in an area troubled with



The project site on the Almacen River

increasingly severe flood damage due to constant sediment deposition. The visit was very instructive in that the ICHARM researchers could have a firsthand look at one of the serious problems faced by a developing country.

(Written by Yoshio Tokunaga)

Field trips by M. Sc. students

ICHARM offers a master's degree program, "Water-related Disaster Management Course of Disaster Management Policy Program (JICA Training Program: Training for Expert on Flood-related Disaster Mitigation)," in collaboration with the Japan International Cooperation Agency (JICA) and the National Graduate Institute for Policy Studies (GRIPS). Currently, 10 students are enrolled in this 10-year-old program. The program includes study tours, in addition to lectures, which are an important part of its curriculum to have a good understanding of flood management in Japan. They visited Kobe and Tokushima from March 1 through 3, 2017.

On the first day, the students visited the Disaster Reduction and Human Renovation Institute in Kobe, Hyogo Prefecture, to learn the Great Hanshin-Awaji Earthquake including damage, restoration and reconstruction. Looking at photos and other exhibits, the students were shocked with the tremendous damage it caused to the Kobe area. At the same time, they were amazed that, despite the severe destruction, the area has been reconstructed very well as if nothing had happened. They were also impressed to learn about local efforts to never let the earthquake fade away from people's mind by organizing and preserving various records of the disaster and to learn and share lessons not only with people in the affected area but also many others, both at home and abroad.

After the exhibition center, the students crossed the Akashi Kaikyo Strait to Tokushima, one of the four prefectures in Shikoku Island, and visited the Ishii Disaster Prevention Station in Ishii Town. They first received a brief lecture on Yoshinogawa, one of the nation's most famous rivers, and then learned several measures that are used in flood fighting efforts in Japan.

In particular, they had a chance to see the ringing sand boil method in place thanks to the staff of the local office. They also learned how to use things they can find around them in the event of disaster, such as using ropes in rescue efforts and creating a stretcher out of everyday clothes, blankets, and vinyl sheets and sand bags used in flood fighting.

The students also met Mr. Kuniichi Yamamoto, a disaster prevention specialist for the Shikoku area, and learned from him "life-saving knot-tying skills," which is very useful in various situations during a disaster. Mr. Yamamoto showed a number of ways to tie knots, each of which is meant for a different scene of a disaster. All this was broadcasted by a local station of the Japan Broadcasting Corporation and reported by a local newspaper company.



The ringing sand boil method applied to a model embankment by the officers of MLIT



At the knot-tying workshop

ICHARM は、JICA 及び政策研究大学院大学 (GRIPS) と連携して、2016 年 10 月から 10 年目となる修士課程「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」)を実施しています。10 名の研修生は ICHARM 内での講義に加えて、日本の洪水対策についてよりよく理解するために、現地視察を通して学んでいます。

2017 年 3 月 1 日～3 日にかけて、神戸・徳島を訪問しました。

初日は、神戸において、人と防災未来センターを訪問し、阪神淡路大震災の被害及びその後の取り組みについて学習しました。研修員は、写真等で見るその大きな被害を知り、また、そのような大きな被害にもかかわらず、当時の様子を感じさせない神戸の街の復興に驚いていました。とりわけ、このような甚大な災害の記録を残し人々の中で風化させない姿勢及びそのような経験から得られた教訓を広く共有しようとしていた姿勢に感銘を受けていました。

2 日目には、明石海峡大橋を見学しました。橋の科学館においては、明石海峡大橋に関する様々な展示があり、またその建設には世界最高水準の架橋技術が適用されたこと等を学びました。その後、明石海峡を渡り、徳島へ移動しました。

吉野川下流に位置する石井防災ステーションにおいて、四国地方整備局徳島河川国道事務所のご協力のもと、四国防災エキスパートの山本邦一先生から、「命を守るロープワーク」の実習を受けました。最初に日本を代表する河川である吉野川の概要説明の後、日本の水防活動で適用される様々な水防工法の説明を受けました。月輪工法においては、当研修の為に実際に施工されており、実物を見ることが出来ました。また、災害時の救助活動に役立つロープの利用方法、また、身近にある衣服・毛布あるいは水防活動の際に使用するビニールシート・土嚢袋などと竹を組み合わせた担架の作成方法などを学びました。

その後、実際にロープを使用して、災害の場面で有益であると思われる様々なロープの結び方を実習しました。この実習の様子は、NHK 徳島放送局のニュース及び徳島新聞の記事で地元の方々に紹介されました。

最終日には、日本の文化を学ぶ目的で、姫路城を訪れました。

ロープワーク実習は、昨年からの研修に取り入れたところですが、実践

Training / Information Networking

的な防災対策として、学生の反応も良いことから、是非、山本先生及び徳島河川国道事務所のご協力を賜り、継続していきたいと考えています。

お忙しい中、現地訪問のご対応を頂いた山本邦一先生、徳島河川国道事務所の皆様には大変お世話になりました。ここにお礼申し上げます。

The study tour ended with a cultural tour to Himeji Castle back in Hyogo. Just like the previous ones, the study tour this time was also very fruitful for the students. Since the knot-tying workshop is found particularly practical among students, though added to the program only a year ago, it should be continued from next year on with support from Mr. Yamamoto and the MLIT Tokushima Office.

Finally, we would like to thank all offices for their cooperation despite the busy schedules.

(Written by Takashi Shirai)

Information Networking

The 6th Global Precipitation Measurement (GPM) Asia Workshop on Satellite Precipitation Data Utilization

2017年1月18～19日に、タイ・バンコクで開催された第6回GPMアジアワークショップに津田主任研究員が参加しました。

本ワークショップは、アジア地域における人工衛星観測雨量の活用促進と、各国のGPMプロダクトの利用に関する研究、応用事例の共有を目的として、JAXA、タイ気象局の共催により開かれたものです。アジア各国政府の気象、防災担当部局や大学、研究機関からの多くの参加がありました。

津田主任研究員からは UNESCO パキスタンプロジェクトにおけるインダス川流域の洪水予警報への GSMaP の適用事例についてのプレゼンテーションを行いました。

本ワークショップには、スリランカ灌漑局から ICHARM 修士課程の修了者でもある SINNAPPOO Kokularamanan 氏が参加し、洪水予警報における GSMaP 補正技術の適用と、ICHARM も技術サポーターとして参加している SAFE プロジェクトが紹介されました。

本ワークショップに参加し、アジア各国では洪水予警報における人工衛星観測雨量のニーズは依然として高く、リアルタイム補正技術も含めた精度向上への期待の高さを認識しました。

The 6th Global Precipitation Measurement (GPM) Asia Workshop on Satellite Precipitation Data Utilization was convened at Bangkok, Thailand, on January 18-19, 2017, and ICHARM Senior Researcher Morimasa Tsuda participated.

The workshop was co-hosted by the Japan Aerospace Exploration Agency (JAXA) and the Thai Meteorological Department in the aim to promote the use of satellite precipitation data in the Asian region, share the results of research conducted by each country on the use of GPM products, and learn from actual applications of the products. It was attended by a host of participants from universities, research institutes, and governmental agencies in charge of meteorology and disaster management of Asian countries.

Dr. Tsuda delivered a presentation on an application of GSMaP to flood forecasting and warning in the Indus River basin, which was conducted as part of a UNESCO Pakistan project.

Mr. SINNAPPOO Kokularamanan of the Sri Lanka Irrigation Department, a graduate from ICHARM master's course, was also at the workshop, and presented an application of a GSMaP bias correction method for flood forecasting and warning and also explained the project called Space Applications for Environment (SAFE), in which ICHARM is also involved as technical supporter.

The workshop was a great opportunity to be reminded of a strong need among Asian countries for satellite precipitation data for flood forecasting and warning and high expectations for further improvement in data accuracy, as well as the development of real-time bias correction technique.



Workshop participants

(Written by Morimasa Tsuda)

International Symposium on the Cryosphere in a Changing Climate in New Zealand

The International Symposium on the Cryosphere in a Changing Climate was held on February 12-17, 2017, in Wellington, New Zealand. ICHARM Research Specialist Dr. LIU Tong attended this meeting and delivered a presentation on her research, "Long-term variations of glaciers under the changing climate in the tropical Andean region". In the presentation, she explained her method for outlining snow/glacier coverage, glacial lakes, and wetlands in Bolivian Andes using satellite data, obtained long-term changing trends, and their relationship with the environment forcing such as El Niño-Southern Oscillation (ENSO) events. The conference was a great opportunity to discuss issues on cryosphere under a changing climate with other experts and practitioners and expand a professional network in the field, which is expected to help make future progress in her research, entitled "Investigating the long-term variations and interactions among glaciers, glacial lakes, and high altitude wetlands in the tropical Andean region as future water resources," funded by Kakenhi (No. 15K18127), or the Grant-in-Aid for Scientific Research.



Venue: Rutherford House, located in the Pipitea Campus of Victoria University of Wellington



conference in session

(Written by LIU Tong)

気候変動下の氷圏に関する国際シンポジウムが、2月12日から17日までニュージーランドのウェリントンで開かれました。ICHARMからはLIU 専門研究員が参加し、気候変動下での熱帯アンデス氷河の長期的変化に関する研究について発表しました。LIU 専門研究員は、特にボリビアアンデス山脈の積雪や氷河、氷河湖、湿地について衛星データを元に情報を収集する方法を説明するとともに、その情報を分析して得られた長期トレンドや、エルニーニョ南方振動に関連する事象など環境強制要因との関係についても説明しました。シンポジウムは、気候変動下の氷圏に関する様々な問題について専門家と議論するすばらしい機会であると同時に、専門分野でのネットワークをさらに広げるよい機会ともなりました。現在、LIU 専門研究員は、熱帯アンデス地域の氷河、氷河湖、高緯度湿地を将来の水資源ととらえ、それらの長期的変化や相互作用に関する研究も科研費の支援を受けて進めています。今回のシンポジウムでの成果はその研究の進展に大いに寄与するものだと考えられます。

The 49th Annual Session of Typhoon Committee in Yokohama

The 49th Annual Session of the Typhoon Committee (TC) was convened in Yokohama, Japan, on February 21-24, 2017, gathering about 100 participants from 13 countries and territories and five international organizations (see the list of participants below).

The session consisted of technical presentations, reports on activity and budget plans from the TC working groups of meteorology, hydrology, and disaster risk reduction, and discussions on other issues including the management of TC. All those were compiled in the final report and approved by the session (visit: <http://www.typhooncommittee.org/49th/TC49final.html> for details). After the session, some participants joined a study tour to the Tsurumi River Multi-purpose Retarding Basin and the Yokohama Local Meteorological Observatory.



49th Session participants

2017年2月21日～24日、パシフィコ横浜において台風委員会 (TC) 第49回総会が開催され、13の国と領域 (日本、米国、韓国、中国、香港、シンガポール、マカオ、マレーシア、フィリピン、ベトナム、タイ、ラオス、カンボジア) と5つの国際機関 (WMO、WESCAP、IREC、JTWC、ADRC) 他から約100名が参加しました。日本からは気象庁 橋田長官、関谷予報部長、長谷川環境海洋部長、国交省水管理・国土保全局水資源部 岡積水資源計画課長、内閣府防災担当 佐谷参事官、東北大学 IRIDeS 小野裕一教授、そして ICHARM から小池センター長と三宅グループ長、徳永上席研究員、海野主任研究員が参加しました。

総会は専門家による技術報告、気象、水文、防災部会の活動及び予算計画の説明、その他台風委員会の運営に関して協議が行われ、最終日に最終報告としてとりまとめられ、参加者により承認されました。詳細は、<http://www.typhooncommittee.org/49th/TC49final.html> に掲載されています。また、総会終了後に参加者は鶴見川多目的遊水地及び横浜

Information Networking

地方気象台の見学を行ないました。

承認された事項のうち ICHARM に関係するものとして、(1) 国土交通省より小池センター長が技術報告で説明した IFI (国際洪水イニシアティブ) や JICA、ADB 事業の連携を通じて、台風委員会の活動に対しこれまで以上の支援強化を行うと表明された、(2) 2015 年から水文部会議長を行っている ICHARM 徳永 永上席研究員が、日本の一層の貢献を条件に 2017-2018 年の同議長に再任された、(3) 2017-2019 年の台風委員会のプロジェクトのひとつに ICHARM 主導の「Flash Flood Risk Information for Local Resilience」が含まれるなどしました。今後、一層、日本及び ICHARM の貢献が期待されることとなりました。

また、総会の開催に合わせ、2月20日に韓国漢江洪水統制所河川情報センターの Cho 氏、Cha 氏、韓国建設技術研究院 (KICT) の Kim 氏の3名が ICHARM を来訪して、研究及び台風委員会に関する意見交換を行ないました。

The items approved by the session include those related to ICHARM: 1) the technical presentation by ICHARM Director Toshio Koike explaining the International Flood Initiative and the statement also made by the director that ICHARM will increase support for TC in cooperation with the Japan International Cooperation Agency (JICA) and the Asian Development Bank (ADB); 2) the reelection of ICHARM Chief Researcher Yoshio Tokunaga as chair for the TC Working Group of Hydrology for the 2017-2018 period under the condition that Japan will make further contribution to TC; and 3) the inclusion of an ICHARM-led project, "Flash Flood Risk Information for Local Resilience," in the TC project plan for the 2017-2019 period. These decisions will require further commitment of Japan and ICHARM to TC activities.



A technical presentation by ICHARM Director

On February 20, 2017, prior to the annual session, Messrs. Dr. Cho and Dr. Cha of the River Information Center of the Han River Flood Control Office (HRFCO) and Dr. Kim of the Korea Institute of Construction Technology (KICT) visited ICHARM and discussed issues on research and TC with Prof. Koike and other ICHARM researchers.



Korean delegates visit ICHARM (February 20, 2017)

Participating countries and territories:

Japan, the United States, Korea, China, Hong Kong, Singapore, Macao, Malaysia, the Philippines, Vietnam, Thailand, Laos, Cambodia

Participating international organizations:

World Meteorological Organizations (WMO), Economic and Social Commission for Asia and the Pacific (ESCAP), International Renewable Energy Congress (IREC), Joint Typhoon Warning Center (JTWC), Asian Disaster Reduction Center (ADRC)

Main Participants from Japan:

- Toshihiko Hashida, Director General, Japan Meteorological Agency (JMA)
- Yasuo Sekiya, Director General, Forecast Department, JMA
- Naoyuki Hasegawa, Director General, Global Environment and Marine Department, JMA
- Toshio Okazumi, Director, Water Resources Planning Division, Ministry of Land, Infrastructure, Transport and Tourism
- Setsuko Saya, Director for disaster management, Cabinet Office
- Yuichi Ono, Professor, International Research Institute of Disaster Science (IRI-DeS), Tohoku University
- Toshio Koike, Director, ICHARM
- Katsuhito Miyake, Deputy Director, ICHARM
- Yoshio Tokunaga, Chief Researcher, ICHARM
- Hitoshi Umino, Senior Researcher, ICHARM

(Written by Yoshio Tokunaga)

ADB project final report submitted to the Myanmar government

Chief Researcher Hisaya Sawano visited Nay Pyi Taw in Myanmar on February 22, 2017, to attend a meeting with Myanmar government officials. The purposes of this visit were to submit the final report on a project funded by the Asian Development Bank, entitled "TA-8456: Transformation of Urban Management – Part II Flood Management," which ended in December 2016, and to discuss the effective use of the results from the project. The participants were from the Department of Meteorology and Hydrology (DMH), which was the counterpart of this project, and the local governments of Yangon, Mandalay and Mawlamyine, where the project was conducted, in addition to Mr. Sawano who was the team leader of the project.

In the meeting, many commented that flood hazard maps produced in the project will be utilized in future policy development. Moreover, the representatives of Yangon City reported that flood management has recently become a priority issue because many parts of the city are vulnerable to inundation with further urban development expected in the near future. They also mentioned that they have already started a project to improve their drainage system. The cities of Mandalay and Mawlamyine also spoke of their ongoing efforts for better drainage.

On behalf of the project team, Mr. Sawano presented several suggestions for the effective use of the project results. He advised performing cross-sectional survey on a regular basis and conducting runoff analysis to monitor changes in the discharge capacities of rivers due to sedimentation and other factors. He also suggested paying attention to changes in rainwater runoff as urbanization progresses, and underlined the importance of correctly recording the datum levels of different elevation data (bench marks, astronomical tide levels, etc.) and having them ready to use for analysis with higher accuracy.



Participants from DMH and the three cities with Dr. Oo (front row, center)

On the 23rd, Mr. Sawano visited the Irrigation and Water Utilization Management Department (IWUMD) to submit the final report and explain the achievements of the project. The officials of IWUMD acknowledged that present elevation data need improving. Referring to the necessity of new analysis methods for better dam management in response to emerging concerns such as deforestation and climate change, they also mentioned that the use of satellite images and more analyses using the RRI model should be promoted. Mr. Sawano also visited the Relief and Resettlement Department (RRD) and the Directorate of Water Resources and Improvement of River Systems (DWIR) and had fruitful discussions on issues to be addressed based on the project results.



Opening address by Dr. Kyaw Moe Oo, deputy director-general of the Department of Meteorology and Hydrology

澤野上席研究員は、昨年末に完了したアジア開発銀行 (ADB) プロジェクト「都市管理に関する技術移転 (TA-8456): パート II (洪水管理)」の最終報告書の提出、及びプロジェクトの成果の今後の活用についての意見交換を目的としてミャンマーを訪問し、2017年2月22日にはネピドーで、プロジェクトのカウンターパートである気象水文局 (DMH)、プロジェクトの対象3都市 (ヤンゴン、マンダレー、モーラミヤイン) 及びプロジェクトチームのリーダーである澤野上席研究員による会議を DMH で開催しました。

会議では、プロジェクトで作成したハザードマップを今後の施策に役立たせたいとの意見が出されるとともに、ヤンゴン市からは、ヤンゴンの多くのエリアが浸水に脆弱であるうえ、さらなる開発が見込まれているため、洪水問題が新たな優先課題になっており、排水機能向上への取り組みが始まっているとの報告があり、マンダレーやモーラミヤインからも、排水システムの改良について取組中であることが紹介されました。

プロジェクトチームを代表し、澤野上席研究員からは、今回の成果を今後も活用する上での留意事項として、堆砂等による河川の流下能力の変化を捉えるため、横断測量を継続的に実施し流出解析を行うことや、都市化の進展に伴う雨水流出状況の変化に注意すること、標高データを整備して解析の精度を上げるとともに、様々な標高データ (ベンチマーク、天文潮位等) の基準点 (Datum Level) の違いを正確に把握し解析に反映することの必要性等について説明しました。

翌2月23日には、IWUMD (灌漑水利用管理局)、RRD (救済再定住局) 及び DWIR (水資源河川改良局) にプロジェクトの最終報告書を提出、説明しました。IWUMD は現状の標高データの精度向上の必要性について認識するとともに、衛星画像の活用や RRI モデルによる解析を進めたいとの考えを示されました。近年の森林減少や、気候変動の影響により、ダム管理について新たな解析が必要となっているとのこと。RRD、DWIR でも今後の課題について意見交換しました。

Information Networking

2月24日にはヤンゴンのUNDPで Ms.Lat Lat Aye (Programme Analyst) に最終報告書について説明。UNDPはミャンマーで、RRDが管理する loss and damage databaseの構築を支援しています。また Ms. Lat Lat Ayeからは、ミャンマーの災害対応の国家計画であり、ADBプロジェクトでも施策提言の基本とした MAPDRR(Myanmar Action Plan on Disaster Risk Reduction)の改訂作業が進められており、まもなく完成する見込みとの情報が提供されました。

2月25日にはヤンゴン工科大学 (YTU (Yangon Technological University)) の Win Win Zin 教授 (Associate Professor) と面会し、ミャンマーの水位観測の状況、RRIモデルの今後の活用、時間雨量の設定等、技術的な課題について幅広く意見交換しました。

この他、JICA事務所、日本大使館とも打合せを行い、報告書の内容について紹介するとともに、今後のミャンマーでの取り組み等について意見交換しました。本プロジェクトの成果、及びプロジェクトを通して得た情報については、ミャンマー政府及びミャンマー政府を支援する日本や海外の組織による今後の取り組みで活かされるよう、情報発信していく予定です。



At IWUMD with Deputy Director-General Soe Myint Tun (third from right) and Director Khon Ra (fourth from right)



At DWIR with Director General Htun Lwin Oo (right) receiving the final report

On the 24th, Mr. Sawano met with Ms. Lat Lat Aye, programme analyst of the United Nations Development Programme (UNDP), at its Yangon office to hand in the final project report and explain the achievement. UNDP has assisted Myanmar in developing the loss and damage database now managed by RRD. She informed him that the Myanmar Action Plan on Disaster Risk Reduction (MAPDRR) has been under revision and will be completed soon. MAPDRR is Myanmar's national strategy for disaster management, and the project team referred to this action plan to prepare recommendations in the final report of the ADB project to improve flood management of the country.



At UNDP with Ms. Lat Lat Aye (left)

On the 25th, Mr. Sawano met with Associate Professor Win Win Zin, Yangon Technological University. He discussed a wide range of technical issues with her, such as water level measurement currently practiced in Myanmar, possible applications of the RRI model, and settings for hourly rainfall measurement.

Mr. Sawano also visited the Yangon office of the Japan International Cooperation Agency and a Japanese embassy to hand in the report, facilitate the understanding of the project, and discuss future plans in Myanmar.

ICHARM is planning to disseminate the results of the project and additional experience and knowledge acquired through the project in the hope that they will be useful for the government of Myanmar and other organizations of Japan and overseas countries, including international agencies, helping the Myanmar government in planning and implementing future projects.

(Written by Hisaya Sawano)

4th Joint Project Team Meeting for Sentinel Asia STEP3 (JPTM2017)

2017年3月8～9日、ベトナムのハノイにて、Sentinel Asia Step 3 第4回合同プロジェクトチーム会合が開催され、岩見上席研究員は、水災害WGで議長を務め、水災害WGの使命など様々な内容について議論するとともに、ICHARMの活動を紹

On March 8-9, 2017, Sentinel Asia Step 3 met for its 4th joint project team meeting in Hanoi, Vietnam. ICHARM Chief Researcher Yoichi Iwami participated as the chair of the water-related disaster working group, leading discussions on various issues including the mission of the working group and presenting the activities of ICHARM.

Sentinel Asia, the initiative in which Asian space and disaster management agencies cooperate to conduct satellite monitoring, including emergency observations, over a widespread area for disaster management purposes, marked the 10th anniversary this year. According to a recent report, as many as 37 emergency satellite observations had been carried out at the time of disasters since last year's meeting and used to take proper response measures to minimize the damage caused by floods, debris flows, earthquakes, forest fires, and other catastrophic events. The report also pointed out that such observations have been performed more often than before since the launch of the ALOS2 satellite.



The 4th joint project team meeting of Sentinel Asia Step 3

The water-related disaster working group, which was restructured from the flood working group when the members met last year, now covers a wider range of water-related disasters, such as typhoons, storm surges, heavy rainfall, which also include floods, sediment disasters, droughts and other similar events associated with extreme meteorological phenomena and climate change. The main responsibilities of this working group is to facilitate technological development for the effective use of space technology, and encourage information sharing among the member countries of Sentinel Asia about their ideas and activities related to the initiative.

As the chair of the water-related working group, Mr. Iwami first confirmed the mission of the working group with the participating members, and then presented the recent activities of ICHARM, such as rainfall monitoring and flood forecasting, inundation area detection, data assimilation, climate change research, the latest developments of the International Flood Initiative (IFI). In response to his presentation, the members discussed a diverse range of topics regarding GSMaP bias correction, SAR data analysis, the accessibility of rainfall forecasting data, etc. The representatives from Lao PDR and the Philippines also delivered presentations on the use of satellites during a flood and a sediment disaster.

The meeting also highlighted the importance of building a closer collaboration and creating more opportunities for discussion among space agencies that provide satellite data, organizations that process and analyze the data to create information, and users who are benefitted from the information provided for disaster management.

ICHARM will continue contributing to Sentinel Asia from a users' point of view, increasing collaboration with other member countries and developing practical technologies that maximize the benefits of space technology in disaster management.

(Written by Yoichi Iwami)

介しました。

Sentinel Asia は、アジアの宇宙機関と防災機関が連携協力し、緊急観測など広域衛星観測を行い、そのデータを防災に活用する枠組みで、10周年を迎えました。報告によれば、昨年の会合以来、37回に及ぶ災害時の衛星緊急観測を実施し、洪水、土砂災害、地震、森林火災等への対応に情報が活用されています。ALOS2衛星の打ち上げ以降、緊急観測回数が増加しています。

水災害WGは、昨年度の会合で洪水WGから名称を変更し、台風、高潮、豪雨、異常気象、気候変動による洪水、土砂災害、渇水等の水災害へと対象を広げました。これらの水災害軽減のため、宇宙技術の活用を行うための技術開発及び各国のセンチネルアジア活動の情報を共有し、意見交換が行うことがWGの目的です。

岩見上席研究員は、議長として、水災害WGに期待されている事項を確認するとともに、近年のICHARMの研究等の活動として、降水監視と洪水予測、浸水範囲把握、データ同化、気候変動、IFI（国際洪水イニシアチブ）の動向について紹介しました。これに対して、GSMaPバイアス補正、SARデータ解析、降雨予測データ入手等について、議論がなされました。また同WGでは、ラオス及びフィリピンの代表から、洪水、土砂災害等の衛星利用について紹介がありました。

会合では、衛星データを提供する宇宙機関、データを加工分析する機関、そして、防災情報を活用するユーザーとの密な連携と議論の重要性が改めて確認されました。

ICHARMは、今後もユーザーの視点に立ち、各国と連携し、宇宙技術を防災に活用する上で有効な技術研究開発を行うことで、貢献していく所存です。

Visit by researchers from the DOST-SEI ASTHRDP in the Philippines

A group of four Philippine researchers visited ICHARM on March 30, 2017. They were members of the Accelerated Science and Technology Human Resource Development Program (ASTHRDP), a scholarship program funded by the Science Education Institute (SEI) of the Department of Science and Technology (DOST) in the Philippines. Prof. Felino P. Lansigan is from University of the Philippines, Los Baños, Prof. Jose Maria P. Balmaceda from University of the Philippines, Diliman, Dr. Elaida

2017年3月30日にフィリピン科学技術省 Science Education Institute (SEI) の Accelerated Science and Technology Human Resource Development Program (ASTHRDP) の一行が ICHARM を訪問しました。4名からなるこの一行

Information Networking / Others

は、フィリピン大学ロスバニョス校の Felino P. Lansigan 教授、フィリピン大学ディリマン校の Jose Maria P. Balmaceda 教授、中央ルソン州立大学の Elaida R. Fiegalan 准教授、デ・ラ・サール大学の Jose Santos Carandang VI 教授で、それぞれの研究活動について紹介がありました。また、ICHARM からは小池センター長が水災害リスク軽減に向けた ICHARM の役割や研究活動を紹介し、澤野上席研究員がルソン島パンパンガ川流域における研究成果を説明しました。来訪された皆さんは ICHARM の気候変動を考慮した洪水氾濫解析や、教育活動について強い関心を持たれ、多くの質問が寄せられました。

R. Fiegalan from Central Luzon State University, and Prof. Jose Santos Carandang VI from De La Salle University. After each of them introduced their research activities, ICHARM Director Toshio Koike explained ICHARM's role and research activities in water-related disaster risk reduction, and Chief Researcher Hisaya Sawano introduced ICHARM's research achievement in the Pampanga River basin, Luzon Island. The visitors were especially interested in flood simulation considering climate change and educational programs at ICHARM and asked many questions on various topics.



Researchers from the DOST-SEI ASTHRDP with ICHARM researchers

(Written by Naoko Nagumo)

Others

ICHARM 10th anniversary publication



10th Anniversary

ICHARM は 2016 年 3 月に設立 10 周年を迎えることができました。これはひとえに皆様のご指導、ご鞭撻の賜物と心より感謝します。これを機に、この 10 年を振り返り、加えて将来への展望を示すために、「ICHARM 10 周年記念誌」の作成に取り組んで参りました。

本記念誌においては、ユネスコ事務局長や国土交通大臣から序文を頂くとともに、UNESCO-IHP 議長、ユネスコ前事務局長、政策研究大学院大学長、国際協力機構理事長からもメッセージを頂きました。

本論は、編集委員長でもある竹内邦良 ICHARM 顧問による 10 年の回顧に始まり、ICHARM 活動の 3 本柱である「研究」「研修・教育」「情報ネットワーク」、そしてそれらを踏まえた「現地実践活動」、「将来の展望」からなっており、巻末には各種資料を網羅的に整理しております。また、過去に ICHARM に在籍された多くの方々のコラムも多数掲載させて頂きました。不十分なところも多々ございますが、ICHARM の活動をご理解頂く一助として、ご高覧いただければ幸いです。

本記念誌は、下記 ICHARM ホームページからダウンロードできますが、ご希望の方には書籍版を送付致しますので、下記連絡先までご連絡ください。

http://www.icharm.pwri.go.jp/publication/pdf/2016/10th_anniversary.pdf

連絡先: icharm@pwri.go.jp

世界の水災害リスクの軽減に向けて、



We are pleased to inform you of the publication of ICHARM's 10th anniversary volume.

ICHARM marked its 10th anniversary in March 2016, and we know that we could not have come this far without your guidance and encouragement. We have produced this commemorative volume to celebrate and reflect on the last decade of ICHARM, as well as to show the way for the institute to move forward.

The volume starts with the forewords kindly provided by Director-General of UNESCO Irina Georgieva Bokoba and Minister of MLIT Keiichi Ishii, which are followed by warm messages from Chair of UNESCO-IHP András Szöllösi-Nagy, former Director-General of UNESCO Koichiro Matsuura, President of GRIPS Takashi Shiraiishi, and President of JICA Shinichi Kitaoka.

The founding director of ICHARM, Kuniyoshi Takeuchi, contributes a chapter looking back at the decadal progress of ICHARM. The following chapters detail ICHARM's three principal activities of research, training and education, and information networking, and also cases of local practice built on the results of these activities. The succeeding director of ICHARM, Toshio Koike, concludes the volume with a future vision, presenting the ideas and strategies to be put into action under the new leadership. At the end of the volume is the Annex furnishing an array of comprehensive lists of many kinds.

Many individuals who once worked or studied at ICHARM also offer their memories with ICHARM for this publication. We hope that you will find the publication interesting,

informative and resourceful.

The commemorative volume is downloadable at the following address:

http://www.icharm.pwri.go.jp/publication/pdf/2016/10th_anniversary.pdf

Also, if you wish to have a hard copy of the volume, please email at: icharm@pwri.go.jp.

With your consistent support, we at ICHARM will continue working towards the global reduction of water-related disaster risks in cooperation with other organizations, governments and communities.

Thank you.

ICHARM が皆様とご一緒に活動させて頂き、皆様のセンターとなるよう努めていく所存ですので、引き続きご支援、ご協力をよろしくお願いいたします。

Annual Hanami lunch

On April 6, 2017, a cherry blossom viewing luncheon was held under big sakura trees on PWRI premises. ICHARM holds this seasonal mini-outing for people at PWRI to mingle with foreign students in our educational program. The event took place on a nice spring day with a good crowd of researchers, assistants and students including the director of ICHARM and the new president and other executives of PWRI.

While everyone was enjoying a lunch box, blossoms and talk with friends and colleagues, Professor Takeuchi, former advisor of ICHARM who just retired this March, played a beautiful piece of music on the flute. The lunch break was rather short, but people had a great time together.

I hope that the event will be something for the foreign students to remember how spring in Japan is.

土木研究所幹部と ICHARM で勉強する博士・修士コース学生及びインターン生(計 15 名)との交流を目的とした花見会を 2017 年 4 月 6 日のお昼休みに行いました。当日は、好天に恵まれ、小池センター長を始め、この 4 月に土木研究所に着任された西川理事長他幹部の方々も参加していただき盛大に行われました。

桜の下、お弁当を食べながらの談笑のひとつときに、この 3 月で ICHARM を退職された竹内顧問のフルート演奏も加わり、和やかな時間があっという間に過ぎていきました。

満開の花の下、外国からの参加者も日本の春の風情を十二分に満喫できたことと思います。



(Written by Shigeyuki Senda)

Personnel change announcement

New ICHARM Members

Seven new members joined ICHARM. They would like to say brief hellos to the readers around the world.

Tetsuya Ikeda / 池田 鉄哉

Chief researcher

Japan



From 2003 to 2005, I was involved in the preparatory works to establish the ICHARM (called as "UNESCO-Center" at that time) at the PWRI.

Since then, I have had a high interest in the ICHARM, I am deeply impressed with the progress of its research and development works in these years.

Actually, this is the first time to work as a member of the ICHARM, I will be very happy if I could contribute to ICHARM's activities.

Takafumi Shinya / 新屋 孝文

Senior researcher

Japan



This is the first time for me to work in Tsukuba area after working for MLIT headquarters and local office, Japan Meteorological Agency, Ministry of Environment and Indonesia National Disaster Management Authority, etc. I hope these experiences would be useful for ICHARM activity, and I could deepen my knowledge.

Hironori Inomata / 猪股 広典

Senior researcher

Japan



Hello, again. I'm back at ICHARM after working at the National Institute for Land and Infrastructure Management for six years. These six years is good enough for me to become a total stranger to what's going on at ICHARM. So please have some patience with me while I'm catching up!

Katsunori Tamakawa / 玉川 勝徳

Research specialist

Japan



I am very much excited to be a member of ICHARM. My research interest is global soil moisture estimation and flood area estimation by using satellite dataset.

I make my best efforts to create new useful information by using Data Integration and Analysis System, for a sound decision making to contribute to reduce the people who are suffered by water related disasters, such as a severe flood.

Yosuke Nakamura / 中村 要介

Exchange researcher

Japan



I am pleased to be a member of ICHARM from April 2017. While I worked in Mitsui Consultants Company, I was experienced in flood control planning, hydrological modeling, inundation analysis, climate change assessment and more.

I am interested in flood forecasting, so I want to study RRI model, IFAS, meteorological model and ensemble forecasting in ICHARM.

Shinji Nakajo / 中條 伸二

Chief staff

Japan



I started working at ICHARM on April 1 as one of the administrative staff members.

I'll try my best to help researchers so that they can focus on their work.

Tetsuya Nakagori / 中郡 哲哉

Senior staff

Japan



Hello. I've just started working at ICHARM since this April. Before coming to ICHARM, I was at the office of General Affairs. I hope I'll get used to things at ICHARM soon. By the way, I do *Aikido* for fun, so please come to me if you are interested in this unique Japanese martial art.

Leaving ICHARM

- **Kuniyoshi Takeuchi** : Advisor
- **Yoichi Iwami** : Chief Researcher
Director, Public Works Division, Nagasaki Prefecture
- **Youji Chida** : Principal Senior Researcher
Deputy Team Leader, Erosion and Sediment Control Research Group, Public Works Research Institute
- **Hiroshi Koseki** : Researcher
Researcher, Hydrologic Engineering Research Team, Public Works Research Institute
- **Noriko Yamaguchi** : Chief Staff
Chief Staff, General Affairs Division, Public Works Research Institute
- 竹内 邦良 顧問
- 岩見 洋一 上席研究員
長崎県 土木部長
- 千田 容嗣 総括主任研究員
国立研究開発法人土木研究所
土砂管理研究グループ 総括主任研究員
- 小関 博司 研究員
国立研究開発法人土木研究所
水工研究グループ 水文チーム 研究員
- 山口 典子 主査
国立研究開発法人土木研究所
総務部 総務課 主査

Comments from internship students

ICHARM accepted three internship students last winter.

Mr. Juyoung YANG from the Republic of Korea, Mr. Shohei Morisawa from Japan, and Mr. Mohammad Newaz Sharif from Bangladesh stayed at ICHARM. They contributed a short message to this volume of ICHARM Newsletter while looking back at their internships.



Juyoung YANG

Yonsei University

Intern period: December 1st, 2016 - February 25, 2017

I had studied in ICHARM from December 1st in 2016 to February 25th in 2017. For 3 months, I'd experienced a lot of things in here and could understand about ICHARM, as an international organization. Many students from different country are studying together, playing and sharing their culture. It was invaluable experiences for me. I could understand each of their culture and we've become international friends.

In ICHARM lectures, I also got various knowledge of water-related disaster, computer programing and modeling. Especially, what I've learned here is most of Computer Programming. My supervisor, RASMY sensei, advised me to learn programming methods and it will be helpful in my future research. So I am focusing on learning GrADS. It is useful for manipulating and visualizing of earth science data and easy to learn. So while studying GrADS, I also made GrADS instruction for students or next intern who want to learn this program. And I am also focusing on learning Linux operating system. Using this OS, I could get the satellite data easily and quickly. Through ICHARM lectures, I could understand the basic of ArcGIS, RRI and Fortran. And I also studied the basic commands of Python and MATLAB by myself.

3 months might be too short to get the major knowledge but I speak with confidence that I had done my best and could get countless knowledge in ICHARM. I'm sure it will be my great research assistance in the future. Thanks to all ICHARM members and students.



Shohei Morisawa / 森澤尚平

Osaka Institute of Technology / 大阪工業大学

Intern period: January 31 - February 7, 2017

My internship was very short and it was about 1 week. I felt it was early that time goes by. But during this short period, I gained much information and valuable experience, and learned many things. Object of this internship at ICHARM was for my study. My study is to calculate the loading of nitrogen from small basin in the forest area to Seto Inland Sea. But I have not measured the discharge for calculating the loadings of nitrogen, so it is necessary to calculate the discharge by modeling of IFAS.

This internship was very valuable and wonderful because such this internship was first time. The content of this internship is to make a runoff model and calculate the discharge used the model, and it was first time. So I had many problem, but Dr. Morimasa Tsuda would kindly helped and taught how to use the IFAS tool from beginning. This opportunity provided such an important step which helps me to advance my study.

I would like to thank ICHARM for this unique opportunity and Dr. Morimasa Tsuda who would kindly helped me and gave much important information of IFAS. Finally, I would like to thank all ICHARM staff.



Mohammad Newaz Sharif

University of Erfurt

Intern period: March 1st - March 31, 2017

The internship with ICHARM was a great opportunity for learning and professional development. First of all, I would like to express my deepest gratitude and special thanks to Rasmy sensei and Ohara sensei, who in spite of being extraordinarily busy, took time out to supervise me. I would like to acknowledge the contributions of Mahtab san gratefully for his generous help from the very first day. I also express my deepest thanks to Tokunaga san, Umino san and Mie san for taking part in useful decision making and giving necessary guidance and credentials that made my life easier in Japan. I am grateful for having a chance to meet all the wonderful ICHARM staffs and students.

I would like to express my deepest sense of gratitude to Prof. Koike, Director, and Mr. Miyake, Deputy Director, and Prof. Takeuchi, Advisor, for their invaluable welcoming words and guidance. Attending Takeuchi sensei's last lecture was very special too. The main objective of this internship was to know about the organization, contribution through research, learning technical skills and networking. Here, I have worked on preparation of flood evacuation map for Tahirpur Upazila of Sunamganj District in Bangladesh and learned about different GIS application in disaster management research and RRI model. Though one month is very short time, I perceive this as a big milestone in my career. I will strive to use gained skills and knowledge in the best possible way, and wish to continue cooperation with ICHARM in the future.

Publication List

* January - March 2017.

A: Peer Reviewed Paper / 査読付論文

- Md. Nasif Ahsan, Karina Vink, Kuniyoshi Takeuchi, *Livelihood Strategies and Resource Dependency Nexus in the Sundarbans, Participatory Mangrove Management in a Changing Climate*, 137-160, February 2017
- Yoichi Iwami, Akira Hasegawa, Mamoru Miyamoto, Shun Kudo, Yusuke Yamazaki, Tomoki Ushiyama and Toshio Koike, 2017, *Comparative study on climate change impact on precipitation and floods in Asian river basins*, *Hydrological Research Letters*, Vol.11(1), 24–30, DOI: 10.3178/hrl.11.24, February 2017
- Duminda PERERA, Yoichi IWAMI, Yoji CHIDA, *Point and non-point source Nutrient circulation modelling for the Takasaki River basin, Chiba Japan*, *JSCE*, 73(4), pp.1-1165-1-1170, March 2017
- Shinji EGASHIRA, Hiroshi TAKEBAYASHI, Masato SEKINE, Nobutomo OSANAI, *Sediment Run-Out Processes and Possibility of Sediment Control Structures in the 2013 Izu-Ohshima Event*, *International Journal of Erosion Control Engineering*, Vol. 9 (2016) No.4, pp.155-164
- 津田守正、入江政安、岩見洋一、上水道の用途別日使用水量の推計における多変量時間的配分手法の適用、土木学会論文集B1 (水工学)、土木学会水工学委員会 (JSCE)、Vol.73(4)、pp.1_271-1_276、February 2017
- 牛山朋来、佐山敬洋、岩見洋一、領域アンサンブル予報を用いた洪水予測手法の開発—平成27年鬼怒川洪水への適用、水工学論文集、土木学会水工学委員会 (JSCE)、Vol.73(4)、pp.1_193-1_198、February 2017
- 牛山朋来、佐山敬洋、岩見洋一、欧州における数値天気予報を利用したフラッシュフラッド予測の現状、水文・水資源学会誌、水文・水資源学会、Vol.30、pp.112-125、2017年3月

B: Non-peer Reviewed Paper / 査読無し論文

None / 該当無し

C: Oral Presentation / 口頭発表

- Mohamed Rasmy, *Maximize the Value of GPM and GSMaP Data for Flood Forecasting, Drought Monitoring, & Disaster Early-warnings in the Developing Regions*, Joint PI Meeting of Global Environment Observation Mission 2016, Tokyo, Japan, January 23-27, 2017
- Morimasa Tsuda, *Application of GSMaP to flood forecasting/analysis*, The 6th GPM Asia Workshop, JAXA, Thai Meteorological Department, Bangkok, Thailand, January 18-19, 2017
- Badri Bhakta Shrestha, *Flood Hazard and Risk Assessment in the Pampanga River Basin of the Philippines*, ICHARM's Follow-up Seminar, Manila, Philippines, January 31, 2017
- 牛山朋来、佐山敬洋、岩見洋一、領域アンサンブル予報を用いた洪水予測手法の開発—平成27年鬼怒川洪水への適用、水工学講演会、土木学会水工学委員会、福岡、2017年3月15～17日
- Liu, T., Kinouchi, T., Tsuda, M., Iwami, Y., Asaoka Y., and Mendoza J.: *Long-term variations of glaciers under the changing climate in the tropical Andean region*, the International Symposium on 'The Cryosphere in a Changing Climate', Wellington, New Zealand, Feb. 2017
- Badri Bhakta Shrestha, *Flood risk assessment in the Solo River basin of Indonesia*, Workshop on Climate Change Impact Assessment in the Solo River Basin, JAKARTA, Indonesia, March 21, 2017
- 郭栄珠、岩見洋一、広域河川氾濫リスク予測に活かせる衛星リモートセンシング観測、第25回東大生研フォーラム、東京大学生産技術研究所、東京大学、2017年3月2～3日

D: Poster Presentation / ポスター発表

- 南雲直子、江頭進治、平成28年台風10号により被災した岩手県小本川流域の地形と氾濫特性、2017年日本地理学会春季学術大会、日本地理学会、筑波大学、2017年3月28～30日

E: Paper in technical magazine / 技術雑誌論文

- None / 該当無し

F: PWRI Publication / 土木研究所刊行物

- ICHARM 10th Anniversary, PWRI Technical Note No 4353, ISSN 0386-5878, Public Works Research Institute (PWRI), March 2017

To subscribe or unsubscribe to our mailing list, please contact us at: icharm@pwri.go.jp
 1-6 Minamihara, Tsukuba, Ibaraki 305-8516, Japan
 Tel: +81 29 879 6809 Fax: +81 29 879 6709 URL: <http://www.icharm.pwri.go.jp/>

メーリングリストへ登録ご希望の方／今後の配信を希望されない方は下記アドレスまでご一報ください。ご意見・ご感想もお待ちしております。
 〒305-8516 茨城県つくば市南原 1-6 国立研究開発法人土木研究所 ICHARM (アイチャーム)
 Tel: 029- 879- 6809 Fax: 029- 879- 6709 Email: icharm@pwri.go.jp