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ICHARM

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Co-response to a challenge

Welcome address at the ICHARM Webinar 2020 on December 9, 2020
ICHARM ウェビナー 2020 での歓迎スピーチ（ICHARM にて、2020 年 12 月 9 日）

It was just after the New Year holidays of the last year that the world first came to know about COVID-19 through disease outbreak news reporting "pneumonia of unknown cause in mainland China." Then, 2020 became an unforgettable year of drastic change for people all over the world. The number of deaths exceeded two million as of January 15th, 2021 (UTC), according to the estimate by Johns Hopkins University. The recorded largest pandemic of viral infections is the Spanish flu, which broke out about one hundred years ago. A recent research paper reports that the flu caused 17,400,000 deaths, while some had estimated 50 to 100 million.

The fight against the coronavirus has continued. New vaccines have been developed, and the shots have begun. Various treatments with medicines have also been applied. However, the reality is that we have not been able to establish a solid method for prevention and treatment even against many already discovered viruses, not to mention against unknown ones. Then, what we should do is to double-check our basic actions one by one on the personal level by reminding ourselves about "the last-mile challenge," a common target addressed for the prevention of all disasters, in addition to developing appropriate governance policies based on deep deliberations between scientists and decision-makers.

According to YouGov, a global trucker surveying personal behavior changes due to COVID-19, the percentage of people who say that they are avoiding crowded public places keeps high globally. On the other hand, there are large regional discrepancies in wearing a face mask in public places, improving personal hygiene, such as washing hands frequently, and avoiding going to work. Although these gaps seem to be closely related to governance policies of each country, they also seem to be strongly influenced by the difference in construals of the self, which have been fostered historically in different culture areas, as cultural psychology points out.

As A. Toynbee writes, the growth and decline of civilizations is a spiritual process. A new civilization is achieved as a creative "response" to a "challenge" in a national crisis with a hitherto unprecedented effort. Clarifying scientific understanding and uncertainties and considering each other's cultural and historical backgrounds, people and governments should "co-respond" to this disaster and take a first step toward a new civilization.

January 29, 2021
KOIKE Toshio
Executive Director of ICHARM

挑戦に対する応戦の協働

「中国で原因不明の肺炎」という報道を通して新型コロナウイルス感染症（COVID-19）を知ったのは、ちょうど 1 年前の正月明けでした。2020 年は全世界にとって歴史に残る激変の年となりました。米国のジョンズ・ホプキンス大学の集計によると、本年 1 月 15 日 (世界標準時) には世界全体で犠牲者が 200 万人を超えました。記録に残るウイルス感染症の世界的大流行（パンデミック）は、約 100 年前に世界を襲ったスペイン風邪です。5000 万人から 1 億人の犠牲者が出たとの説もありますが、最近の研究では世界全体で 1740 万人が犠牲になったと報告されています。

ワクチンが開発され、接種が始まり、薬剤による治療も試みられています。しかし、未知のウイルスに対してはもちろん、現在発見されている多くのウイルスに対しても予防法や治療法はまだ確立されておりません。政策決定者と科学との間の熟議に基づいた適確な統治政策が必要であると同時に、全ての災害に共通の課題である「ラストマイルチャレンジ」に従って、一人ひとり基本的行動を見直すことが重要です。

COVID-19 を回避する市民行動に関する世界的調査（YouGov）によれば、公共の人混みを避ける市民行動は洋の東西を問わず高い水準に達していますが、公共空間でのマスク着用、手洗い、通勤回避などは地域によって明確な差があります。これは各国でとられている統治政策とも密接に関連しているとも考えられますが、文化心理学が指摘するところの各文化圏で歴史的に共有されてきた自己感の違いとも深く関係しているようです。

A. トインビーの言うように、文明の盛衰は精神的過程であると考えることができます。国家の存亡の危機をもたらす「挑戦」に、かつてない努力をもって創造的に「応戦」することから、新たな文明が築かれてきました。科学的知見と不確実性を明らかにして、各々の文化的背景を基に、市民と統治が協力してこの災禍に応戦しつつ、新たな文明を築く糸口を切り拓いていく必要があります。

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Special Topics

ICHARM Executive Director KOIKE Toshio was given the 2020 GEO Individual Excellence Award
ICHARM 小池俊雄センター長に 2020 GEO Individual Excellence Award が授与されました

The Group on Earth Observations (GEO) convened GEO Week 2020 on November 2-6, 2020, online showcasing the efforts to implement the Canberra Declaration, adopted at the 2019 GEO Ministerial Summit in November 2019, and holding a panel discussion on the benefits from GEO and data sharing.

On November 4, the 2020 winners of the GEO Individual Excellence Award were announced for the individuals who had demonstrated an exceptional personal commitment to the GEO mission and vision. ICHARM Executive Director KOIKE Toshio was selected for this award for his considerable contribution to the establishment and expansion of GEO. Together with Mr. ISHIDA Chu, a senior expert at the Satellite Applications and Operation Center (SAOC), JAXA, he is the first winner from Asia as well as from Japan.

Executive Director KOIKE contributed to the establishment of GEO in 2005 as one of the co-chairs of ad-hoc GEO, the intergovernmental preparatory body for its establishment, and played a leading role in drafting the 10-Year Implementation Plans twice for 2006-2015 and 2016-2025. Helping convene regional communities in Asia and Oceania by establishing Asia-Oceania Group on Earth Observations (AOGEO) in the last five years, he was also praised for significant contributions to promoting the Asian Water Cycle Initiative (AWCI). AWCI aims at establishing and strengthening the platform for water-related disaster risk reduction in cooperation with Asian countries by combining international networking and earth observation through the International Flood Initiative (IFI), for which ICHARM serves as the secretariat, and the Data Analysis and Integration System (DIAS), which Japan has been developing as one of the five national key technologies.

Executive Director KOIKE participated as a speaker in a virtual panel, “Challenges and approaches to data sharing: The future of open data,” on November 6. He gave a presentation entitled "River Basin Disaster Resilience and Sustainability by All in Asia and Africa," in which he introduced the recent activities of ICHARM, including the efforts at e-learning for flood management practitioners in the West Africa region.

2020 GEO Individual Excellence Award given to ICHARM Executive Director KOIKE
ICHARM 小池センター長への 2020 GEO Individual Excellence Award 授与

Source:
http://earthobservations.org/geoweek2020.php?t=home
http://earthobservations.org/geo_blog_obs.php?id=473

(Written by IKEDA Tetsuya)

2020 年 11 月 2 ～ 6 日、地球観測に関する政府間会合（Group on Earth Observations: GEO）は、2020 GEO Week をオンラインで開催し、2019 年 11 月の GEO 閣僚サミットで採択されたキャンベラ宣言に対する取り組み状況を紹介するとともに、GEO から生み出される価値やデータの共有に関するパネル討議が行われました。

11 月 4 日には GEO の使命やビジョンに対して優れた取り組みを行った個人に授与される GEO Individual Excellence Award の 2020 年受賞者の発表が行われ、GEO の設立や拡張への貢献に対して ICHARM 小池俊雄センター長に授与されました。小池センター長は、石田中 JAXA 特任担当役とともに、アジアおよび日本初の受賞者となりました。

小池センター長は、GEO 設立準備政府間部会の共同議長国代表として 2005 年の GEO 設立に貢献し、2006-2015、2016-2025 の 2 度の 10 年実施計画の執筆を主導しました。またこの 5 年間は、アジア・オセアニア地球観測に関する政府間会合（Asia-Oceania Group on Earth Observations: AOGEO）を設立することでアジア・オセアニア地域のコミュニティを構築支援するとともに、ICHARM が事務局を務める国際洪水イニシアティブ（IFI）による国際ネットワークと地球観測、さらには日本が国家基幹技術として開発してきたデータ統合・解析システム（DIAS）を組み合わせて、アジア各国と協力して水災害リスク軽減のプラットフォームづくりとその強化を目指すアジア水循環イニシアチブ（AWCI）を推進したことが讃えられました。

なお、小池センター長は 11 月 6 日に開催された Virtual Panel「データ共有の課題と取り組み：オープンデータの未来」にも発表者として参加しました。ここでは「アジア・アフリカ地域における流域治水」について発表を行い、その中で西アフリカ地域を対象とした e- ラーニングなど、ICHARM の最近の活動について紹介しました。

出典：
http://earthobservations.org/geoweek2020.php?t=home
http://earthobservations.org/geo_blog_obs.php?id=473

Science Council of Japan recommends the promotion of disaster resilience and sustainability
日本学術会議が災害レジリエンスと持続可能性の推進策を提言

2020 年 9 月、日本学術会議は「災害レジリエンスの強化による持続可能な国際社会実現のための学術からの提言－知の統合を実践するためのオンライン・システムの構築とファシリテータの育成－」と題する提言を発出しました。

http://www.scj.go.jp/ja/info/kohyo/pdf/kohyo-24-t298-1.pdf

提言では、災害レジリエンスと持続可能な開発の 2 つの課題は密接に、構造的に関連していると捉えられており、学びと改善を通して新たな価値を生み出すために、統合的な理解（シンセシス）と実践の重要性が強調されています。ただし現場の関係当事者が、様々な地域や専門分野以外の情報に精通することは難しく、情報を統合化して現場での問題の解決に向けて意思決定し、実行することには困難があります。

そこで、科学者コミュニティに対しては、知の統合知識ベースとして「知の統合オンライン・システム（OSS）」の構築と、現地において議論の進行、問題解決推進の支援、専門的な助言を行う「ファシリテータ」の積極的な育成と量的拡大の必要性が強調されています。その上で、下記のような提言がなされています。

「現場の関係当事者と科学者コミュニティは、OSS の効果的利用とファシリテータの支援により、災害リスクの認識を対話の積み重ねによって共有し、知の統合の循環系を形成して、防災・減災と環境・開発の因果関係を科学的に解明し、定量的な理解を進めて、連携した行動を推進するべきである。とりわけ SDGs 達成における防災・減災の影響と役割を明確にして、活動に反映すべきである。」

ICHARM では、信頼性が高く説明責任を有するデータ・情報とコミュニティ・人材による包摂的で科学知に基づく社会づくりのビジョンを掲げ、気候の変化の下で水災害レジリエンスの強化と持続可能な開発の実現を目的にした研究・教育・国際協力活動を推進しており、日本学術会議の提言を受け、図に示す知の統合循環系の構築の具体化に取り組んでいます。

小池俊雄
ICHARM センター長 /
日本学術会議会員

In September 2020, the Science Council of Japan (SCJ) published a policy recommendation titled “Building a sustainable global society by strengthening disaster resilience: Developing an "Online Synthesis System (OSS)" and fostering "Facilitators" to realize consilience.”

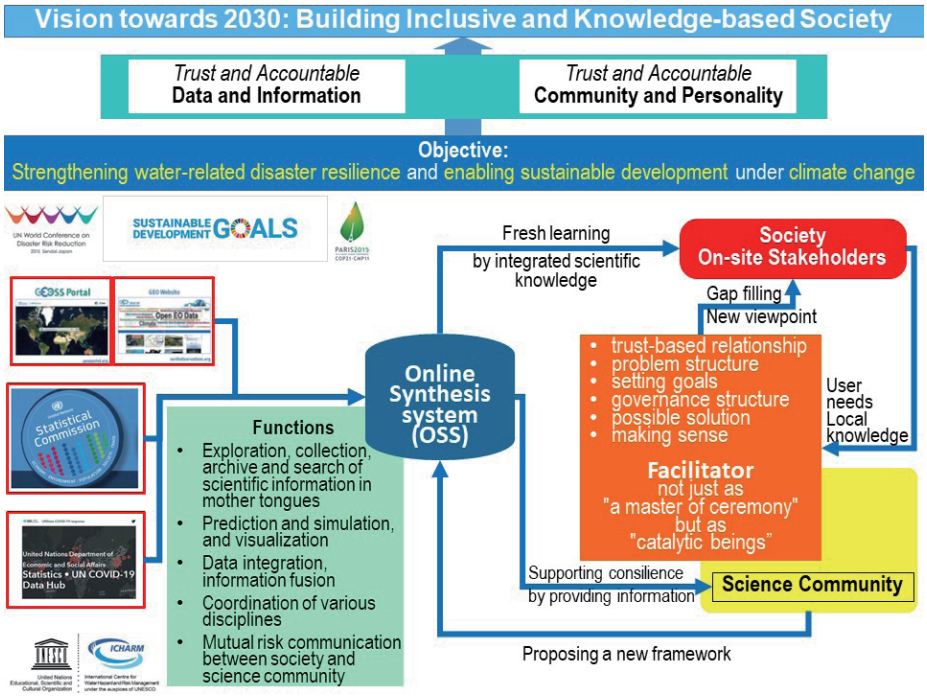
http://www.scj.go.jp/ja/info/kohyo/pdf/kohyo-24-t298-1en.pdf

Recognizing that disaster resilience and sustainable development are closely and structurally interlinked, SCJ emphasizes the importance of synthesis and actions to produce new values through the practice of learning and improvement. On-site stakeholders, however, see challenges in acquiring information from a broad range of geographical and professional areas and making decisions to resolve on-site issues through data integration and information fusion.

SCJ, therefore, recommends the scientific community to develop an "Online Synthesis System (OSS)" as a consilience knowledge base and cultivate and increase "Facilitators" as human resources who have functions to moderate meetings, lead the way in resolving problems, and provide professional advice on-site. Then, the following actions are recommended:

“On-site stakeholders and the scientific community should take collaborative actions, with effective utilization of the OSS and support from Facilitators, by sharing the understanding of disaster risk through every dialogue, forming a cyclic system of consilience, discovering the relationship of causes and effects between DRR and Environment/Development scientifically, and deepening quantitative understanding. Above all they should clarify the effects and roles of DRR in achieving SDGs and reflect them on their activities.”

ICHARM has been promoting research, education, and international cooperation to strengthen water-related disaster resilience and achieve sustainable development under climate change with a vision of “Building Inclusive and Knowledge-based Society” based on trustable, accountable data-information and community-personality. In response to the recommendation from SCJ, ICHARM is now trying to construct a cyclic system of consilience schematically shown in the figure.



Roles of the OSS and Facilitators and ICHARM's vision
OSS とファシリテータの役割と ICHARM の展望

KOIKE Toshio
Executive Director, ICHARM and Council Member, SCJ, Cabinet Office of Japan

Research

E-learning training course framework applied in West African countries under the "Water disaster platform to enhance climate resilience in Africa (WADiRE-Africa)" project

「西アフリカにおける気候変動を考慮した水災害軽減のためのプラットフォーム (WADiRE-Africa)」プロジェクト：西アフリカ諸国に e ラーニング研修コースの枠組みを適用

A new e-learning training framework was developed by ICHARM for enhancing flood risk awareness, disaster reduction and education during the global COVID-19 pandemic and was introduced for the West African population under the "Water disaster platform to enhance climate resilience in Africa (WADiRE-Africa)" project, which is funded by the Ministry of Foreign Affairs of Japan between April 2019 and March 2021.

To date, frequent Niger and Volta River basin floods such as the 2020 African Sahel flood has been occurring in the Niger-Volta basin countries, affecting the population and economic development in the West Africa region. For the WADiRE-Africa Project implementation, ICHARM, the UNESCO Intergovernmental Hydrological Programme (IHP), and the AGRrometeorology, HYdrology, METeorology (AGRHYMET) Regional Center conducted a kickoff meeting in July 2019 at Lome, Togo, identifying gaps with representatives of the Niger Basin Authority (NBA), the Volta Basin Authority (VBA), and the eleven Niger-Volta basin countries and introducing available Japanese flood-related science, technology and preparedness practices to bridge identified gaps. At ICHARM, a broad range of regional and national capacity building activities to predict, monitor, and mitigate flood disasters in West Africa was developed jointly with nominated AGRHYMET, NBA and VBA experts, who came from West Africa to Japan to receive advanced training at ICHARM and to share local experiences for the development of a regional Niger and Volta Flood Early Warning Systems (FEWS) and Bamako and Mango hot spots FEWS on Data Integration and Analysis System (DIAS), respectively.

Since COVID-19-related health risks have imposed global travel restrictions and cancellations of all face-to-face meetings, remote training was the only available option to proceed with capacity building activities for the population from the eleven countries of the Niger-Volta basin within the WADiRE-Africa project duration. In addition, ICHARM's capacity building and training activities had to consider the local West Africa environment, such as unstable internet connectivity and the French language spoken in many countries, leading to the unique ICHARM's e-learning framework. As the WADiRE-Africa Project achievement, 300 West African professionals and executives of the NBA, VBA and 11 Niger-Volta countries were nominated by AGRHYMET to join the e-learning training course on flood risk, hazard mapping and evidence-based contingency planning, and another 40 participants are planned to be nominated to join the e-learning training of trainers to take a role as facilitators for leading flood disaster preparedness in local communities.

Considering these limitations, ICHARM prepared one-week e-learning training course through the online participation of test connection, opening, 1st and 2nd discussion, and closing sessions. E-learning course materials were provided with pre-recorded audio narrations in English and French through the e-learning tab in the FEWS prototype version 1.0 for West Africa, which is operated on DIAS specifically for participants' e-learning course access and real-time flood monitoring (Photo 1). To access the English or French e-learning tab in the FEWS, participants need to login to DIAS with a registered DIAS account and use a desktop or laptop computer with an internet connection for downloading e-learning materials for offline self-study education as well as completing the online course evaluation test, which is also available in both languages for English and French speaking countries in West Africa. Prior to the training, these procedures were explained to the West Africa participants during the test connection session together with technical

ICHARM は新型コロナウイルス感染症の感染爆発期間における洪水リスクへの意識向上、被害軽減、教育の強化を目指して新しい e ラーニング研修の枠組みを開発し、外務省から資金提供を受けた「西アフリカにおける気候変動を考慮した水災害軽減のためのプラットフォーム（WADiRE-Africa）」プロジェクト（プロジェクト期間 2019 年 4 月～2021 年 3 月）のもと、その枠組みを西アフリカに導入しました。

これまで、ニジェール川、ボルタ川流域では、2020 年アフリカサヘル洪水等の洪水がたびたび発生し、西アフリカ地域に人的被害と経済成長の阻害を引き起こしています。これ受け、ICHARM とユネスコ政府間水文学計画（IHP）、西アフリカの農業気象水文センター (AGRHYMET) は、本プロジェクトを実施するべく、2019 年 7 月にトーゴ国ロメでキックオフ会合を開催しました。ここではニジェール川流域機構（NBA）、ボルタ川流域機構（VBA）および両河川流域 11 か国の代表とギャップの特定を行い、それを埋めるために、日本が提供可能な洪水関連の科学技術や事前防災の事例を紹介しました。また ICHARM は AGRHYMET、NBA、VBA から推薦された専門家を招聘し、その協力のもと、災害の予測、監視、軽減を目指して地域レベル、国レベルの能力開発活動を幅広く展開しました。ICHARM では西アフリカから招聘した専門家に高度な研修を実施し、一方で招聘した専門家から現地の経験が提供されたことで、地域レベル（ニジェール川、ボルタ川流域）の洪水早期警報システム（FEWS）および各河川流域の洪水危険地点（ニジェール川流域バマコ、ボルタ川流域マンゴー）のコミュニティレベルでの FEWS をデータ統合・解析システム（DIAS）上に開発することができました。

新型コロナウイルス感染症の感染リスクにより、世界的に旅行が制限され、対面会議がすべて中止となったため、本プロジェクトの期間内に、ニジェール川、ボルタ川流域の 11 か国の人々の能力開発を進めるには、遠隔研修が唯一可能な選択肢となりました。加えて、今回の能力開発、研修活動においては、インターネットの不安定さや多くの国がフランス語圏であること等、西アフリカ現地の環境を考慮する必要がありました。その結果 ICHARM 独自の e ラーニングの枠組みが開発されました。プロジェクトの成果として、AGRHYMET の指名を受けた西アフリカの専門家や NBA,VBA およびニジェール川、ボルタ川流域の 11 か国の幹部 300 人が e ラーニング研

修に参加し、洪水リスク、ハザードマッピング、エビデンスに基づく緊急時対応計画策定について学びました。今後さらに地域コミュニティで洪水災害への備えを主導するファシリテーターの役割を果たすべく、40人が指名を受け、e ラーニングによる「研修トレーナー研修」に参加する予定です。

このようにコロナ禍の制約を受ける中で、ICHARM では 1 週間の e ラーニング研修コースとして、テスト接続、開講式、2 回に及ぶ質疑応答・討議、修了式等を行いました。e ラーニングコースの提供のため、DIAS に「西アフリカ洪水早期警報システムプロトタイプバージョン 1.0」という特設サイトを運用し、研修参加者は、そのサイトの「e ラーニング」タブから、英語、フランス語で事前録音された教材にアクセスし、リアルタイムで洪水を監視できます（写真 1）。また特設サイトの英語またはフランス語の e ラーニングのタブにアクセスし、研修を受講するには、参加者は DIAS にアカウントを登録してログインすることでインターネットに接続されたデスクトップまたはノートパソコンからオフラインでの自習教材をダウンロードできます。習得度を評価するオンライン試験の完了も必要で、試験は西アフリカ諸国の使用言語に対応して英語、フランス語の両方で提供されます。事前のテスト接続セッションでは、これらの全手順を説明し、ICHARM や DIAS 事務局がテクニカルサポートやトラブルシューティングも行います。e ラーニングの自習教材は、DIAS の特設サイト「e ラーニング」タブからダウンロードが可能で、6 点（入門講義、実習チュートリアル各 3 点）のパワーポイントファイルで構成され、各ファイルには 60 分の英語またはフランス語の講義音声が録音されています。このオフラインの自習形式により、参加者は都合の良い時間とペースで学習を進めることができます。このことは、日本と西アフリカ諸国の 8 時間の時差を考えると特に重要です。加えて、オンラインの討議セッションが 2 回設けられ、参加者が ICHARM の提供する教材について英語、フランス語で質問する機会もあります（写真 2）。さらに、リアルタイムのオンラインセッション中、参加者のインターネット接続が弱い場合は、電子メールでの質疑応答も可能です。メールのやり取りは翻訳を行い、英語、フランス語どちらでも可能です。修了認定としては、3 つの入門講義からランダムに選ばれた 30 問の正誤問題で構成されるオンライン試験で、80％以上の正答率を達成すれば研修は修了となります。研修の最終イベントとして、ICHARM、AGRHYMET、およびユネスコが共同でオンライン修了式を実施します。参加者は祝辞を受け、修了式の後にユネスコが電子メールで修了証を授与します。

この ICHARM の e ラーニング研修の枠組みは、西アフリカと同様の環境に置かれ、洪水被害を受ける多

Photo 1. Screenshot of the self-study e-learning training tab with introductory lectures and hands-on tutorials in the Flood Early Warning System prototype for West Africa on DIAS.
写真 1. 自習用 e ラーニング研修タブのスクリーンショット。DIAS 上に開設した西アフリカ洪水早期警報システムのプロトタイプに関する特設サイトに入門講義と実践的なチュートリアルを掲載。

support and troubleshooting by ICHARM and DIAS. In the e-learning FEWS tab on DIAS, the downloadable self-study e-learning materials consisted of six PowerPoint files, as three introductory lectures and three hands-on tutorials and each of which is with a 60-minute recorded narration in English and French. This off-line self-study format allows the e-learning course participants to study at their convenient time and pace; this arrangement is especially important, considering eight-hour time difference between Japan and West African countries. West Africa participants also had an opportunity to ask questions about ICHARM's course materials either English or French during the two online discussion sessions (Photo 2). In addition, ICHARM's e-learning course design included an email Q&A communication with English and French translation between ICHARM and West African participants whose internet connection is not strong enough during the online real-time sessions. For the successful completion of e-learning training course, West African participants must pass the online evaluation test by achieving 80% correct answers. The online test in the FEWS on DIAS consists of randomly selected 30 true or false questions from the three introductory lectures in the FEWS on DIAS. As the final

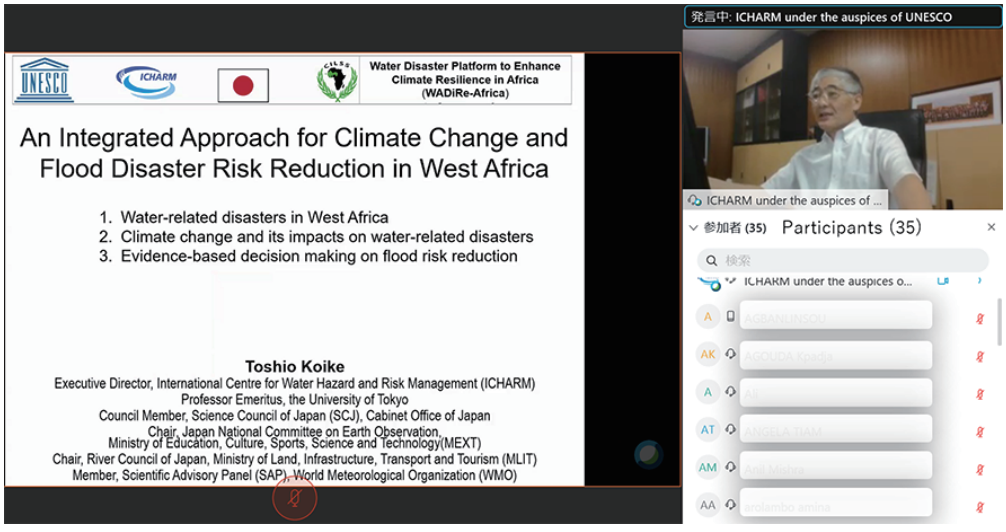


Photo 2. Screenshot of Prof. Koike's explanation to West African participants during an online discussion session.
写真 2. オンライン討議セッション。小池センター長が西アフリカの参加者に説明を行う。

event of ICHARM's e-learning training, an online closing session was conducted jointly by ICHARM, AGRHYMET and UNESCO. The West African participants were given a congratulatory address and awarded certificates of completion by UNESCO, which were emailed to the participants after the closing session.

As a result, ICHARM's e-learning training framework offers a blueprint to achieve successful capacity building activities in many flood-affected countries which are in a similar situation to West Africa's environment.

(Written by Maksym Gusyev)

くの国においても、能力開発を成功させるための 1 つのモデルとしての活用が期待されています。

Myanmar-Agriculture Development Support Project: Technical Support in Flood Simulation for Downstream Areas of the Swa Chaung Dam
ミャンマー - 農業開発支援プロジェクト：ゾーチャウンダム下流域における洪水シミュレーションの技術支援

In August 2018, a spillway concrete weir of the Swa Chaung Dam, located about 60 km south of Naypyidaw, the capital of Myanmar, failed and caused large-scale flooding downstream, which damaged more than 100 villages and forced 50,000 people to evacuate and be displaced. According to rainfall data from the ground rain gauges at the dam, the precipitation from August 16 to 31recorded about 200 mm in total, and the dam water level had reached the full water level two days before the failure. Among many other countries where many irrigation dams have been constructed to use rainy season water for dry season agriculture, Myanmar has been exposed to such flood risk, which has become greater in recent years, as heavy rainfall has been even more intense because typhoons have become increasingly larger due to global warming. For this reason, it is urgent to predict possible flood events in case of a dam failure and prepare emergency response measures in advance.

In this context, ICHARM participated in a flood risk reduction project by the Irrigation and Water Utilization Management Department (IWUMD) of Myanmar through the World Bank. The main objective of this project was to provide technical support for flood simulation and flood risk mapping to reduce flood risk and damage in the downstream areas during a heavy rain event and prevent the failure of the Swa Chaung Dam.

In this project, we reproduced the inundation area due to the dam failure in August 2018 and estimated the inundation area in case of rainfall of 200-1000 year return periods and the maximum possible precipitation (PMP). In each simulation case, we used the Rainfall-Runoff-Inundation (RRI) model, which can calculate rainfall-runoff and inundation simultaneously. Regarding the precipitation used for the analysis, although several ground rain gauges are installed in the target basin to observe daily precipitation, we decided not to use local data because the resolution was insufficient in both time and space. Instead, we used distributed precipitation prepared by correcting the Global Satellite Mapping of Precipitation (GSMaP) with ground rainfall data. GSMaP is satellite-based rainfall information provided by the Japan Aerospace Exploration Agency (JAXA) and has a time resolution of 1 hour and a spatial resolution of about 10 km (latitude and longitude 0.1-degree grid).

To verify the simulation accuracy of the model, we used the inundation area estimated based on satellite images of the Sentinel-1 Synthetic Aperture Radar (SAR) operated by the European Space Agency. In this report, we share with the readers

2018 年 8 月、ミャンマーの首都ネピドーの南約 60㎞に位置するゾーチャウンダムの洪水吐が決壊し、ダム下流域で発生した大規模な洪水によって 100 以上の村が被害を受け、約 5 万人が避難を余儀なくされました。ゾーチャウンダムに設置されている地上雨量計データによると 8 月 16 日から 31 日の期間に累積降水量が約 200㎜に及ぶ継続的な降雨が発生し、決壊 2 日前には満水位に達していました。ミャンマーでも乾季の農業に雨季の水を利用するために、多くの灌漑用ダムが建設されており、特に近年は地球温暖化により豪雨の頻度および規模が増加傾向にあり、ダムの決壊や河川の氾濫によるリスクが高まっています。

このため、ダムが決壊した場合に起こりうる洪水を想定し、事前に対応策を講じることが喫緊の課題となっています。

このような背景から、豪雨時やゾーチャウンダム決壊時における下流地域の洪水シミュレーションおよび洪水リスクマッピングの技術的サポートを主目的として世界銀行が主導してミャンマーの灌漑水利用管理局（IWUMD）が実施しているプロジェクトに参画することになりました。

具体的には、2018 年 8 月のゾーチャウンダムの洪水吐の決壊による氾濫域の再現計算や 200 年・1000 年確率および可能最大降水量（PMP）の降雨が発生した場合の氾濫域の算出などを実施しました。いずれのケースにおいても降雨流出と氾濫解析を一体的に行える RRI モデルを使用して検討を行いました。解析に必要な降水量に関して、対象流域周辺では数か所の地上雨量計で日降水量が観測されていますが、時間と空間の両方で解像度が不十分であったため、時間分解能 1 時間、解像度約 10㎞（緯度経度 0.1 度格子）の

JAXA が提供している衛星全球降水マップ GSMaP を地上降雨データで補正した降雨分布を使用しました。

モデルの精度検証には欧州宇宙機関によって運用されている Sentinel-1 の合成開口レーダ（SAR）の衛星画像解析により推定した氾濫域を使用しました。ここでは 2018 年の再現計算の結果のみを紹介します。図 -1 は、SAR から推定した洪水痕跡と RRI モデルにより計算された最大浸水域を比較しています。計算結果が洪水痕跡のエリアとよく一致しており、再現性の高いモデルを構築することができました。このような手法は、特に観測データが乏しい地域には非常に有用な手法といえます。この解析結果により、図 -2 に示すように、任意の地点での浸水深の時系列に関する情報を示すことができ、洪水ハザードマップやタイムラインの作成に役立てることができます。

part of the project, the results of the 2018 reproduction calculation. Figure 1 compares the flood traces estimated from SAR with the maximum inundation area calculated by the RRI model. The calculation results are in good agreement with the flood trace area, and we were able to build a highly reproducible model. This method is very useful, especially for areas with insufficient observation data. As shown in Figure 2, these analysis results can provide information on a time series of inundation depth at any point along the river, which can be useful for creating flood hazard maps and timelines.

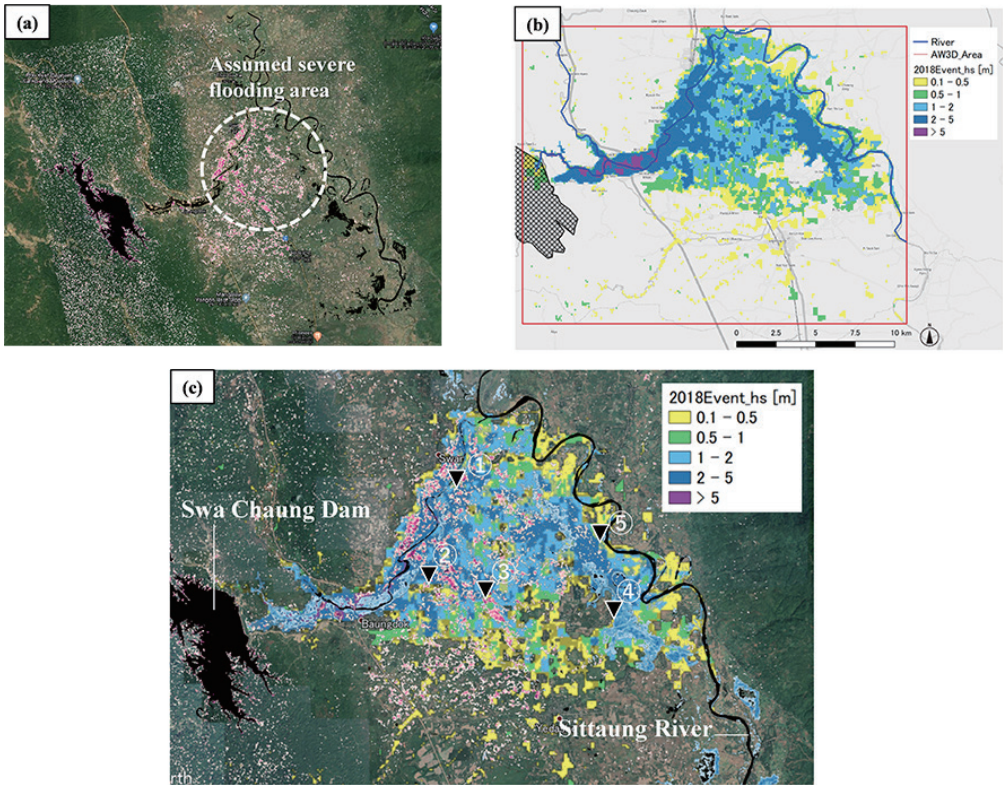


Fig. 1: (a): The flood traces estimated based on satellite images of Sentinel-1's Synthetic Aperture Radar (SAR). (b): Calculation results of the August 2018 flood by the RRI model. The spatial resolution of the elevation data used in the model is 100m. (c): A figure created by superimposing (b) onto (a).
図 -1(a)：Sentinel-1 の合成開口レーダ（SAR）の衛星画像の解析により推定した洪水痕跡。(b)：RRI モデルによる 2018 年 8 月洪水の計算結果。モデルの空間解像度は 100m の地形データを使用。 (c)：(a) と (b) を重ねた図。

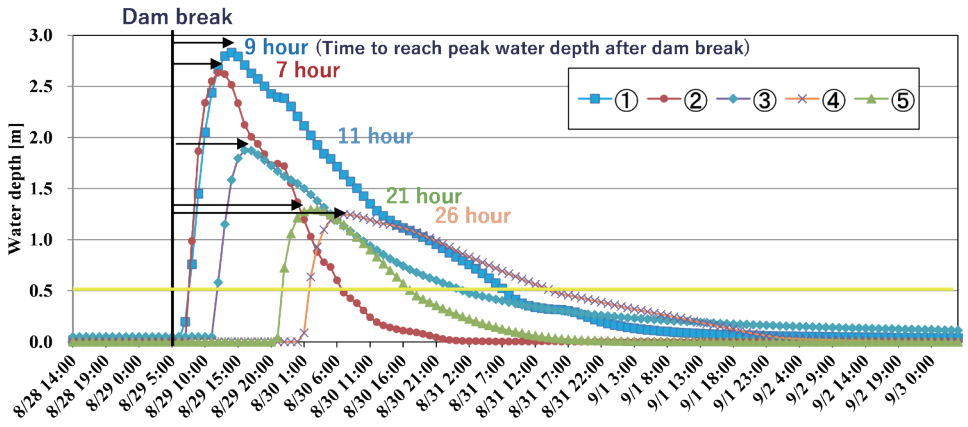


Fig. 2: Simulation results of time-series inundation water depths at five points.
図 -2　5 つの地点における浸水深の時系列計算結果

(Written by KAKINUMA Daiki and AIDA Kentaro)

Use of "Collection of Critical Situations during Flood Emergency Response"
水害対応ヒヤリ・ハット事例集の活用状況

ICHARM has published a booklet entitled "Collection of Critical Situations during Flood Emergency Response" on its homepage on June 25, 2020, aiming to improve the emergency response capacities of local governments and promote more effective management of flood disasters, which have occurred frequently across Japan in recent years.

Defining critical situations as ones in which local government officers panic, do not know what to do, cannot make a decision, are confused, in dilemma, etc., during an emergency response effort, this collection introduces typical critical situations from the review reports of past flood disasters. The booklet features 28 cases of critical situations, each printed on a two-page spread with lessons to assist local government officers in taking more practical measures in terms of "Facilities," "Procedure" and "Skill."

Also provided with the booklet is "Appendix for local government response under COVID-19," which lists possible critical situations and necessary countermeasures during flood emergency response under COVID-19.

From June to the end of December, the Japanese version of the booklet recorded 4,940 page views, while the English version had 632 page views, as shown in the figure below. The collection was selected as "Technology to be disseminated with high priority" by the Public Works Research Institute (PWRI) and has been introduced at several exhibitions held by the PWRI, such as New Technology Showcase, held in Tokyo on September 30, Kochi on December 3, and Fukuoka on December 17, 2020.

The English version was introduced by Senior Researcher OHARA Miho on October 6, 2020, at a webinar, "Transdisciplinary Approach for Building Societal Resilience to Disasters under and after COVID-19," which was jointly held by Technical Committee (TC) 21: Transdisciplinary Approach (TDA) for Building Societal Resilience to Disasters of The Asian Civil Engineering Coordinating Council (ACECC) and the Philippine Institute of Civil Engineers (PICE).

ICHARM will continue promoting the booklet to contribute to reducing as much water-related disaster damage as possible despite the pandemic.

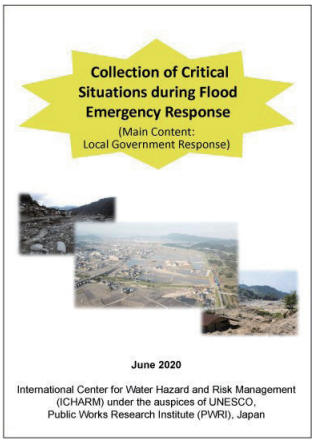


Fig.1 Cover page of the booklet
図 1　事例集の表紙

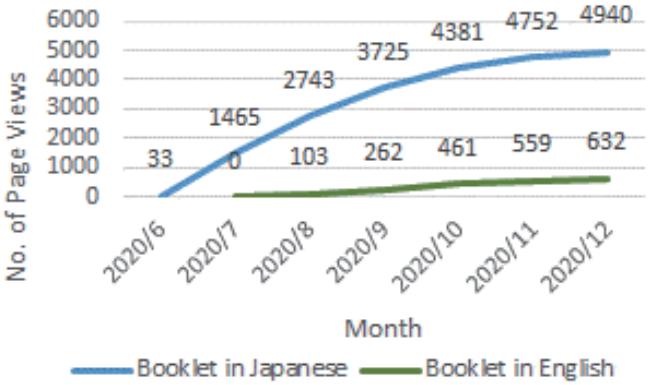


Fig. 2 Number of page views of the booklet in each month
図 2　事例集のホームページの月別閲覧数

(Written by OHARA Miho)

ICHARM では、昨今の全国的な水害の頻発を鑑み、地方自治体の防災担当部署の災害対応力の向上を目指して、2020 年 6 月 25 日から、「水害対応ヒヤリ・ハット事例集」をホームページで公開しています。この事例集は、水害対応において、職員が「困る・焦る・戸惑う・迷う・悩む」などの状況に陥る事例を「水害対応ヒヤリ・ハット事例」として新たに定義し、地方自治体が公表している過去の水害での災害対応検証報告書などからこれらの事例を抽出し、冊子「地方自治体編」として取りまとめたものです。冊子には、28 の典型的な事例とともに、「設備等」「仕組み」「スキル」という 3 つの観点からの教訓が見開きページで紹介されています。また、別冊の「新型コロナウイルス感染症への対応編」では、新型コロナウイルスへの感染が懸念される中での水害発生を想定し、起こりうる事例と望ましい対策を各ページで紹介しています。

2020 年 6 月 25 日から 12 月末までに、下図の通り、事例集の日本語版冊子のページには 4940 件、英語版冊子のページには 632 件のアクセスがあり、多くの方々にご活用いただいているようです。また、本事例集は土木研究所の令和 2 年度の重点普及技術に選定され、土木研究所の主催により 9 月 30 日に東京、12 月 3 日に高松、12 月 17 日に福岡で開催された技術展「土研新技術ショーケース」での展示を行うなど、普及に向けた活動を行っています。

英語版の事例集に関しては、アジア土木学協会連合協議会の第 21 技術委員会「TC21: 分野・部門横断的アプローチによる災害に強い社会づくり」がフィリピン土木学会との共催で 10 月 6 日に開催したウェビナー「Transdisciplinary Approach for Building Societal Resilience to Disasters under and after COVID-19（コロナ禍中及びその後における社会的災害レジリエンスの構築にむけた分野・部門横断的アプローチ）」において、大原美保主任研究員が話題提供を行いました。今後も引き続き、普及に向けた活動を行っていく予定です。

ICHARM holds the 65th R&D Seminar
第 65 回 ICHARM R&D セミナーの開催

ICHARM では、水災害分野に関する国内外の専門家を招聘し、最新の知識や知見について講演いただき、参加者の研鑽を深める機会として、不定期に「ICHARM R&D セミナー（ICHARM 研究開発セミナー）」を開催しています。

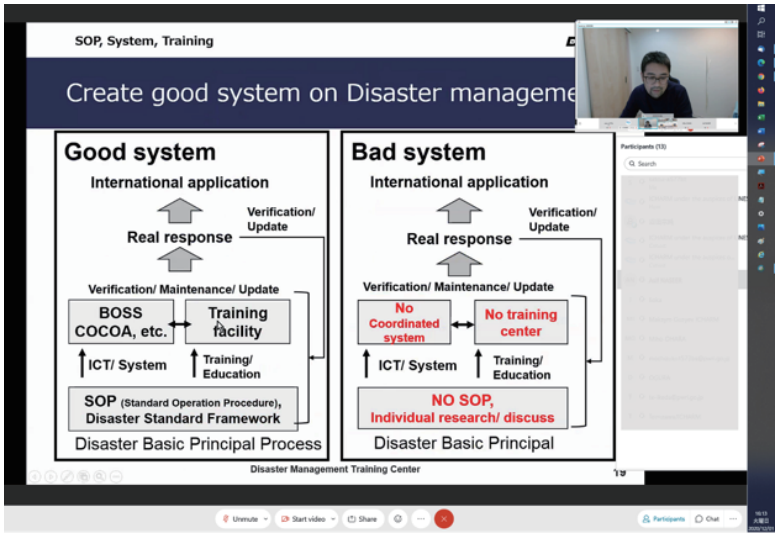
2020 年 12 月 1 日には、東京大学生産技術研究所の沼田宗純准教授を講師としてお招きし、第 65 回 ICHARM R&D セミナーを開催しました。講演では、「Approach from the disaster management process and development of the BOSS (Business Operation Support System) for the comprehensive disaster management」と題して、災害対応業務に取り組む地方自治体の職員が全体像を把握しつつ円滑な業務の実施を支援するシステム（BOSS）の概要と国内外での利活用状況について、オンラインでご講演いただきました。自治体の職員が、BOSS と紙のマニュアルを参照しながら、避難所運営訓練を実施した実験結果を比較することで BOSS の有用性が示されるなど、専門知識の少ない職員が効率的に災害対応業務をこなすために、先端技術がどのように役立つかを考える上で非常に有益な講演となりました。

ICHARM では、今後も様々な機会を捉え、セミナーを開催していく予定です。

ICHARM holds R&D Seminars on an irregular basis to provide self-development opportunities for researchers to keep up with the latest knowledge and information by inviting domestic and international experts in the field of hydrology and water-related disasters.

The 65th seminar was held on December 1, 2020. The speaker was Associate Professor NUMADA Muneyoshi of the Institute of Industrial Science, the University of Tokyo. The title of his lecture is "Approach from the disaster management process and development of the BOSS (Business Operation Support System) for the comprehensive disaster management." He explained BOSS as a system that enables local government staff in charge of disaster response to grasp the whole picture of the disaster and smoothly implement operations, including how BOSS is used in Japan and overseas. He highlighted the usefulness of BOSS by comparing the results of experiments in which local government staff conducted shelter management training using either BOSS or paper manuals. The seminar was very useful for the participants to think about how advanced technology can help non-experts work out problems efficiently during an emergency.

ICHARM plans to hold seminars at various opportunities in the future.



A scene of the online lecture
講演の様子

Group photo with audience
参加者全員で集合写真

(Written by MOROOKA Yoshimasa)

Special contribution on flood disasters risk reduction after Typhoon Hagibis in 2019

Typhoon Hagibis in October 2019 left serious flood damage over a wide area of Japan, particularly its eastern parts. The East Japan Railway Company (JR East), one of the biggest railway companies in Japan, was among the severely affected due to extremely heavy rainfall caused by the typhoon. Especially, its bullet train yard of Nagano Shinkansen was inundated.

This edition of ICHARM Newsletter carries a special contribution from Mr. SHINYA Takafumi, who worked at ICHARM as a senior researcher from April 2017 to March 2018 and is now working at JR East. In his article, Mr. SHINYA details the efforts for flood disaster risk reduction by JR East based on the lessons learned from the severe disaster damage experiences.

2019 年台風 19 号による洪水被害への対策についての特別寄稿

2019 年 10 月、大型の台風 19 号（Hagibis）により、特に東日本を中心に広範囲にわたって深刻な洪水被害が発生しました。中でも日本で最も大きな鉄道会社の一つである東日本旅客鉄道株式会社（JR 東日本）は、台風がもたらした異常な豪雨によって長野新幹線の車両基地が浸水するなど甚大な洪水被害を受けました。

本号のニュースレターでは 2017 年 4 月から 2018 年 3 月まで主任研究員として ICHARM に在籍し、現在、JR 東日本に勤務されている新屋孝文氏から特別寄稿いただきました。本稿ではこうした被害を受けた JR 東日本による洪水対策の取り組みについて取り上げられています。

JR East's efforts to strengthen its flood resilience
JR 東日本における水害対策について

SHINYA Takafumi, Deputy General Manager, Construction Department, East Japan Railway Company
新屋孝文　東日本旅客鉄道株式会社　建設工事部　次長

I was at ICHARM for a year from April 2017 to March 2018. Since April 2020, I have been with JR East, a Japanese railway company, assigned temporarily from the Ministry of Land, Infrastructure, Transport and Tourism (MLIT) on a personnel exchange program between the public and private sectors.

In 2019, due to heavy rainfall caused by Typhoon Hagibis, the Chikuma River in Nagano Prefecture overflowed, flooding the Nagano Shinkansen (bullet train) Rolling Stock Center (NSRSC). Many people were probably shocked to see the scenes of Shinkansen trains soaked in floodwaters on TV. My primary responsibility at JR East is to give technical advice to the company in taking necessary measures to protect the Shinkansen and regular trains and facilities from flood damage.

When the NSRSC was flooded, the damage was enormous. In addition to 10 sets of Shinkansen trains (120 cars in total), storage tracks, many garages, and electrical facilities such as substations were badly damaged.

The NSRSC was built in 1997, when the Nagano Shinkansen line, which is now part of Hokuriku Shinkansen line, started its service. It is managed using the "ownership-operation separation" method. The Japan Railway Construction, Transport and Technology Agency (JRTT) constructed and owns the center while JR East leases it for parking, inspecting, and maintaining Shinkansen trains.

Before the construction, investigations were conducted to learn the details of the construction site, including past floods such as the one in 1982, the topography of the surrounding area, and the effect of the drainage channels running around the site. Based on the investigations, the height of the entire premises was raised by about 2 m higher than that of the surrounding ground. Despite that, the NSRSC was flooded; the scale of the 2019 flood exceeded the scale assumed initially.

Since it is unrealistic to raise the NSRSC's entire premises of about 110,000 m^2 again or relocate it to another location, we are trying to come up with different coping measures by carefully estimating the level of damage to the operation of train services and the NSRSC and the level of importance of each facility, while also considering the difficulty of early restoration.

For example, we believe that the electrical equipment and facilities are needed

2017 年 4 月からの 1 年間、ICHARM でお世話になりました。2020 年 4 月からは、官民人事交流制度の一環で国土交通省から JR 東日本に派遣されています。

令和元年東日本台風（Hagibis）の影響により千曲川が氾濫し、長野新幹線車両センター構内に留置してあった北陸新幹線車両が浸水した映像に衝撃を受けた方も多いかと思います。今後当社管内において、在来線も含めた鉄道施設における浸水対策を進めていくにあたり、水害に関する技術的観点から社内で助言を行うことを主な役割としています。

長野新幹線車両センターにおいては、新幹線車両 10 編成 120 両に加え、構内の留置線や各種車庫、変電所等の電気設備が被害を受けました。

同センターは、長野新幹線（現在の北陸新幹線）の 1997 年の開業に合わせて整備されたものです。いわゆる上下分離と呼ばれる方式で、施設の建設、保有は（独）鉄道建設・運輸施設整備支援機構（JRTT）が行い、当社が施設を借り受け新幹線の留置や点検、メンテナンス等をおこなっています。

建設当時、当該地区における 1982 年の洪水等過去の浸水の記録や周辺の地形、排水路との関係等を調査の上、構内全体を周辺の地盤より約 2m かさ上げ盛土されていましたが、今回、これを上回る浸水の影響を受けたことになります。

約 11 万 m^2 にわたる構内全体のさらなるかさ上げや他所への移転は非現実的であり、浸水した場合に列車の運行や車両基地の操業に及ぶ支障の度合いや、早期復旧の困難さに応じた設備毎の重要度を考慮し、対

応策を検討しています。

具体的には、一旦浸水すると運行への影響が大きいと考えられる配電や信号等の電気設備については、かさ上げが必要と考えています。また、車両の検修庫等については、建屋開口部等に止水板または止水壁の設置が必要と考えています。その他、車両基地の操業に必要な機器等については、予備品の確保や他箇所での代替による機能確保が必要と考えています。（図１）

当社としては、これらの財産保有者である JRTT と協議の上、対策を進めることとしています。

長野新幹線車両センター以外の鉄道施設については、最新の洪水ハザードマップ等を確認し、その最大浸水深に達した場合に浸水が想定される重要設備を抽出のうえ、重要度に応じた対策を設備毎に検討しています。かさ上げや止水板の設置等のハード対策、あるいは予備品の確保や代替設備の活用等のソフト対策を、老朽化に伴う更新等も踏まえながら計画的に講じていくこととしています。

車両留置箇所における車両の浸水対策については、想定最大規模降雨（L2）を想定して、車両避難の判断を支援する指標を整備のうえ、車両の避難を行っていくこととしています。

ハザードマップ等を活用して、L2 規模の降雨に伴う河川の氾濫等により浸水被害が想定される車両留置箇所を抽出し、それぞれの箇所毎に車両避難の判断を支援する指標を整備します。この指標に加え台風の進路等の一般の気象情報を含めて車両の避難を総合的に判断し、台風などの異常気象時に車両の浸水防止を図っていくこととしています。

具体的には、河川管理者が公開する河川水位の予測、気象庁が公開する「流域雨量指数」の予測に加えて、気象庁の降雨予測をもとに河川水位に影響する「流域降雨量」を当社独自に算出し、これらを組み合わせて車両避難の判断に活用することとしています。（図２）

車両の避難には、運転手の安全も確保された避難先（別の車両基地や駅構内等）、運休前後や避難の運行計画を決定した上で、事前にお客さまへの周知を行う必要があります。このため、丸一日を超えるような長いリードタイムが必要ですが、現在の予測技術では精度の上で課題が残されており、いわゆる「空振り」覚悟で運用を開始しています。当社としても、ICHARM を含めた研究開発機関の活動により、浸水の予測技術が今後さらに向上していくことを強く望んでいるところです。

私自身、これまで 20 年近く主に水災害対策を推進し地域を「守る側」で仕事をしてきましたが、今回初めて、これまでどちらかというと「守られる側」に位置付けられていた施設を担う組織に身を置いています。

会社としては、重要な公共交通インフラを担う事業者として、自然災害への対応においても社会的な使命を負っている一方、民間企業として

to be placed in higher bases. Since power distribution and railway signals rely on them, they would significantly impact our operations if flooded. Also, the train inspection and repair garage probably need barriers or walls to prevent floodwaters from entering through the garage's openings. In addition, with regard to the necessities for the operation of the NSRSC, the backup sets of equipment, the substitute site at a different location, or both should be prepared. (Fig. 1)

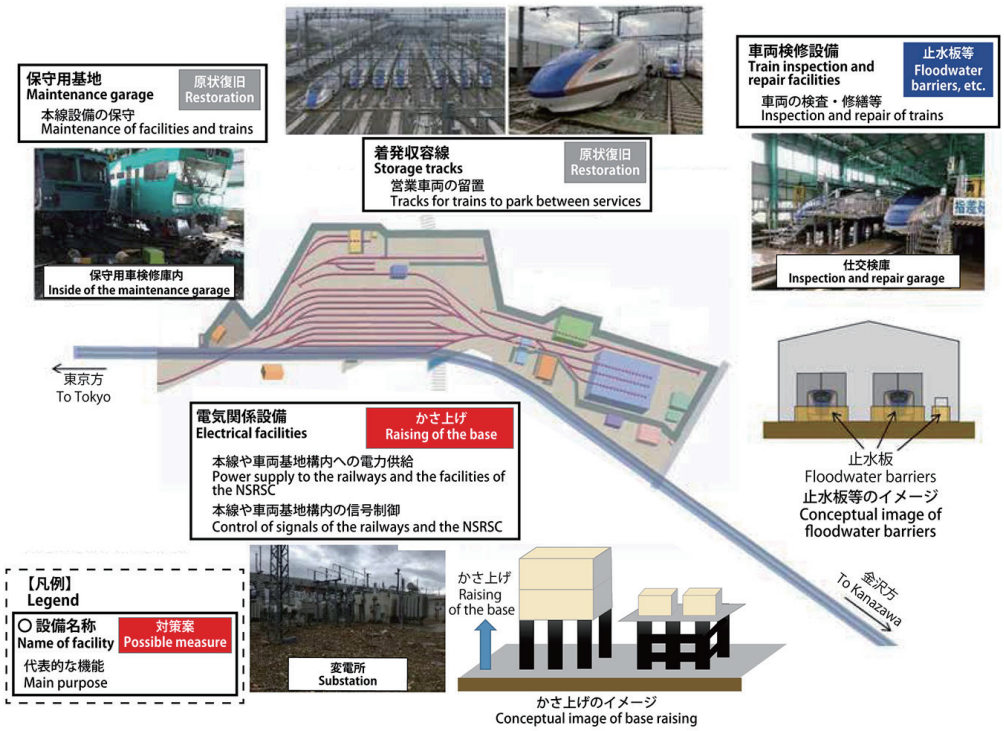


Fig. 1 JR East's plans for flood damage risk reduction at the NSRSC
図 1　長野新幹線車両センターの被災設備浸水対策イメージ（JR 東日本検討案）

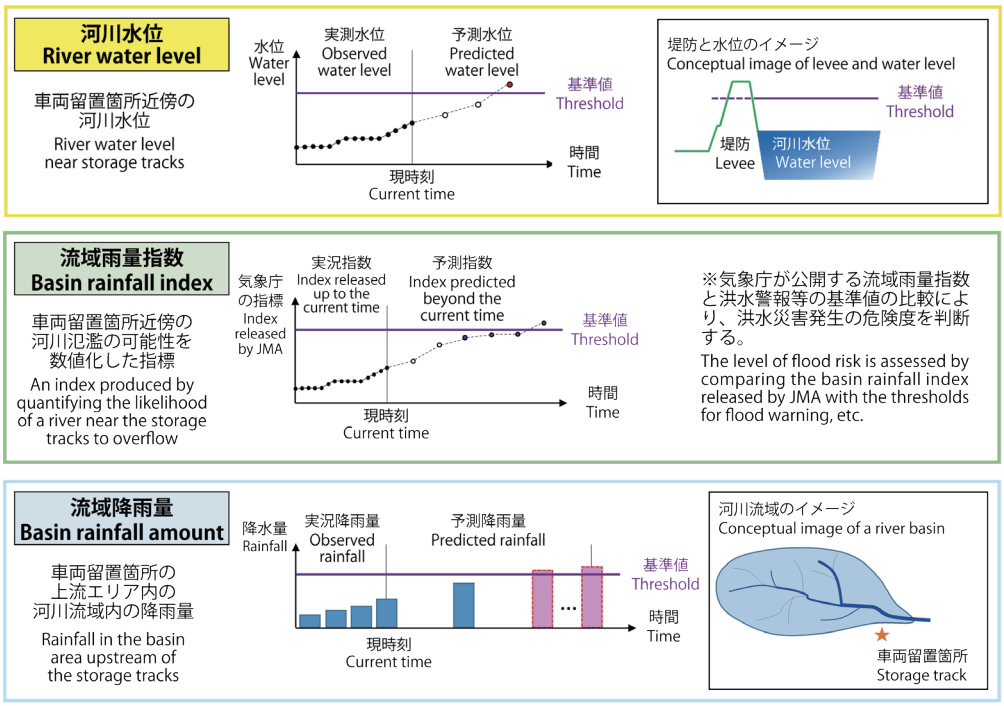
JR East is hoping that these improvements will be made in consultation with JRTT, the owner of the NSRSC.

We are also discussing plans for other railway facilities and equipment in addition to those of the NSRSC. Using latest flood hazard maps, we have selected important facilities and equipment that are likely to be flooded when the inundation reaches the highest predicted depth, and started studying protective measures for each of them according to their importance in the operations. We will systematically implement both structural measures, such as elevating the bases and installing flood barriers, and non-structural measures, such as securing backup facilities and equipment and using alternative facilities, while looking at the timing of renewal of aging facilities and equipment at the same time.

We also need to protect trains from floodwaters when they are parked on storage trucks. Our plan is to evacuate trains to safe locations when flooding is predicted. To this end, we are planning to create the criteria for evacuating trains in case of the maximum predicted rainfall, which is labeled as L2.

Using hazard maps and other tools, we will first select storage trucks that are likely to be flooded if nearby rivers overflow due to the L2 rainfall. Then, the criteria for evacuating trains will be set for storage trucks at each location. In addition to the criteria, meteorological information, such as the course of a typhoon, will be taken into account to protect trains from floodwaters effectively in a time of typhoons and other extreme weather events.

More specifically, we are planning to develop a decision-making scheme for the evacuation of trains, based on three types of data: the "river water levels" released by river administrators, the "basin rainfall index" released by the Japan Meteorological Agency (JMA), and the "basin rainfall amount" to foresee river water levels that JR East uniquely estimates using rainfall predicted by JMA. (Fig. 2)



※これらの指標のほか、一般の気象情報も含めて車両の避難を総合的に判断する。
The decision about the evacuation of trains will be made comprehensively based on different types of information, including the indexes listed above and general meteorological information, etc.

Fig. 2 The criteria for decision making for evacuating trains
図２　車両の避難の判断を支援する指標

At present, one major challenge is a long lead time required to evacuate trains. The evacuation is possible only after securing rolling stock yards or stations that can keep both trains and train operators safe. In addition, we need to determine the operation schedules before and after the evacuation and notify users of the information. This takes a lead time of at least one day, but the current technology still cannot offer substantially accurate predictions even a day ahead. Despite that, we have put this system in practice, knowing that, in some cases, we may later find out that all actions taken were unnecessary. We strongly hope that ICHARM and other research centers will upgrade flood prediction technology to increase accuracy.

Looking back at some 20 years of my career, I have been working to “protect” people and society by promoting flood control measures. Working at JR East, however, I have realized that, for the first time, I am working at a private entity responsible for facilities and equipment that are on the side of people and society, the side of “being protected.”

As an operator of vital public transportation infrastructure, JR East is naturally expected to fulfill its social responsibilities, even for appropriately coping with natural disasters. On the other hand, as a private company, the organization needs to prioritize projects for efficient investment. There have been quite a few opportunities in which I really think about the balance between the two. Especially in the past several months under the COVID-19 pandemic, social and other situations around the company have undergone drastic changes, forcing it to face a tough challenge of restructuring its revenue mechanism to survive an unprecedented event. I often think about how I can contribute to this railway company using my expertise accumulated through the long-term involvement in flood control and disaster management.

I do not have much time left with JR East. Still, I would like to contribute as much as possible to the company through my expert knowledge and experience in flood management. I would also like to keep both public and private perspectives and continue to think about what measures should be taken for various public and private actors in order to practice integrated flood management in a river basin.

の投資の優先順位の考え方もあり、そのバランスの重要性を感じる場面も少なくありません。特にこのコロナ禍において、当社を取り巻く環境も劇的に変化しており、これに対応していく収益構造への変革も非常に大きな課題となっています。治水や防災行政に関わってきた技術者として、鉄道会社における浸水対策にどのように関与していくべきなのか、考えさせられることも多々あります。

限られた派遣期間ではありますが、水災害に関する技術的な知見をできるだけ提供していくとともに、「流域治水」の方向性の中で民間企業も含めた様々な主体に対してどのような施策が講じられるべきなのか、官・民の視点から考えていきたいと思っています。

Introduction of ICHARM research projects / 研究紹介

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

そのうち、研究としては

(1) 水災害データの収集、保存、共有、統計化
(2) 水災害リスクのアセスメント
(3) 水災害リスクの変化のモニタリングと予測
(4) 水災害リスク軽減の政策事例の提示、評価と適用支援
(5) 防災・減災の実践力の向上支援

の 5 つの柱のもと、革新的な研究活動を行っています。

本号では、大沼克弘上席研究員の行っている「水災害に関して行ってきた研究～金沢大学と国総研水害研究室での取り組み～」と会田健太郎専門研究員の行っている「ICHARM プロジェクトにおける衛星リモートセンシングを用いた水災 害状況把握技術の適用と応用支援」を紹介します。

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

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

(1) Water-related disaster data archiving, sharing and statistics
(2) Risk assessment on water-related disasters
(3) Monitoring and forecasting water-related disaster risk changes
(4) Support through proposal, evaluation and application of policies for water disaster risk reduction
(5) Support for improving the capacity to practice disaster prevention and mitigation

This issue introduces a researcher as listed below:

ONUMA Katsuhiro, Senior Researcher

Research conducted on water-related hazards: Efforts at Kanazawa University and Flood Disaster Prevention Division of NILIM

AIDA Kentaro, Research Specialist

Supporting ongoing ICHARM projects by applying analytical technologies using satellite remote sensing to water-related disasters

Research conducted on water-related hazards: Efforts at Kanazawa University and Flood Disaster Prevention Division of NILIM

水災害に関して行ってきた研究～金沢大学と国総研水害研究室での取り組み～

ONUMA Katsuhiro, Chief Researcher
大沼克弘　上席研究員

私は 2020 年 4 月 1 日に金沢大学から ICHARM に着任しました。

本稿では、金沢大学と国総研水害研究室に在籍していた当時の研究を中心に紹介します。

2017 年 4 月に金沢大学大学院自然科学研究科に都市・河川防災講座が、一般社団法人北陸地域づくり協会の寄付によって設立されました。本講座では，「河川災害等に対する北陸地域の防災力・即応力強化」を使命として、3 年間実施することとなりました。

その成果は、水災害の予測精度と避難情報の精緻化・高度化、氾濫による建物・インフラの被害予測と影響評価の精緻化・高度化、災害時の人間行動と要支援者にかかわる課題の「見える化」、避難計画・被害軽減策の検討に向けた評価・分析等多岐にわたりました。成果は、講座主催の 4 回のシンポジウムや毎年作成された研究報告書、論文等を通じて公表されました。

私は、平成 30 年 7 月豪雨や令和元年台風 19 号を対象に、広域災害、複合災害、連鎖災害、情報提供や避難の観点から調査・分析を行いました。これらを踏まえて、隣接する水系での同時氾濫、同一水系内での同時氾濫、土砂・洪水氾濫、氾濫がその下流部の氾濫を誘発する連鎖災害、水路を通じた氾濫の拡散といった観点から、北陸地方で起こりうる想定外の浸水について、具体的事例を示しながら整理し分析を行いました。例えば、石川県を流れる国管理河川である手取川が氾濫した場

I joined ICHARM on April 1, 2020, from Kanazawa University.

This article focuses on the research I conducted when I was at Kanazawa University and the Flood Disaster Prevention Division of NILIM.

Let me start with the work at Kanazawa University. In April 2017, the university began a program for the prevention and mitigation of flood and urban disasters as part of the Graduate School of Natural Science and Technology, using a donation from the Hokuriku Regional Development Association. The program period was three years with the mission of "strengthening the disaster prevention and response capabilities of the Hokuriku region against river disasters.”

The results of the research included: more accurate estimation of water-related disasters and more sophisticated evacuation information; more sophisticated estimation of damage to buildings and infrastructure caused by flooding and more sophisticated evaluation of the impact caused by a disaster; visualization of human behavior and issues related to those who need assistance during disasters; and evaluation and analysis for evacuation planning and damage mitigation measures. Those achievements were presented at four symposiums organized by the program, as well as in annual reports and papers.

In that project, I conducted research and analysis on wide-area disasters, complex disasters, chain disasters, and information provision and evacuation, focusing on disasters caused by the July 2018 torrential rain and Typhoon Hagibis in 2019. Based on the results, I organized and analyzed data and information on unexpected inundation cases that could occur in the Hokuriku region, from the viewpoints of simultaneous inundation in adjacent water systems, simultaneous inundation in the same water system, sediment and flood inundation, chain disasters in which an inundation event triggers another inundation event in downstream areas, and the spread of inundation through waterways. For example, when the Tedorigawa River, a nationally managed river flowing through Ishikawa Prefecture, overflows, the floodwaters will spread to the adjacent Kakehashigawa River system, as shown

in Figure 1, at the maximum expected depth. However, since there is an area where the inundation depth is likely to exceed the height of the bank of the Hacchougawa River, a branch of the Kakehashigawa River, the inundation water may flow into the Kakehashigawa River via the Hacchougawa River, resulting in inundation whose scale exceeds that of the currently predicted event in areas along the Kakehashigawa River. In addition, a comparison was performed between inundation calculations according to a manual for preparing maps of flood inundation estimation areas and a more precise inundation model. The manual employs one-dimensional river-channel calculation using 200-meter pitch cross-sectional survey results, while the more precise inundation model employs two-dimensional river-channel calculation using ground height data of river channels. The results showed that the latter approach, which can reflect the areal distribution of sandbars, may lead to larger inundation damage estimates, especially for rivers with well-developed sandbars. Some of these results were presented at a meeting of the Council for Disaster Mitigation Measures Concerning Large-Scale Flooding in the Tedorigawa, Kakehashigawa and other rivers as a social contribution through science.

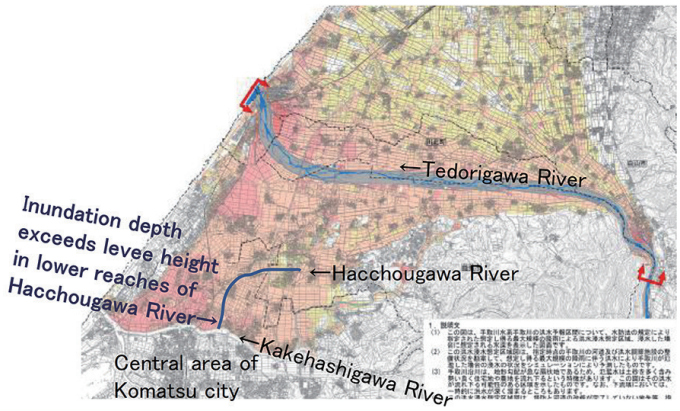


Fig. 1 Estimated maximum flood inundation of the Tedorigawa River
図 -1　手取川の洪水浸水想定（想定最大規模）

Figure 2 The downstream area of the Hacchougawa River, where the floodwaters of the Tedorigawa River may overflow and flow into the Kakehashigawa River. The central area of Komatsu City is located along the left bank of the Kakehashigawa River.
図 -2　手取川の氾濫水が越水して流入する可能性がある八丁川最下流部
（梯川の左岸に小松市中心市街地が広がっている）

When I was at the Flood Disaster Prevention Division of NILIM, a project team in which I was involved developed a real-time inundation forecasting system for the Kanda and Shakujii River basins in Tokyo in order to prevent and mitigate flood damage and water-related accidents caused by unexpectedly strong rainfall events. A two-dimensional unsteady flow calculation program was also developed to calculate the contiguous areas of river channels, levee breaches, and inundation areas in an integrated manner using the flux difference splitting (FDS) method. The team applied this program to simplified terrain models and actual terrain and compared the results with the calculation results acquired using a calculation method that is widely used at present. In addition, the team conducted research on the use of private-sector probe data and CCTV to understand inundation conditions better. Based on inundation simulations, research on inundation control was conducted by quantitatively estimating the effects of linear embankment structures on inundation diffusion control, storage, and flow direction control. It was also conducted by quantitatively estimating disaster mitigation with drainage facilities and drainage pump vehicles used to direct or mitigate inundation flows.

I would like to make use of my various research and administrative experiences to tackle future challenges in the field of water-related hazards.

合、図 -1 に示すように想定最大でその氾濫は隣接する梯川水系まで広がりますが、浸水深が支川の八丁川の堤防の高さを上回る区間があるため、その氾濫水は八丁川を経て梯川に流入し、梯川の現在の想定を越える浸水が起こりえます。さらに、国管理河川でよく行われている 200 mピッチの横断測量成果を使って河道内は一次元計算を行う洪水浸水想定区域図作成マニュアルに基づく氾濫計算と、河道の地盤標高データを活用し、河道内は二次元計算を行うより詳細なモデルによる氾濫計算を比較し、特に砂州が発達している河川では砂州の面的分布を反映できる後者のほうが氾濫被害想定が大きくなる場合があることを示しました。このような成果の一部は、手取川・梯川等大規模氾濫に関する減災対策協議会で説明する等社会還元に努めました。

国総研水害研究室に在籍していた時、ゲリラ豪雨に伴う水害・水難事故の回避・軽減できるよう、リアルタイム浸水予測システムを東京都の神田川流域及び石神井川流域を対象に構築しました。また、FDS 法（流束差分離法）を用いて、河道、堤防決壊域及び氾濫域の連続した領域を一体的に計算できる二次元不定流計算プログラムを作成し、これを様々な簡易地形モデルや実際の地形に適用し、現在広く用いられている計算方法に基づく計算結果との比較を行いました。さらに、民間プローブデータの活用や CCTV 等浸水状況の把握に関する研究を行いました。氾濫シミュレーションに基づき、線状盛土構造物による氾濫の拡散抑制・貯留・流向制御、排水施設や排水ポンプ車等による氾濫流の誘導・吸収による減災効果を定量的に試算する等氾濫制御に関する研究を行いました。

これまでの様々な研究や行政の経験を活かして今後水災害に関する研究に取り組むことができればと思います。

Supporting ongoing ICHARM projects by applying analytical technologies using satellite remote sensing to water-related disasters

ICHARM プロジェクトにおける衛星リモートセンシングを用いた水災害状況把握技術の適用と応用支援

AIDA Kentaro, Research Specialist
会田健太郎　専門研究員

私の専門分野は衛星リモートセンシング解析で、これまで特に衛星データによる土壌水分推定をターゲットに研究に携わってきました。昨年 7 月に ICHARM に着任させて頂いてからは、衛星リモートセンシングによる主に洪水の水災害状況把握の解析と技術開発、そして ICHARM で進めている各プロジェクトへの適用と応用支援に携わっています。

地上を観測する衛星に搭載されたセンサは主に 3 種類あり、簡単に言うと肉眼と同じように見る " 光学センサ "、物質が放射する微弱なマイクロ波を検出する " マイクロ波放射計 "、そして、衛星のアンテナからマイクロ波を地上に向けて照射して、地上から戻ってくるマイクロ波を計測する " マイクロ波散乱計 " です。光学センサは数 10cm の空間解像度を実現していますが、マイクロ波放射計や散乱計の地上空間解像度は数 10km にもなります。そこで、マイクロ波散乱計のアンテナ長とパルス処理を工夫して数 m の空間解像度を実現させているのが合成開口レーダ（SAR）と呼ばれるセンサになります。

洪水氾濫域（水面）を検出する場合、複数の可視と近赤外の周波数で計測する光学センサは、水面と陸面で周波数毎に異なる反射特性を利用して、複数の周波数を組み合わせることで水域を検出しています。しかし、夜間や雲に覆われている場合は地上の様子を確認することができません。一方、SAR では水面では衛星から斜めに照射するマイクロ波が反対方向に反射してほとんど戻ってこないという特徴を用いて、建物や樹木がなければ水面範囲を比較的容易に推定することができます。SAR は雲に影響されず、夜間でも観測できるため、この技術は国内外の洪水状況の把握に広く活用されています。

ICHARM で進められている国内外の水災害研究や教育においても、過去から蓄積されている衛星データの解析は対象災害の状況と過去事例の把握のために不可欠なものとなっています。今日では、衛星データの解析基盤として、ウエブブラウザを介してインターネット上の計算機ですべての処理が可能なクラウド化が進んでおり、インターネット環境さえあれば衛星画像をウエブ上で解析して、その結果を即座に共有できる環境が提供され始めています。

このコロナ禍において人々の移動や交流は制限されていますが、非接触である衛星観測とインターネットの組み合わせは、この状況

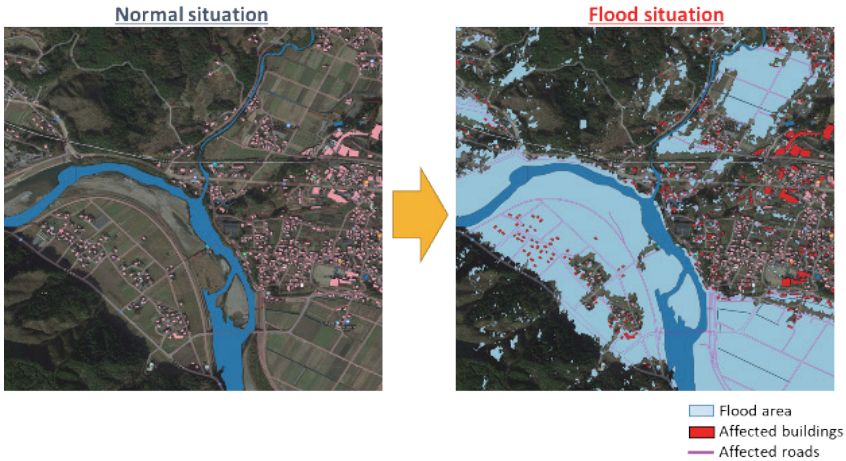
My speciality is satellite microwave remote sensing, and so far, the main research focus has been land surface soil moisture. Since I joined ICHARM in July 2019, I have been working on the analysis of water-related disasters, especially flooding, and the technological development for that purpose. Supporting ongoing projects at ICHARM by applying such technologies is also part of my responsibilities.

There are mainly three types of sensors onboard earth observation satellites. The first one is optical sensors, which capture images in almost the same way as human eyes do. The second one is microwave radiometers, which detect subtle microwaves radiated by thermal materials. The third one is microwave scatterometers, which transmit microwaves from the antenna to the earth and receive subtle microwaves returning from its surface. Optical sensors can capture images with spatial resolutions of several tens of centimeters, while the spatial resolution of microwave sensors is several tens of kilometers. To improve the spatial resolution of microwave sensors to several meters, sensors called synthetic aperture radars (SAR) have been developed by the technical improvement of the antenna length and pulse transmission.

For flooded area (water surface) detection, optical sensors detect water surfaces by capturing different optical frequencies since land and water surfaces have different reflection characteristics. However, this type of sensor does not work well when it is cloudy or night. On the other hand, SAR is capable of observing the land surface through clouds or even in night time and estimating flooded area easily by taking advantage of SAR's characteristic that there are almost no signals returning from the water surface. Due to this property, SAR is widely used to monitor flood situations both in Japan and overseas.

Analysis of archived satellite data is essential for current water-related disaster research projects and educational programs at ICHARM. In recent years, the cloud analysis environment has started to be widely available, enabling all data processing to be done on a web browser. All you need is an internet connection, and you can analyze satellite data on the web and share the results with other experts as soon as the analyses are done.

People's movements and exchanges are restricted in this COVID-19 disaster. Under these circumstances, a combination of non-contact satellite observations and the internet can be a key tool for improving research and education. We are entering a



An example of flooded area estimation using ALOS2/PALSAR2 (JAXA) at the Kuma River at about 1 PM on July 4, 2020.
JAXA の ALOS2/PALSAR2 による 2020 年 7 月 4 日 13 時頃の球磨川における洪水氾濫状況検出例

very exciting era where increasingly more satellite data will be available and where the internet will be accessible from anywhere on the ground via space. In such an era, we should skillfully incorporate sophisticated technology and innovate our response to water-related disasters, which have become more severe year by year due to climate change. For that aim, I would continue to work on research and development to make international contributions to water-related disaster risk reduction through ICHARM's projects.

下で調査研究や教育を進展させるための拠り所とも言えます。今後、衛星データはますます豊富になり、インターネットも宇宙経由で地上のどこからでも接続できる時代になっていきます。このような日々進化する技術をうまく取り込んで、気候変動により年々深刻化している水災害への対応も進化させていかなくてはなりません。そのためにも、ICHARM のプロジェクトを通じて、水災害対応における国際貢献に寄与していくことをモチベーションとして研究開発に励んで参ります。

Training & Education

Educational program updates
修士課程研修　活動報告

The 2020-2021 M.Sc. course began with the opening ceremony held online on October 1. Seven new students started the 14th year of the master's program at home in their countries, because of the COVID-19 pandemic. For the first two weeks, they self-studied using e-learning materials: the introductory lectures and tutorials prepared for the West Africa Project and the video clips of the final presentations made on August 6, 2020, by the students who just graduated this past September.

On October 19, all seven students delivered an online inception report presentation. Speaking from different countries, each student explained the organization they are currently working at and the challenges they are facing. They went on to share their research interest with possible research themes they are hoping to work on. Many ICHARM researchers, including Executive Director KOIKE Toshio, gathered at the lecture room of ICHARM and intently listened to the presentations. Some instructors for ICHARM master's program from other organizations also joined the meeting remotely.

On October 20, online lectures by ICHARM researchers started. Executive Director KOIKE and Dr. MIYAMOTO Mamoru were the first to deliver a series of lectures on hydrology to the new students. ICHARM has recently introduced a new electric whiteboard for online lectures. With this powerful tool, the lectures have been going very well, as if they were happening face to face right at ICHARM.

Lecture by Executive Director KOIKE using an electric whiteboard
電子黒板を用いた小池センター長による講義

As this is a one-year master's course, students select their thesis themes within two months from October to November, right after starting the program. They listen to presentations by ICHARM faculty members and researchers and weigh which presentation is close to their research interest. Once the theme is decided, they will start a research project under the supervision of faculty members.

From October 21 to 30, the students listened to three faculty members, Dr. YOROZUYA Atsuhiro, Dr. USHIYAMA Tomoki, and Dr. MIYAMOTO Mamoru, and four ICHARM researchers explaining their research. They found each presentation very interesting and started to consider their own research themes.

On November 17, of all new students, three from Bangladesh, Malaysia, and Myanmar came to ICHARM after a two-week quarantine at JICA Tsukuba. They met

2020 年度修士コース開講式が 10 月 1 日にオンラインで行われました。COVID-19 の影響により、本年度 7 名の新たな学生は、14 期目 1 年間の修士プログラムに各々の母国から遠隔により授業に取り組み始めました。

始めの 2 週間は、西アフリカプロジェクトで活用された紹介教材や、9 月に卒業したばかりの修士学生が 8 月 6 日に行った最終論文発表のビデオクリップなどの e-learning 教材をダウンロードして自主学習を行いました。

10 月 19 日には、7 名の新入生によるインセプションレポート発表会がオンラインで開催されました。各学生は自身の所属組織や担当業務、自国が抱える課題について説明するとともに、ICHARM において取り組みたい研究テーマなどを発表しました。

小池俊雄センター長を始め多くの ICHARM 研究員がレクチャールームに集まり、学生達の発表に耳を傾けていました。また、本修士コースのインストラクターを務める外部講師の先生方もリモートで参加しました。

10 月 20 日から、ICHARM 講師による講義がスタートしました。トップバッターは、小池俊雄センター長、宮本守研究員による Hydrology の講義でした。

ICHARM では本年度オンライン講義用に電子黒板を導入しました。この強力なツールのお陰で、学生達はそれぞれの自国にいながらも、まるで一緒に ICHARM 教室内で聴講しているかのような雰囲気が醸し出され、講師もスムーズに講義を展開することが出来ました。

この修士コースは 1 年間の課程であるため、学生達は通常プログラムが始まる直後の 10 月から 11 月にかけて自身の論文テーマを決めています。彼等は、ICHARM 教員メンバーやその他 ICHARM 研究員からのプレゼンテーションを聴講し、ど

の説明が自身の興味のある研究テーマに沿うものとなっているかを考えます。その後各自のテーマが決まると、指導教員のもとにリサーチプロジェクトを進めていきます。

10 月 21 日から 30 日にかけて、ICHARM 教員メンバーである萬矢敦啓主任研究員、牛山朋來主任研究員、宮本研究員及びその他 ICHARM 研究員から各研究テーマについてプレゼンテーションが行われました。学生達はそれぞれの説明に非常に興味をもち、各自の研究テーマについて検討を開始しました。

11 月 17 日、7 名の修士学生のうち、バングラデシュ、マレーシア及びミャンマーから 3 名の学生が JICA 筑波で 2 週間の隔離期間を経て、ICHARM に通学することが出来ました。まずセンター長室において、小池センター長から歓迎の言葉を受けた後、ICHARM のスタッフに挨拶に回りました。オンライン講義やプレゼンテーションを通じて既に顔馴染みになっている教員や研究員もいました。

次に ICHARM における日常生活の決まりやルールについて説明を受けた後、構内の食堂や図書館などの施設を見学しました。各施設のスタッフから利用方法について丁寧な説明を受けました。

午後は、京都大学の佐山敬洋准教授による Practice on Flood Forecasting and Inundation Analysis の講義が始まりました。今回、佐山先生はリモートからの講義であったため、学生達は Mohamed Rasmy 主任研究員のサポートを受けながら、ICHARM 側とリモート側の双方から講義を受ける形式となりました。

11 月 20 日から 12 月 4 日にかけて、GRIPS の集中講義が行われました。今回はオンラインの開催であったことから、来日している学生は JICA 筑波、来日出来ない学生は母国から遠隔で参加しました。

12 月 8 日、ブータンから 2 名の修士学生が同じく 2 週間の隔離期間を経て、ICHARM に通学できることとなり、既に 11 月から通学している 3 名の学生と合流しました。午後から国際社会開発協力研究所の渡辺正幸代表が ICHARM に来所し、学生は対面とオンラインの双方から Basic Concepts of Integrated Flood Risk Management(IFRM) の講義を受講しました。

12 月 9 日には、牛山主任研究員による Computer Programming、江頭進治研究・研修指導監による Hydraulics の講義が始まりました。また、同日午後には ICHARM Webinar 2020 に参加する機会を得ました。

12 月 11 日、本修士学生 7 名と博士課程の 2 名の新入生を歓迎する Welcome Gathering が 2 階のオープンスペースで開かれました。修士学生で未入国の 2 名のうちトンガの学生は、所用により残念ながらオンラインから出席できませんでしたが、その他の新入生は ICHARM メンバーと交流を深めることができま

Executive Director KOIKE and received welcoming words from him. Afterward, they greeted ICHARM staff face to face, including the lecturers and researchers, the familiar faces they had already known from online lectures and presentations.

After receiving explanations about things they should know to study at ICHARM, the students were taken on a little tour to see rooms and facilities on its premises, such as the study room, cafeteria, and library. The staff at each stop politely told them about what is available there for them and how they can use them.

On the afternoon of the same day, one of the external lecturers, Associate Professor SAYAMA Takahiro of Kyoto University, delivered his first lecture on "Practice on Flood Forecasting and Inundation Analysis" online with help from Senior Researcher Mohamed Rasmy. This time, some students attended his lecture from ICHARM while others from other places remotely.

In front of the panels about PWRI
土木研究所パネル前にて


Receiving welcoming words from Executive Director KOIKE
小池センター長からの歓迎挨拶

Associate Professor SAYAMA gives a lecture online
京都大学佐山准教授によるオンライン講義


Dr. Rasmy helps a student.
Rasmy 主任研究員によるサポート

From November 20 to December 4, the students participated in GRIPS's online intensive course; some from JICA Tsukuba, where they stay, and others from their home countries.

On December 8, two students from Bhutan were able to come to ICHARM for the first time after a two-week quarantine at JICA Tsukuba and joined the three who started coming to ICHARM in November. In the afternoon, Mr. WATANABE Masayuki, a lecturer of the master's program and the president of the Institute for International Social Development & Cooperation, visited ICHARM and delivered lecture on "Basic Concepts of Integrated Flood Risk Management (IFRM)" to the students, who were either in class or online.

From December 9, two new lectures started: "Computer Programming" instructed by Dr. USHIYAMA and "Hydraulics" by Prof. EGASHIRA Shinji. On the same day, the students had an opportunity to join "ICHARM Webinar 2020".

On December 11, a welcome gathering for the new seven master's students and two Ph.D. students was held in the open space on the 2nd floor. Unfortunately, of the two who can't come to Japan yet, a student of Tonga could not attend the gathering due to a personal matter. Still, the rest of the students and ICHARM members had a great time getting to know each other.

We are hoping that the other two students of Mauritius and Tonga will soon join these five and really looking forward to seeing all of them studying together.

Master's students with Mr. WATNABE (center)
渡辺国際社会開発協力研究所代表（中央）
と記念撮影

Welcome Gathering
歓迎セレモニーにて

(Written by MIYAZAKI Ryosuke)

した。
ICHARM スタッフ一同、残りのモーリシャスとトンガの２名の学生が一日も早く来日し、７名が共にICHARM で学べる日が来ることを心待ちにしております。

Comments from new doctoral course students
博士課程　新研修員からのコメント

Two students joined the 2020-2022 doctoral program in October. They would like to say brief hello to the readers around the world.

2020年10月、2020-2022年度博士課程に2人の研修員が加わりました。彼らからのコメントをここに紹介いたします。

Tedla Mihretab Gebretsadik

Supervisor: Mohamed Rasmy Abdul Wahid

My name is Mihretab Gebretsadik Tedla from Ethiopia. I have been working at the Ministry of Water Irrigation and Energy of Ethiopia, since 2012 as a senior hydrologist and water resource engineer. During my stay, I was a coordinator for hydro-met system modernization project and seasonal reservoirs operation planning and participated in national disaster risk mitigation task forces. I also have work experience in private Engineering companies including an internship at Yooshin Engineering in South Korea. I have two MSc degrees, MSc in Engineering from Sungkyunkwan University and MSc in Water Supply and Environmental Engineering from Addis Ababa University.

I am glad to join ICHARM as RA while studying PhD at GRIPS. I plan to utilize this great opportunity to nurture my professional expertise and research capability. In addition, I would like to contribute to the improvement of disaster-related policy and strategies in developing countries. My research interests are hydrological extremes hazard analysis and forecasting model development with climate change adaptation and suggestion for integrated developmental policy. Hazard mapping, reservoirs optimization, environmental implications of hydrological extreme events, evidence-based forecasting and "easy-access" dissemination for the forecasted information are among my research interests.

Md Majadur Rahman

Supervisor: HARADA Daisuke

I am Md Majadur Rahman from Bangladesh. I have been working for Bangladesh Water Development Board (BWDB) since 2007. Being an employee of BWDB, I have to fight with different water related disaster regularly. Japan has a long history to harmonize with natural disasters. GRIPS is leading Japan's policy research institute with world class standards and ICHARM is the global centre of excellence for water related disaster management. Thus it is a great opportunity to study and research on Disaster risk reduction (DRR) field in ICHARM and GRIPS for learning advanced DRR knowledge and technologies. I have set my study plan on policy studies for river basin development focuses on the balance of key elements of a river basin with climate change, geomorphology, the biosphere and man-made interventions. I want to apply new knowledge for the design and planning of sustainable water infrastructures. I think it will help me a lot in my future career and to fulfill my dream of serving the nation.

Comments from new master's program students
修士課程　新研修員からのコメント

I am Farzana Ahmed form Bangladesh. I have been working in Bangladesh Water Development Board (BWDB) as a Civil Engineer since 2012. Some of my colleagues completed their master's and PHD from ICHARM. Their excellent performance in the job field encouraged me to apply for the master's program in ICHARM. I really like the working environment of this institution. The teachers, researchers and staffs are very cooperative. I hope I can apply the knowledge acquired through this course for the betterment of my organization as well as for my country.

I am Nedrup Tshewang from Bhutan. Back in my country, I was working as Deputy Executive Engineer for Department of Agriculture under Ministry of Agriculture and Forests. I have been working in the Department for last 19 years as an Irrigation Engineer involving in planning, surveying, designing and implementation of the Irrigation system.

Currently, I am pursuing my master's degree in Flood Disaster Risk Reduction in ICHARM, GRIPS. Infact, its great enthusiastic and privilege for me to study in the well renowned University in the world and moreover, the good practices of Japan.

Looking forward to take back the knowledge, skills and attitude gained and implement in our country to serve our nation in better way.

Warm greetings everyone! I am Jamyang Zangpo working as a civil engineer in the National Center for Hydrology and Meteorology(NCHM), Bhutan and currently pursuing master's in Flood Disaster Risk Reduction at ICHARM, Japan. It is a well-timed opportunity and I am happy for being able to join ICHARM especially when NCHM is striving to keep up with the rest of the world in the field of hydro-meteorology, their understanding, monitoring, mitigating and reducing the impacts of climate change towards achieving ecologically balanced sustainable development. ICHARM has conducive learning environment and I look forward to making the most of it.

I am Norain Osman, from Malaysia. I am Civil Engineer by profession working with the Government of Malaysia. My last posting before furthering Master Program Study in ICHARM was with the Building Maintenance and Facility Branch, Malaysian Public Work Department (In Malay: Jabatan Kerja Raya Malaysia, JKR). I was graduated in 2002 in Local University and I have been working as a Civil Engineer involved in Project Management and Building Maintenance since that.

To be part of ICHARM and one of the student in this program was a great opportunity to me. I was skeptical at first before joining the program because I am afraid the difference that I will bring in me like my culture, my religion, my restriction of eating and outfit with hijab will make people uneasy around me. But I was wrong. The diversity of students, researchers, lecturers in ICHARM as they are working and learning are unique. I am surprise with their openness, the bond, the warm welcoming and the kind, patient and helpfulness from the lecturers and employees make me happy to be part of them. I am here to learn the best from ICHARM as they are the best and Japan is also the best choice of place to learn because of their experienced and hardworking people. So, I will nurture all the studies and experienced that I will gain from this program and bring all the good things back to Malaysia to be practiced then.

My name is Akshay Kowlesser and I come from Mauritius. As a civil engineer with a keen interest in the risk mitigation of water related disasters, I am extremely honored to have been admitted to the MSc. in Flood Disaster Risk Reduction at ICHARM where I am confident that the opportunity to learn from transdisciplinary experts will be a great asset not only to me professionally but to the emerging field of flood disaster reduction in Mauritius. Although joining remotely from Mauritius for the past three months due to the COVID-19 induced travel restrictions, ICHARM has ensured that this physical distance does not at all hinder the course progression.

My name is Aye Mon Khaing from Myanmar. I have worked as a staff officer in the Design Branch at Irrigation and Water Utilization Management Department under the Ministry of Agriculture, Livestock and Irrigation.

I am glad to join ICHARM as a master's student in the Disaster Management Policy course. That is why, I have chances to study natural disasters, to manage natural hazards and vulnerability and to share knowledge about disaster management with other international students. I have really appreciated all of the teachers' kindness and patience with us.

My name is Tevita Aho from Tonga. I am current working at the Ministry of Infrastructure of Tonga on the Building Services & Control Division. I work as a Civil Engineer is to carry out consultancy support services to Government of Tonga in the areas of engineering, including project scoping, investigation, analysis, design, reporting and surveillance for structural engineer and related project. I have a Bachelor on Engineering Technology Civil from the Unitec Institute of Technology from New Zealand.

I am very glad to join ICHARM and GRIPS for study Master Thesis on Flood Disaster Risk Reduction. This is a great opportunity and is useful not only for me but also for my country in so many ways especially in natural disaster situation.

Action Reports from ICHARM Graduates

ICHARM provides graduate-level educational programs for foreign government officers in charge of flood risk management in collaboration with GRIPS and JICA: a one-year master's program, "Water-related Risk Management Course of Disaster Management Policy Program," and a three-year doctoral program, "Disaster Management Program."

Since their launches, over 100 practitioners and researchers have completed either of the programs. They have been practicing knowledge and experience acquired through the training in various fields of work after returning to their home countries. This section is devoted to such graduates sharing information about their current assignments and projects with the readers around the globe. Mr. Christian Darwin Jacob Valencia, who graduated from the master's program in 2019, has kindly contributed the following article to this issue.

ICHARMでは、政策研究大学院大学（GRIPS）、国際協力機構（JICA）と連携して、世界各国から洪水対策の行政官を対象として、1年間の修士課程「防災政策プログラム　水災害リスクマネジメントコース」を実施するとともに、3年間の博士課程「防災学プログラム」を実施しています。これまで100名を超える実務者・研究者の方々が各課程を修了し、帰国後、本研修で習得された知識や経験を生かして、様々な分野において活躍されています。

ICHARMニュースレターでは、こうした卒業生の方々から、ご活躍の様子について寄稿していただくこととしております。本号では2018年度（12期）修士課程卒業のChristian Darwin Jacob Valencia氏（フィリピン）から寄稿いただきましたので、ご紹介します。

Christian Darwin Jacob Valencia

Engineer II, Safety and Disaster Management Coordination Division, Bureau of Maintenance, Department of Public Works and Highways, Manila, Philippines

I am Christian Darwin Jacob Valencia from the Republic of the Philippines' Department of Public Works and Highways (DPWH). In 2018, I was given the opportunity to stay and study in Japan for a year. I am part of the 2018-2019 batch of Master Course students under the Disaster Management Policy Program jointly organized by JICA, GRIPS, and ICHARM of PWRI.

After finishing the degree in September 2019, I returned to the Philippines with the intentions and hopes to improve the disaster management, not only of my organization, but of the country by sharing the knowledge I have gained from the Program. I presented my research entitled, "RRI Model-Based Evacuation Timeline of City and Municipality LGUs in Pampanga River Basin" to my colleagues and shared the results of the study with other government agencies including the Pampanga River Basin Flood Forecasting and Warning Center (PRFFWC). The PRFFWC is the office responsible in issuing flood related information to communities within the Pampanga River Basin and its allied river system. The research aims to develop a scenario-based timeline to help communities in high-risk areas to efficiently evacuate and for the local government units (LGUs) to effectively respond during flood disasters.

Photo 1. Virtual Pilot Testing of FCIA and DiSiRe Applications, together with participants from DPWH Regional and District Engineering Offices conducted last November 26-27, 2020.

Photo 2. Discussion on hazard mapping with Senior High School students

As part of the Safety and Disaster Management Coordination Division of the DPWH, our task is to capacitate the Department and its personnel in preparing and responding to disasters. With the knowledge I learned, especially on Geographic Information Systems (GIS), DPWH is now developing desktop/mobile applications to enhance our Disaster Risk Reduction and Management (DRRM) capabilities. These are the Disaster Situational Report (DiSiRe) and the Flood Control Inventory Application (FCIA). DiSiRe application aims to improve the process of reporting the status of national roads and bridges during disasters, while the FCIA will serve as the central map and repository data of all DPWH-maintained flood control and drainage structures for the purposes of funding prioritization and future planning.

I am greatly inspired by many brilliant professors we have met in the Program, and I realized that somehow, I want to be like them. Therefore, when I returned to the Philippines, I accepted an opportunity to teach Disaster Readiness and Risk Reduction Course to Senior High School Students in a school in Quezon City, Metro Manila. The course focuses on the application of scientific knowledge and the solution of practical problems in a physical environment. It is designed to bridge the gap between theoretical science and daily living. Through teaching this course, I can share my knowledge on DRRM to these young people and to promote the culture of safety and disaster awareness. This December 2020 marks my second year of teaching and I'm looking forward to more years.

Photo 3. GRIPS graduation ceremony with Assoc. Prof. OHARA Miho last September 2019

Indeed, my participation in the Program expanded my network, knowledge and experience on DRRM and with this, I will continue serving my country through my work.

Information Networking

Typhoon Committee 9th meeting of working group on hydrology and 15th integrated workshop on the WEB

WEB 会議方式による台風委員会 第 9 回水文部会および第 15 回統合部会

2020 年 10 月 22 日に台風委員会第 9 回水文部会がオンラインで開催されました。会議には日本、中国、香港、ラオス、マレーシア、フィリピン、韓国、シンガポール、タイ、ベトナムの 10 の国・地域と台風委員会事務局から約 30 名の参加がありました。日本からは国土交通省・村瀬勝彦国際室長他 1 名が、ICHARM から池田鉄哉特別研究監（水文部会議長）、冨澤洋介主任研究員、宮本守研究員が参加した他、オブザーバーとして気象庁から田中信行アジア太平洋気象防災センター所長が参加しました。会議では各国・地域の台風被害に関するメンバーレポートや現在実施中の年間実行計画（AOPs）の進捗等についての発表及び議論が行われました。本会議は当初、第 4 回アジア・太平洋水サミットの機に日本がホストすることとしていましたが、サミットの延期及び COVID-19 による感染症拡大の影響によりオンラインでの開催とし、国際建設技術協会がその支援を行いました。このため、村瀬室長からは次回の水文部会について、改めて日本で開催したいとの提案を行い、各国から賛同を得ました。

12 月 1 日及び 2 日には台風委員会第 15 回統合部会がオンラインで開催されました。初日午前の全体会合では「コロナ禍における台風 / 緊急対応」について 5 名の基調講演が行われたのち、台風委員会の活動の基となる次期戦略計画についての議論が行われました。午後には水文部会をはじめ各部会が開催され、最終日に各部会からの報告と閉会式が行われました。ICHARM からは水文部会議長である池田特別研究監、冨澤主任研究員、宮本研究員が参加しました。

ICHARM では今後ともこのような国際枠組みの場を通じて活動の推進、研究成果の普及に努めていく所存です。

The 9th meeting of the Working Group on Hydrology (WGH) of the Typhoon Committee (TC) was held online on October 22, 2020. The meeting was attended by about 30 participants from 10 Members, including Japan, China, Hong Kong, Laos, Malaysia, the Philippines, Korea, Singapore, Thailand, and Vietnam. The TC Secretariat was also present at the meeting.

From Japan, representing the Ministry of Land, Infrastructure, Transport and Tourism (MLIT), Dr. MURASE Masahiko, the director of International Affairs, participated with another ministry official. Three researchers attended from ICHARM: Director for Special Research IKEDA Tetsuya, who presently serves as the chair of the WGH, Senior Researcher TOMIZAWA Yosuke, and Researcher MIYAMOTO Mamoru. Mr. TANAKA Nobuyuki, the head of the Tokyo Typhoon Centre, was also at the meeting as an observer representing the Japan Meteorological Agency.

In the meeting, the participants presented and discussed their member reports on typhoon damage and the progress of Annual Operating Plans (AOPs), which are currently under implementation. Originally, Japan intended to host this WGH at the opportunity of the 4th Asia Pacific Water Summit. However, due to the postponement of the summit and the impact of the pandemic of COVID-19, it was decided to be held online with support from the Infrastructure Development Institute (IDI). For this reason, Dr. MURASE proposed that Japan host the next WGH meeting again in 2021, and the other participants agreed.

In the meantime, TC convened the 15th integrated workshop online on December 1-2. At the plenary session on the first day, five experts delivered a keynote speech on typhoon and emergency operations during COVID-19. After that, the participants had discussions on TC's next strategic plan, which is the basis of the TC actions. In the afternoon, WGH and the other working groups held parallel sessions, which were followed by the plenary session on the second day, where each working group reported the outcomes of their session. From ICHARM, WGH Chair IKEDA, TOMIZAWA and MIYAMOTO participated in the workshop.

ICHARM will continue striving to progress its activities and share research outcomes with other experts and organizations through such international frameworks as TC.

Participants of the 9th WGH meeting
第 9 回水文部会参加者

(Written by TOMIZAWA Yosuke)

ICHARM holds the ICHARM Webinar 2020 -Interaction with Students and Young Researchers-
ICHARM Webinar 2020 ～学生・若手研究者との交流～ を開催しました

ICHARM held "ICHARM Webinar 2020" at 15:00-16:40 on December 9, 2020, mainly for students and young researchers at universities and research institutes in Japan, with the aim of widely disseminating information on ICHARM's research activities.

The webinar was attended by 14 students, mainly master's and doctoral students, from universities in Japan. Following the welcome address of Executive Director KOIKE Toshio, Deputy Director ITO Hiroyuki introduced ICHARM's activities, and several researchers outlined their research projects in various fields: meteorology, hydrology, sediment transport and channel changes, and disaster risk reduction. After the plenary session, the participants and the researchers exchanged ideas in parallel thematic discussions, divided into four groups of different research areas.

In addition to general questions such as how to decide on research themes and what career paths are available, the participants also asked highly technical questions in the parallel thematic discussions, for example, about the operation of RRI models and technical details on the location of efficient spur dikes.

ICHARM will eagerly try to disseminate its research activities by hosting this kind of events from time to time to raise the interest of young researchers in particular who would be our partners in the future.

2020 年 12 月 9 日（水）15:00 ～ 16:40、主に国内の大学・研究機関に在籍する学生および若手研究者を対象として、ICHARM の研究活動について広く情報発信することを目的とした ICHARM Webinar 2020 を開催しました。

Webinar には、国内の大学に在籍する修士・博士課程の学生ら 14 名が参加しました。小池俊雄センター長の開会あいさつに続き、伊藤弘之グループ長から ICHARM の活動紹介、そして気象、水文、流砂・流路変動、防災の各研究テーマについての概要紹介が行われました。その後、参加者は 4 つの研究テーマについての分科会に参加し、各研究テーマに関して ICHARM 研究者との交流・意見交換を行いました。

参加者からは、どのようにして研究テーマを決めていくのか、どのようなキャリアパスがあるのか、といったような全般的な質問に加えて、各分科会では降雨流出解析モデルの運用や効率的な水制の設置位置に関する専門的な内容について質問がなされるなど、高い関心が寄せられました。

ICHARM では、こうした機会を随時設けることで研究活動についての情報発信に精力的に取り組み、特に将来的なパートナーとなり得る若手研究者により関心を高めてもらえるよう努めていくこととしています。

Scene of the webinar at ICHARM
Webinar の開催状況

Thematic discussion on sediment transport and channel changes
テーマ別分科会の様子（流砂・流路変動）

Thematic discussion on hydrology
テーマ別分科会の様子（水文）

Group photo with audience
参加者全員の集合写真

(Written by MOROOKA Yoshimasa)

Miscellaneous

Personnel change announcements
人事異動のお知らせ

Leaving ICHARM

- **Robin Kumar Biswas:** Research Specialist
  Bangladesh Water Development Board (BWDB)

○**ロビン　クマー　ビスワス**　専門研究員
Bangladesh Water Development Board

Awards / 受賞リスト

* October - December 2020

- *Prof. KOIKE Toshio, the executive director of ICHARM given the 2020 GEO Individual Excellence Award*
  See **Special Topics on page 3.*

ICHARM小池俊雄センター長に2020 GEO Individual Excellence Awardが授与されました。
＊3ページのSpecial Topics参照。

Publications / 発表論文リスト

* October - December 2020

1. Journals, etc. / 学術雑誌（論文誌、ジャーナル）

None / 該当者無し

2. Oral Presentations (Including invited lectures) / 口頭発表（招待講演含む）

- *江頭進治、竹林洋史、萬矢敦啓、原田大輔、掃流砂・土石流・浮遊砂・泥流の統一解析法、第65回水工学講演会（Online）、土木学会水工学委員会、2020年11月4日～6日*
- *牛山朋來、中村要介、伊藤弘之、令和元年台風第19号に伴う千曲川洪水のアンサンブル洪水予測シミュレーション、第65回水工学講演会（Online）、土木学会水工学委員会、2020年11月4日～6日*
- *中村要介、江頭進治、池内幸司、柿沼太貴、RRIモデルと河床変動予測モデルを組み込んだ粒子フィルタによる河川水位予測、第65回水工学講演会（Online）、土木学会水工学委員会、2020年11月4日～6日*
- *原田大輔、江頭進治、連行速度を用いた浮遊砂の解析法、第65回水工学講演会（Onlilne）、土木学会水工学委員会、2020年11月4日～6日*
- *大原美保、栗林大輔、藤兼雅和、水害対応ヒヤリ・ハット事例集（地方自治体編および新型コロナウイルス感染症への対応編）の作成、日本災害情報学会第22回学会大会予稿集、日本災害情報学会第22回学会大会（Online）、日本災害情報学会、2020年11月28日～29日*

3. Poster Presentations / ポスター発表

- *NAGUMO Naoko, HARADA Daisuke, Tanjir Saif Ahmed, EGASHIRA Shinji, Bank erosion owing to tidal currents and its impact on village distribution in the Sittaung River estuary, Myanmar, JpGU-AGU Joint Meeting 2020 (Online), July 12-16, 2020*

4. Magazines, Articles / 雑誌、記事（土技資含む）

None / 該当者無し

5. PWRI Publications / 土研刊行物（土研資料等）

None / 該当者無し

6. Other/ その他

None / 該当者無し

Editor's Note
編集後記

Best wishes for the new year.

It is no exaggeration to say that the last year saw the entire world severely affected by COVID-19. Japan is no exception. The style and values of the people's work and life have been forced to change significantly.

Offices have taken various measures to reduce the infection risk, such as keeping disinfectant gels here and there and installing partitions between desks. The city library in Tsukuba, where ICHARM is based, has been making unique efforts. Among them is the introduction of a sophisticated cleaning robot that cleans and sterilizes places simultaneously by utilizing the latest technology as an alternative means for human work.

At ICHARM, telework and online meetings have come to be held on a daily basis. To adapt to these "new normals" better, we have also introduced an electronic whiteboard for educational and training activities. So far, this new tool has been working wonderfully, making classes "real" event to students who still have to attend them virtually.

I feel that these various reforms will lead to further improvement of the workplace environment even after COVID-19.

Making a fresh start in the new year, we will do our best to deliver news about ICHARM's latest activities, as we did in the previous years.

Last but certainly not least, we pray for your health and further prosperity this year.

Mt. Tsukuba on 2021 New Year's Day
2021 年元旦の筑波山

ICHARM Newsletter Editorial Committee
MIYAZAKI Ryosuke

新年のご挨拶を申し上げます。

昨年は、世界全体が新型コロナウイルス一色の年と言っても過言ではなく、日本でも人々の仕事や生活に対するスタイルや価値観が一変した年でもありました。

各施設において、除菌ジェルやパーテーションの設置など、感染リスクの低減に向けた様々な工夫を目にするようになりました。

中でもつくば市の図書館では、人による除菌作業の代替手段として、最先端技術を活用した除菌清掃ロボットを導入するなど、つくば市らしい取り組みを行っているとのことです。

ICHARM においても、テレワークやオンラインによる会議が日常的に行われるようになったほか、研修活動において、本年度電子黒板を導入した結果、コロナ禍において来日出来ない学生に対しても、さながら ICHARM で受講している学生と同様の雰囲気のなかで、講義を行うことが出来るようになりました。

このような職場における様々な日常的な改革が、コロナ終息後においても、引き続きその良い面を継続していくことで、職場環境の向上につながるものと感じております。

本年も気持ちを新たに全力で ICHARM の取り組みを紹介してまいります。

このような状況ではありますが、皆様のご健康と益々のご繁栄を心よりお祈り申し上げます。

ICHARM ニュースレター
編集委員会
宮﨑 了輔

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