第9回洪水管理国際会議（ICFM9）への参加

令和5年3月7日
和歌山県砂防課
和歌山県土砂災害啓発センター

The 9th International Conference on Flood Management (ICFM9) on
“River Basin Disaster Resilience and Sustainability by All
– Integrated Flood Management in the Post COVID-19 Era”

国立研究開発法人土木研究所の主催で2023年2月18日～22日につくば国際会議場にて開催された第９回洪水管理国際会議に和歌山県県土整備部河川・下水道局砂防課と和歌山県土砂災害啓発センターが参加し、ポスター発表を行いました。

➢ Disaster Mitigation Education for reducing sediment disaster impact conducted by the Wakayama Prefectural Government （和歌山県における土砂災害による被害を軽減するための防災教育）

○ポスター発表の様子

発表者：副主査　岸畑明宏

○発表に寄せられた意見

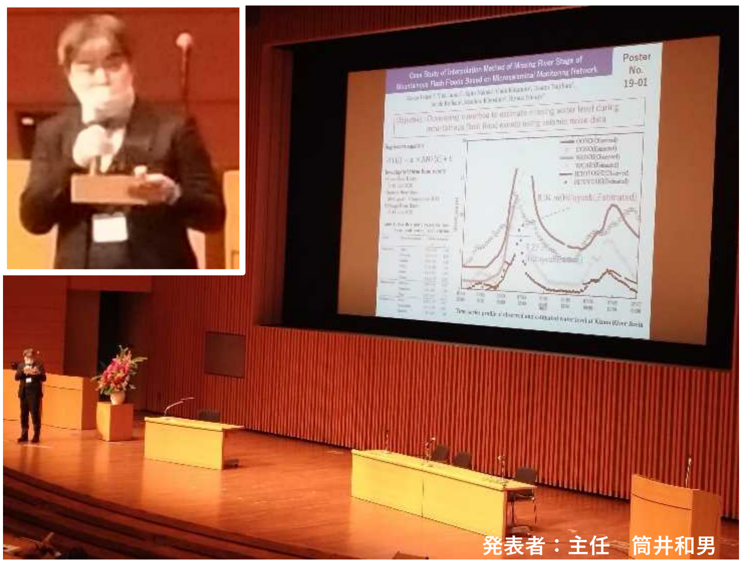
【海外からの参加者】
○インドから
・RPGのようなゲーム導入は興味深い。
・ゲームプレイは複数人？一人？
○ブラジルから
・土石流模型実験装置とRPGはとても可能性がある。
○国籍未確認
・RPGは「マインクラフト」か？
・タイムラインについて。これは何か？

【国内からの参加者】
・ゲームの取り組みは面白い。
・ゲーム制作にかかった費用は？
・5年前にセンターを訪問した。また行きたい。

➢ Case Study of Interpolation Method of Missing River Stage of Mountainous Flash Floods Based on Microseismical Monitoring Network

（地震観測網の微小振動データからの山地河川洪水時の欠測推移の補完に関する事例研究）

○ポスター発表の様子



発表者：主任　筒井和男

○発表に寄せられた意見

【海外からの参加者】
○イランから
・地震計データの新しい使い方が非常に興味深く感じた。

○国籍未確認
・新しい手法で興味深い。
・水位の上昇前に、地盤振動のノイズレベルが上昇する理由は判明しているのか？

【国内からの参加者】
・地震計データの新しい利用方法の提案であり、既存のインフラを用いた検討と思う。
・精度の向上を目指してほしい。

洪水管理国際会議
世界中の様々な専門家や政策立案者が集って洪水に関して議論を行い、それぞれのアイデアや経験について意見交換を行う唯一の国際会議

～ 防災RPG(英語版)のデモンストレーション ～
対象：和歌山県海南市立第三中学校　2年生
日時：令和5年3月14日(火)
①10時45分～11時35分(2年A組)
②11時45分～12時35分(2年B組)
場所：和歌山県海南市立第三中学校

第9回洪水管理国際会議（ICFM9）への参加

The 9th International Conference on Flood Management (ICFM9) on "River Basin Disaster Resilience and Sustainability by All – Integrated Flood Management in the Post COVID-19 Era"

- **Disaster Mitigation Education for reducing sediment disaster impact conducted by the Wakayama Prefectural Government** （和歌山県における土砂災害による被害を軽減するための防災教育）

〇ポスター

Disaster Mitigation Education for reducing sediment disaster impact conducted by the Wakayama Prefectural Government

Satoru Morikawa, Tadanori Ebisu, Takaki Sakaguchi (Wakayama Prefectural Government)
Akihiro Kishihata, Kaname Mori (Wakayama Sabo Research and Education Institute)

1. DME about sediment disasters

The Wakayama Sabo Research and Education Institute (IWSRE) evaluates the disaster mitigation education (DME) as one of its main activities in order to succeed the thought of sediment disaster prevention **"the thought of SABO"**.

〇The Stage of DME

- **First stage (Goal):** The **IWSRE** implements the DME at all primary and secondary schools in the prefecture **in cooperation with** school teachers.
- **Second stage (Overall Goal): School teachers** implement the DME **under the support** of the IWSRE.
- **Third stage (Super Goal): School teachers** implement the DME **by themselves.**

The first stage DME has been placed **in annual educational plan** and has launched at **all primary and secondary schools in Hidakagawa town** (Fig.1).
And at Ichinono primary school, **school teachers** try to implement the second stage DME (Fig.2) **under the support of the IWSRE**.

Fig.1 The first stage DME at Sougawa-Daiichi primary school

Fig.2 The second stage DME at Ichinono primary school

2. Ideas of DME conducted by the IWSRE

- **Sustainable DME** based on **systematic educational plan** in response to the stage of a school year
- **Practical study** such as experimental learning, model experiment (Fig.3), field observation at construction site, etc. (Fig.4)
- **Group work** to think evacuation by students and to exchange their opinions
- **Development and introduction** of the **new educational contents** using digital technology (Fig.5)
- **Discussion** with school teachers **in advance** over educational contents and classes

Fig.3 Model experiment

Fig.4 Field observation

3. DME at Ichinono primary school

Ichinono primary school suffered **severe damage in 2011** (Fig.6).

↓

The school decided to evaluate the DME and hometown education **as a comprehensive learning subject** in an **annual educational plan**.

↓

The school teachers made a **curriculum of the DME** for each grade and carry out the DME continuously **under the support of the IWSRE**.

↓

The teachers of Ichinono primary school **established the Disaster Prevention Day of Ichinono primary school (DPDI)** to learn about the disaster prevention with their **families and residents** every year (Fig.7).

Fig.5 New educational digital contents

4. Development of the future DME

The IWSRE thinks that **"collaboration" with concerned agencies** and **"sustainability" of the enforcement system** will be keywords for developing the future DME.

- **The Actions for developing the future DME**

① **Construction of the organized enforcement system**
② **Annual educational plan of each school**
③ **Improvement of recognition about the DME**
④ **Construction of the consultation system**
⑤ **Development of evaluation method (Fig.8)**

Fig.6 Disaster by typhoon TALAS

Fig.7 The DME workshop on DPDI

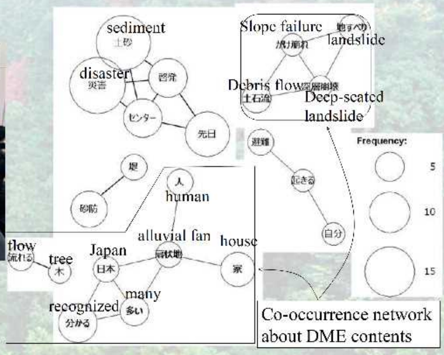


Fig.8 An example of the evaluation of learning effect with word co-occurrence network

IWSRE HP →

YouTube Channel →

➢ **Case Study of Interpolation Method of Missing River Stage of Mountainous Flash Floods Based on Microseismical Monitoring Network**（地震観測網の微小振動データからの山地河川洪水時の欠測推移の補完に関する事例研究）

○ポスター

Case Study of Interpolation Method of Missing River Stage of Mountainous Flash Floods Based on Microseismical Monitoring Network

Kazuo Tsutsui[1], Yuta Tanida[2], Akito Nakata[3], Gaku Kitamoto[4], Osamu Tsujihara[3], Soichi Kaihara[2], Atsuhiko Kinoshita[4], Hiroaki Nakaya[5]

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Introduction

In mountainous areas, as flash floods cause destruction in the case they overflow channel banks. Some types of instruments are used to measure the water level. But they are installed inside the channel. They are sometimes destroyed. We tried to develop a method to interpolate missing peak river stage by using the data of high sensitivity seismograph network(Hi-net) built in Japan.

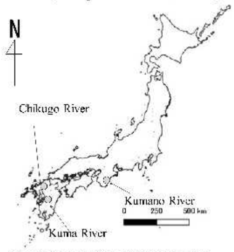

Figure 1: Location of three basins

Figure 4: Map of water level, Hi-net, rainfall stations at Kuma River Basin

Figure 2: Example picture of water level station (Nachi river in Wakayama Prefecture)

Figure 3: Location map of Hi-net

Figure 5: Map of water level, Hi-net, rainfall stations at Kumano River Basin

Figure 6: Map of water level, Hi-net, rainfall stations at Chikugo River Basin

Methods

Investigated three flood events
・Kuma River Basin : 3–19 July 2020
・Kumano River Basin : 30 August – 6 September 2011
・Chikugo River Basin : 5–17 July 2020

Regression equaiton

$$WL(i) = a \times RMS(t) + b$$

WL : one-hour water level
a, b : control parameters

$$RMS(i) = \sqrt{\frac{1}{N}\sum_{j=0}^{N-1} y(i,j)^2}$$

y : velocity value of j-th at i minute (several band-pass filter attempted)
N : number of samples in one minute

Table 1: Best fit a and b values for each event and water level station

Event	Water level station	Control parameter a	Control parameter b
Kuma river	Oono	1.52×10^8	-1.03
	Hitoyoshi	5.03×10^7	-1.12
	Fukada	4.93×10^7	6.28
	Ichibu	6.12×10^7	-1.43
	Taraki	8.44×10^7	-1.40
	Watari	1.13×10^8	-2.14
Kumano river	Akebono	2.93×10^7	-0.67
	Narukawa	5.60×10^7	-1.09
	Ouga	9.27×10^7	-1.17
Chikugo river	Arase	1.92×10^8	1.45
	Esonoshuku	1.65×10^8	-1.51
	Kobuchi	1.72×10^8	1.44

Results and Discussion

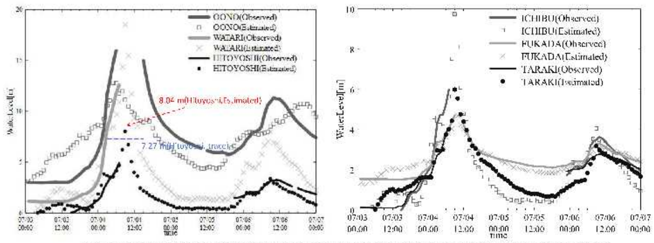

Figure 7: Time-series profile of observed and estimated water level at Kuma River Basin
(a) Oono, Watari, Hitoyoshi (b) Ichibu, Fukada, Taraki

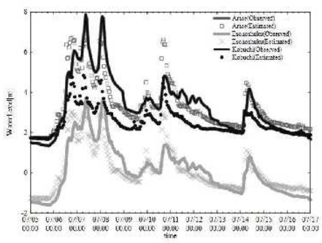

Figure 8: Time-series profile of observed and estimated water level at Chikugo River Basin

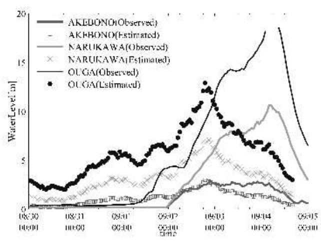

Figure 9: Time-series profile of observed and estimated water level at Kumano River Basin

Table 2: NSE coefficients

Event	Water level station	NSE
Chikugo river	Arase	0.80
	Esonoshuku	0.80
	Kobuchi	0.48

Conclusions

・The best fit estimated water level was 8.04 m and trace level was 7.27 m at Kuma River event.
・1–2 Hz band-pass filter showed the best correlation.
・Hi-net station nearby the seacoast showed worse correlation at Kumano River event.
・At Chikugo River event , NSE coefficient was 0.80.

References

Takezawa et al. : Study on characteristics of ground vibration during times of flooding in mountainous rivers, 2013
Tsutsui et al. : Estimation of missing river water level value during flood based on the analysis of ambient seismic data. 2021
Shakti P.C. and Kaoru Sawazaki: River discharge prediction for ungauged mountainous river basins during heavy rain events based on seismic noise data