"Big City Challenges on Geo-hazard and Geo-resources"

We invited research papers in the topic of geohazard and georesources. But not limited to research papers of basic geology, applied geology, geophysics, geochemistry, engineering geology, geo-environmental engineering and any related geoscience.

Further information, visit us at https://icgoes.geologi.ugm.ac.id/

Published under licence by IOP Publishing Ltd
Preface
International Conference on Geological Engineering and Geosciences
ICGoES 2021

International Conference on Geological Engineering and Geosciences (ICGoES 2021) presents ‘Big City Challenges on Geohazard and Georesources’ as the main conference theme. This conference provides a forum for international researchers, academics, practitioners, policymakers and related communities to discuss, share and exchange their latest research and experience progress associated with the field of geological engineering and geosciences. In addition, this conference also aimed to address a common issue of georesources sustainability, renewable energy sources and climate change-related geohazard and disasters in the development of urban areas. Certainly, those issues require an integrated approach and collaborative efforts in particular to build and enhance resilient cities in the respective countries.

ICGoES 2021 provides opportunities to all participants in expanding their network, as an important step to achieve a coordinated approach and interdisciplinary collaboration at the regional and international level in the field of geological engineering and geosciences. We invited research papers on the topic of geohazard and georesources; but not limited to research papers, recent cases, and in-depth reviews of basic geology, applied geology, geophysics, geochemistry, engineering geology, geo-environmental engineering and any related geoscience.

Due to the COVID-19 pandemic situation during the year, it is not easy to hold a regular conference in a specific place. There were travel restrictions and regulations from the World Health Organization and the Indonesian Government to be complied with to cut the spread of the COVID-19 virus in terms of physical distancing. In this uncertain condition, the ICGoES should not be postponed since participants have arranged to address their research findings at this conference. Thus, the committees of ICGoES have decided to switch the conference format into a virtual meeting using ZOOM.

The ICGoES 2021 is held online from 16 to 18 March 2021 and managed by the Department of Geological Engineering, Faculty of Engineering, Universitas Gadjah Mada, Yogyakarta, Indonesia. This virtual international conference invites reputable researchers from all over the world such as Japan, Germany, USA, France, Vietnam, Thailand, Myanmar, Malaysia, Laos, Nepal, UK and the Czech Republic, as our scientific committee and reviewers. As the call of full paper was announced on 15 October 2020, up to 19 February 2021, this conference has attracted more than 70 papers and posters submitted to the EasyChair Submission System. After being reviewed, the scientific committee has selected around 63 papers and posters from diverse countries such as Japan, Germany, Myanmar, France, and Indonesia, to be presented at this conference.

During the plenary session of the conference, we were pleased to welcome five distinguished experts to share their experience and present their insightful keynote speech, that is:

- Prof. Junji Kiyono from Kyoto University, Japan with presentation title ‘Toward the construction of a long period earthquake early warning system in Bangkok’,
- Prof. Dwikorita Karnawati, Head of Indonesian Agency for Meteorology, Climatology and Geophysics (BMKG), Indonesia with presentation title ‘Earthquake and Tsunami Mitigation in Yogyakarta International Airport, Indonesia’,
- Prof. J. Ramon Arrowsmith from Arizona State University, USA with presentation title ‘Sharpening our view of active faults’,
- [Additional details about the other experts can be added here]
Prof. Koichiro Watanabe from Kyushu University, Japan with presentation title ‘Twenty years research collaboration on georesources between UGM and Kyushu University with expansion to Asia-Africa georesources research network’, and

Prof. Thomas R. Rüde from RWTH Aachen University, Germany with presentation title ‘Water for Big Cities – the challenge between local wells and centralized water supply from rural areas.’

Following the plenary sessions, we held panel discussions with Geohazard Focus of ‘The role of academics in building resilient cities’ on the first day, and Georesources Focus of ‘Academic collaboration for sustainable development of georesources’ on the third/last day of the conference. We divided into 15 parallel sessions for participants to present their research covering the following topics: methods and advances in petroleum and coal geology (2 sessions), anthropogenic geology and environmental degradation (1 session), methods and advances in economic geology (1 session), seismic hazards (1 session), advances in geology and geomorphology (1 session), methods and advances in applied geophysics (1 session), applied geophysics for urban areas (1 session), advance methods in hydrogeology (2 sessions), advances in hazard mitigation (1 session), methods in petrology and petrogenesis (1 session), progress in unconventional georesources (1 session), progress in volcanology and geothermal (1 session), and machine learning in geological engineering and geosciences (1 session).

Each parallel session consisted of 4-5 presenters, 1 moderator, 1 timekeeper and 1 technician. An allocation time of 12 minutes maximum for presentation followed by 3 minutes for Q&A session was given to each presenter. Presenters were allowed to submit the recording of the presentation 2 days before the actual schedule if they were not sure about the internet connection. However, during the record is play, the presenter must be still attending live for the following Q&A session.

The ICGoES 2021 virtual conference was technically run very well and smoothly via ZOOM online system by Universitas Gadjah Mada, attended by more than 185 participants in total. No major technical issue from the host side, keynote speakers, as well as participants during the conference. Most of the participants did their presentations live, engaged throughout plenary, panel discussion and parallel sessions. Feedbacks, comments and questions from participants in all sessions were very positive and constructive. The post-conference in-depth review was carried out to refine all papers. Authors were asked to revise their paper according to suggestions and comments from reviewers and considering all constructive inputs and feedbacks during the conference. About 52 papers received final decision to be accepted and submitted for publication into the IOP Conference Series: Earth and Environmental Science.

We would like to acknowledge all of those who supported the ICGoES 2021. We would like to express our sincere gratitude to all scientific committees who made in-depth reviews of full papers, to sponsors who give their support, and to each individual and institutional help that is very important for the success of this conference. Thank you to all the organizing committee and related parties who built this virtual conference feasible and successful.

We are hopeful that the proceedings will serve as important references which will lead not only to scientific research and academic purposes but also in practical, industry and policy aspects associated with the field of geological engineering and geosciences.

Best regards,

Hendy Setiawan, Ph.D.
Chairman of the ICGoES 2021
Universitas Gadjah Mada
List of Committees

Editorial Board
Prof. Tsutomu Sato (Hokkaido University, Japan)
Univ.-Prof. Dr. Klaus Reichert (RWTH Aachen University, Germany)
Prof. Yasuo Miyabuchi (Kumamoto University, Japan)
Prof. Dr. Ir. Subagyo Pramumijoyo, DEA. (Universitas Gadjah Mada, Indonesia)
Prof. Ir. Teuku Faisal Fathani, S.T., M.T., Ph.D. IPU. (Universitas Gadjah Mada, Indonesia)
Prof. Dr. Myo Thant, University of Yangon, Myanmar
Dr. Patrick Lachassagne, Université de Montpellier, France
Pipat Laowattanabandit, Ph.D., Chulalongkorn University, Thailand
Dr. Nguyen Bach Thao, Hanoi University of Mining and Geology, Vietnam
Assoc. Prof. Ir. Dr. Mohd Ashraf Mohamad Ismail, Universiti Sains Malaysia, Malaysia

Advisory Boards
Prof. Dr. Ir. Subagyo Pramumijoyo, DEA. (Universitas Gadjah Mada, Indonesia)
Ir. Muhammad Waziz Wildan, M.Sc., Ph.D. (Universitas Gadjah Mada, Indonesia)
Dr.rer.nat. Ir. Heru Hendrayana, IPU. (Universitas Gadjah Mada, Indonesia)
Dr. Ir. Agung Harijoko, S.T., M.Eng., IPM. (Universitas Gadjah Mada, Indonesia)

Scientific Committee
Prof. Tsutomu Sato (Hokkaido University, Japan)
Prof. Toshifumi Igarashi (Hokkaido University, Japan)
Prof. Klaus Reichert (RWTH Aachen University, Germany)
Prof. Dr. Ir. Subagyo Pramumijoyo, DEA. (Universitas Gadjah Mada, Indonesia)
Prof. Ir. Teuku Faisal Fathani, S.T., M.T., Ph.D., IPU. (Universitas Gadjah Mada, Indonesia)
Prof. Amanda Clarke (Arizona State University, USA)
Prof. Dr. Myo Thant (University of Yangon, Myanmar)
Prof. Dr. Su Su Kyi (University of Yangon, Myanmar)
Prof. Yasuo Miyabuchi (Kumamoto University, Japan)
Prof. Masahide Matsumura (Kumamoto University, Japan)
Dr. Patrick Lachassagne (University of Montpellier, France)
Assoc.Prof. Dr. Ir. Mohd Ashraf Mohamad Ismail (Universiti Sains Malaysia)
Dr. Nguyen Bach Thao (Hanoi University of Mining and Geology, Vietnam)
Dr. Pipat Laowattanabandit (Chulalongkorn University, Thailand)
Dr. Phetnakhone Xaixongdeth (National University of Laos)
Dr. Rishi Parajuli (University of Bristol, UK)
Dr. Afikah Rahim (Universiti Teknologi Malaysia)
Dr. Basanta Raj Adhikari (Tribhuvan University, Nepal)
Dr. Jan Klimeš (The Czech Academy of Sciences, Czech Republic)
Dr. Has Baator (Asia Air Survey, Co. Jp., Japan)
Claude Thielen, M.Sc. (RWTH Aachen University, Germany)
Sara Pena Castellnou, M.Sc. (RWTH Aachen University, Germany)
Prof. Dr. Sugeng Sapto Suryono, S.T., M.T., IPU. ASEAN.Eng. (Universitas Gadjah Mada, Indonesia)
Dr.rer.nat. Ir. Wayan Warmada, IPM. (Universitas Gadjah Mada, Indonesia)
Dr. Ir. Ferian Anggara, S.T., M.Eng. IPM. (Universitas Gadjah Mada, Indonesia)
Dr.rer.nat. Wiwit Suryanto. (Universitas Gadjah Mada, Indonesia)
Dr.Eng. Ir. Agung Setianto, S.T., M.Si., IPM. (Universitas Gadjah Mada, Indonesia)
Dr. Ir. Agung Harijoko, S.T., M.Eng., IPM. (Universitas Gadjah Mada, Indonesia)
Dr.Eng. Ir. Wawan Budianta, S.T., M.Sc., IPM. (Universitas Gadjah Mada, Indonesia)
Dr.rer.nat. Ir. Arifudin Idrus, S.T., M.T., IPU. (Universitas Gadjah Mada, Indonesia)
Dr.Eng. Ir. Wahyu Wilopo, S.T., M.Eng., IPM. (Universitas Gadjah Mada, Indonesia)
Ir. Pri Utami, M.Sc., Ph.D., IPM. (Universitas Gadjah Mada, Indonesia)
Ir. Jarot Setyowiyoto, M.Sc., Ph.D., IPM, ASEAN.Eng. (Universitas Gadjah Mada, Indonesia)
Dr.Eng. Ir. Lucas Donny Setijadji, S.T., M.Sc., IPU. (Universitas Gadjah Mada, Indonesia)
Ir. Salahuddin, S.T., M.Sc., Ph.D., IPM. (Universitas Gadjah Mada, Indonesia)
Ir. I Gde Budi Indrawan, S.T., M.Eng., Ph.D., IPM. (Universitas Gadjah Mada, Indonesia)
Dr.Eng. Ir. Akmuluddin, S.T., M.T. (Universitas Gadjah Mada, Indonesia)
Dr.Eng. Ir. Didit Hadi Barianto, S.T., M.Si., IPM. (Universitas Gadjah Mada, Indonesia)
Dr. Sarju Winardi, S.T., M.T. (Universitas Gadjah Mada, Indonesia)
Dr.rer.nat. Mochamad Nukman, S.T., M.Sc. (Universitas Gadjah Mada, Indonesia)
Dr.rer.nat. Ade Anggraeni, S.Si., M.T. (Universitas Gadjah Mada, Indonesia)
Dr.rer.nat. Herlan Darmawan, S.Si., M.Sc. (Universitas Gadjah Mada, Indonesia)
Karlna, S.T., M.Eng., Ph.D. (Universitas Gadjah Mada, Indonesia)
Dr.Eng. Guru Sudharma, S.Si., M.Sc. (Universitas Gadjah Mada, Indonesia)
Dr.Sc. Andung Bayu Sekaranom, S.Si., M.Sc. (Universitas Gadjah Mada, Indonesia)
Dr. Ani Hairani, S.T., M.Eng. (Universitas Muhammadiyah Yogyakarta, Indonesia)
Ir. Moch. Indra Novian, S.T., M.Eng. (Universitas Gadjah Mada, Indonesia)
Hidayat Panuntun, S.T., M.Eng., D.Sc. (Universitas Gadjah Mada, Indonesia)
Rahmat Hidayat, S.T., M.Eng. (Universitas Gadjah Mada, Indonesia)
Indra Arifianto, S.T., M.Eng. (Universitas Gadjah Mada, Indonesia)
Kartika Palupi Savitri, S.T., M.Sc. (Universitas Gadjah Mada, Indonesia)
Yan Restu Freski, S.T., M.Eng. (Universitas Gadjah Mada, Indonesia)

Organizing Committee
Department of Geological Engineering, Faculty of Engineering, Universitas Gadjah Mada, Indonesia
Chairman : Hendy Setiawan, S.T., M.Eng., Ph.D.
Co-Chairman : Esti Handini, S.T., M.Eng., D.Sc.
Secretary : Wita Dyaswati, A.Md.
Maya Kristine Kusumaningtyas, S.Psi.
Suci Dandi Pertwi, S.Fil.
Treasurer : Monika Anggraeni Pamungkassari, A.Md.
Member : Dr.rer.nat. Ir. Doni Prakasa Eka Putra, S.T., M.T., IPM.
Ir. Anastasia Dewi Titisari, M.T., Ph.D., IPU.
Dr.Eng. Ir. Donatus Hendra Amijaya, S.T., M.T., IPM.
Ir. Nugroho Imam Setiawan, S.T., M.T., D.Sc., IPM.
Ir. Gayatri Indah Marliyani, S.T., M.Sc., Ph.D. IPM.
Dr. Haryo Edi Wibowo, S.T., M.Sc.
Fahmi Hakim, S.T., M.Sc.RWTH.
Creative Team : Rocky Tirajean Sembiring, Antonius Chandra Widihermawan, A.Md.,
Fransiska Noralita, A.Md., Riyantono, Widyatmoko,
Eko Hendrawan Arianto, Bagus Wijaya, S.IP., Paulus Winarno, S.Pd.,
Ghiffary Riza Ramadhan, Bela Islamadina, Dewi Sintia Reka,
Fenta Dhia Ayu Prameswari, Zulfa Nurul Azizah Saifudin, and Asep Kuswara.
Conference Photos

Opening Speech, Dean of Faculty of Engineering, Universitas Gadjah Mada

Master of Ceremony of ICGoES 2021 during Plenary Session

Keynote Speech: Prof. Dwikorita Karnawati, Head of Indonesian Agency for Meteorology, Climatology and Geophysics (BMKG), Indonesia

1st Panel Discussion with Geohazard Focus: The Role of Academics in Building Resilient Cities

Parallel Session Speech: Vanessa Steinritz from RWTH Aachen University, Germany

Parallel Session in the topic of Advances in Hazard Mitigation

Parallel Session Speech: Bidhya Subedi from Kyoto University, Japan

Luncheon Talk with Topic: Borderless Geology and Geoscience in the face of Changing Earth
Photo Session during the Conference

Parallel session in the topic of Methods and Advances in Petroleum and Coal Geology

Keynote Speech: Prof. Dr. Thomas R. Rüde from RWTH Aachen University, Germany

Keynote Speech: Prof. Koichiro Watanabe from Kyushu University, Japan

2nd Panel Discussion with Georesources Focus: Academic Collaboration for Sustainable Development of Georesources

Dr. Ferian Anggara as panelist in the Discussion of Sustainable Development of Georesources

Closing Speech, Head of Departement of Geological Engineering, Universitas Gadjah Mada

Closing and Announcement for Post-Conference Review and Publication Process