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International Symposium on Earth Resources Management and Environment

Symposium Proceedings

Jointly organized by

Division of Sustainable Resources Engineering
Faculty of Engineering
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University of Moratuwa
Sri Lanka

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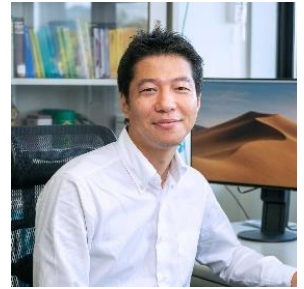
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Message from the Symposium Chair

Professor Tsubasa Otake

Head/ Division of Sustainable Resources Engineering

Hokkaido University



We, the faculty members and staff of the Division of Sustainable Resources Engineering at Hokkaido University are honored to host the 8th International Symposium on Earth Resources Management and Environment (ISERME 2024), which is jointly organized by our division and the Department of Earth Resources Engineering at the University of Moratuwa, Sri Lanka. Since its inception in 2017, ISERME has been held annually, alternating between Hokkaido University and the University of Moratuwa, overcoming challenges like those posed by the COVID-19 pandemic. We have now established a hybrid format (both in-person and online) to ensure that many participants, including undergraduate and graduate students from both universities, can actively engage in the symposium.

The symposium covers a wide range of topics in earth resources engineering, including exploration geology, mineral processing and hydrometallurgy, rock mechanics, environmental and water management, and the application of machine learning to mining engineering. I firmly believe that this symposium offers an excellent opportunity for all participants to not only delve deeper into their research but also broaden their academic horizons and expand their global networks. In particular, I encourage students to interact with researchers with diverse expertise, as this may spark new ideas and solutions to the complex issues we face globally. I extend my gratitude to all the organizers for making this symposium possible and to the Faculty of Engineering at Hokkaido University for their financial support.

As the symposium chair, I wish all participants an enjoyable and productive experience at ISERME 2024.

2nd September 2024

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Keynote Address

Professor Youhei Kawamura

Division of Sustainable Resources Engineering

Graduate School of Engineering

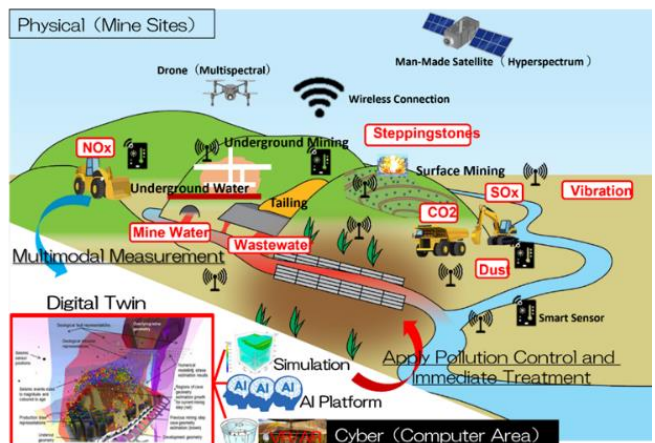
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Environmentally Harmonious Mining System Utilizing Knowledge from Inactive and Abandoned Mine Management -SATREPS Project for Kazakhstan-

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The development of underground resources such as rare metals is essential to the realization of a decarbonized society. On the other hand, environmental destruction, such as carbon emissions and groundwater pollution from mining operations themselves, is a serious problem on a global scale. Kazakhstan is a resource-rich country with a wealth of underground resources, including rare metals, but its mining operations are causing environmental destruction. A sustainable mining development system that does not cause environmental destruction in Kazakhstan is indispensable for industrial development and improvement of the quality of life of the people. This research aims to contribute to the realization of a decarbonized society and measures against environmental destruction, which should become the norm for the global mining industry, through the construction and diffusion of a super-managed, environmentally conscious mine development system that utilizes smart mining technology and mine environment management technology in which Japan has an advantage. First, (1) environmental monitoring based on field surveys and various multimodal measurements will be conducted to establish a comprehensive environmental assessment method. Next, (2) Digital Twin will be implemented in the computer domain through digitization of information, including network development. By using a digital twin interface to “visualize” the environment and operations, search for environmental pollution hot spots, and utilize AI, an IoT platform will be built to identify pollution models, assess environmental risks, and propose countermeasures and mining methods. (3) Based on the findings, immediate measures to deal with pollution control are taken on site in a cycle. Finally, (4) the institutional design for the diffusion of the system. In collaboration with stakeholders, the project will communicate the “state” of the target mine to the world, publicize its usefulness and promising, industrialize the system, create jobs, and develop a system plan, including a funding scheme, for the mine.



Keynote Address

Dr. S. P. Chaminda

Head /Department of Earth Resources Engineering

Faculty of Engineering

University of Moratuwa, Sri Lanka



Geospatial Technology for Better Decision-Making and Planning

In an era marked by rapid urbanization, climate change, and complex socio-economic challenges, the demand for precise, data-driven decision-making has never been more critical. Geospatial technology, encompassing Geographic Information Systems (GIS), remote sensing, and spatial analytics, has become a pivotal tool in transforming our understanding, interpretation, and interaction with the world. This keynote addresses the revolutionary impact of geospatial technology on decision-making and planning across various sectors. Future urban planning stands to benefit immensely from geospatial technology through optimized land use, smart infrastructure development, and enhanced environmental management. In disaster management, advancements in geospatial technology will improve our ability to predict, prepare for, and respond to natural hazards with greater accuracy. The agriculture sector will witness significant improvements in precision farming, resource management, and crop monitoring. Integration with cutting-edge technologies such as artificial intelligence (AI), machine learning (ML), and the Internet of Things (IoT) will further enhance the capabilities of geospatial technology, enabling real-time data analysis and predictive modeling. This convergence will empower organizations to achieve higher accuracy, efficiency, and transparency in their decision-making processes. Despite challenges related to data quality, accessibility, and privacy concerns, the ongoing innovation and increasing adoption of geospatial technology hold the promise of revolutionizing decision-making and planning processes. This keynote will inspire participants to harness these technologies, fostering a more informed, resilient, and sustainable future planning and decision-making.