



LSGS & RILS RESEARCH SEMINAR

From Arctic Change to Mid-Latitude Extremes: Integrating Satellite Observations, Geospatial Big Data, and Explainable AI

📅 27 OCT 2026 (TUE)

🕒 15:30 - 16:30

📍 DE304 , POLYU

🌐 ENGLISH

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ABSTRACT

Rapid advances in satellite remote sensing, geospatial big data, and artificial intelligence (AI) are transforming our ability to observe, analyze, and understand complex climate and environmental processes. However, translating large volumes of Earth observation data into reliable scientific knowledge remains challenging because environmental phenomena involve nonlinear interactions, heterogeneous spatial and temporal scales, and complex physical mechanisms.

This seminar introduces an integrated research framework combining satellite observations, ground-based measurements, atmospheric reanalysis, geospatial analysis, machine learning (ML), and explainable artificial intelligence (XAI). The presentation highlights how these complementary approaches can be used to investigate atmospheric aerosols, air quality, climate variability, and extreme environmental events.

Particular attention is given to the integration of satellite-derived environmental information with data-driven models and physical diagnostics. As a recent case study, the unprecedented 2025 water crisis in Gangneung, South Korea, is examined using Landsat imagery, surface meteorological observations, reservoir records, atmospheric reanalysis, and XAI. The analysis illustrates how multiscale geospatial information can help characterize acute drought conditions, identify atmospheric circulation anomalies, and investigate potential relationships between regional environmental extremes and high-latitude atmospheric variability.

The seminar also discusses the scientific opportunities and limitations of AI-based environmental analysis, emphasizing model interpretability, physical consistency, uncertainty, and the distinction between statistical associations and causal mechanisms.

Keywords: Satellite Remote Sensing; Geospatial Big Data; Climate and Environmental Change; Machine Learning; Explainable AI; Atmospheric Aerosols; Extreme Events

BIOGRAPHY

Professor Kwon-Ho Lee is a Professor in the Department of Atmospheric and Environmental Sciences at Kangwon National University, Republic of Korea. He graduated from Korea University in 1999 and received his MSc. and Ph.D. from the Gwangju Institute of Science and Technology (GIST) in 2005. He conducted research associate at the University of Maryland, USA, until 2009.

His research interests include environmental remote sensing, air quality, climate change, geospatial data analysis. His recent research investigates GeoAI aided carbon research, AI based remote sensing, and potential connections between high-latitude environmental changes and mid-latitude climate extremes. He aims to integrate Earth observations, atmospheric reanalysis, and AI-based approaches to advance the understanding of complex environmental processes and climate-related risks.

Moderator:

Prof. Sr Prof. Charles Man Sing WONG, Associate Dean of FCE, Professor of LSGS, member of RILS

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