Editorial: Methods and applications in environmental informatics and remote sensing

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Editorial on the Research Topic
Methods and applications in environmental informatics and remote sensing

We are living in an era where environmental science demand innovative approaches and cutting-edge technologies. Environmental informatics and remote sensing have emerged as powerful tools in this regard, revolutionizing our understanding of the environment and providing valuable insights for sustainable management. In this editorial, we are thrilled to introduce a topic dedicated to exploring the methods and applications in environmental informatics and remote sensing, shedding light on the latest advancements and showcasing their transformative potential.

The field of environmental informatics has witnessed significant advancements, fueled by rapid developments in information technology, data science, and computational modeling. Many studies related to environmental science, such as atmosphere (Zhang, et al., 2021), water (Zhang, et al., 2023), soil and forest, *etc.*, are being deeply changed. This Research Topic aims to capture the latest methodologies and techniques that leverage these advancements to address complex environmental issues. From novel algorithms from data processing and fusion (Liu et al., 2022a) to advanced machine learning approaches, especially deep learning (Liu et al., 2022b), this issue delves into the state-of-the-art methods driving progress in environmental informatics. Simultaneously, remote sensing has experienced remarkable growth, propelled by the advent of high-resolution satellite imagery, unmanned aerial vehicles (UAVs), and other technological breakthroughs. These advancements have enabled scientists to monitor and analyze the Earth's surface in unprecedented detail, uncovering crucial information about land cover changes, habitat degradation, climate patterns, and more. The Research Topic explores the diverse applications of remote sensing in environmental research, highlighting its role in driving informed decision-making and sustainable environmental management.

With this topic on environmental informatics and remote sensing, we try to introduce the latest theory and methods of applying remote sensing technology to environmental science. It contains eight papers that demonstrate the latest research to advance the science in research areas such as forest, surface water, air pollutants, land degradation, *etc.*

Forests remain perhaps one of the most relevant issues in the field of environmental information. Three of the papers are related to forests. Guo et al. present a forest cover map

generation for the Qinghai-Tibet Plateau based on a multisource dataset and the random forest algorithm. The paper discusses the methodology and highlights the importance of accurate forest mapping for ecological studies and conservation planning. The study contributes to a better understanding of the forest dynamics in this region. Xiao et al. present a temporal-based forest disturbance monitoring analysis using a case study of nature reserves in Hainan Island, China, from 1987 to 2020. The paper discusses the impacts of various disturbances on the island's forests and proposes effective monitoring strategies. The findings contribute to better understanding forest dynamics and conservation efforts. Cárdenas et al. propose a method for reconstructing tree branching structures using UAV-LiDAR data. The study focuses on developing a reliable and efficient approach to extract detailed tree information. The research has implications for ecological studies and forestry management, enabling accurate characterization of tree structures.

Surface water is also an important field of environment research based on remote sensing. Wang et al. compare the retrieval of phycocyanin concentrations in Chaohu Lake, China, using MODIS and OLCI images. The study focuses on assessing the accuracy and reliability of different remote sensing data for monitoring water quality. The research provides valuable information for effective environmental monitoring and management of freshwater bodies. Li et al. conducted a case study on the eco-environmental changes in typical coastal zones of southern China, specifically Guangdong coastal counties, from 1987 to 2020. The paper explores the transformations in the coastal areas and discusses their implications. The study provides valuable insights into the environmental dynamics of this region.

We also have two papers about air pollutants and land degradation, which are also questions at the heart of environmental information science. Wu explores the spatio-temporal heterogeneity and relationships of six criteria air pollutants in China using a tri-clustering-based approach and Li et al. investigate the extraction of rocky desertification information in karst areas using multispectral sensor data and multiple endmember spectral mixture analysis. There is other study on spatial pattern of scenic spots, such as Zhu et al. developed a simulation method combining optimal scale and deep learning to analyze the spatial pattern of scenic spots, which contributes to enhancing the planning and management of scenic areas.

The Research Topic on "*Methods and Applications in Environmental Informatics and Remote Sensing*" promises to be a platform for interdisciplinary research and collaboration, highlighting the latest advancements and breakthroughs in these fields. By bringing together scientists, technologists, and environmental practitioners, this topic advances our understanding of the environment. The researchers from around the world contributed their original research and shared their valuable insights, thereby shaping a better future for our planet through the power of environmental informatics and remote sensing.

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Conflict of interest

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