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Author: Mr. Ayush Harish Kumar
Amity University, Dubai, United Arab Emirates

Ms. Sathiyagayathiri Subramanian
Amity University, Dubai, United Arab Emirates
Mr. Sarath Raj Nadarajan Syamala
Amity University, Dubai, United Arab Emirates
Mr. Yash Pradeep Dhake
College Of Engineering , Pune, India

COMPREHENSIVE RISK ASSESSMENT AND MAPPING OF MULTI-HAZARD VULNERABILITIES IN VANUATU ISLAND USING GOOGLE EARTH ENGINE AND REMOTE SENSING TECHNIQUES

Abstract

This study aims to conduct a comprehensive multi-hazard risk assessment and mapping for Vanuatu Island, located in the Oceania region. Utilizing Google Earth Engine and multispectral satellite imagery from Landsat and Sentinel platforms from the years 2014-2024, the research employs advanced remote sensing techniques. The methodology involves meticulous data collection, pre-processing, and application of sophisticated algorithms for extracting pertinent information related to natural disasters such as earthquakes, landslides, and floods. Satellite imagery undergoes rigorous radiometric and geometric correction, ensuring accurate analysis. Advanced image processing techniques, including change detection and classification algorithms, are implemented to derive critical information on terrain stability, land cover changes, and hydrological characteristics. Integration of high-resolution elevation models further enhances the precision of landslide susceptibility assessments. The resulting spatially explicit risk maps depict the distribution of multi-hazard vulnerabilities across Vanuatu Island. These maps serve as a valuable tool for policymakers, emergency responders, and stakeholders, facilitating informed decision-making in disaster preparedness, land-use planning, infrastructure development, and resource allocation. The spatial distribution of identified risks guides the prioritization of mitigation efforts, allowing for efficient resource allocation and enhanced resilience against natural hazards. This study contributes to the advancement of scientific methodologies for multi-hazard risk assessment in geographically complex regions.