Review of: "Cloud-based geospatial services for building capacity and safeguarding heritage in climatically marginal landscapes"

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Potential competing interests: No potential competing interests to declare.

This article, titled “Cloud-based geospatial services for building capacity and safeguarding heritage in climatically marginal landscapes” addresses the urgent challenges faced by communities living in extreme climatic regions in the context of climate change. The authors explore the potential of free cloud-based geospatial services, specifically Google Earth Engine, in building capacity and protecting heritage in the Yukon-Kuskokwim Delta in Alaska, USA, and Mauritania. The study presents five analytical remote sensing tools designed to address environmental concerns in these regions. The article proposes that cloud-based geospatial services can empower rural communities with limited resources to access and process spatial data, ultimately contributing to the preservation of cultural and natural heritage. Overall, the article is well-structured, highly informative, and contributes significantly to the field of heritage preservation and climate resilience.

Introduction:
The introduction provides a comprehensive overview of the challenges faced by communities living in climatically extreme regions and sets the stage for the importance of using geospatial services for heritage preservation. The authors effectively highlight the significance of these issues and the potential impact on cultural landscapes. Furthermore, the article outlines the specific study regions, which helps readers contextualize the importance of the proposed solutions. The use of credible sources and data adds credibility to the article's foundation.

Methods:
The article introduces Google Earth Engine (GEE) as the primary tool for analyzing and visualizing spatial data. The description of GEE and its features is clear and easily understandable. The authors effectively argue for the applicability of GEE in addressing heritage preservation challenges in rural areas. The use of real-world examples, such as the Alaska Native Yup'ik people's experiences and the socio-economic landscape of Mauritania, enhances the relevance of the methods.

Results:
The presentation of five automated workflows demonstrates the versatility and practicality of using GEE for heritage preservation. Each tool is carefully explained, with in-depth technical details and code examples. The decision to make these tools accessible to non-specialists in remote rural communities is commendable and aligns with the United Nations' Sustainable Development Goals. The integration of user-friendly interfaces and step-by-step instructions enhances the

reproducibility and practicality of the methods.

Discussion:
The discussion section effectively highlights the potential benefits of GEE in safeguarding heritage sites. The authors discuss how cloud-based geospatial services, combined with longitudinal satellite records and UAV imagery, can offer cost-effective and high-resolution solutions for heritage protection. The emphasis on user-owned data being processed with GEE further strengthens the argument for empowering local communities to participate actively in heritage preservation. The comparison of the challenges faced by the two study regions reinforces the universal applicability of the proposed solutions.

Conclusion:
The conclusion effectively summarizes the key findings and emphasizes the importance of cloud-based geospatial services in building capacity and safeguarding heritage in climatically marginal landscapes. The authors' call to action for the development of user-friendly software packages tailored to remote communities is well-grounded in the context of the United Nations' developmental targets. The implications of satellite-based broadband Internet on the viability of these solutions add relevance to the conclusion.

Overall, the article is well-written, informative, and provides valuable insights into the use of cloud-based geospatial services for heritage preservation in climatically marginal regions. The use of real-world examples, comprehensive explanations, and accessible tools enhances the article's readability and practicality. This work is a significant contribution to the field of geospatial technology and heritage preservation. I strongly recommend this article for publication, especially because of its potential to benefit both academia and local communities working towards safeguarding their cultural and natural heritage in the face of climate change challenges.

With kind regards,

Daniel Fernández, 27/07/2023