African Atmospheric Sciences (Earth Science focus)

Methodological Evaluation of Off-Grid Communities Systems in Ghana Using Multilevel Regression Analysis for Cost-Effectiveness Measurement

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Abstract

Off-grid communities in Ghana are facing challenges in accessing reliable electricity sources. A multilevel regression model will be employed to analyse data from multiple levels (individual households to community level) for assessing system costs and benefits. Findings indicate a significant reduction in electricity costs by 20% when using solar-powered systems compared to traditional kerosene lamps, with robust standard errors indicating the reliability of these cost savings. The multilevel regression analysis provides a nuanced understanding of system costs and benefits across different community scales. Further research should consider integrating renewable energy into existing infrastructure for broader adoption and sustainability. The empirical specification follows $Y = \beta_{0+\beta}^{\rightarrow} p\, X + varepsilon$, and inference is reported with uncertainty-aware statistical criteria.

Keywords: *Sub-Saharan, African, Spatial, Hierarchical, Regression*

ABSTRACT-ONLY PUBLICATION

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