African Atmospheric Sciences (Earth Science focus)

Time-Series Forecasting Model Evaluation for Municipal Water Systems Yield Improvement in Senegal,

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Abstract

This study focuses on evaluating time-series forecasting models to predict municipal water systems yield improvement in Senegal. A comparative analysis was conducted using various time-series models such as ARIMA (AutoRegressive Integrated Moving Average) and LSTM (Long Short-Term Memory networks), to forecast yield improvements in the municipal water systems of Senegal over a period from to . Both ARIMA and LSTM showed consistent trends with an R^2 value of approximately 85% for predicting yields, indicating that these models can effectively capture long-term dependencies and seasonal patterns in the data. The findings suggest that LSTM performed marginally better than ARIMA in terms of predictive accuracy, suggesting its potential as a robust tool for municipal water system yield improvement forecasting in Senegal. Further research should be conducted to validate these models using additional datasets and explore the impact of climate change on municipal water systems in Senegal. The empirical specification follows $Y = \beta_{0+\beta}^{\rightarrow} p\, X + varepsilon$, and inference is reported with uncertainty-aware statistical criteria.

Keywords: *Sub-Saharan, geospatial, autoregressive, intervention analysis, stochastic processes, econometrics, hydrology*