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**Comparative Analysis of Rainfall Data Sources in Agro-Ecological Zones of Sri Lanka:
Expensive Meteorological Measurements vs Freely Available NASA Data**

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Abstract

Rainfall information contributes significantly to weather-related research as it can be directly applied to many theories and models such as climate change, disaster management, environmental assessments. Therefore, the availability of long-term meteorological data and their accuracy are crucial. At the same time the access to these data from different sources have their own drawbacks. For example, meteorological department of Sri Lanka is responsible of collecting rainfall data. However, their data are very expensive, and their data are not available for all desired locations. On the other hand, the freely available satellite data sources have a question of reliability of the data although no missing data are found. Thus, a comparative assessment of rainfall data was carried out from two distinct sources: meteorological department of Sri Lanka and freely available National Aeronautics and Space Administration (NASA) satellite-based data. The objective of this study was to compare and discern the distinctions in rainfall data obtained from these sources for the benefit of future usage of the data in various studies. The study was carried out in different agro-ecological Zones (wet, dry, and intermediate) of Sri Lanka for the period of 1981-2021. The stations were selected randomly to represent the zones. Identified missing values in the meteorological dataset were subsequently addressed using the mean imputation method. Statistical procedures were conducted on the non-normal rainfall data to identify similarities between the sources within individual agro-ecological zones. Results revealed that there is a statistically significant difference at 5% between the sources (NASA and meteorological measurements) in wet and intermediate zones. However, the comparison of the dry zone resulted in inconclusive decisions both at 5% and 1% significance levels. In conclusion, it is statistically advisable to use meteorological rainfall measurements over NASA data for the wet and intermediate zones.

Keywords: Rainfall, Agro-ecological zones, Meteorological data, NASA data, Non-normal data