

CHARACTERIZING LONG-TERM TRENDS AND ENSO-RELATED VARIABILITY OF REFERENCE EVAPOTRANSPIRATION AND ITS METEOROLOGICAL CONTROLS ACROSS LUZON, PHILIPPINES

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ABSTRACT

Reference evapotranspiration (ET_0) is an indicator of atmospheric evaporative demand and plays an important role in hydroclimatic assessment. In the Philippines, existing ET_0 research has largely focused on local-scale or rainfall-related analyses, with limited regional assessments of its long-term trends, ENSO-related variability, and meteorological controls. This study aims to characterize the long-term trends and ENSO-related variability of ET_0 and its key meteorological variables across Luzon, Philippines, and assess the relative sensitivity of ET_0 to changes in these variables. Historical meteorological observations from selected stations will be used to estimate ET_0 using the FAO-56 Penman-Monteith method. Long-term trends will be analyzed using the Mann-Kendall test and Sen's slope estimator, while ENSO-related variability will be examined through seasonal anomaly analysis using the Relative Oceanic Niño Index (RONI) to classify ENSO phases. The relative sensitivity of ET_0 to key meteorological variables will be assessed using a first-order Taylor series approximation. The results of these analyses will be interpreted together to examine the relationships between ET_0 variability and changes in its meteorological controls across different temporal scales and locations. The study is expected to provide a regional characterization of ET_0 variability and its meteorological controls across Luzon, contributing to a better understanding of atmospheric evaporative demand and providing information that may be relevant to irrigation planning, drought assessment, and water resource management.

Keywords: *Reference evapotranspiration, FAO-56 Penman-Monteith, atmospheric evaporative demand, trend analysis, ENSO, sensitivity analysis, Luzon*