Assessing the relation of tree ring width with climate variables in South Korea through multi-gridded dataset

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The Tree Ring Width (TRW) records are one of the main paleoclimate proxies that estimate the past climate variability. TRW measurements pave the way for scientists to produce sequences from various kinds of trees and reconstruct climate variables over the past years. Understanding the relation between TRW and climate variables in the past would help us analyze climate change events. This study has applied multi-gridded datasets to find the relations and model TRW data with different climate variables in South Korea's northeast. We utilized TRW data related to our case study that is available on the NOAA website; furthermore, we have checked three primary gauges, namely Agmerra (The Modern-Era Retrospective Analysis for Research and Applications), CRU TS4.03 (Climatic Research Unit Time-Series version 4.03), and APHRODITE's (Asian Precipitation-Highly-Resolved Observational Data Integration Towards Evaluation) for climate variables. In the first step, we have checked the relation between the gauges' precipitation data and observation TRW. According to the obtained efficiency criteria, CRU performed the best consequences. In the second step, we have tried to model observation TRW as a dependent variable and four climate variables of CRU (precipitation, minimum temperature, potential evapotranspiration, and diurnal temperature range) as independent ones over 1969-1998. We have created a linear regression model and determined the accurate coefficients for each climate variable. Besides, we have examined the observation TRW and modeled TRW data. The results showed that with $R^2 \approx 0.40$ and a $p\text{-}value$ of 0.0323, the regression line was linearly significant at the 95 percent significance level. It represents that our model is acceptable. We will extend our model with Artificial Intelligence methods and try to apply other TRW stations in the future step. In this way, we may produce highly accurate models and fill the gaps for future researches.