

# QUALITY ASSESSMENT OF GEDI ELEVATION DATA

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## ABSTRACT

As a new spaceborne laser remote sensing system, the Global Ecosystem Dynamics Investigation, or GEDI, is being widely used for monitoring forest ecosystems. However, its measurements are subject to uncertainties that will affect the calculation of ground elevation and vegetation height. This research intends to investigate the quality of the GEDI elevation data and its relevance to topography and land cover.

In this study, the elevation of the GEDI data is compared to 3DEP DEM, which has a higher resolution and accuracy. All the experiments in this study are conducted for two locations with vastly different terrain and land cover conditions, namely Tippecanoe County in Indiana and Mendocino County in California. Through this investigation we expect to gain a comprehensive understanding of GEDI's elevation quality in various terrain and land cover conditions.

The results show that GEDI data in Tippecanoe County has better elevation accuracy than the GEDI data in Mendocino County. GEDI in Tippecanoe County is almost four times more accurate than in Mendocino County. Regarding land cover, GEDI have better accuracy in low vegetation areas than in forest areas. The ratio can be around three times better in Tippecanoe County and around one and half times better in Mendocino County. In terms of slope, GEDI data shows a clear positive correlation between RMSE and slope. The trend indicates as slope increases, the RMSE increases concurrently. In other words, slope and GEDI elevation accuracy are inversely related. In the experiment involving slope and land cover, the results show that slope is the most influential factor to GEDI elevation accuracy.

This study informs GEDI users of the factors they must consider for forest biomass calculation and topographic mapping applications. When high terrain slope and/or high vegetation is present, the GEDI data should be checked with other data sources like 3DEP DEM or any ground truth measurements to assure its quality. We expect these findings can help worldwide users understand that the quality of GEDI data is variable and dependent on terrain relief and land cover.