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| **Data.GEO-TREES - A Global Harmonised in-situ Data Repository for Forest Biomass maps Validation** |
| Monitoring of forest biomass and its changes is critical for understanding climate and ecosystem dynamics. Recently, innovative space instruments specifically designed for this task have been launched, with more expected soon. These missions depend on ground-based estimates for calibrating algorithms and validating products. The GEO-TREES (https://geo-trees.org/) is an international cooperation to maintain a global in-situ forest biomass database to support earth observation and to encourage investment in relevant field-based observations and science. Its mission is to bridge the gap between the remote sensing (RS) community and ecological and forest inventory experts working on the ground, fostering mutual benefits.  For the RS community, GEO-TREES offers partnership with leading ecological research teams and networks that manage permanent forest plots. This collaboration aims to resolve data sharing challenges and standardize biomass data flow from individual tree measurements to plot-level aggregation. Ecologists, in turn, gain from enhanced access to global biomass data, standardized data collection protocols, identification of data gaps, and potentially increased funding opportunities to address these gaps and data deficiencies.  GEO-TREES is an inclusive initiative, inviting further collaboration from various networks and teams. Its online database, accessible for plots with author permission, includes essential information such as plot coordinates, canopy height, and above-ground biomass of trees, covering areas of 0.25 ha or larger. Larger plots are subdivided into smaller plots to capture variability in height and biomass.  Adhering to the CEOS Aboveground Biomass Land Product Validation protocol, GEO-TREES strives to establish a network of biomass reference measurement (BRM) sites. Core BRM sites are distinguished by comprehensive measurement criteria, including tree inventory across ten 1-ha permanent sample plots, airborne lidar scanning over 1,000 ha, terrestrial lidar scanning across three hectares, and the integration of weather stations and automated soil moisture monitoring.  Data.GEO-TREES database is essential for validating and calibrating satellite observations and various models. A comparison of plot biomass data with existing global and regional maps (incl. CCI Biomass, NASA JPL, ICESat-2) reveals significant uncertainties in biomass estimation, highlighting the importance of initiatives like GEO-TREES in improving the accuracy and reliability of biomass measurements.  This study is supported by the European Space Agency FRM4Biomass project (RFP/3- 18237/23/I-EF-bgh). |