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Globe-LFMC, a global dataset of destructive in-situ live Fuel Moisture Content samples

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Live Fuel Moisture Content (LFMC) is the amount of water in leaves per unit of dry matter and influences the susceptibility to wildfire. Understanding the plant water status has also important implications for assessing early drought warning in natural vegetation, determining over and under watering practices in agricultural crops and assessing forest health and pest infestation such bark beetle.
Field sampling and gravimetric methods are the most direct way to estimate LFMC. This requires in-situ destructive sampling of a representative sample of leaf material, which is then, weighed fresh, oven dried, and reweighed to determine dry weight. Field sampling is costly and has operational difficulties in assuring the spatial and temporal significance of the sample. For a database be representative of the LFMC conditions of a broad area, sampling should be performed in different sites and periods. Consequently, the collection of these measurements to represent region or global scales conditions is not feasible with the resources of a single organization or research group. Remote sensing data provide the opportunity to estimate LFMC over large areas at fine spatial and temporal resolution, but these data also require field samples for calibration and validation. The LFMC observational limitation makes it difficult to obtain LFMC at a sufficient number of locations within a short time interval to calibrate and validate satellite data products. Given the importance and limitations of sampling LFMC, there is a need of an international effort to create and share a global database of field measurements for use in improving and validating LFMC estimates.
We present Global-LFMC, the more comprehensive global database of in-situ destructive sampling measurements of LFMC. Global-LFMC is a compilation of 15,8220 field measurements recorded by the authors via different campaigns of field-work measurements carried out in 1,413 sampling sites from 1977 to 2018 under the frame of different projects and funding from 11 countries.
This database will lead to further advancement towards operational adoption of LFMC estimation and formal evaluation program for LFMC estimation methods that should better guide end-users to decide which model-product they should use in accordance with the accuracy needed. It will also help to understand spatial variability in LFMC across plant, local, and regional scales to better inform sampling strategy. The database can also be used to calibrate dynamic global vegetation models, eco-physiological models of plant drying as well as understanding the physiological drivers of LFMC and the relationship between LFMC and environmental change and other processes and hazards such as wildfire occurrence and behavior.