



Assessing forest biomass maps with harmonized inventory data in Europe

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Updated and harmonized spatially explicit estimate of forest biomass stocks in Europe helps to better assess the regional carbon balance. Every European country has a National Forest Inventory (NFI) system from which it is possible to obtain reliable statistics on forest biomass resources and related carbon stocks. However, the NFI data are not always recent nor frequently updated, usually do not provide the spatial distribution of biomass, and are based on country-specific inventory designs that make it difficult their integration for regional (i.e. European) assessments. Meanwhile, maps of aboveground forest biomass have been produced using satellite data calibrated with ground observations. However, the accuracy assessment of the existing maps is limited by the lack of reference data consistent over the study region and representative of the map cells, and the uncertainty in their reliability is a severe limit to their operational use.

Here, we used harmonized forest biomass data for 26 European countries derived by National Forest Inventories using a common biomass definition and estimator to assess four biomass maps. The assessment was performed at regional, national and sub-national scales using harmonized statistics derived from almost half million ground plot measurements, and at pixel level using a subset of 22,166 plots covering most European forest types. The field plots were temporally aligned with the maps using growth rates and further screened using an innovative approach based on tree cover variability to remove the plots not representative of the map cells. We also assessed the effect of harmonizing national statistics and found that the harmonized biomass values exhibit significant differences compared to the national estimates for 14 countries.

Our study shows that harmonized and representative reference data are essential to assess properly the accuracy of biomass maps. Our harmonized reference dataset showed that all maps tended to overestimate at low biomass and underestimate at medium – high biomass, resulting in an overall negative bias. We further identify the factors affecting the maps performance and provide indications for their improvements.