SHORT COMMUNICATION

A platform to visualize, analyze and improve biomass datasets: http://biomass.geo-wiki.org

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Terrestrial biomass has been recognized as an essential climate variable and as such represents an important dataset for the scientific community. While a lot of effort has gone into producing such datasets in recent years, there is a need to begin to harmonize efforts.

To that end, http://Biomass.Geo-Wiki.org presents a collection of global, regional and in-situ biomass datasets produced by a number of institutions, overlaid on the Google Earth platform (Tab. 1., Fig. 1). Datasets contain above ground live biomass, forest woody biomass and in-situ forest biomass measurements and span

Fig. 1. The interface of http://biomass.geo-wiki.org

spatial scales from global to national, regional and plot measurements in northern Eurasia (Tab. 1). All datasets obtained were converted into unified units and a common color scheme and are available for visual comparison. As we assemble further datasets, the goal is to perform various scientific tasks including: gap analysis, cross-product validation, possible harmonization and hybrid product development. Furthermore, this tool could potentially provide the necessary scientific platform to enhance collaboration in the area of global biomass monitoring and substantially contribute to different important ecological studies, e.g. to studying major biogeochemical cycles.

Taking Russia as an example we describe briefly the method and results. The Russian dataset was represented by a hybrid land cover (HLC) as a system integration of remote sensing, inventories, statistics, and in situ measurement data (Schepaschenko et al. 2010). The HLC serves as the background of an Integrated Land Information System (ILIS). The latter is developed in the form of a multilayer geographic information system, including numerous georeferenced attribute databases. A comprehensive hierarchical classification of land cover includes from several tens (e.g., wetlands) to several hundreds (e.g., grasslands and shrubs) to several tens of thousands of (forests) vegetation records. Parameterization of land classes was provided based on the principle of sequential use of the most accurate data which were
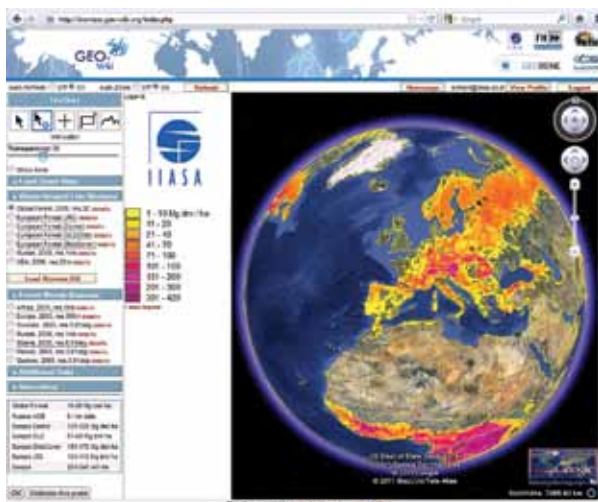
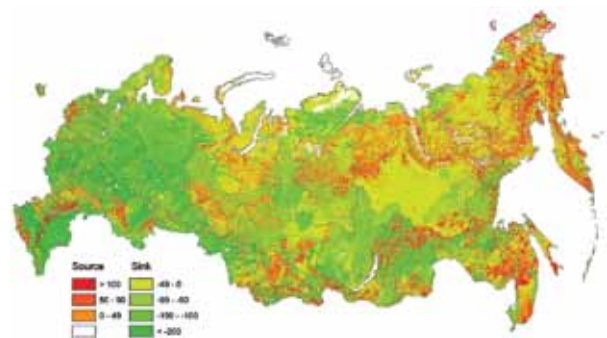**Tab. 1.** Onboard biomass datasets description

Region	Base year	Resolution	Provider	Object, units	Method
Above ground live biomass					
Global	2005	30 arc min	IIASA	Forest, Mg dm/ha	FAO data downscaling by RS
Europe	2005	1 km	IIASA	Forest, Mg dm/ha	FAO data downscaling by RS and forest maps
Russia	2009	1 km	IIASA	Vegetation,Mg dm/ha	National forest and land statistics downscaling by RS and supplementary material
USA	2000	30 m	WHRC	Vegetation,Mg dm/ha	Landsat + Forest Inventory
Tropics	2000	1 km	NASA	Forest, Mg dm/ha	Lidar (GLAS) + spatial imagery (MODIS, SRTM, QSCAT) + Inventory plots
Tropics	2010	500 m	WHRC	Forest, Mg dm/ha	Lidar (GLAS) + MODIS + Inventory plots
Forest woody biomass					
Tropical Africa	2003	1 km	WHRC	Woody biomass,Mg dm/ha	MODIS + field measurements
Europe	2000	500 m	Joanneum Research	Growing stock, m^3/ha	MODIS + forest inventory
Russia	2009	1 km	IIASA	Growing stock, m^3/ha	National forest statistics downscaling by RS and supplementary material
Sweden	2005	0.01°	Gamma Remote Sensing; Friedrich Schiller Univ.	Growing stock, m^3/ha	ENVISAT ASAR, MODIS VCF
Central Siberia	2005				
Mexico	2008				
Quebec	2005				
In situ forest biomass measurements					
Northern Eurasia	1952– –2007	sample plots (3500)	IIASA design	Tree height, m; Above ground live biomass, Stem biomass, Coarse woody debris, t C/ha	Destructive sample tree measurements

available from multiple sources. In the case of overly coarse resolution of satellite data for pixel wise parameterization (e.g., identification of dominant tree species, estimation of forest age or amount of live biomass), we applied a multivariate optimization algorithm that maximized likelihood of spatial identification and accuracy of the attributes for area units of about 15' × 15'.

The ILIS serves as the background of a terrestrial ecosystems verified full carbon account for Russia. Based on a landscape-ecosystem approach, it has been shown that during the last decade ecosystems of Russia provided a net carbon sink (Net Ecosystem Carbon Balance) in range from 0.5 to 0.7 Pg C annually dependently upon regional weather conditions and the disturbances regimes for individual years. The study showed that substantial areas, particularly in the north on per-mafrost and in disturbed forests, switch from a carbon sink to a source (Fig. 2). Explicit georeferencing of all components of carbon cycling allows better understanding of the drivers which affect carbon flows.

Fig. 2. Carbon balance for Russia, g C m^{-2}

The Geo-Wiki could serve as an effective tool for improvement of the accuracy of terrestrial ecosystems carbon accountings in different ways:

– by increasing of the accuracy of land cover descriptions and its quantification;
– by the possibility to realize a temporally and spatially explicit account;
– by use of a unified land cover for harmonized application of different methods of carbon cycle research (landscape- ecosystem approach; dynamic vegetation models; eddy covariance; and inverse modeling). The latter is important taking into account the fuzzy nature of terrestrial vegetation carbon accounting for large territories and the needs for integration and harmonization of results received by different methods (Shvidenko et al. 2010).

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