



Global forest mask and other applications of Geo-Wiki validation platform

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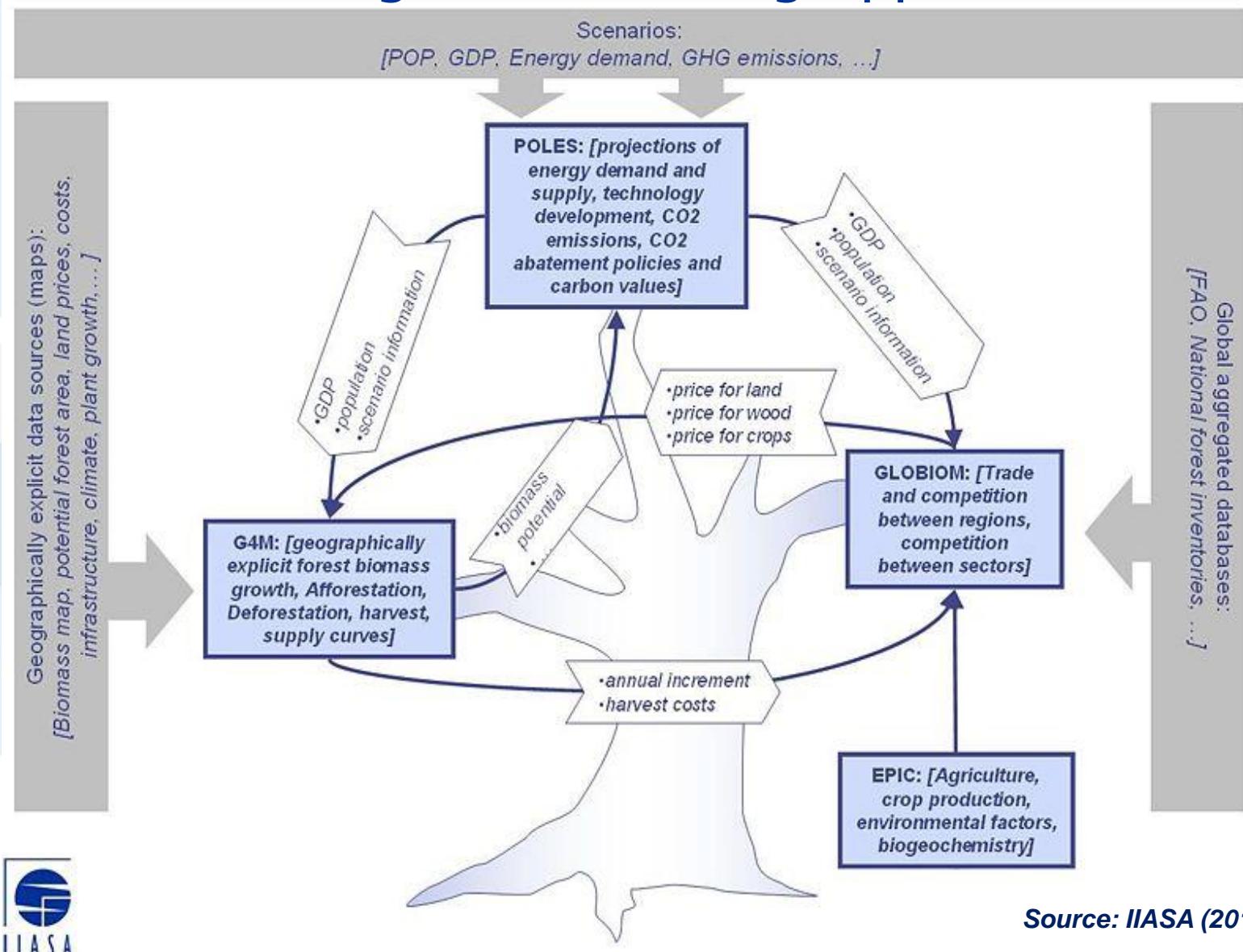
CROWDLAND

Project reference: 617754
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Modeling Biomass Supply at Global Scale

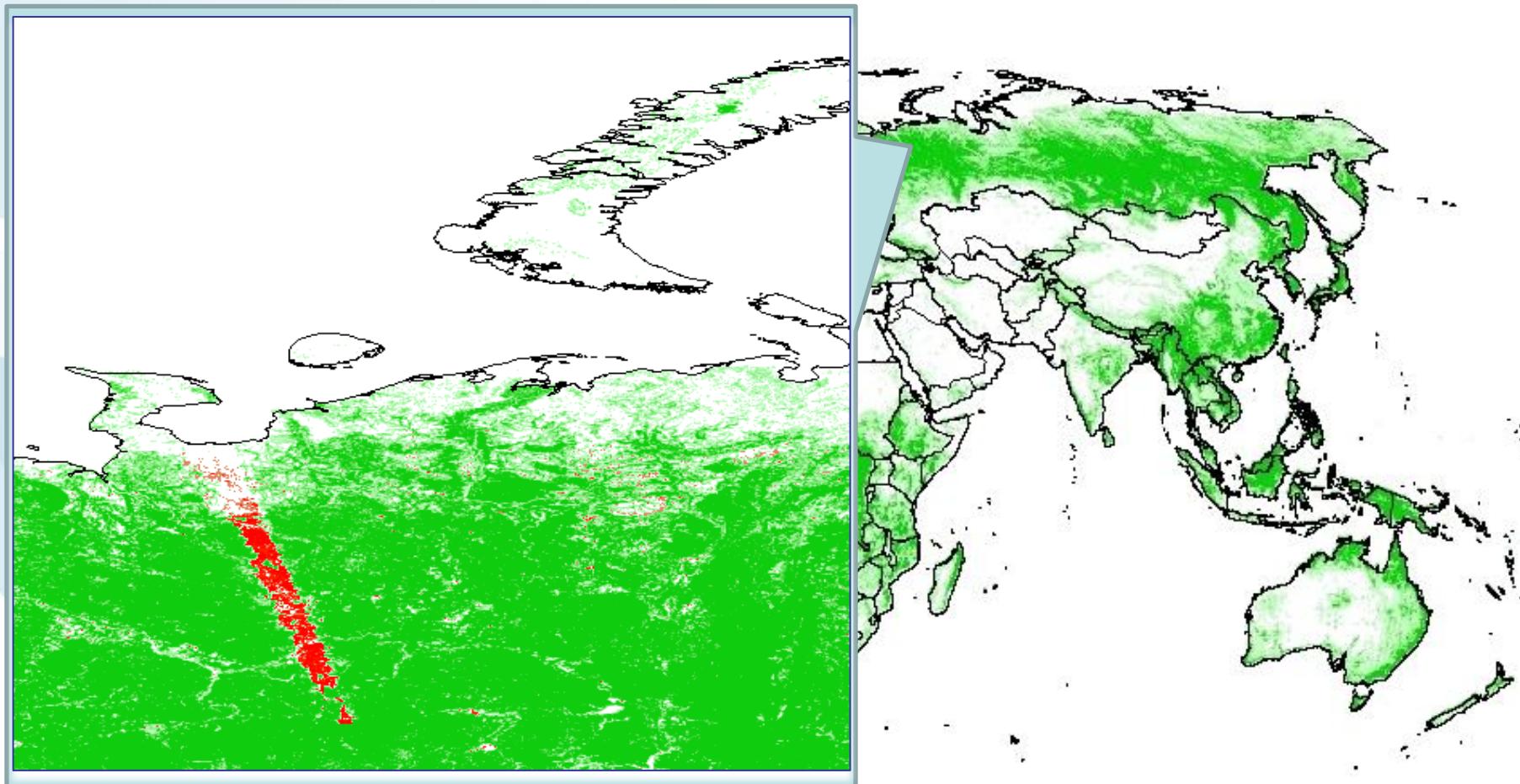
An Integrated Modeling Approach



Available Global Forest Cover Datasets

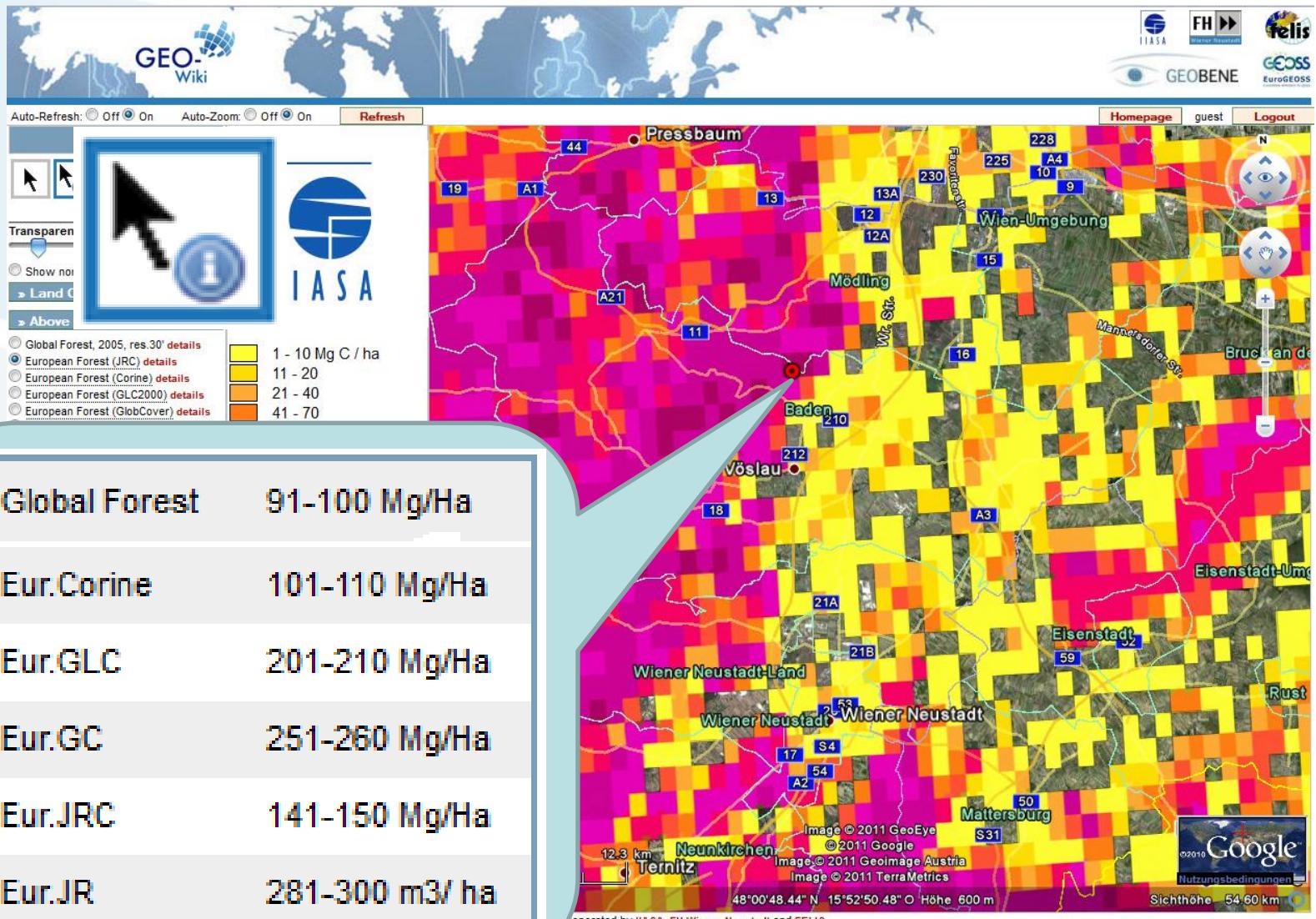
- Land cover (e.g. MODIS LC, GlobCover, GLC2000, CCI LC, GlobeLand30)
- Vegetation Continuous Fields (MODIS VCF, FAO world's forest map)
- Landsat-based forest cover (Sexton et al., 2013; Hansen et al., 2013)
- Radar-based (e.g. Jaxa Palsar forest mask)
- Hybrid (e.g. GLC-SHARE by FAO)

Jaxa PALSAR forest mask (25m resolution)



http://www.eorc.jaxa.jp/ALOS/en/palsar_fnf/fnf_index.htm

Uncertainties of forest biomass estimation



Crowdsourcing / Citizen Science

- Outsourcing to the crowd (Howe, 2006)
 - e.g. Amazon's Mechanical Turk
- Using the crowd to collect data, solicit ideas, analyze data, do voluminous tasks that could otherwise not be done
- Volunteered Geographic Information (VGI)
- Citizen Science
 - Contributory, Collaborative, Co-created

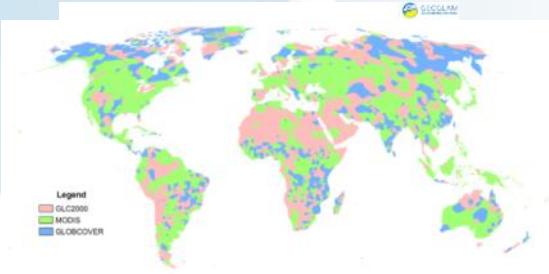
Visualization of Global Land Cover, Biomass, Photos, etc.



Crowdsourcing of Land Cover (Google Earth, Bing Maps)



Creation of Hybrid Land Cover Maps



Geo-Wiki

The Geo-Wiki Project is a global network of volunteers who help to improve the quality of land cover maps. By comparing satellite images with ground truth data, we can determine which land cover categories are most likely to be correct and which are not. This information is used to refine the land cover maps for the creation of new and improved global maps.

Validation of Land Cover Maps



In-situ Data via Geo-Wiki Pictures app

Serious Games (Cropland Capture)



<http://Geo-Wiki.org>

Visualization, Crowdsourcing and Validation

The screenshot shows the homepage of the Geo-Wiki platform. At the top, a banner reads "ENGAGING CITIZENS IN ENVIRONMENTAL MONITORING". Below the banner, there are several sections:

- GEO-Wiki** logo and navigation links:
 - » Home
 - » News / Outreach
 - » Instructions
 - » Download Data
 - » Mobile Apps
 - » Supporting projects
 - » Related projects
 - » Data source
- Games** section:
 - » Instructions + Videos
 - » Cropland Capture
 - » FAQ
- Branches** section:
 - » Geo-Wiki branches
 - » AusCover Geo-Wiki
 - » Livestock Geo-Wiki
 - » Risk Geo-Wiki
 - » SIGMA Geo-Wiki
 - » LACOVAL
- The Geo-Wiki Platform** section:

Geo-Wiki is a platform which provides citizens with the means to engage in environmental monitoring of the earth by providing feedback on existing spatial information overlaid on satellite imagery or by contributing entirely new data. Data can be input via the traditional desktop platform or mobile devices, with campaigns and games used to incentivize input. Resulting data are available without restriction.
- General overview**, **Competition**, and **Geo-Wiki pictures** buttons.
- Login** form:

Email: fritz@iiasa.ac.at
Password:
 Remember me next time?

[I've lost my password!](#)

[Register here!](#)
- Administration** section:

» Smartphone Legends
- Tweets** from **IIASA**:

Congratulations to @GrowersNation, for winning the @GEOSEC2025 #GEOappathon! #foodsecurity #earthobservation bit.ly/1vl4vaW

Retweeted by Cropland Capture

[Tweet to @CropCapture](#)
-
- [Gefällt mir](#) [Teilen](#) 272

Biomass.Geo-Wiki.org

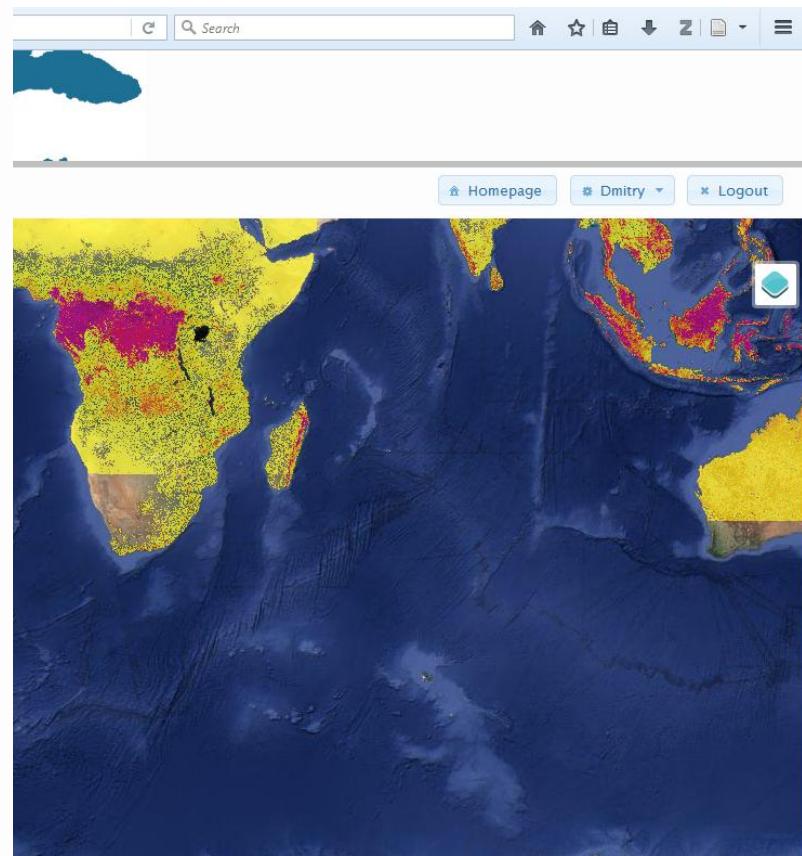
WAGENINGEN UR
For quality of life

Don't show any overlays

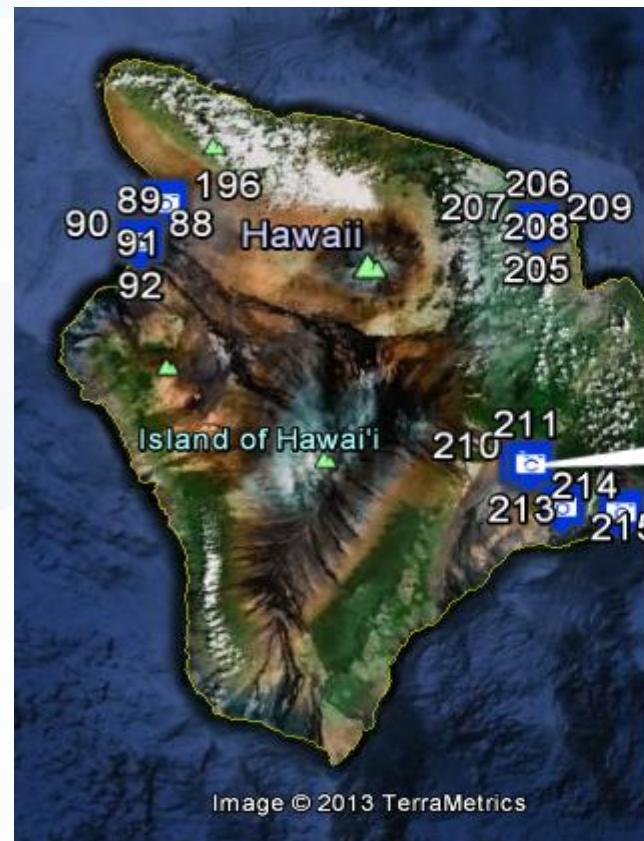
- Land Cover
- Disagreement
- Above Ground Live Biomass
 - Global Forest by IIASA [reference](#)
 - Pan-Boreal [reference](#)
 - European Forest (JRC) [reference](#)
 - European Forest (Corine) [reference](#)
 - European Forest (GLC2000) [reference](#)
 - European Forest (GlobCover) [reference](#)
 - Russia, 2009, res.1km [reference](#)
 - USA by WHRC [reference](#)
 - Tropics by NASA [reference](#)
 - Tropics by WHRC [reference](#)
 - Tropics by WUR [reference](#)
 - Canada [reference](#)

Show legend Yes No

Forest Woody Biomass



Mobile App: Geo-Wiki Pictures



Serious Game: Picture Pile

Total Score: 496

Weekly Score: 0

Sorted: 26.07249%

Week 17 ends in 6 days, 6 hours, 1 minutes.

Do you see tree loss
over time?



←
No

→
Yes

Report

Tanzania

Tip: Use cursor keys!

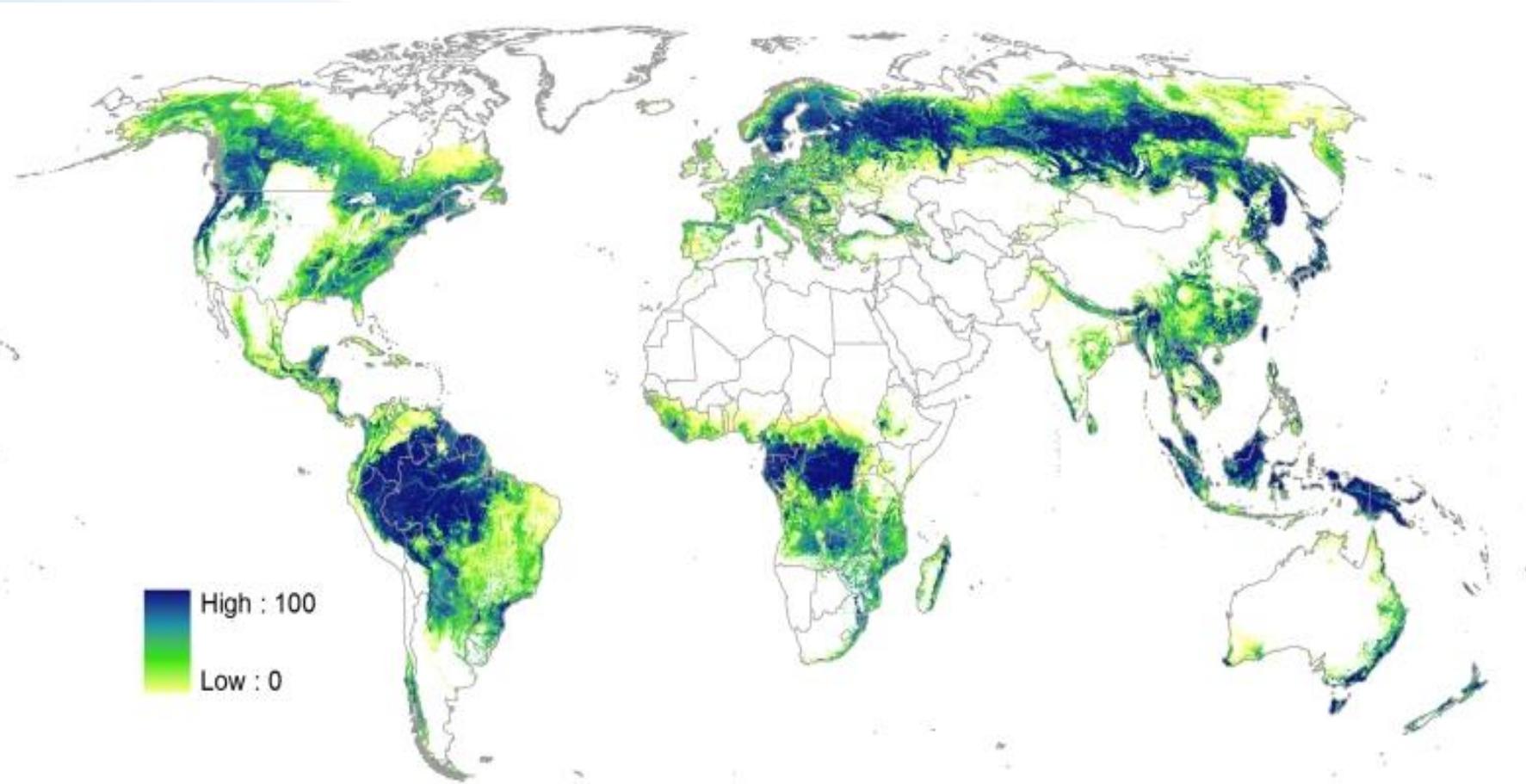


Maybe ↓



- More than 1.5 mil pics have already been sorted

Global Hybrid Forest Cover Map



Schepaschenko et al. (2015) in Remote Sensing of Environment

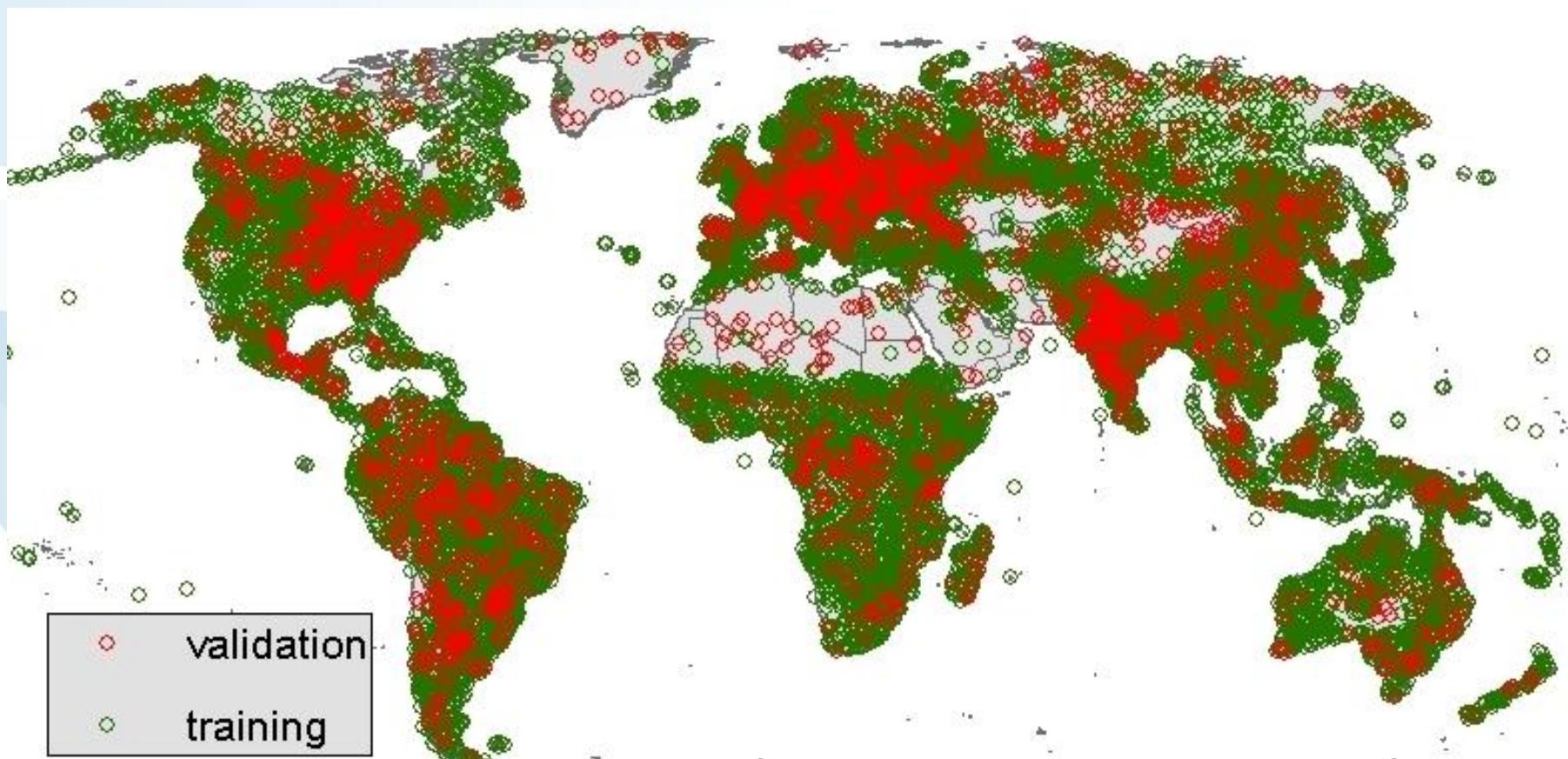
GlobBiomass project is acknowledged

Estimation of forest cover using Geo-Wiki and high resolution Google Earth imagery

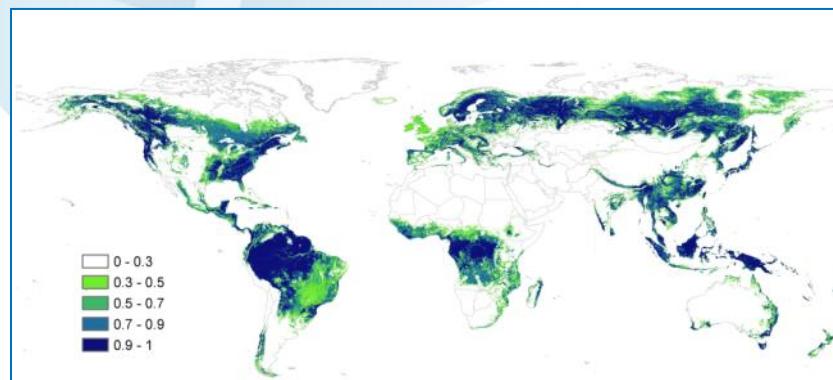
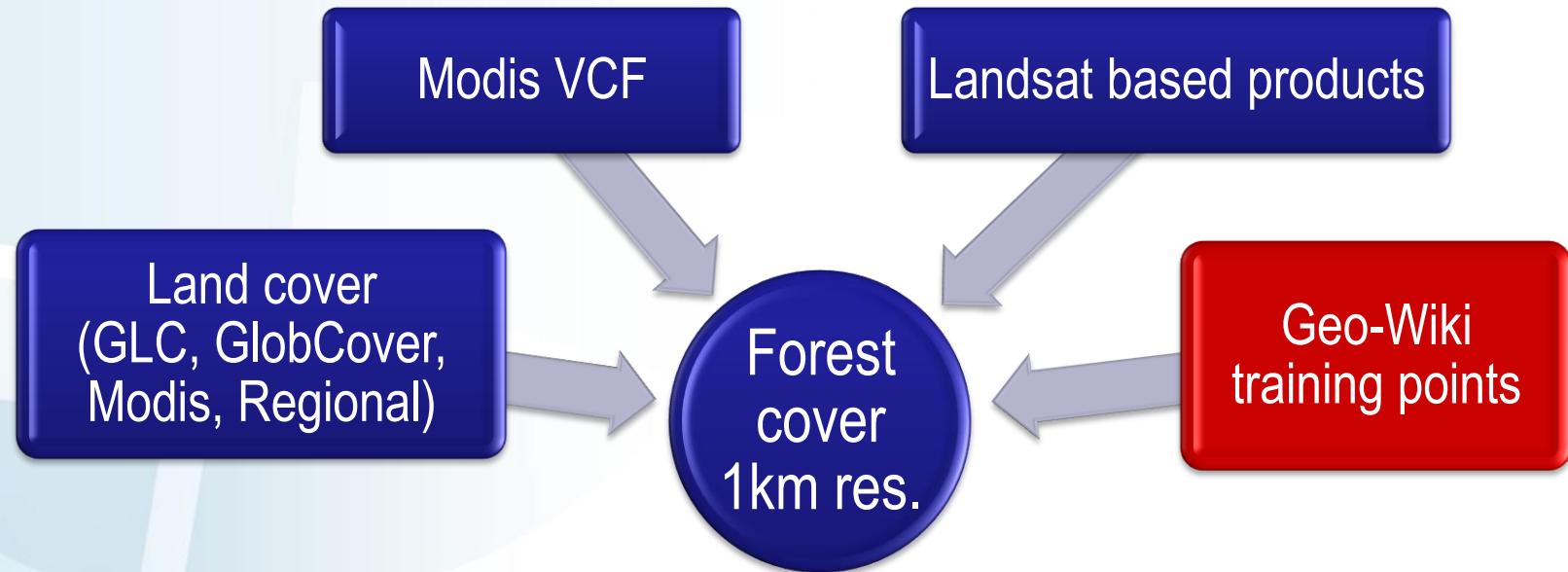


where 55% of 1km pixel area is estimated to be forest cover with tree cover of 90% stocking in this example.

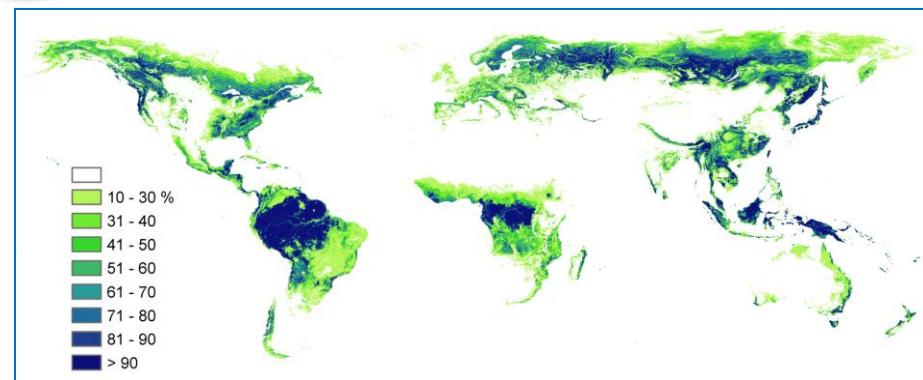
Geo-Wiki training (~18K) and validation (~2K) points



Global Forest Mask: synergy of remote sensing and crowd-sourcing

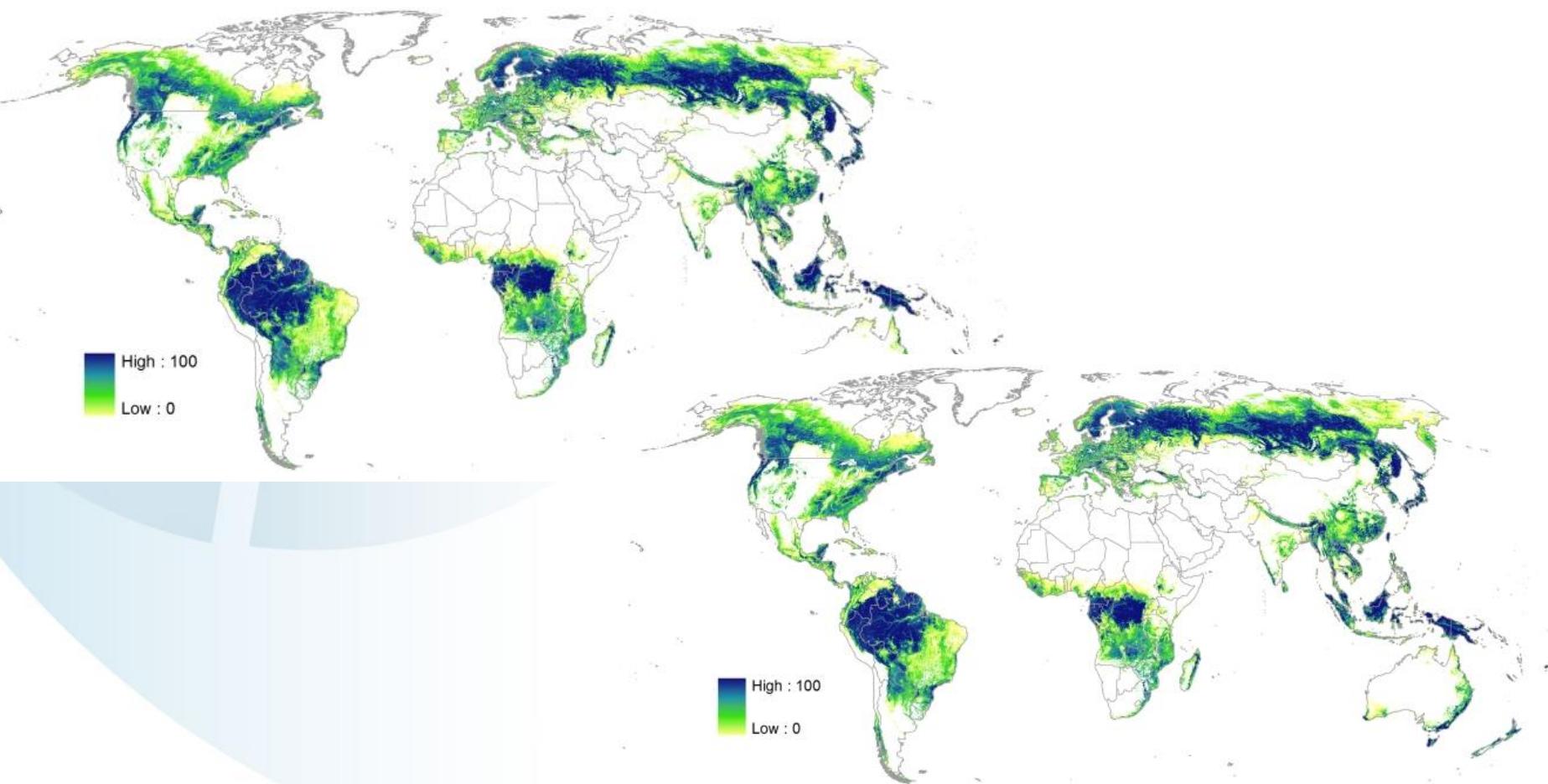


Forest probability



Forest cover, %

Hybrid forest cover maps “Best guess” or calibrated to FAO FRA



Available at <http://forest.geo-wiki.org>

Validation of input datasets and final hybrid product

Forest recognition accuracy, %

Hybrid “best guess”



Hansen’s FC



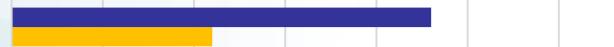
Landsat VCF



MODIS VCF



Regional mosaic



MODIS LC



GlobCover



GLCNMO



GLC2000



Percentage forest cover (correlation, R^2)



■ overall

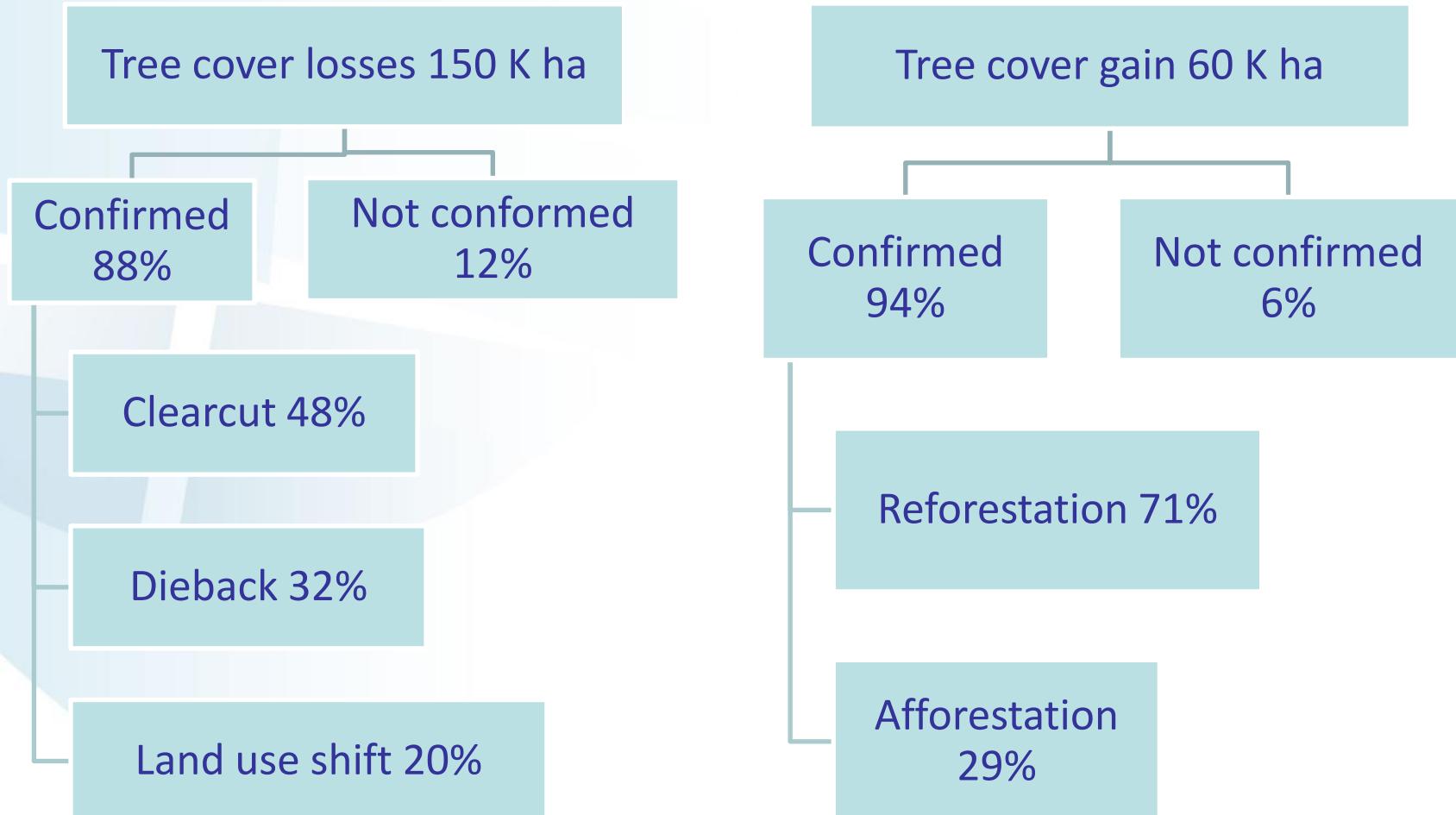
■ disagreement area

■ overall

■ disagreement area

Tree cover change in Moscow region 2000-2013

Validation of tree cover change dataset by Hansen et al., 2014



Laco-Wiki The Land Cover Validation Platform

Welcome to Laco-Wiki

LACO-Wiki is a new web-based solution for validating land cover and land use maps. Using a variety of reference layers including satellite and aerial imagery from Google and Bing as well as OpenStreetMap, validation is a simple four-step process. After uploading your dataset, generate and validate the samples and create a report with the accuracy assessment.

Share your validated samples with us and you will help to build an open database that can be used to improve future land cover and land use maps.



Upload a dataset

You can upload your own maps for validation in either vector or raster format. Currently accepted formats are shape files and geoTIFFs in a WGS84 projection. Once uploaded you can design a customized legend for display. Additional datasets can also be uploaded to help you in the validation process.



Validate your map

Using reference information such as satellite imagery, you can validate your sample using your own legend, either by selecting the class, confirming the class or correcting incorrectly classified ones. You can validate the samples by yourself or you can share any validation session to distribute the work.



Generate a validation sample

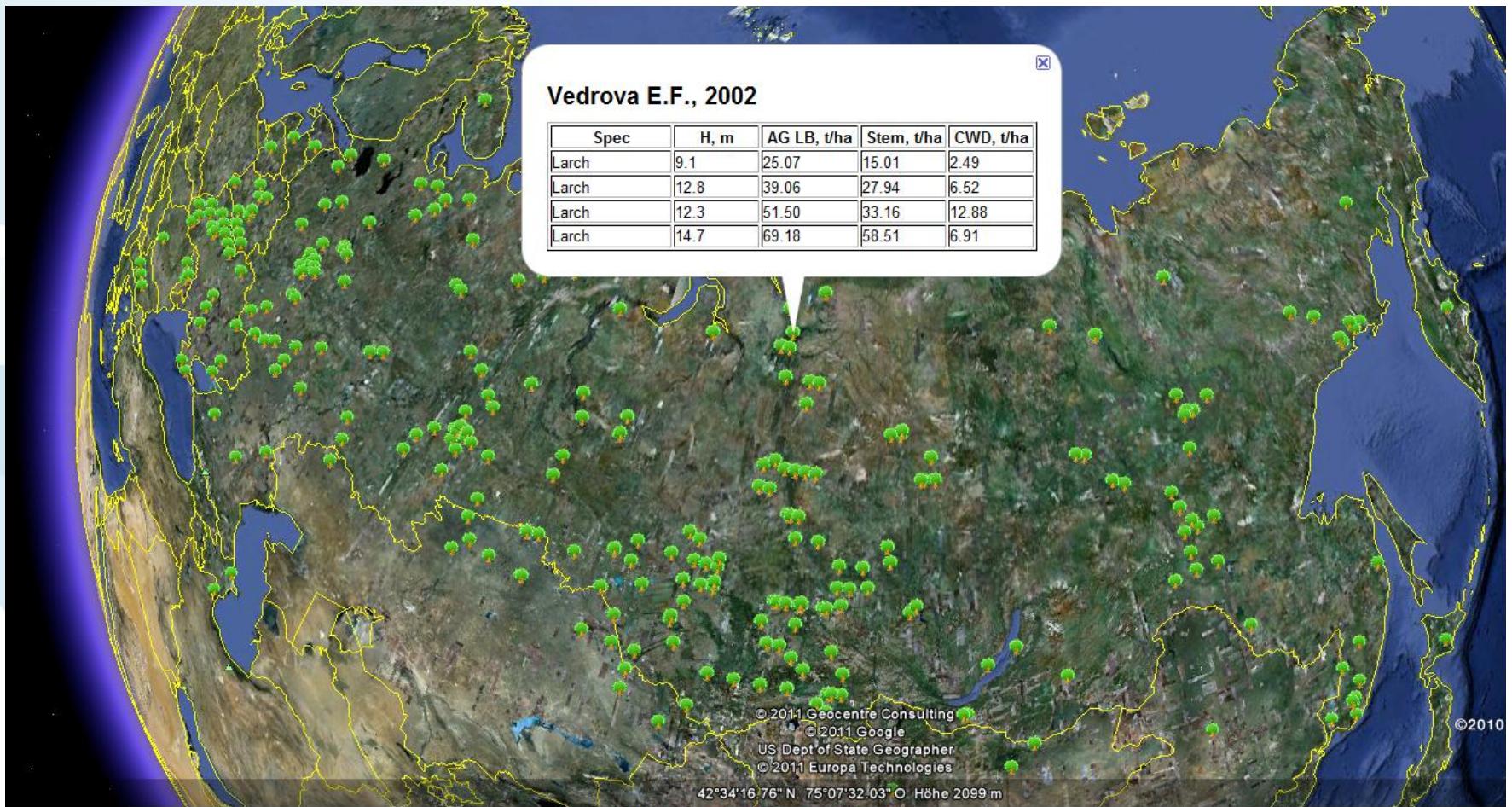
Once you have uploaded your map, you can create sets of validation samples using random, stratified or systematic sampling. You can specify the size of each sample or be guided by calculations of the minimum sample size needed based on the required confidence levels for your project.



Report on the accuracy

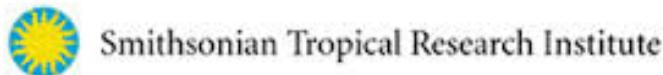
After validation you can download the raw data, the confusion matrix and generate a customized report on accuracy assessment, choosing from a set of different quality indicators including overall accuracy, omission and commission errors, kappa, average mutual information (AMI) and more.

Database of field biomass measurements



Forest Observation System: Towards Global Biomass *in situ* Data Repository

- Support Calibration/Validation of the ESA BIOMASS mission
- Elaborate a Live Biomass database accessible for the entire community
- Populate the database with the data from several multinational networks (RAINFOR, ArtiTRON, etc.)



Thank you for your attention

More information:

<http://geo-wiki.org>

<http://www.iiasa.ac.at/web/home/research/modelsData/Geo-Wiki/Geo-Wiki.en.html>

More readings:

Schepaschenko D, See L, Lesiv M, et al. (2015). [Development of a global hybrid forest mask through the synergy of remote sensing, crowdsourcing and FAO statistics.](#) *Remote Sensing of Environment*, 162:208-220.

See L, Fritz S, Perger C, Schill C, McCallum I, Schepaschenko D etc. (2015). [Harnessing the power of volunteers, the internet and Google Earth to collect and validate global spatial information using Geo-Wiki.](#) *Technological Forecasting and Social Change*

Fritz S, McCallum I, Schill C, Perger C, See L, Schepaschenko D, Kraxner F, Obersteiner M (2012). [Geo-Wiki: An online platform for improving global land cover.](#) *Environmental Modelling and Software*. V.31: 110-123 .

