

Global Biomass Map Products

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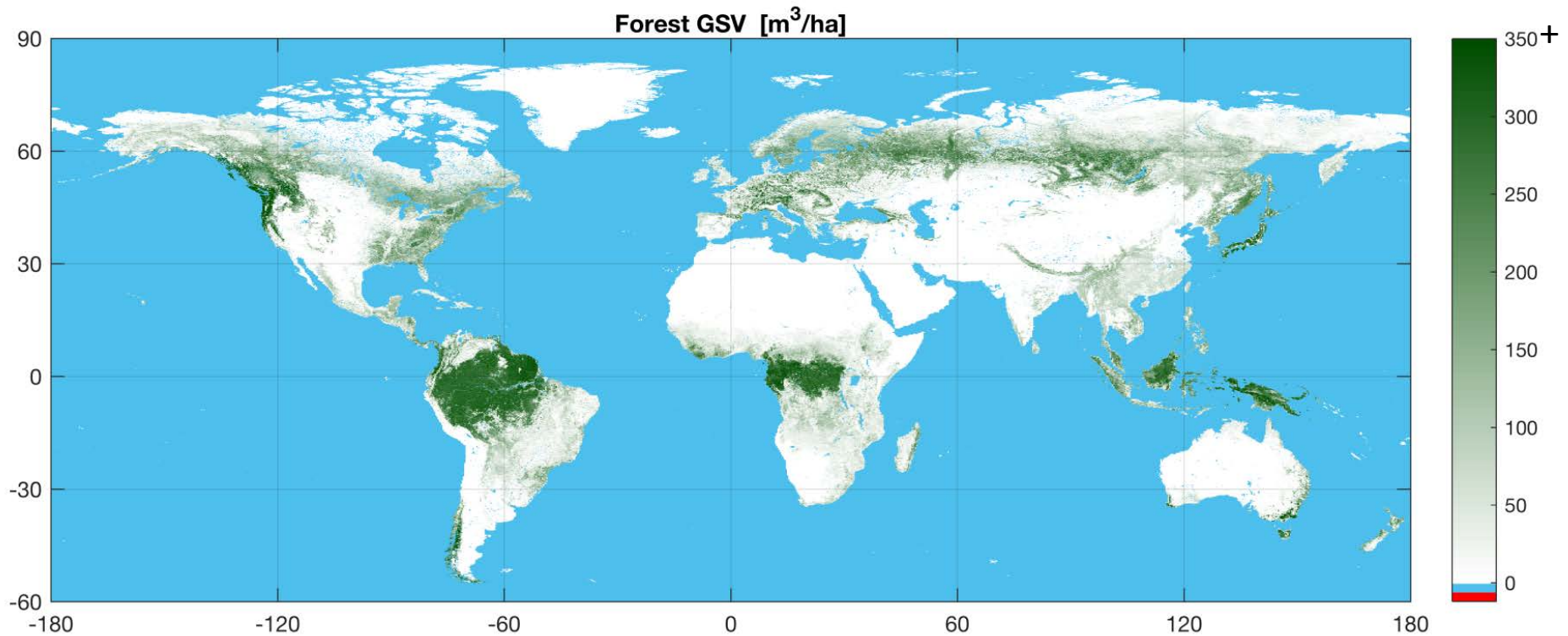
GlobBiomass team



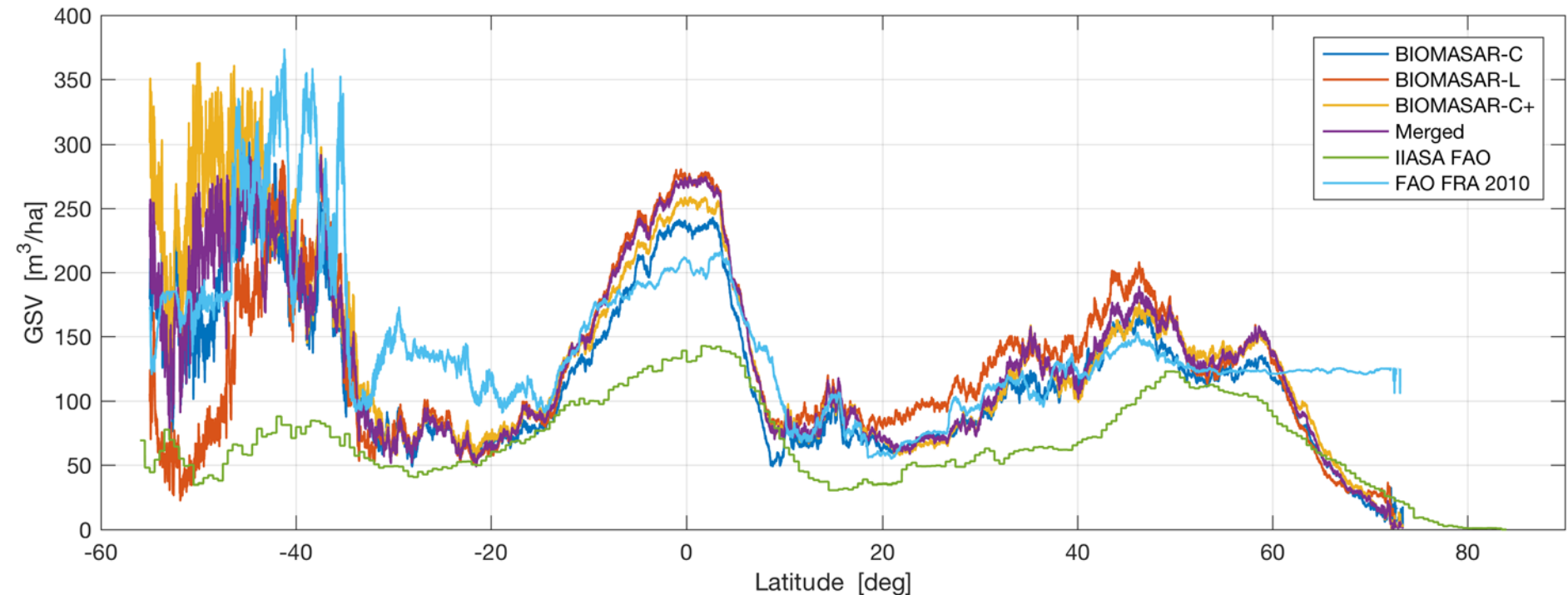
Status of global biomass datasets at UW3

- A first version of the global AGB and GSV datasets were delivered to ESA and consortium with a pixel size of 100 m (trade off between memory issues and quality of estimates) at the end of April 2017 with the previous version of the retrieval algorithms → several groups undertook validation of it, demonstrating regional flaws
- The second version obtained with the current and final retrieval algorithm is presented at this meeting. Regional assessments, demo and validation will be given during the meeting

GSV estimates (as of August 2017)



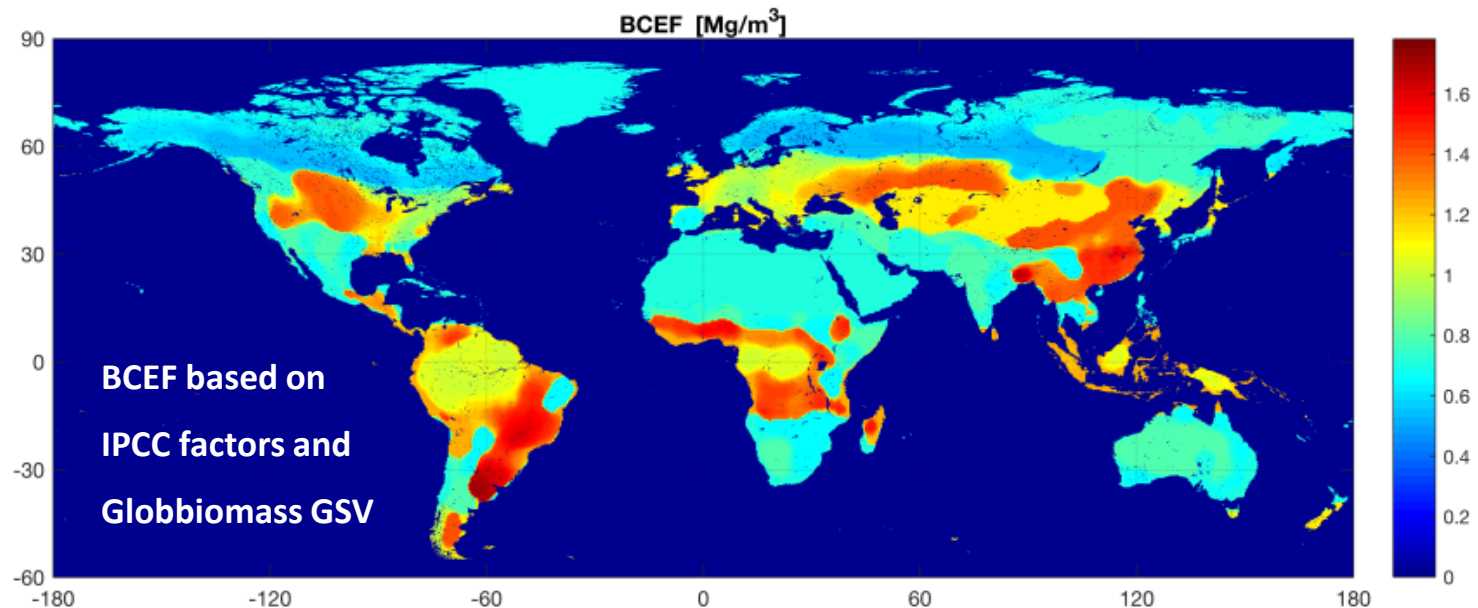
Latitudinal profiles of GSV estimates



From GSV to AGB and carbon stocks

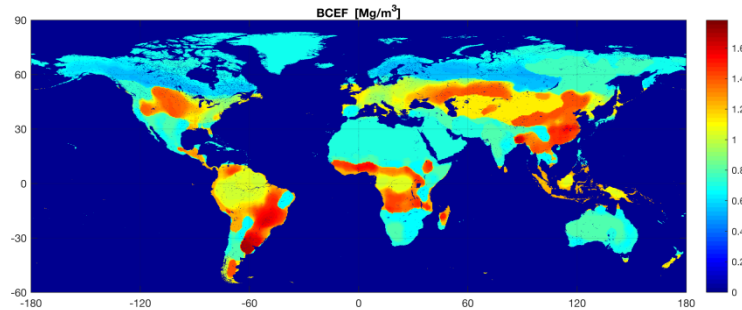
- **AGB = BCEF * GSV**
 - BCEF = Biomass Conversion and Expansion Factor
 - C = conversion: from stem volume to stem biomass, i.e., wood density (typically 0.3 – 0.8)
 - E = expansion: stem to total biomass, i.e. proportion of branch, needle, foliage biomass of total biomass (typically between 1.1 and 1.5)
- **C stocks = 0.47 * AGB**

- BCEF for major biomes according to IPCC
 - Boreal: ~ 0.5
 - Temperate: ~ 0.7
 - Dry tropical: ~ 0.5
 - Humid tropical : ~ 1
 - NOTE: the lower the GSV, the higher the BCEF

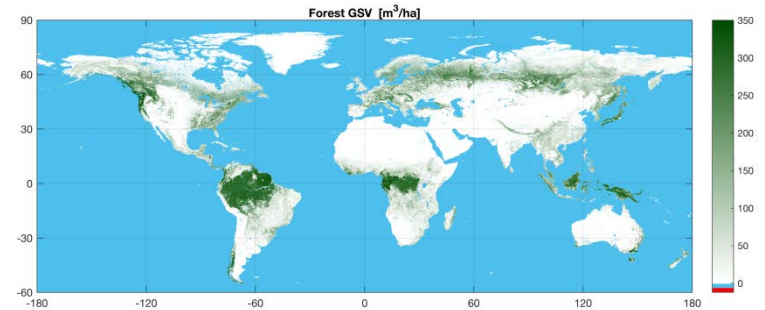


$$\text{AGB} = \text{BCEF}_{\text{IPCC}} * \text{GSV}$$

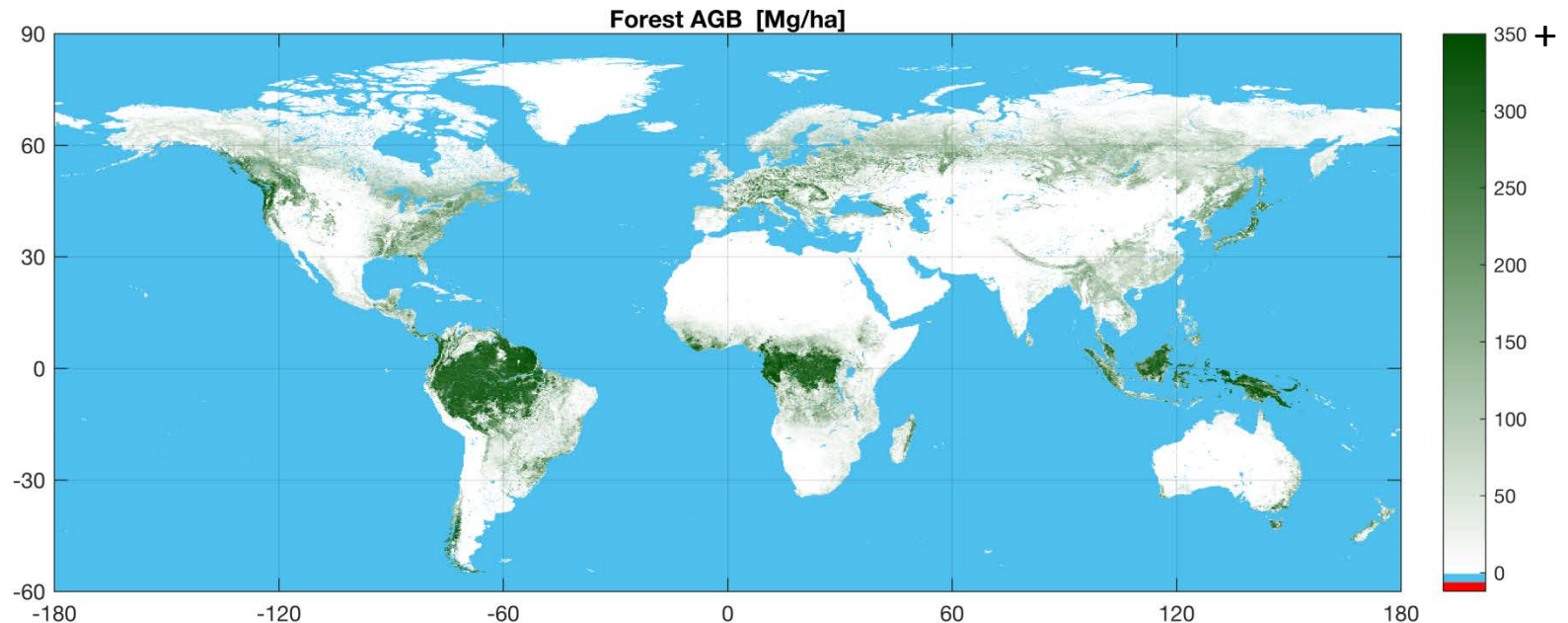
(as of August 2017)



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Assessment of estimates

- Validation using plots of the biomass database at WUR (see presentation by Danae Rozendaal on Wednesday)
- Comparison with in situ observations available at Globbiomass regional partners and selected users
- Comparison with inventory-based estimates at provincial and national scale
- Comparison with global statistics by FAO
- Cross-comparison with other EO-based estimates
- For the sake of simplicity, all assessments are undertaken at 0.01 deg, i.e., 1 km spatial resolution → impact of land fragmentation may have an impact on what is displayed and discussed here

Summary of strengths and weaknesses

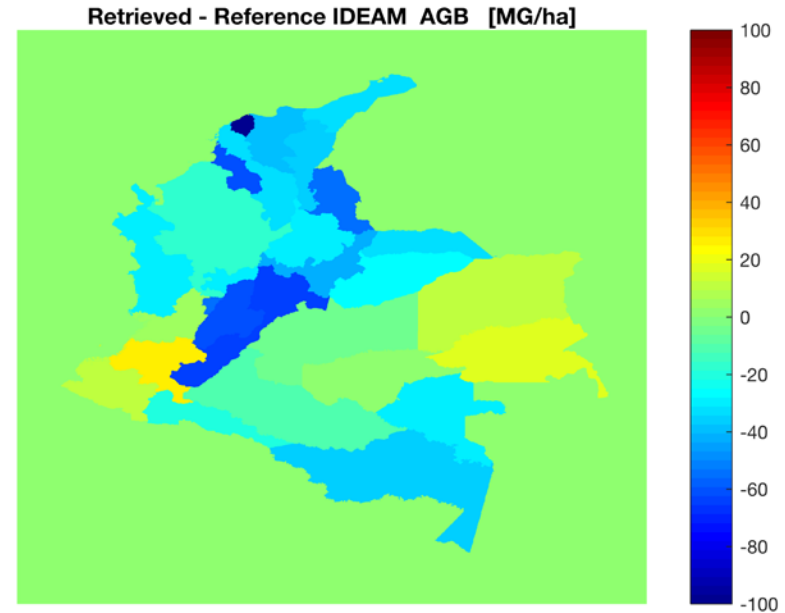
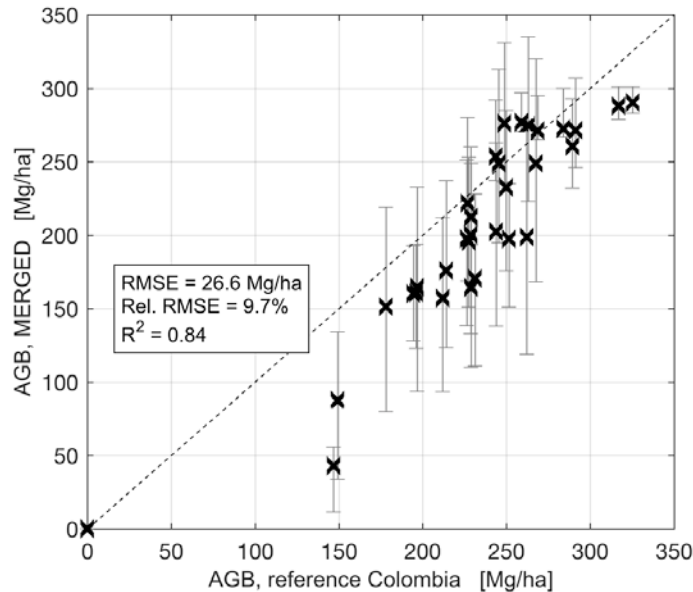
- **Thorough visual analysis of retrieved GSV**
- The global estimates represent well the level of biomass
- How accurate are the estimates? See next slides
- Flaws occur in correspondence of marked topography (due to incorrect compensation of slope-induced effects in PALSAR mosaics)
- Very local artefacts occur in correspondence of
 - tree cover set to 0 (actually very dense forest),
 - image banding in PALSAR mosaic or ASAR retrieval
 - uncompensated ionospheric striping in PALSAR mosaic
 - soil saturated soils / rough terrain
 - dense mangroves (underestimation)

Assessment at provincial level

- Averages of GSV or AGB per county / province for
 - US (> 3,000 counties)
 - Canada (12 ecoregions)
 - Mexico (26 states)
 - Central American countries
(per leaf type)
 - Colombia (32 provinces)
 - Chile (11 provinces)
 - Tanzania (25 regions)
 - Mozambique (10 provinces)
 - Europe (~ 300 regions in 27 nations)
 - Russia (83 provinces (oblast))
 - China (31 provinces)
 - Japan (47 provinces)
 - India (34 states)
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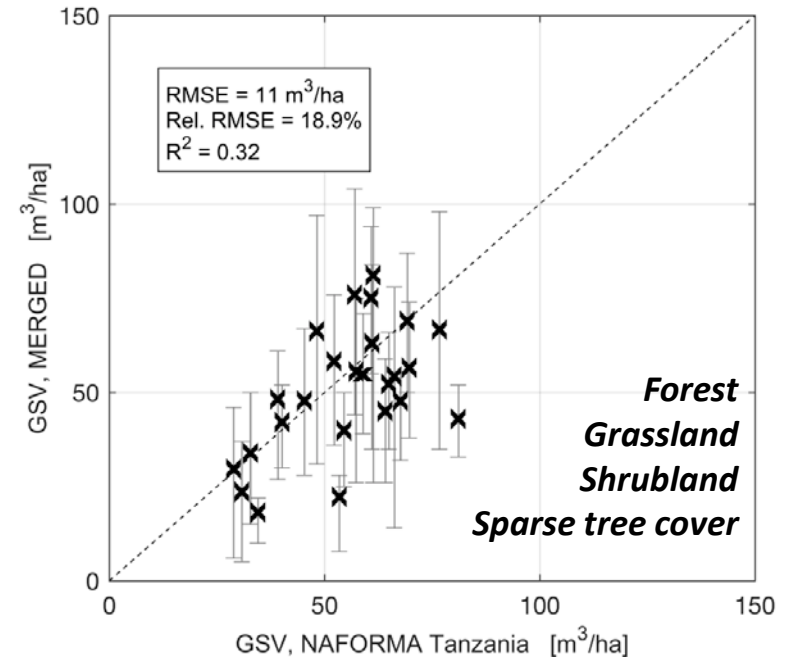
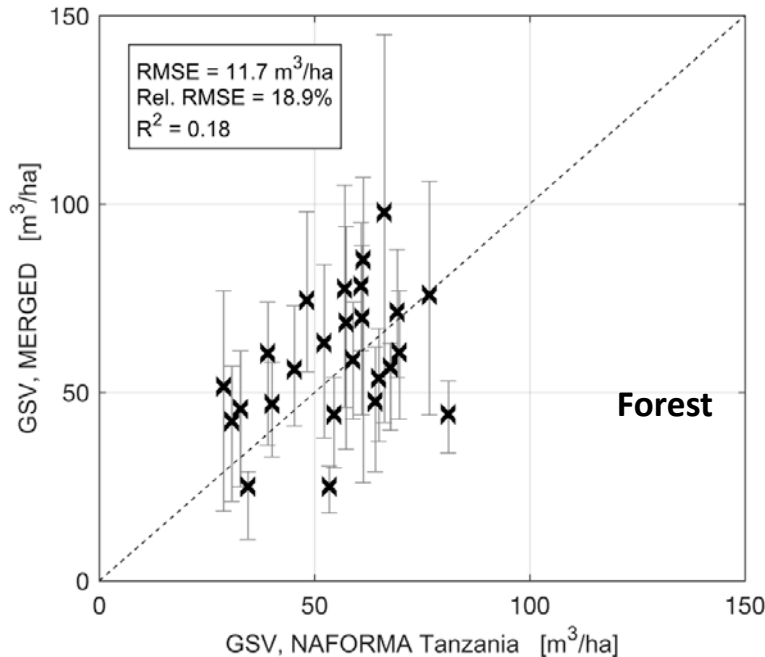
ALL DATA PUBLISHED IN LITERATURE

Assessment - Colombia



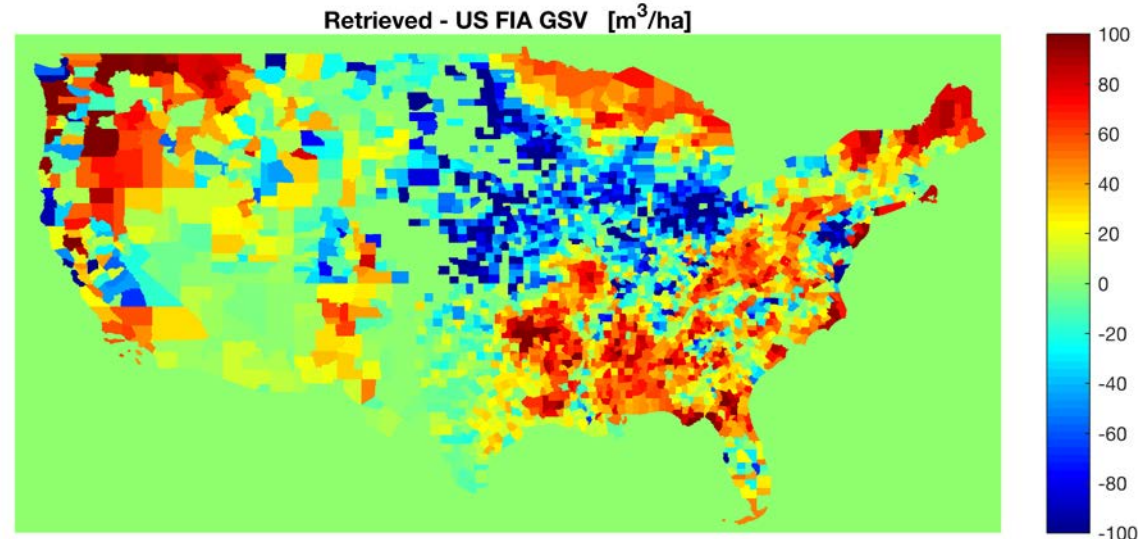
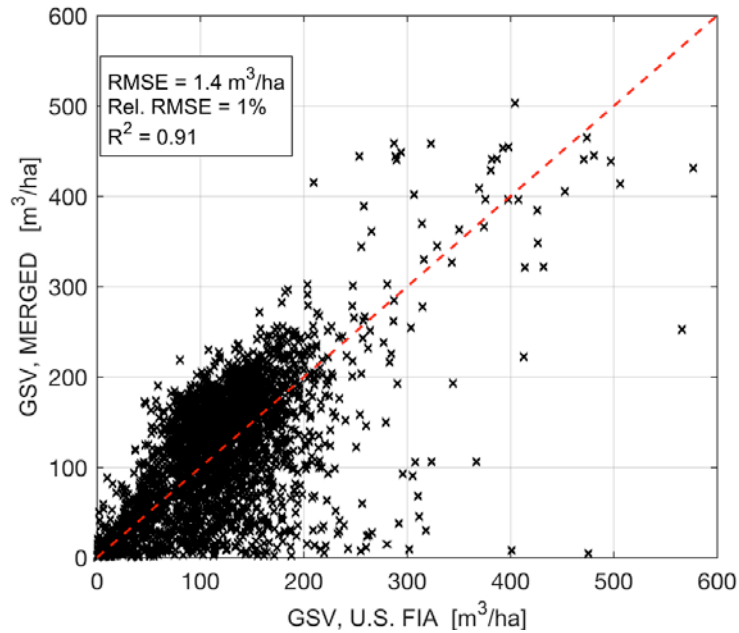
- Agreement throughout the entire range of biomass
- Discrepancies attributed to an imperfect characterization of max GSV → values updated for re-processing

Assessment - Tanzania



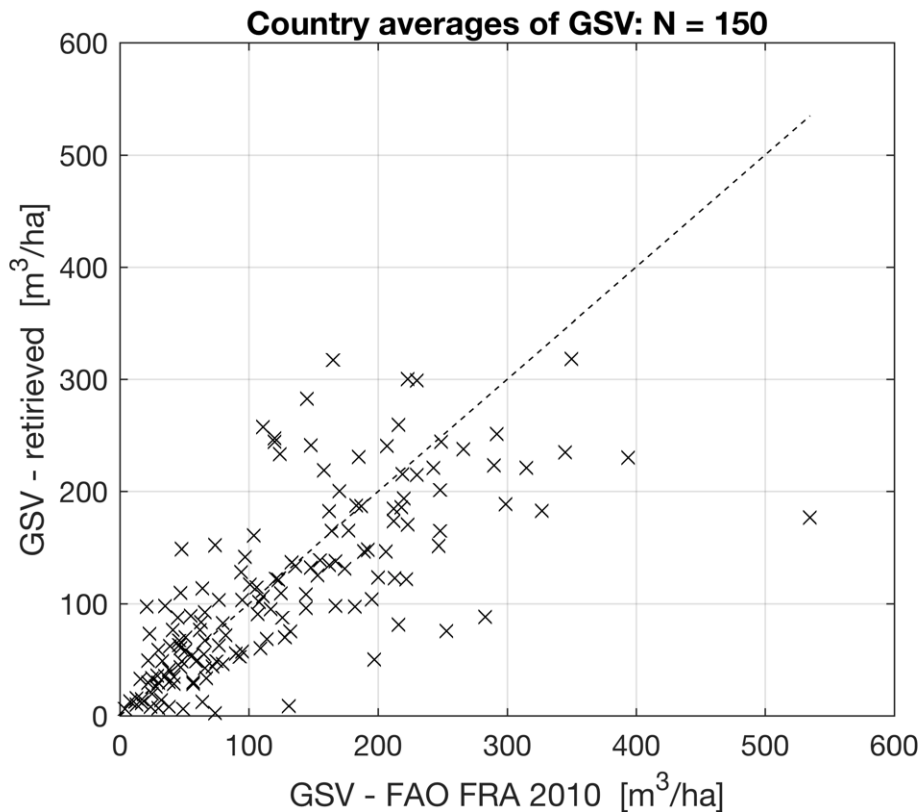
- Assessment affected by the definition of “forest”
- CCI Land Cover used as reference → issues with classification accuracy and spatial resolution
- Overall, decent agreement between retrieved and reference GSV

Assessment w.r.t. U.S FIA data

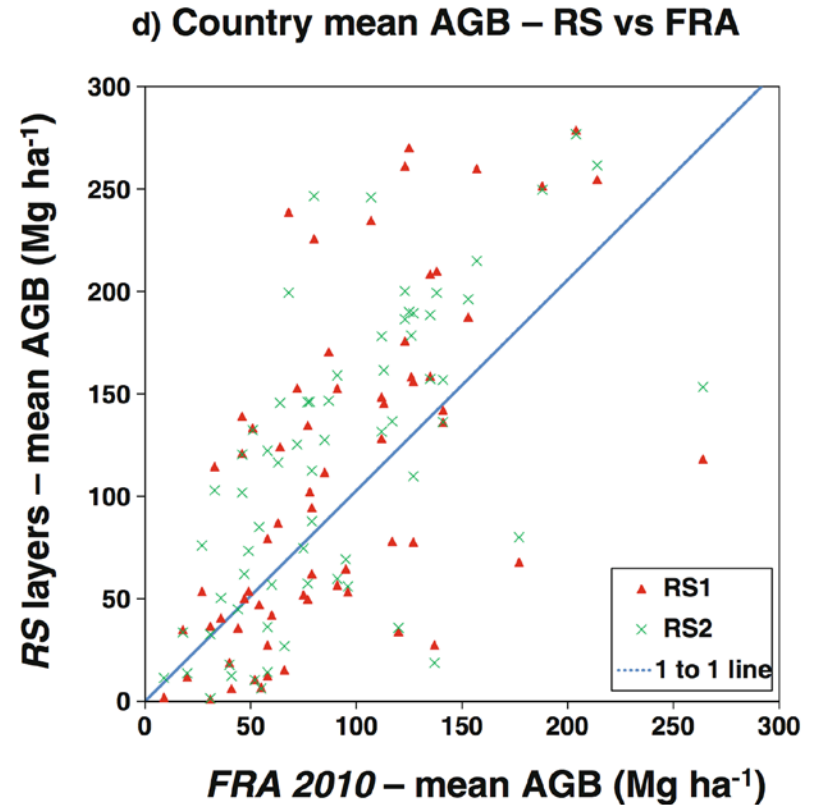


- Such assessments indicate whether there are systematic errors but requires detailed understanding of what we are looking at
- Overestimation in Pacific NW because of too high biomass ($> 600 \text{ m}^3/\text{ha}$)
- Overestimation in Southwest and Great Lakes region: too high max GSV \rightarrow updated for re-processing
- Underestimation in Midwest: very little forest \rightarrow not really indicative of errors

Retrieved GSV vs FAO FRA 2010 country statistics

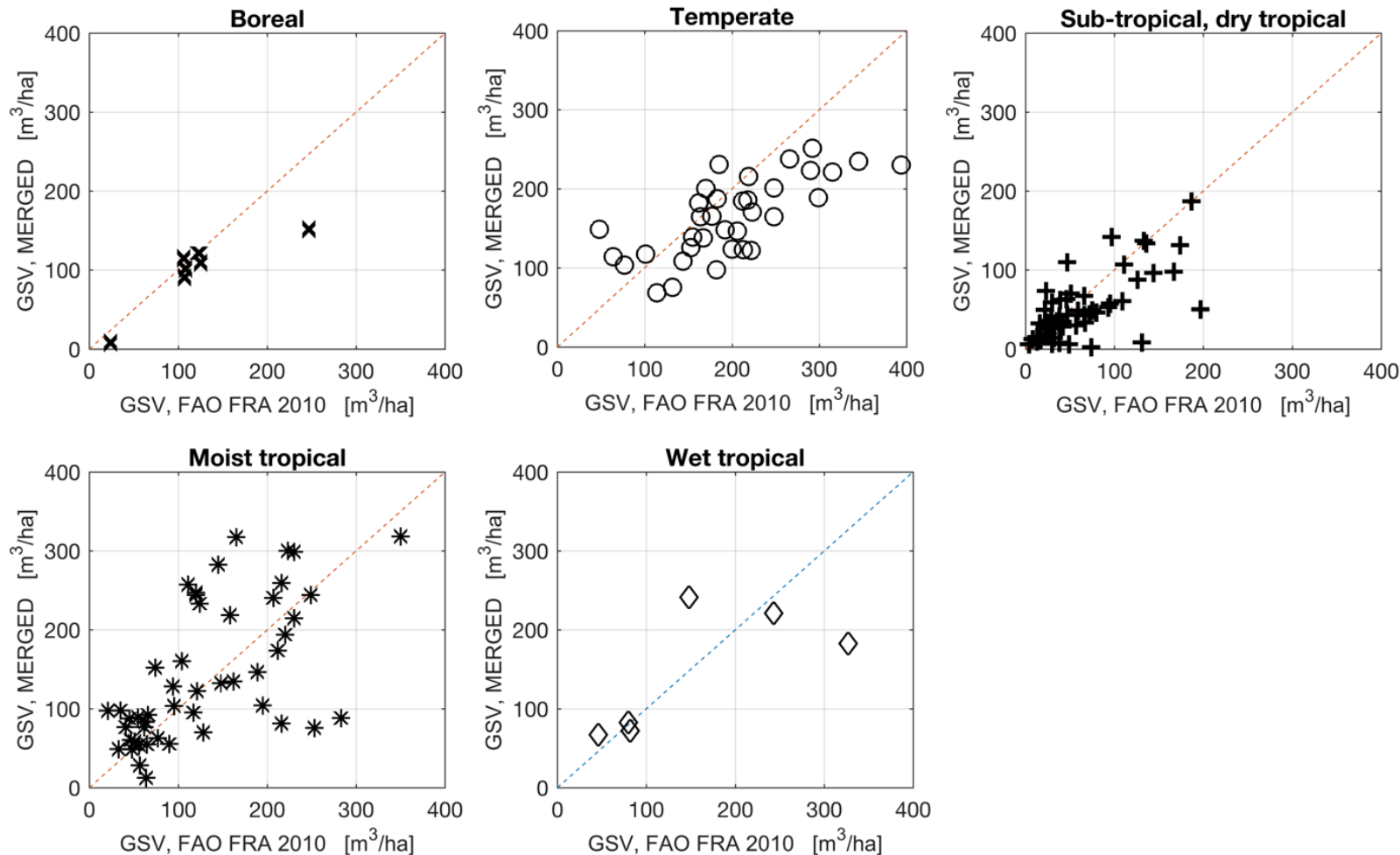


This study, as of August 2017

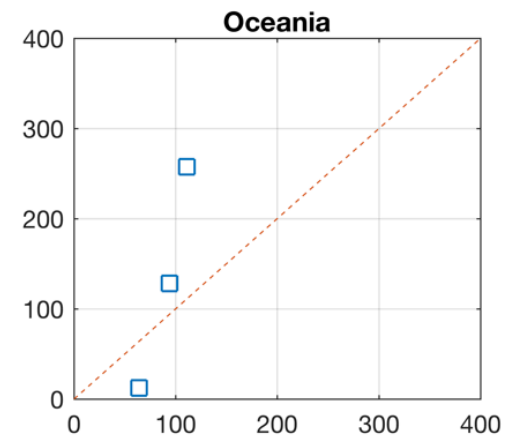
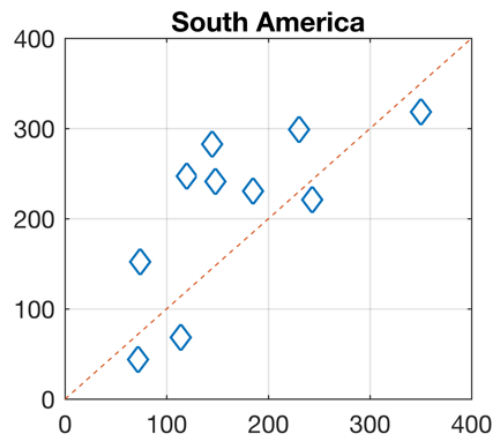
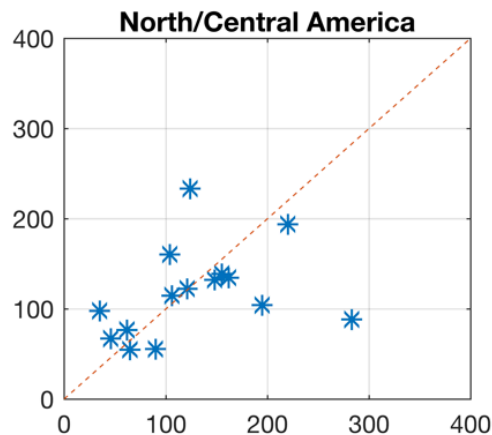
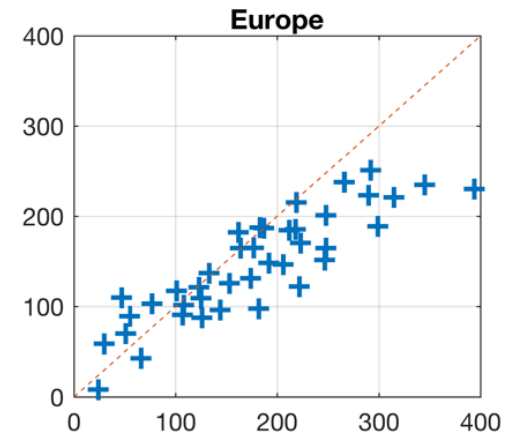
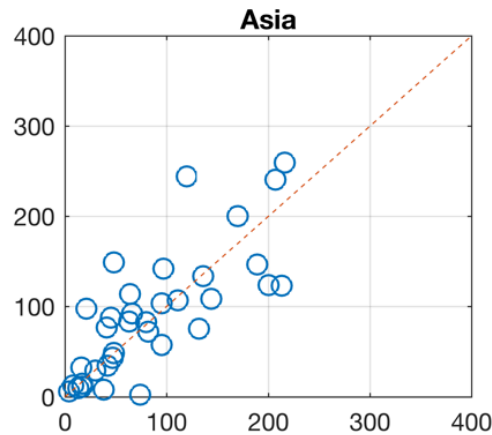
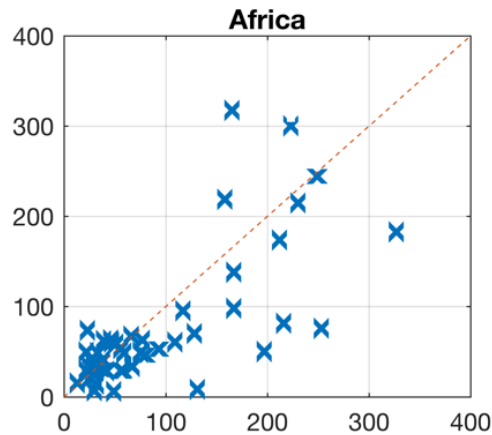


(Mitchard et al., 2013)

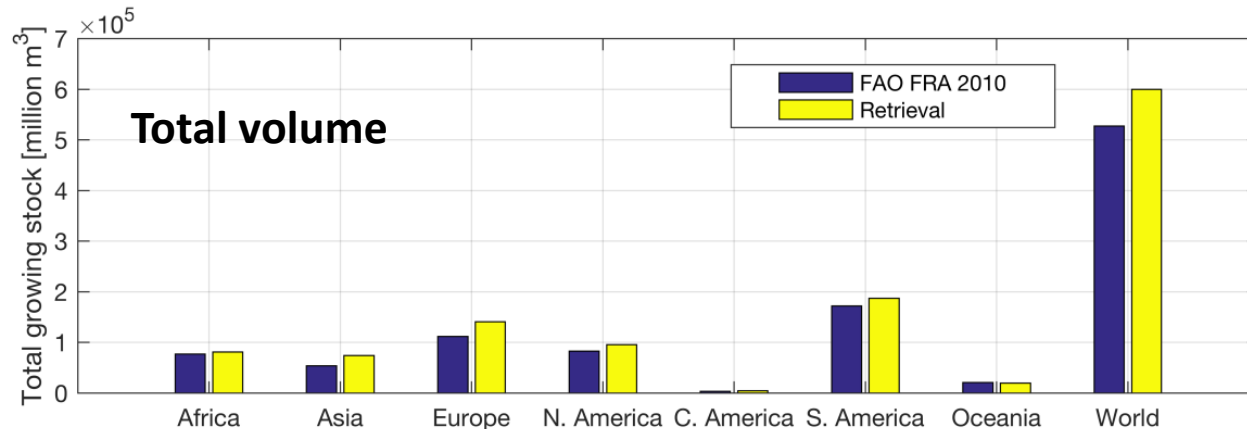
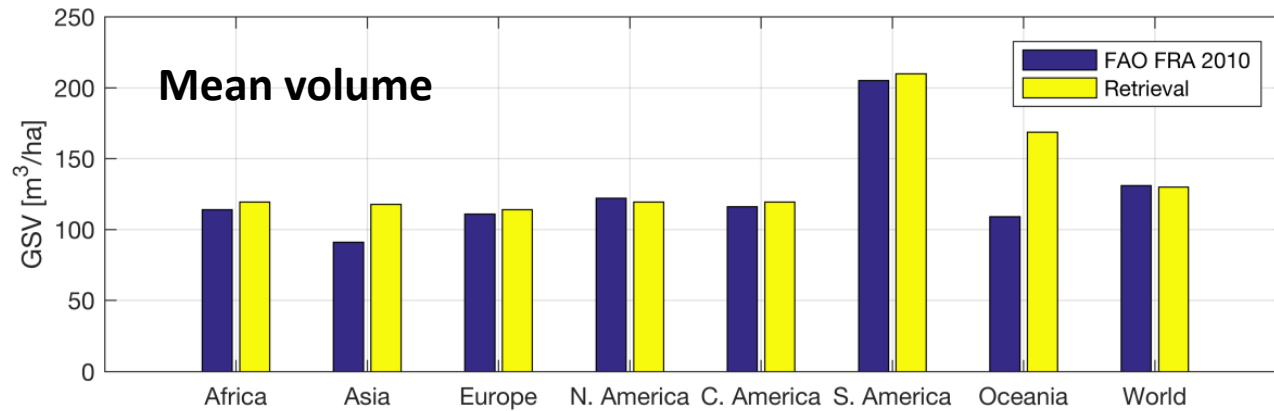
Retrieved GSV vs FAO FRA 2010 country statistics



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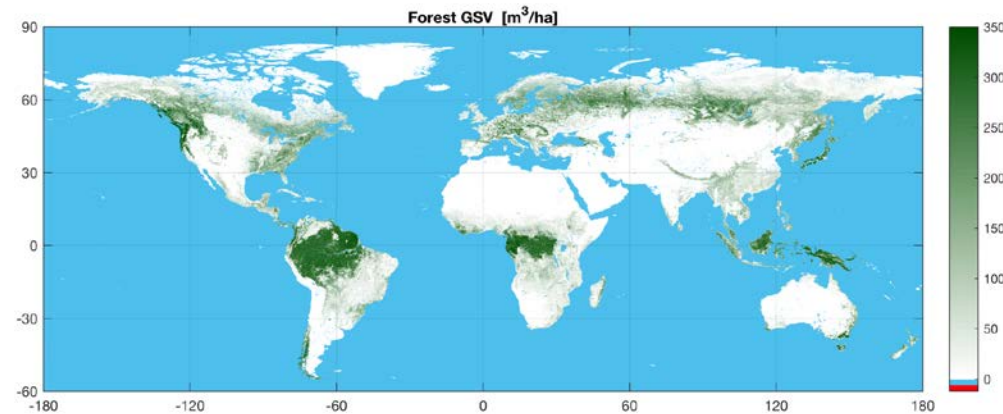


Global GSV statistics



- Error bars for the time being omitted; will be added once we have sufficient confidence in the estimates

In summary



- Reference year: 2010 (+/- 1 year)
- Spatial resolution: 100 m (internal: 25 m with questionable reliability)
- Each pixel is characterized by accuracy statistics
- Availability: public, beginning of 2018 via Globbiomass website
 - Global GSV
 - Global AGB