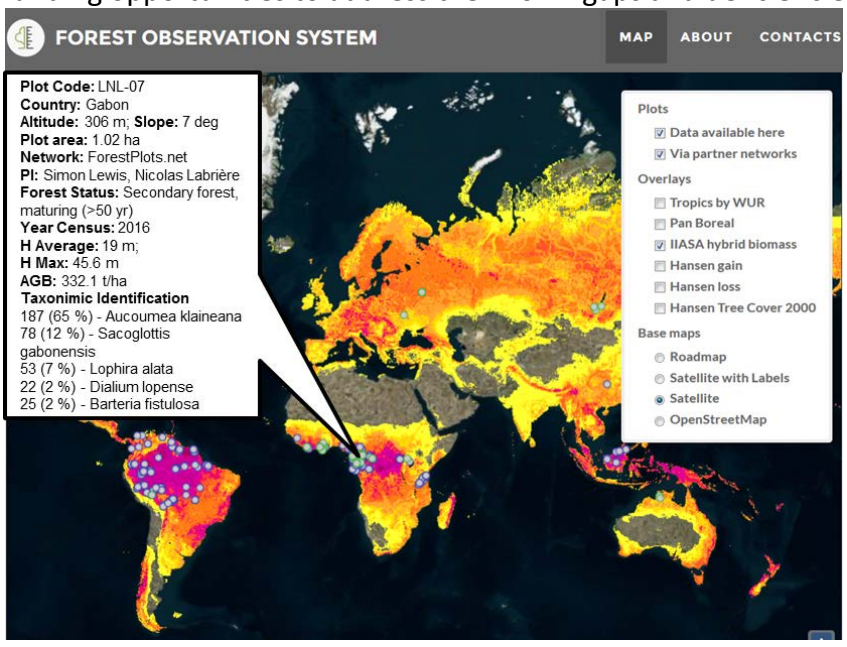
# The 4th Mission – the need for a global plot-based biomass reference

Jérôme Chave (CNRS, France, jerome.chave@univ-tlse3.fr), Klaus Scipal (ESA, Netherlands), Dmitry Schepaschenko (IIASA, Austria, schepd@iiasa.ac.at), Oliver Phillips(University of Leeds, UK), Stuart J. Davies (STRI, USA), Simon Lewis(UCL, UK), Christoph Perger (IIASA), Christopher Dresel (IIASA), Ian McCallum (IIASA), Steffen Fritz (IIASA)

Forest monitoring is high on the scientific and political agenda. Global measurements of forest height, biomass and how they change with time are urgently needed as essential climate and ecosystem variables. Three spaceborne missions to measure forest structure are going to be launched in the coming years, namely ESA BIOMASS, NASA GEDI and NISAR. How to make the best use of these missions? Will users trust the derived products? To address these questions, we need to launch the "4th mission" – to collect high quality ground data for calibration and validation.

The Forest Observation System – FOS (http://forest-observation-system.net/) is an international cooperation to establish a global in-situ forest biomass database to support environmental monitoring, earth observation and to encourage long-term investment in relevant field-based observations and science. FOS aims to link the Remote Sensing (RS) community with ecologists who measure forest biomass in the field for a common benefit. The added value of FOS for the RS community is the partnering of the most established teams and networks that manage permanent forest plots globally; to overcome data sharing issues and introduce a standard biomass data flow from tree level measurement to the plot level aggregation served in the most suitable form for the RS community. Ecologists benefit from the FOS with improved access to global biomass information, data standards, gap identification and potential improved funding opportunities to address the known gaps and deficiencies in the data.




FOS, currently in the proof-of-concept phase includes such networks as: the Center for Tropical Forest Science – Forest Global Earth Observatory (CTFS-ForestGEO), the ForestPlots.net (incl. RAINFOR, AfriTRON and T-FORCES) and the IIASA network in Northern Eurasia. FOS is an open initiative with other networks and teams most welcome to join.

The online database (http://forest-observation-system.net/) provides open access for both *metadata* (e.g. who conducted the measurements, where and which parameters) and *actual data* for a subset of plots where the authors have granted access. A minimum set of database values include: principal investigator and institution, plot coordinates, number of trees, forest type and tree species composition, wood density, canopy height and above ground biomass of trees. Plot size is 1 ha (preferably) or at least 0.25 ha.

The database will be essential for validating and calibrating satellite observations and various models, but also has immense ecological value itself for both science and policy. The focus is to provide ground support for the future ESA Earth Explorer BIOMASS mission. We are currently exploring synergies with other ongoing projects (e.g. GlobBiomass project) and other ongoing or future missions (e.g. NASA GEDI, NISAR; JAXA ALOS; ESA SAOCOM-CS).