

Citizen science mobile app for measuring trees and forests

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Citizens for Copernicus (C4C): Combing Copernicus and Crowdsource Data for Forest Resources Monitoring



The C4C project has received funding from the Austrian Research Promotion Agency (FFG) under ASAP 2022 call, <u>application No. 47907528</u>.

Open-Earth-Monitor Cyberinfrastructure (OEMC)



This project has received funding from the European Union's Horizon Europe research and innovation programme under grant agreement No. 101059548.

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Novel Data Ecosystems for Sustainability (NODES), IIASA

Event: GEO-OPEN-HACK-2024

Date: 25. June 2024

NoDES - Novel Data Ecosystems for Sustainability





Advancing Citizen Science

Enriching Earth Observation

Exploiting the digital revolution







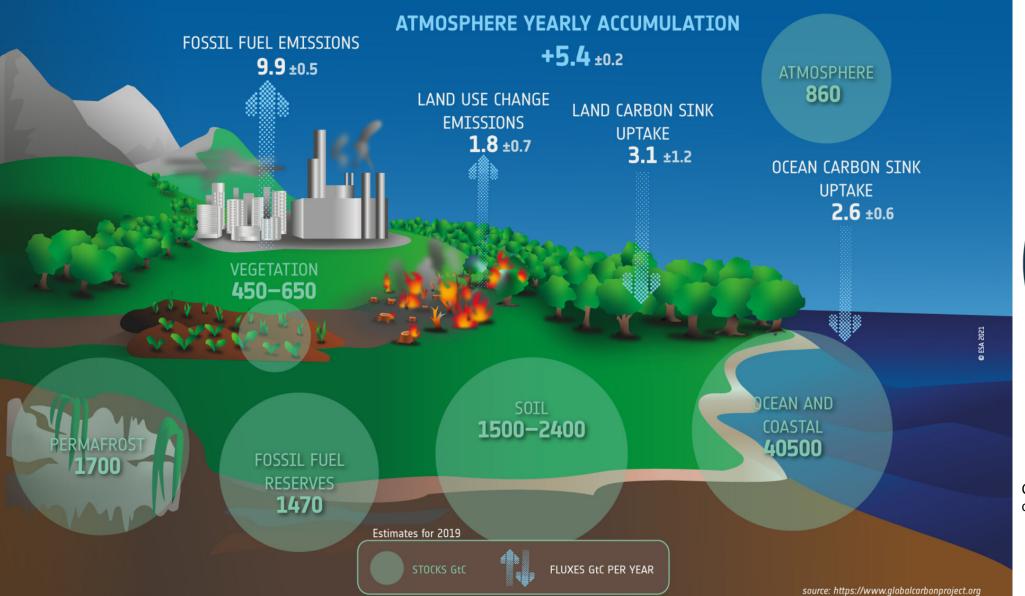






GLOBAL CARBON BUDGET





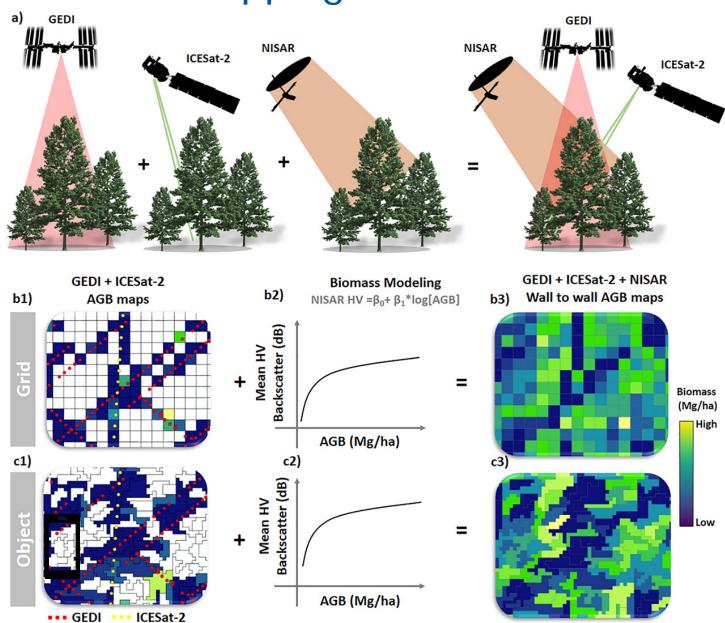


Credit: ESA

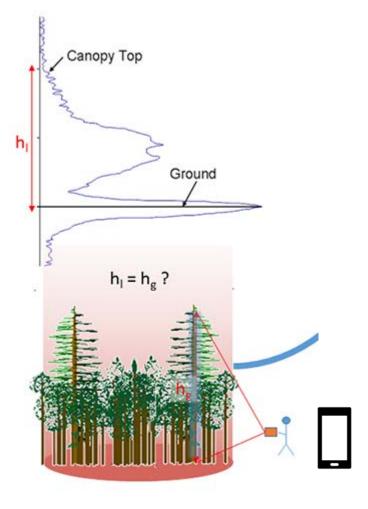
data source: Global Carbon Project

Biomass mapping from Satellite data





Local measurement and validation

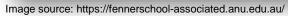


Credit: University of Maryland/ NASA

Aim...











Mobile app measurements and data storage



Geo-Quest:

- New citizen science app for iOS and Android
- Users can do quests to collect in-situ ground data
- 2 quest types:
 - o Opportunistic
 - Predefined locations
- Engagement: Leaderboards, Achievements
- Currently in closed testing:

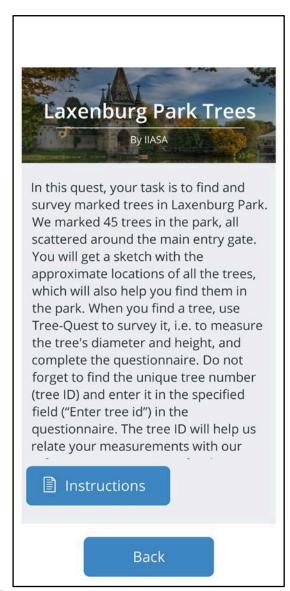
https://testflight.apple.com/join/JDFZdPEh
https://play.google.com/store/apps/details?id=com.iiasa.geoguest

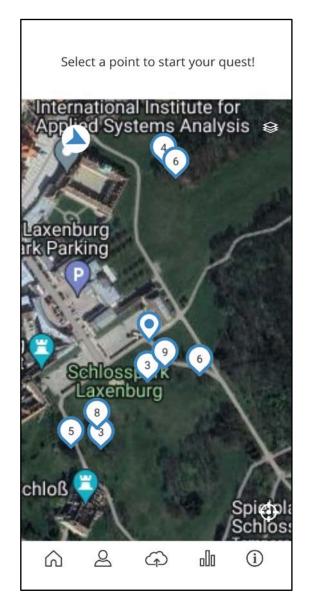




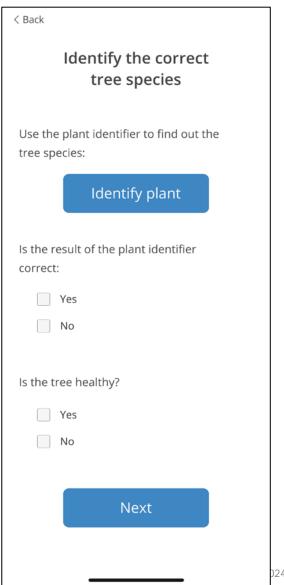
Tree-Quest: Single Tree Measurements











Tree-Quest: Single Tree Module

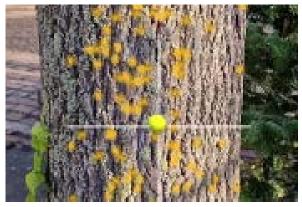


Feature points



- 3D AR session
- continues evaluation of camera pose
- features parsed and visualized by the app
- seedpoint selection and relative measurements
- AR user interaction

Seedpoint



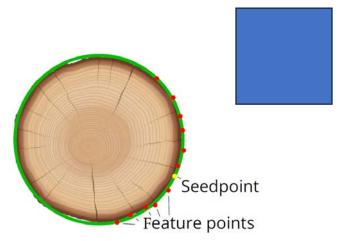
Tree-Quest: Single Tree Module



DBH calculation with circle fit



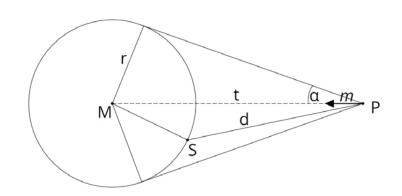
- feature points selected wrt. seedpoint
- circle fit to the horizontal projection of the points
- Settings:
 - · height tolerance
 - min & max distance to the nn-point
 - robust fit
 - coordinate transformation



DBH calculation with tangents



- left and right tangents defined by the user
- DBH and tree center calculated from
 - the angle between tangents
 - seedpoint vector
 - · camera position P





Tree-Quest: Single Tree Module



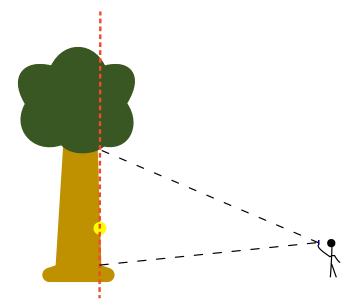
Tree height calculation



Volume calculation



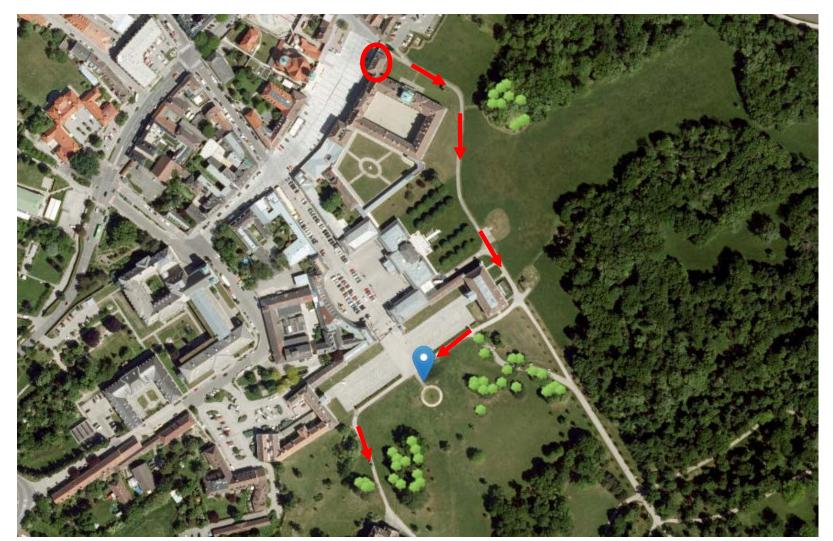
- based on the setpoint vertical plane
- bottom and top tree points defined by the user
- intersection points between the bottom and top vectors with the vertical plane
- distance between the intersection points



basal area x height

GEO-OPEN-HACK-2024: Laxenburg Park Campaign



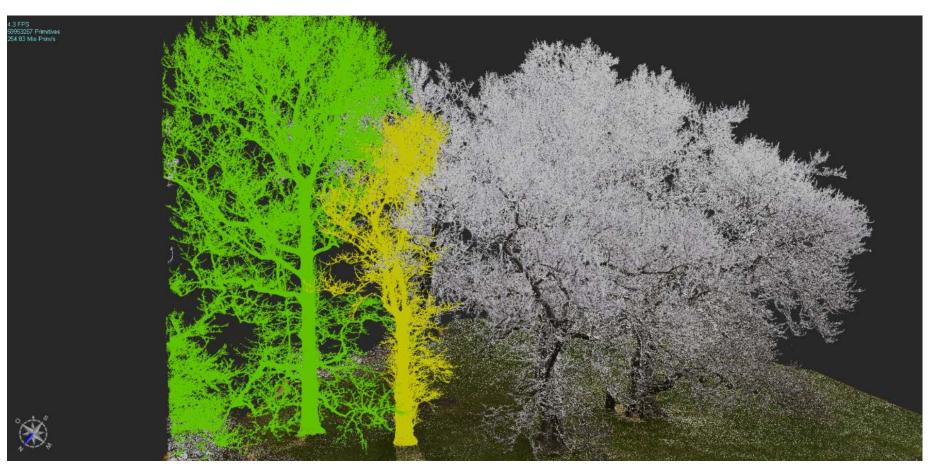














Calibration / Validation

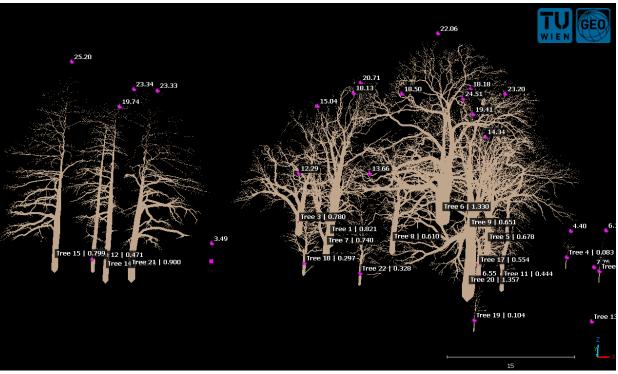


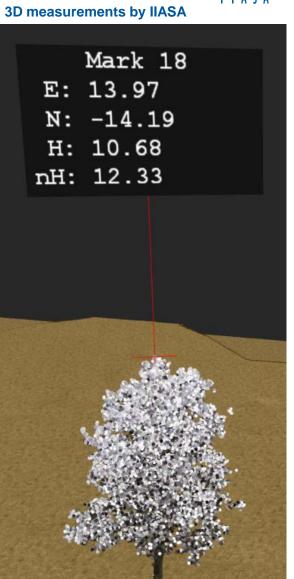






3D Tree Models created by TU Wien, Photogrammetry Group





GEO-OPEN-HACK-2024: Laxenburg Park Campaign

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Aim:

Survey all 45 trees or as much as possible, <u>but only once!</u>

Leaderboard:

Score (0, 1] is calculated for each tree

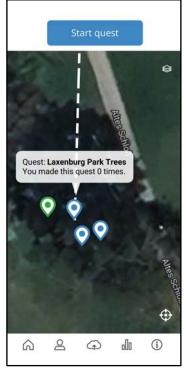
Milutin

- based on your measurement accuracy (TLS ref.)
- Scores for all surveyed trees are summed up for ranking

Prices:

!!! The top three participants on the Leaderboard will be awarded !!!









Rudi Weinacker

Tobias Sturn



Florian Hofhansl



Santosh Karanam

Leaderboard

Rank	User Name	User Id		Submis	Submissions	
1	FloH	3a1096ba-ac72-e5d1-db7b-de8cd2dc81e8		46		252
2	TobiasTest	3a0e981c-b614-da76-456a-beade5e6230d	https://c4cweb.main.geo-wiki.org/	4	Thank you!	
3	TreeObserver	3a134d1d-800a-37e4-ed17-32298d3f04cf				
4	TestGQ	3a133903-61b1-af73-1590-bbb9e1a5dfca		1	Novel Data Ecosystems for Sustainabi	ility, IIASA