

# Citizen Science Mobile App and Data in Support of Forest Mapping

## Tree-Quest App and Laxenburg Park Campaign

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



The C4C project has received funding from the Austrian Research Promotion Agency (FFG) under ASAP 2022 call, [application No. 47907528](#).

### Open-Earth-Monitor Cyberinfrastructure (OEMC)



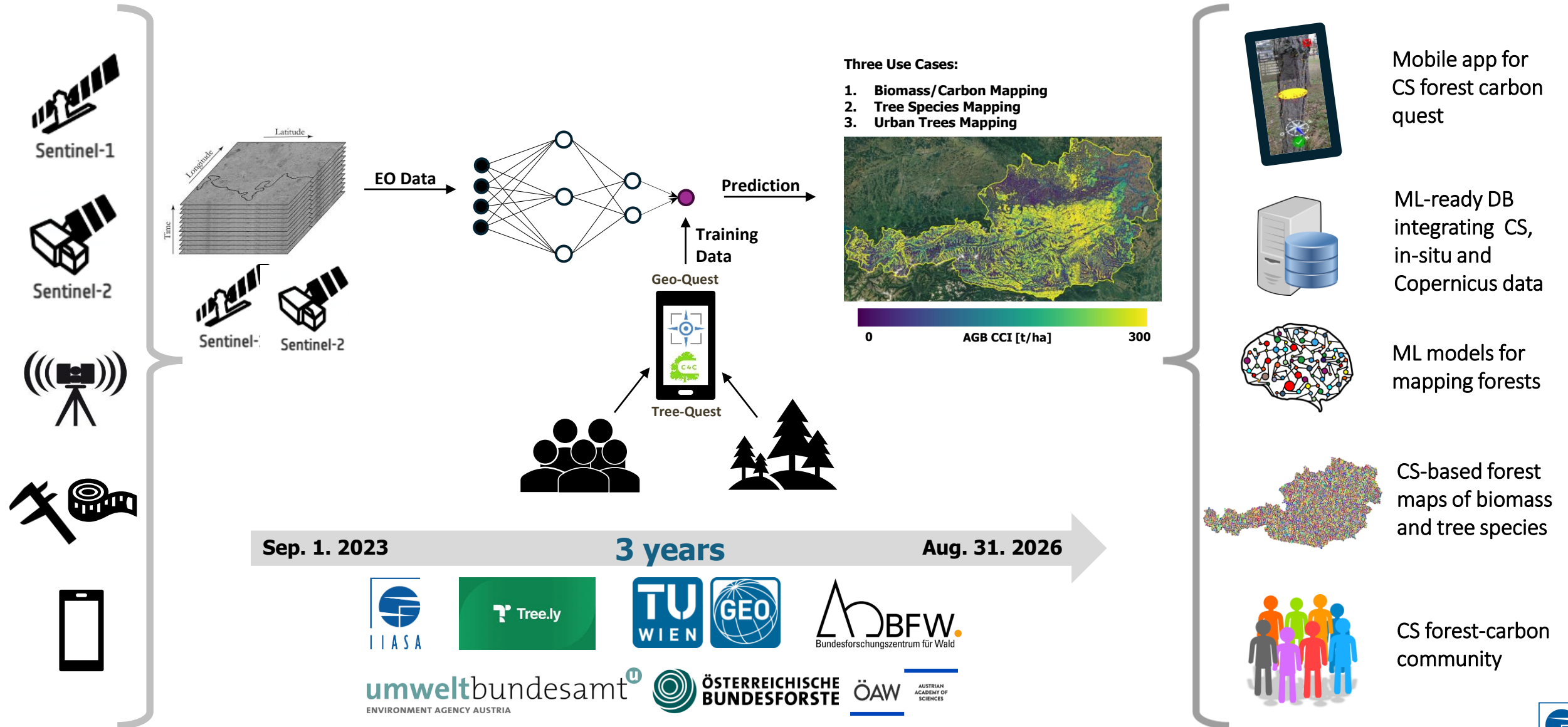
This project has received funding from the European Union's Horizon Europe research and innovation programme under [grant agreement No. 101059548](#).

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Date: 25. February 2026

# Citizens for Copernicus (C4C) project



# The Geo-Quest mobile application

Easy and accurate Earth Observation - enhanced ground data collection



Geo-Quest

Available for Android and iOS

Includes different Citizen Science quests:

- Tree-Quest
- Forest-Quest
- Crop Capture



# Tree-Quest: Single Tree Measurements

Collects ground data such as:

- Tree Diameter (DBH)
- Tree Height (TH)
- Tree Species

Based on the measurements the app estimates:

- Volume of the tree
- Aboveground biomass of the tree
- Carbon stored in the tree

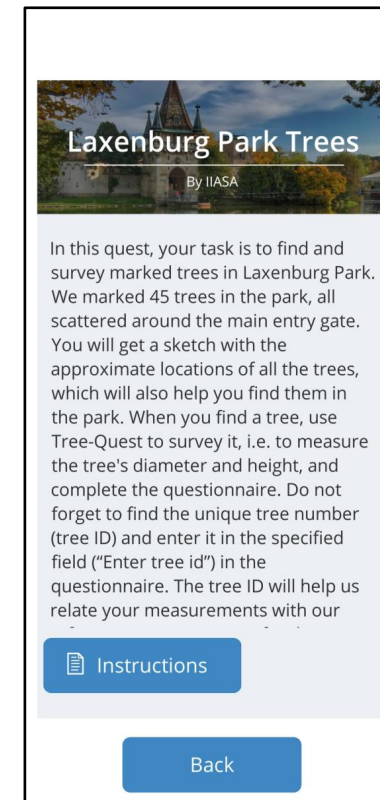
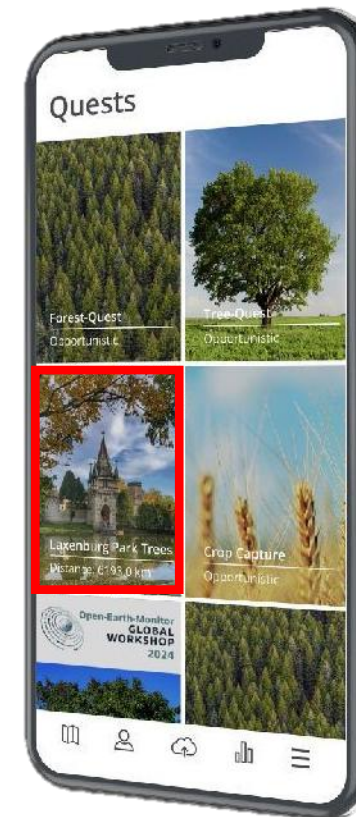
Available two quest types:

- Opportunistic
- Predefined locations

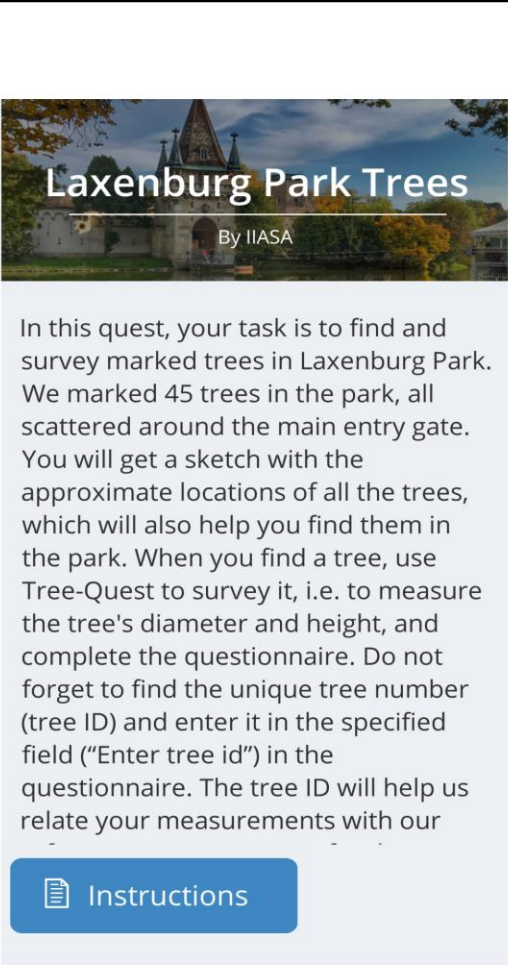
Tree-Quest uses augmented reality

- 3D points
- Circle fit
- Cylinder

## Interactive 3D augmented reality modules



# Tree-Quest: Single Tree Measurements

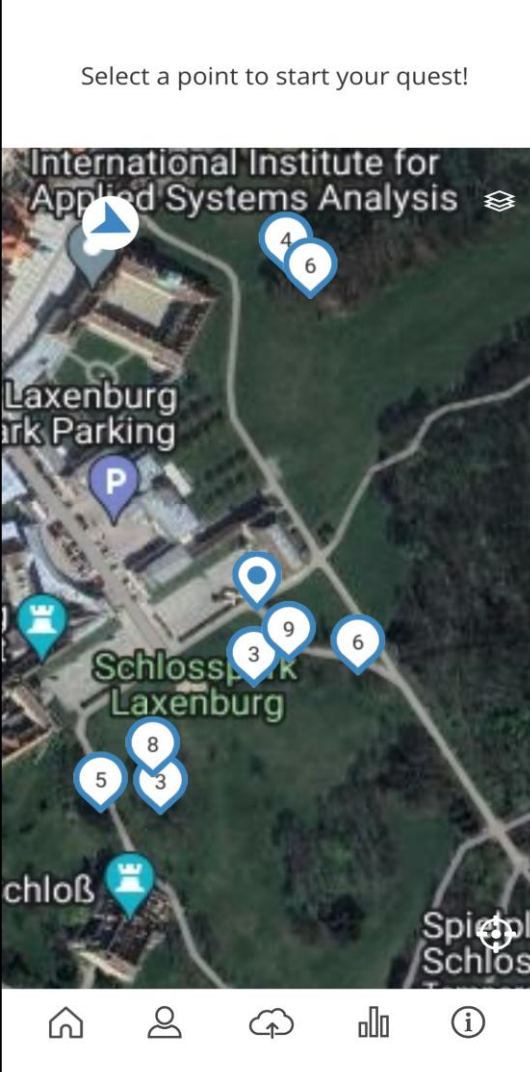


**Laxenburg Park Trees**  
By IIASA

In this quest, your task is to find and survey marked trees in Laxenburg Park. We marked 45 trees in the park, all scattered around the main entry gate. You will get a sketch with the approximate locations of all the trees, which will also help you find them in the park. When you find a tree, use Tree-Quest to survey it, i.e. to measure the tree's diameter and height, and complete the questionnaire. Do not forget to find the unique tree number (tree ID) and enter it in the specified field ("Enter tree id") in the questionnaire. The tree ID will help us relate your measurements with our

[Instructions](#)

[Back](#)



Select a point to start your quest!

International Institute for Applied Systems Analysis


Laxenburg Park Parking

Schlosspark Laxenburg

Schloß

Spiegel Schloß

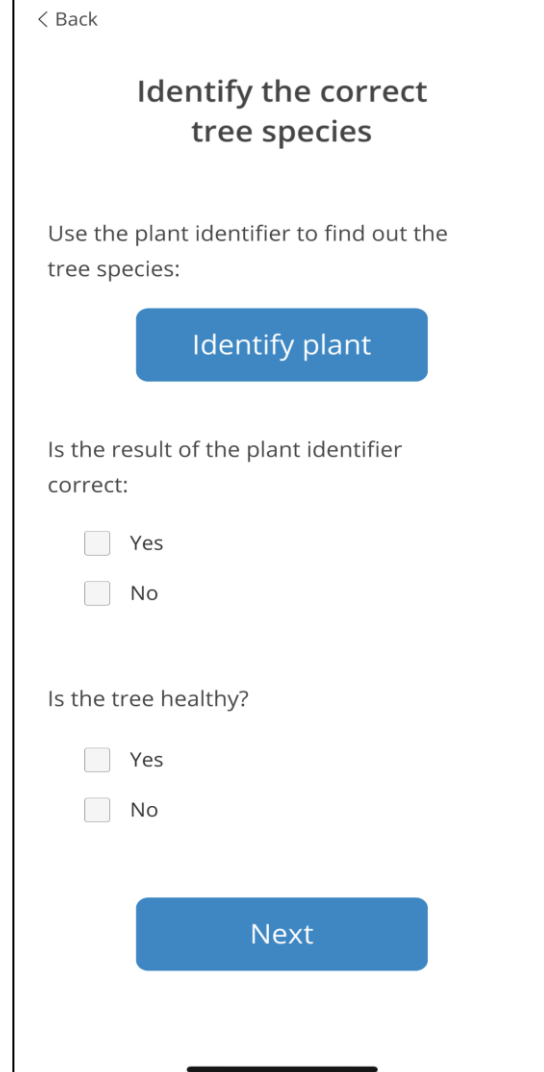
Home, Profile, Cloud, Bar, Info icons at the bottom.



**Tree-Quest**

Distance: 0.136 m  
Diameter: 0.058 m

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**Identify the correct tree species**

Use the plant identifier to find out the tree species:

[Identify plant](#)

Is the result of the plant identifier correct:

Yes  
 No

Is the tree healthy?

Yes  
 No

[Next](#)

# Tree-Quest: Single Tree Module

Feature points



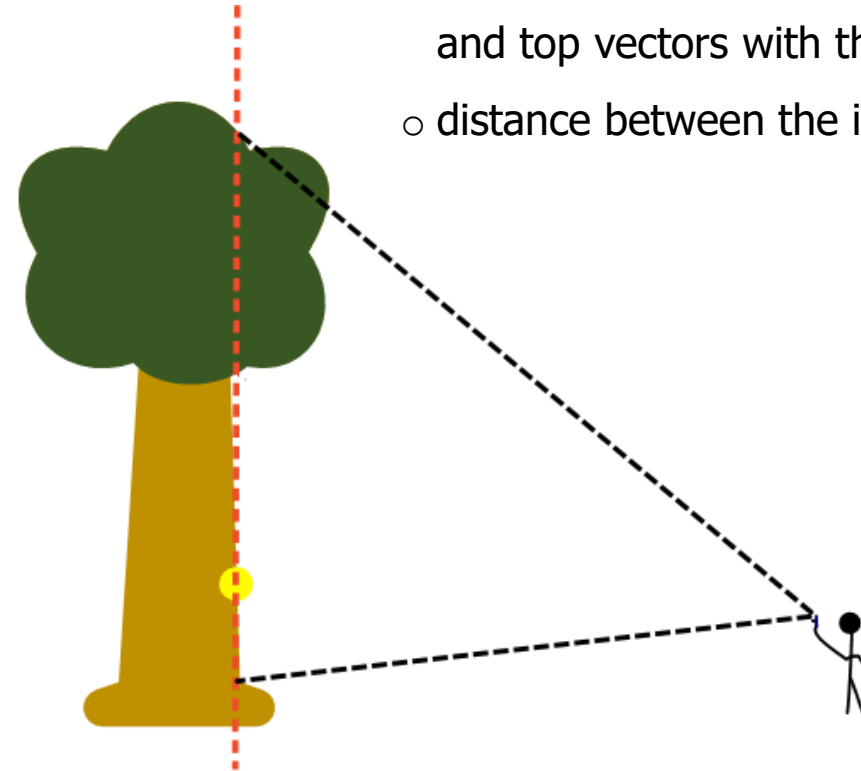
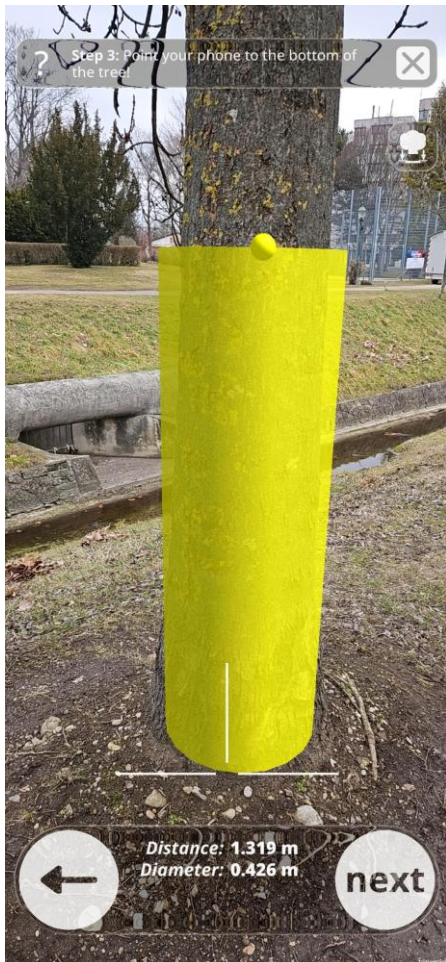
Seedpoint



- 3D AR session
- features parsed and visualized by the app
- seedpoint selection and relative measurements
- AR user interaction

# Tree-Quest: Single Tree Module

## Tree height (TH) calculation



- based on the seedpoint 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

# Laxenburg Tree Campaign



## Laxenburg Park

Users  
**30**

Submissions  
**682**

Images  
**5343**

[Login to download submission data.](#)

### Aim:

- Survey all 45 trees, only once!

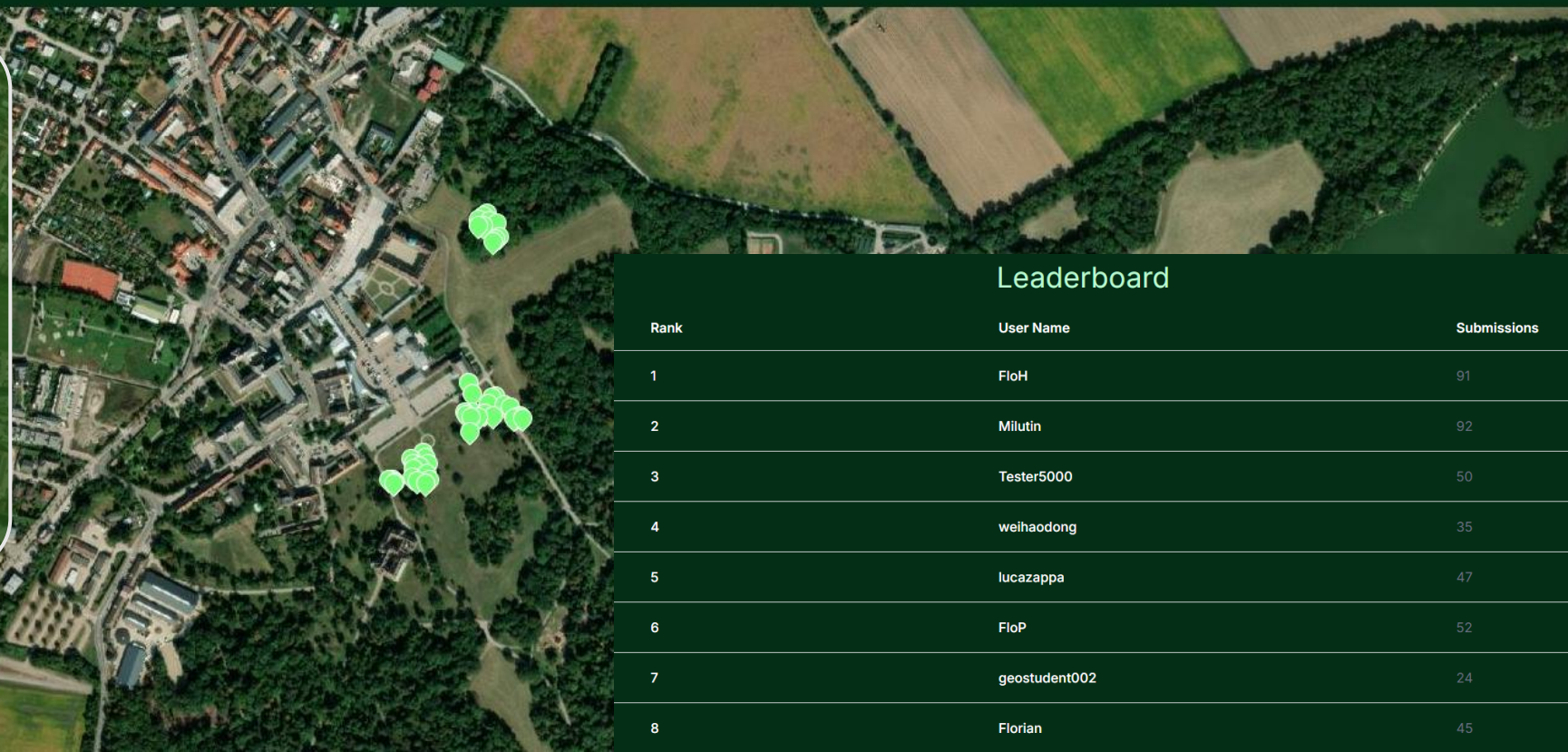
### Participants:

- 23 people, GEO-OPEN-HACK 2024 event

### Ranking:

- Score is calculated for each tree

**Prizes for the top 3 best ranked participants**



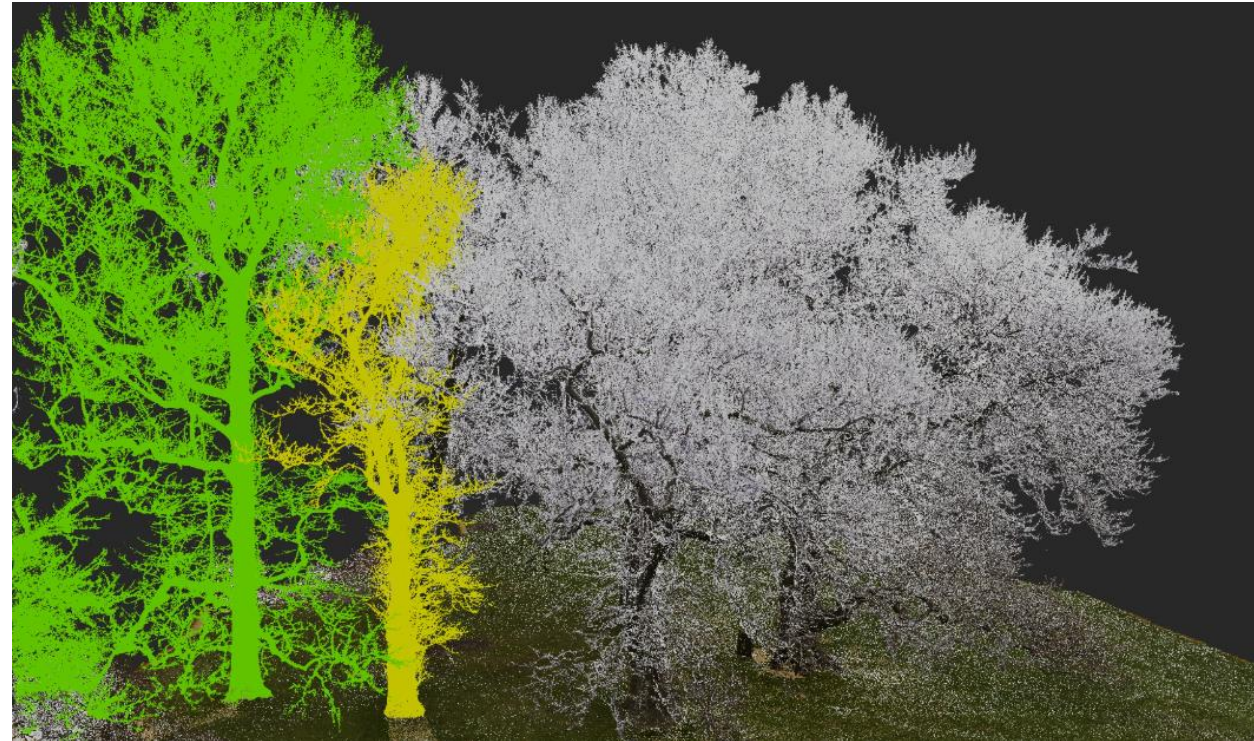
### Leaderboard

| Rank | User Name     | Submissions |
|------|---------------|-------------|
| 1    | FloH          | 91          |
| 2    | Milutin       | 92          |
| 3    | Tester5000    | 50          |
| 4    | weihaodong    | 35          |
| 5    | lucazappa     | 47          |
| 6    | FloP          | 52          |
| 7    | geostudent002 | 24          |
| 8    | Florian       | 45          |

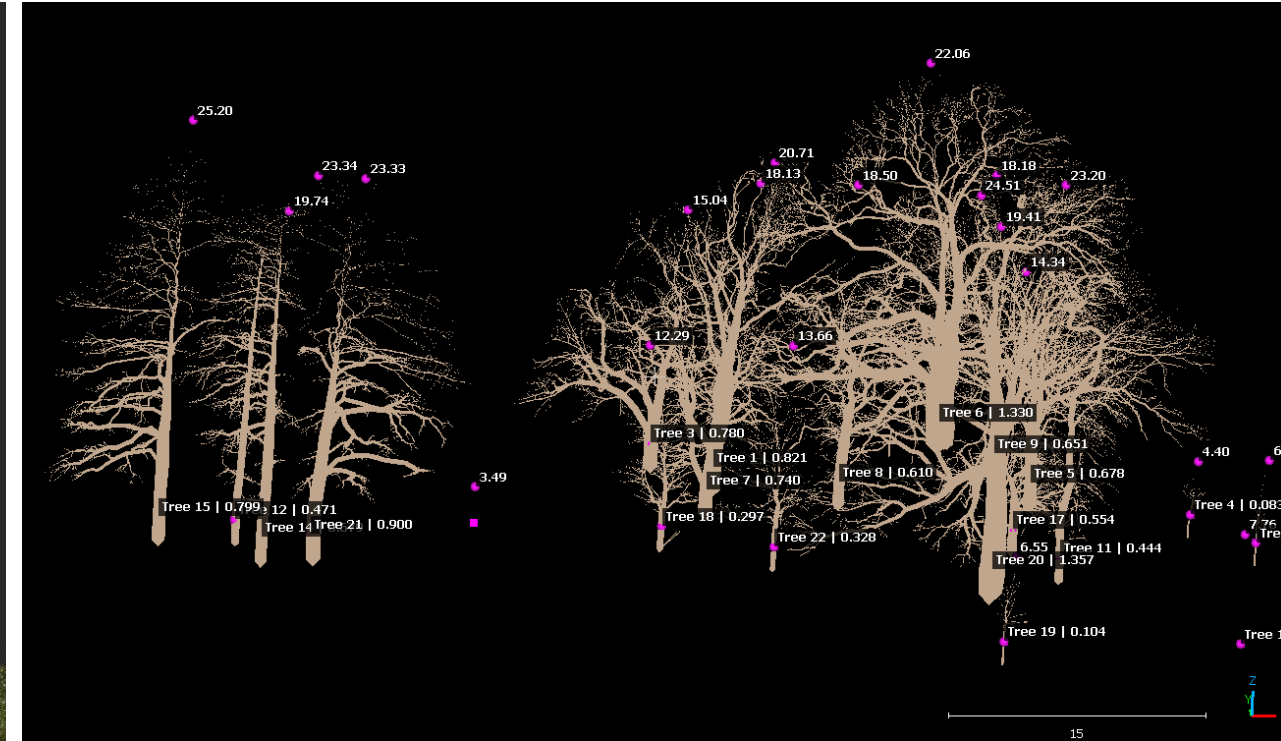
# Terrestrial Laser Scanning



Point cloud from TLS



3D Tree Models created by TU Wien, Photogrammetry Group

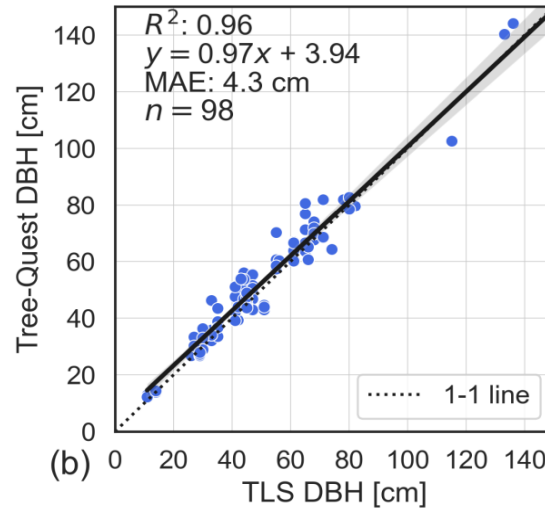
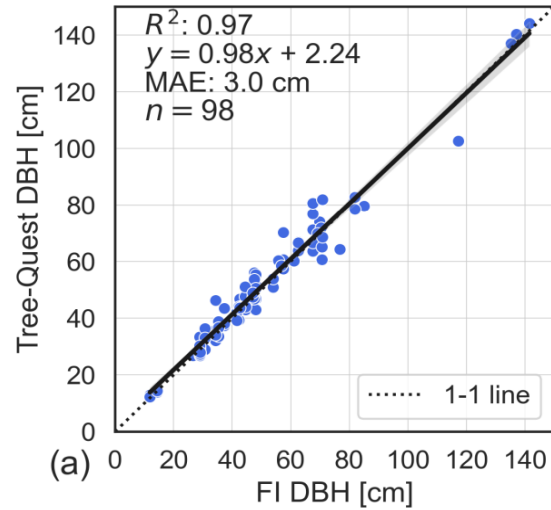


NFI-like forestry measurements acquired by IIASA and TU Wien

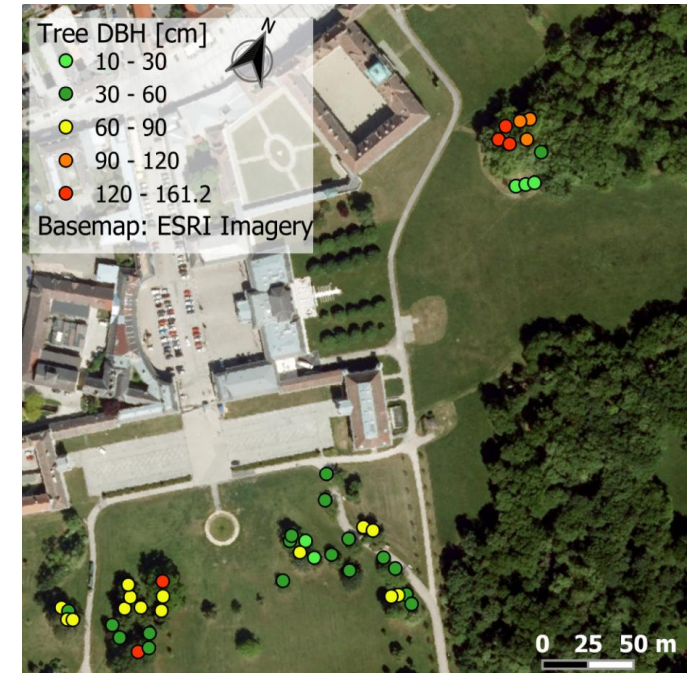
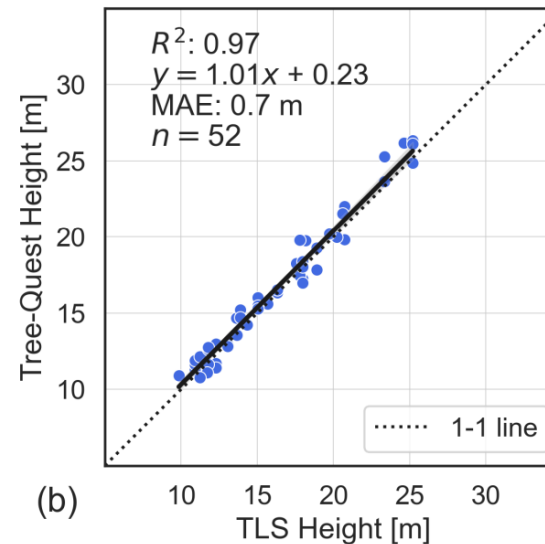
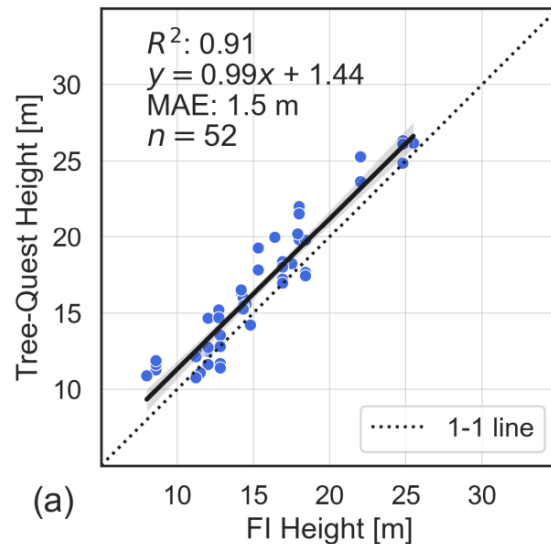


# App Validation

**DBH rMAE 6%**  
compared to  
FI measurements



**TH rMAE 11%**  
compared to  
FI measurements



Publication about Tree-Quest  
under review - Milenković et al.

# Thank you for your attention.

## Questions?

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