

Crowd-driven tools for the calibration and validation of Earth Observation products

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*EO Open Science 2017 Conference
Session: Open Data & Tools*

Motivation

- Improving the quality of EO-based Land Use & Land Cover products
- Uncovering the potential of citizen science and crowdsourcing at the intersection of LULC & EO
- Lowering cost and extending in-situ data collection methods
- Innovating calibration/validation approaches within processing chain of environmental monitoring



Crowd-driven process

- LULC mapping has a conventional top-down approach
- It is possible to involve citizens and interested experts to crowdsource the needed information using a more participatory approach
- In EO domain, we can engage stakeholders (within and outside the scientific community) in various tasks, including satellite image interpretation and online interactive mapping



Crowd-driven tools

1

Geo-Wiki
Engagement
Platform



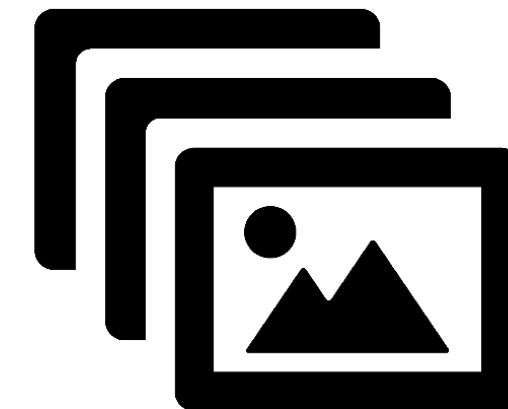
2

LACO-Wiki
Validation
Platform



3

Picture
Pile



4

FotoQuest
Go



1

Geo-Wiki Engagement Platform

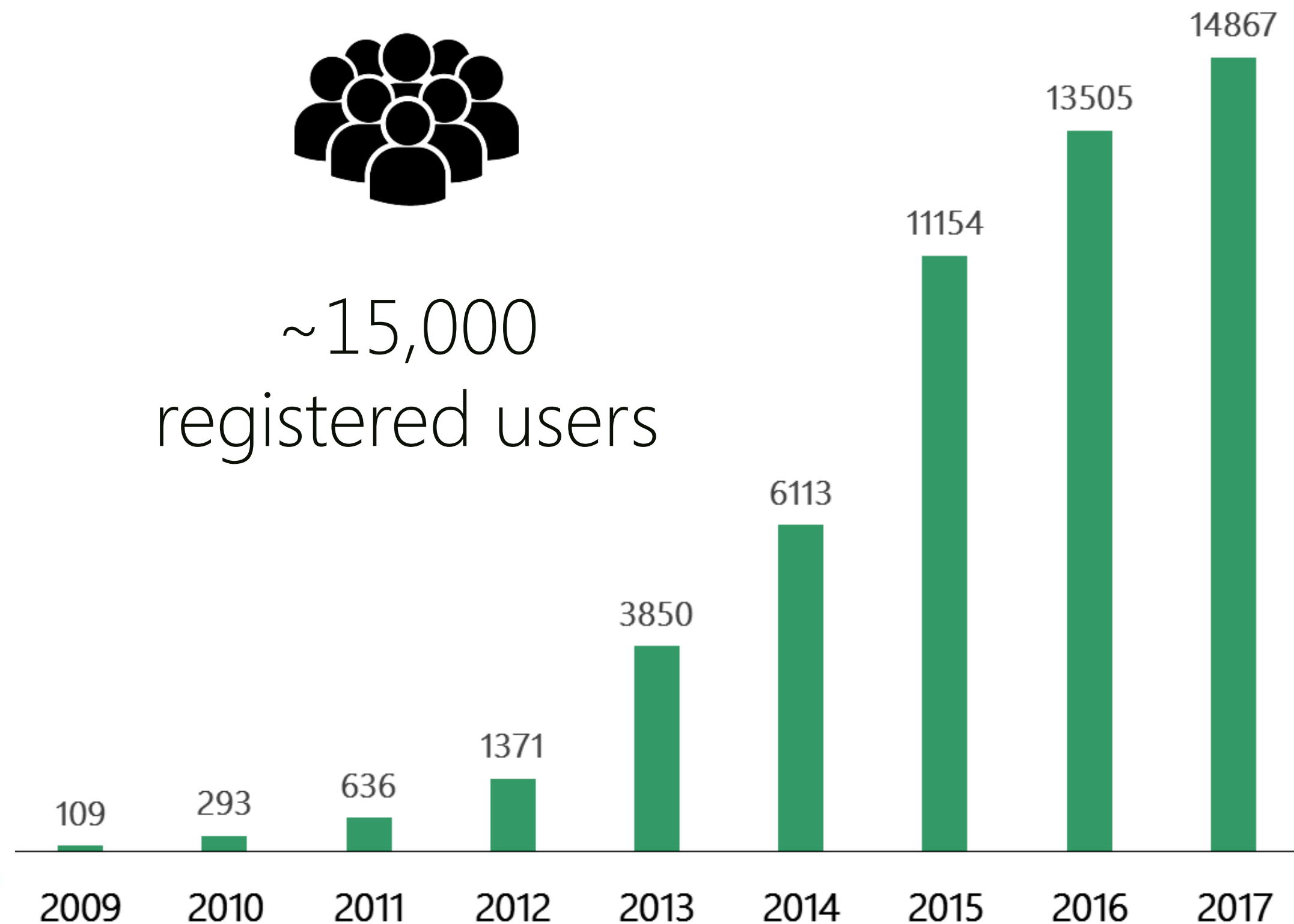


Geo-Wiki is an open platform that provides citizens with the means to engage in environmental monitoring by providing feedback on existing spatial information overlaid on satellite imagery or by contributing entirely new data.

A screenshot of the Geo-Wiki website interface. On the left, there is a navigation menu with the GEO-Wiki logo and links for Home, News, Publications, Downloads, Sources, Games, Picture Pile, Picture Paint, and FAQ. The main content area is titled "Get involved now!" and lists several ongoing projects: FotoQuestGo, New! Global Built-Up Surfaces, Picture Pile, Geo-Wiki pictures, LACO-Wiki, and Picture Paint. Each project card includes a small image and a brief description of the activity. At the bottom of the page, there are three red YouTube play button icons with the text "General overview", "Competition", and "Geo-Wiki pictures".



~15,000 registered users



1

Geo-Wiki Engagement Platform

Series of crowdsourcing campaigns since 2011

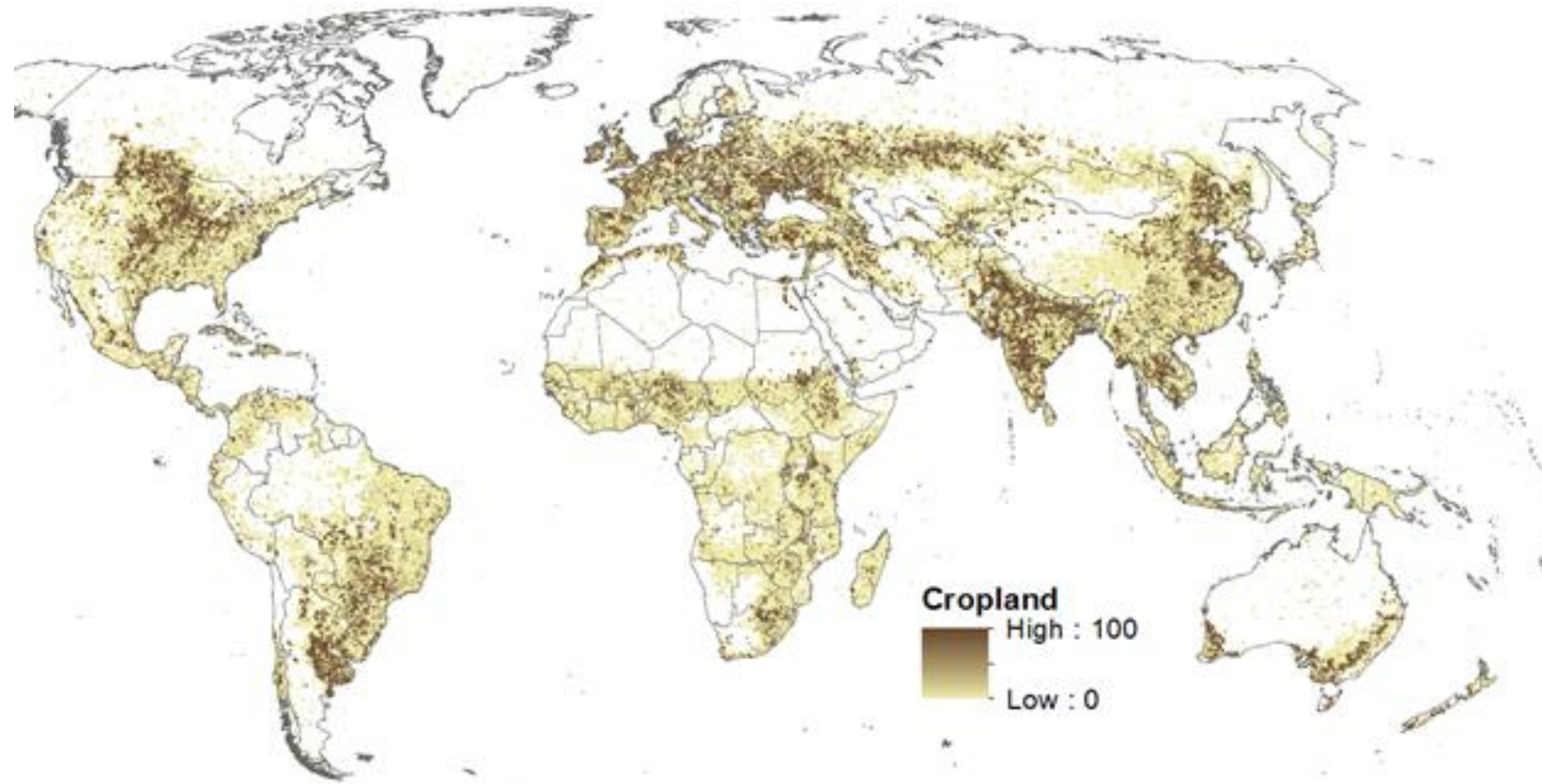
2016

Global Cropland Validation → 36,000 points
Global Field Size → 130,000 points



Fritz et al., (2017) A global dataset of crowdsourced land cover and land use reference data. Scientific Data 4: p 170075.

Global Cropland Validation



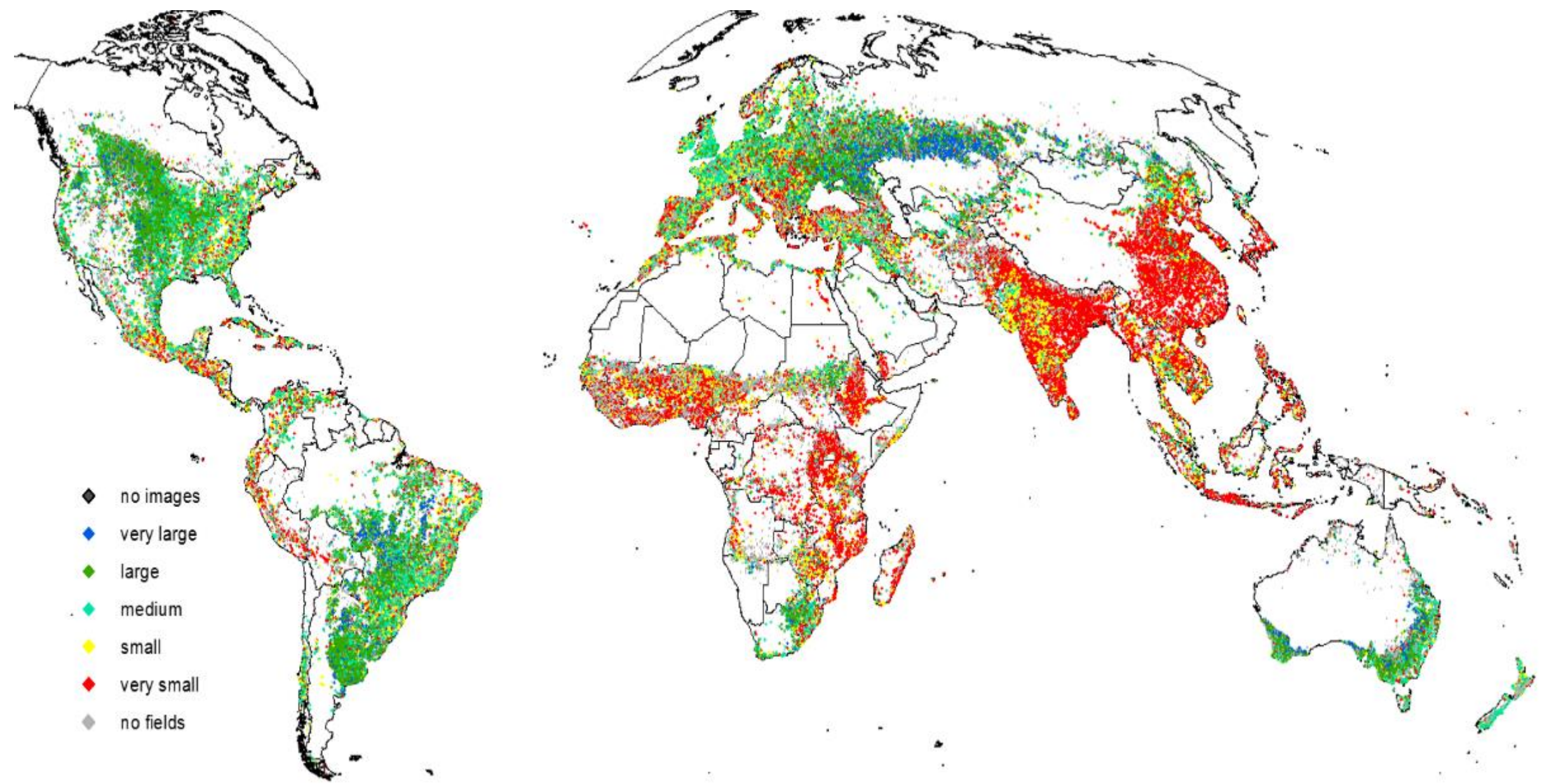
80
volunteers



144K
validations

Laso Bayas et al., (2017) A global reference database of crowdsourced cropland data collected using the Geo-Wiki platform. Scientific Data (in press)

Global Field Size



130
volunteers



390K
validations

2

LACO-Wiki Validation Platform

An open user-driven web interface that provides LC validation methods for map production and validation. Recommended by EEA for validating Copernicus local component datasets (i.e. Urban Atlas)



laco-wiki.net

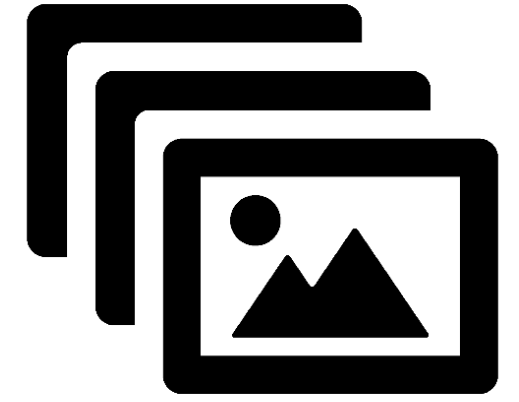


The screenshot displays two identical validation panels side-by-side. Each panel features a satellite image on the left with a blue rectangular selection box. To the right of the image is a 'Classify the object:' section with a legend of 11 categories: Cultivated land (10), Forest (20), Grassland (30), Shrubland (40), Wetland (50), Water bodies (60), Artificial surfaces (80), Bareland (90), and Permanent snow and ice (100). Below the legend is a 'Sample Information' section containing: Sample Item ID 106036, Validated by, Timestamp -, and Bing imagery date 02 Mar 2013 GMT. A 'Download sample (kmz)' button is located at the bottom of this section. At the very bottom of each panel is a progress bar showing 'Progress in Total: 99.8 % (499 / 500)'. Navigation arrows and 'Validation # : 500' are visible at the top of each panel.



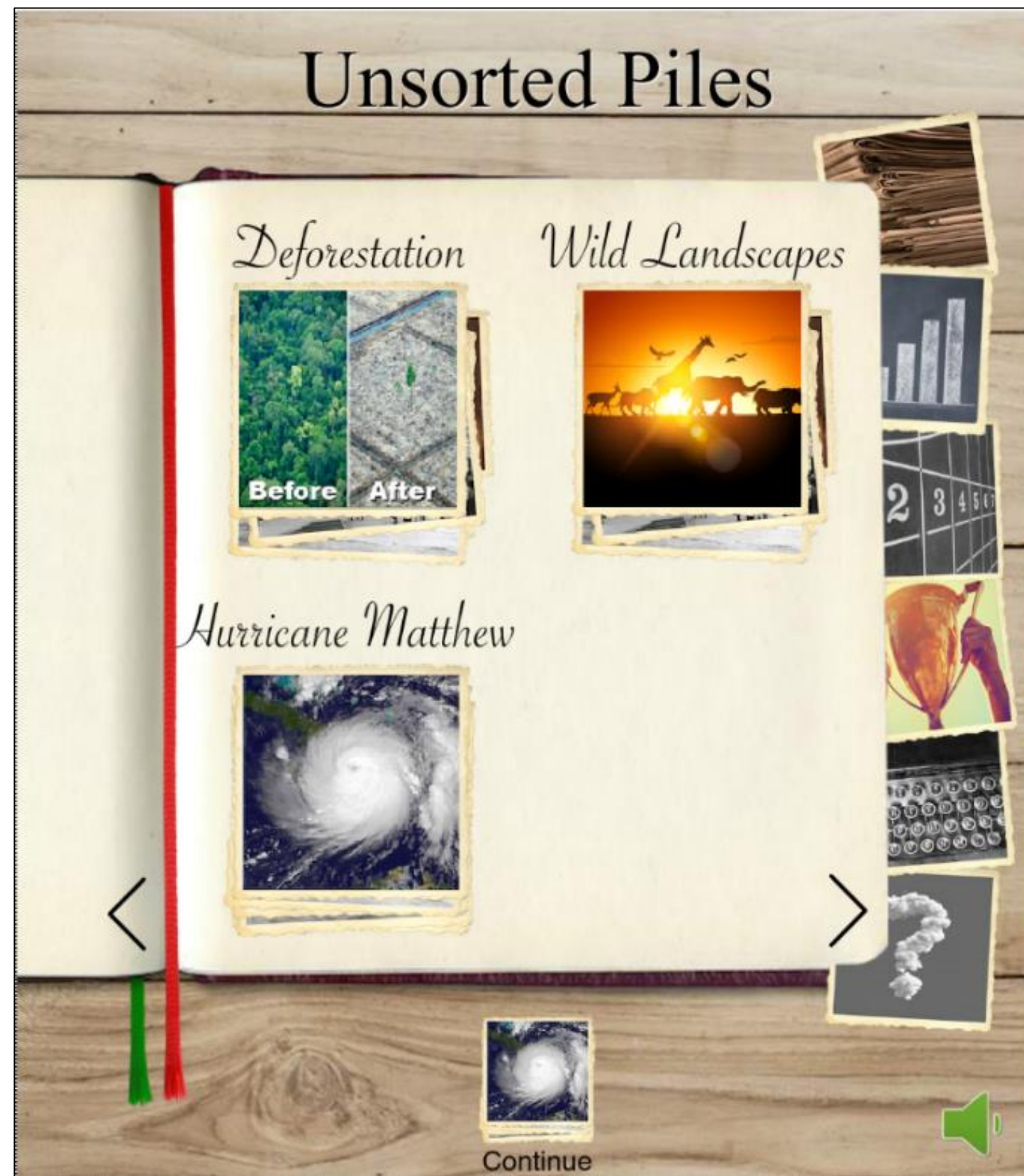
3

Picture Pile



Mobile application for rapid image assessment and change detection. Designed to be generic and flexible tool customizable to different domains that requires EO data as an input resource.

geo-wiki.org/games/picturepile



3

Picture Pile

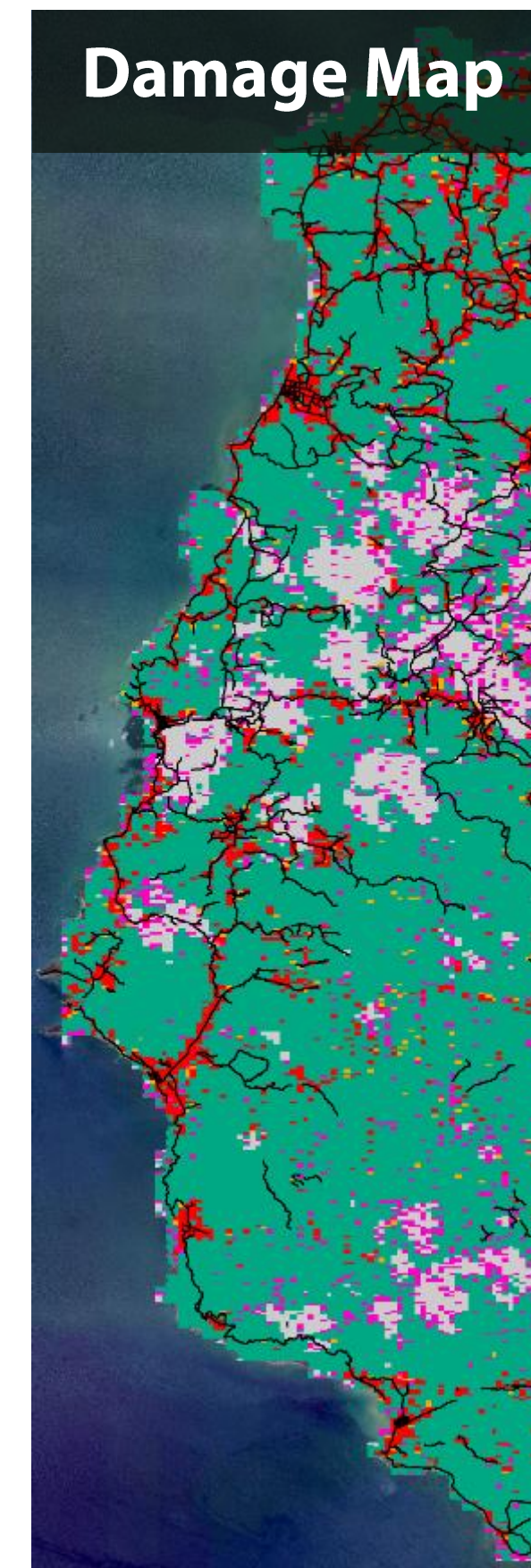
Hurricane Matthew
Post-disaster damage mapping



179
volunteers



249K
validations



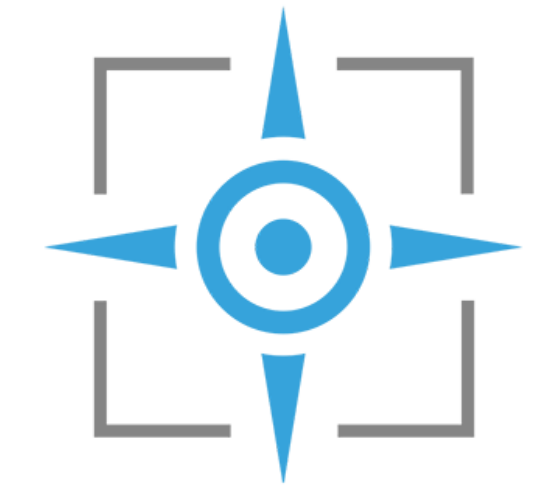
- Damaged
- Likely damaged
- Unknown
- No damage
- Not usable



4

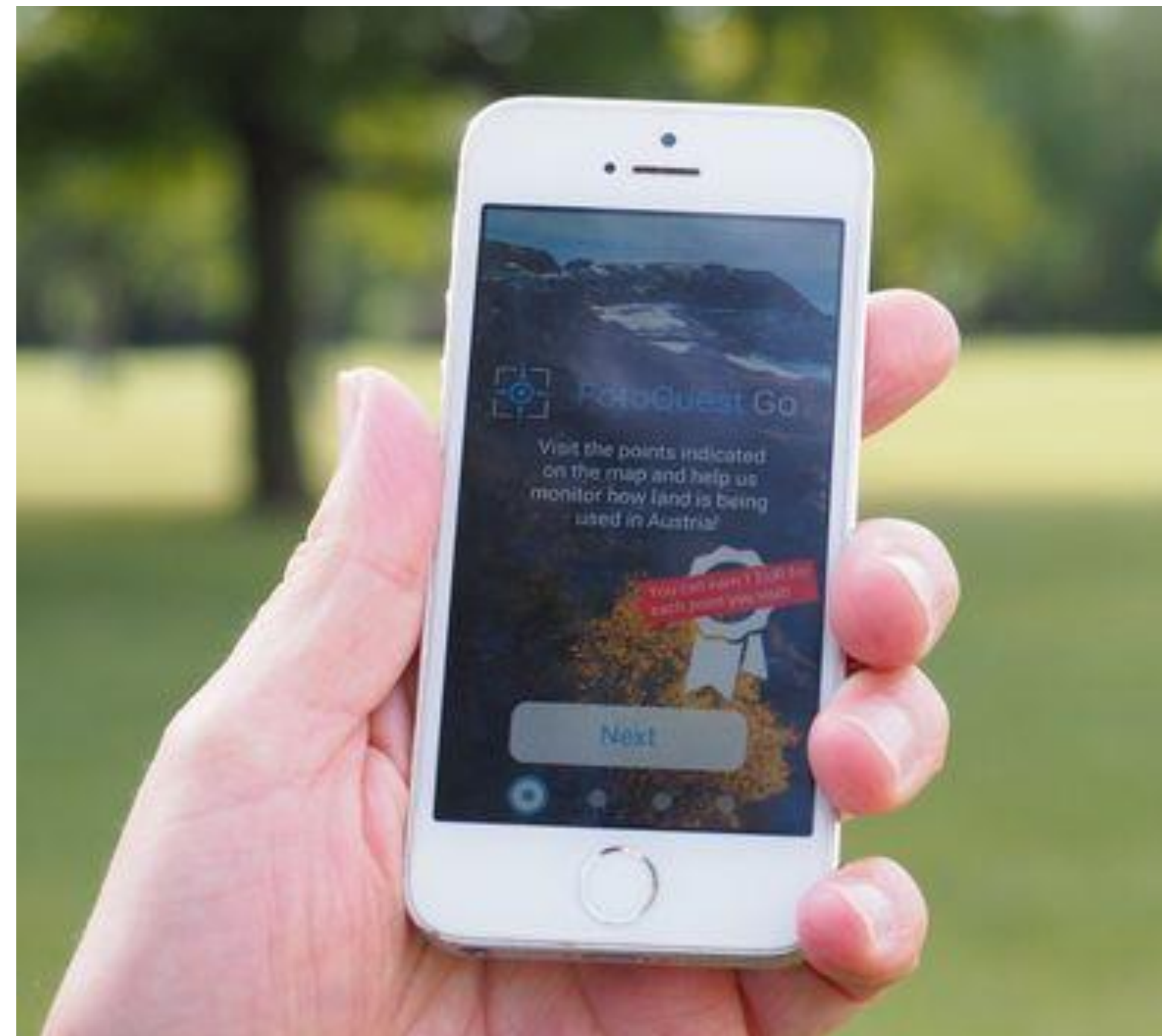
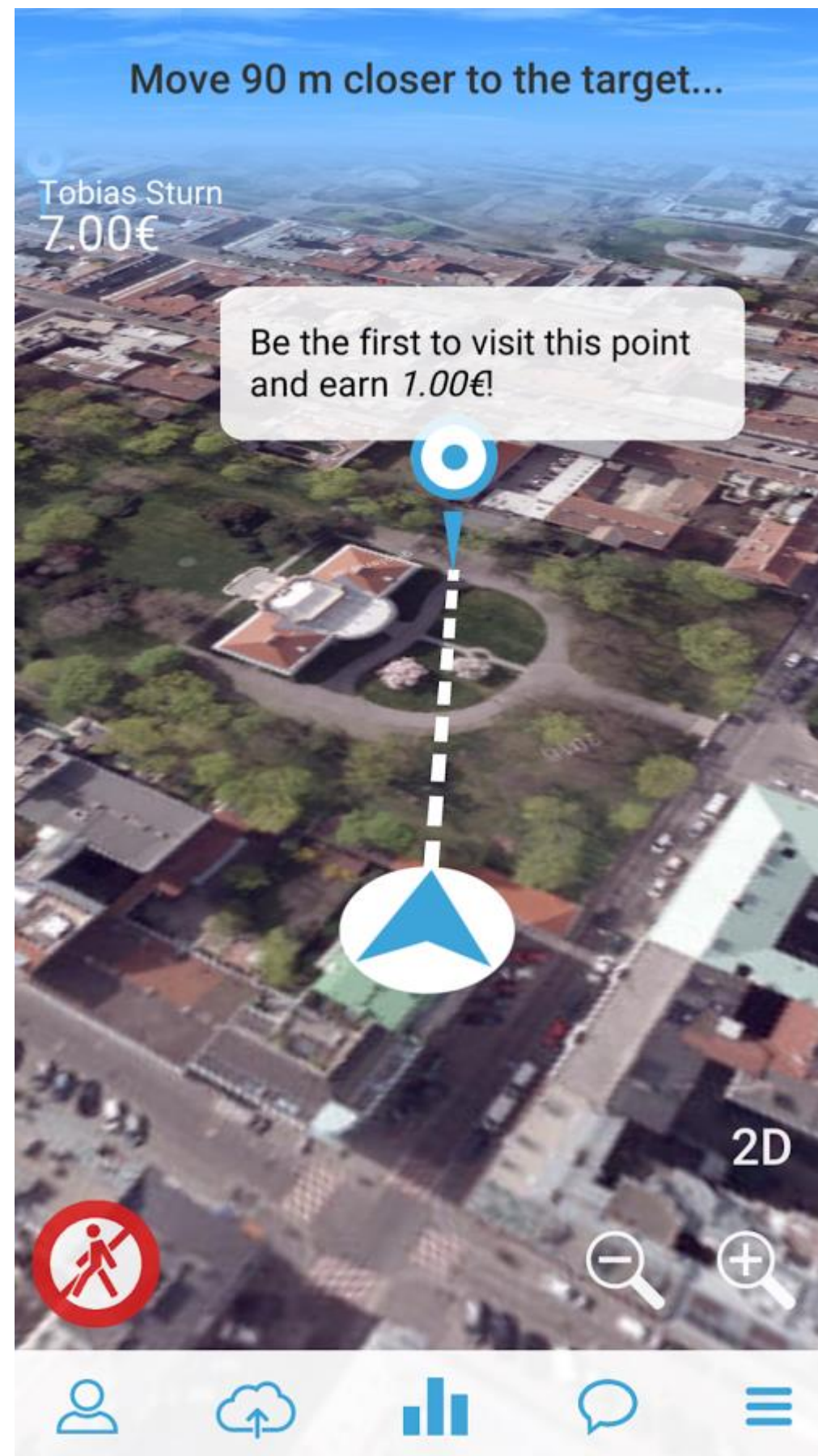
FotoQuest GO

Mobile application for in-situ data collection to promote community-based LULC awareness and monitoring.
Campaign just launched in Austria!



FotoQuestGo

<http://fotoquest-go.org/>

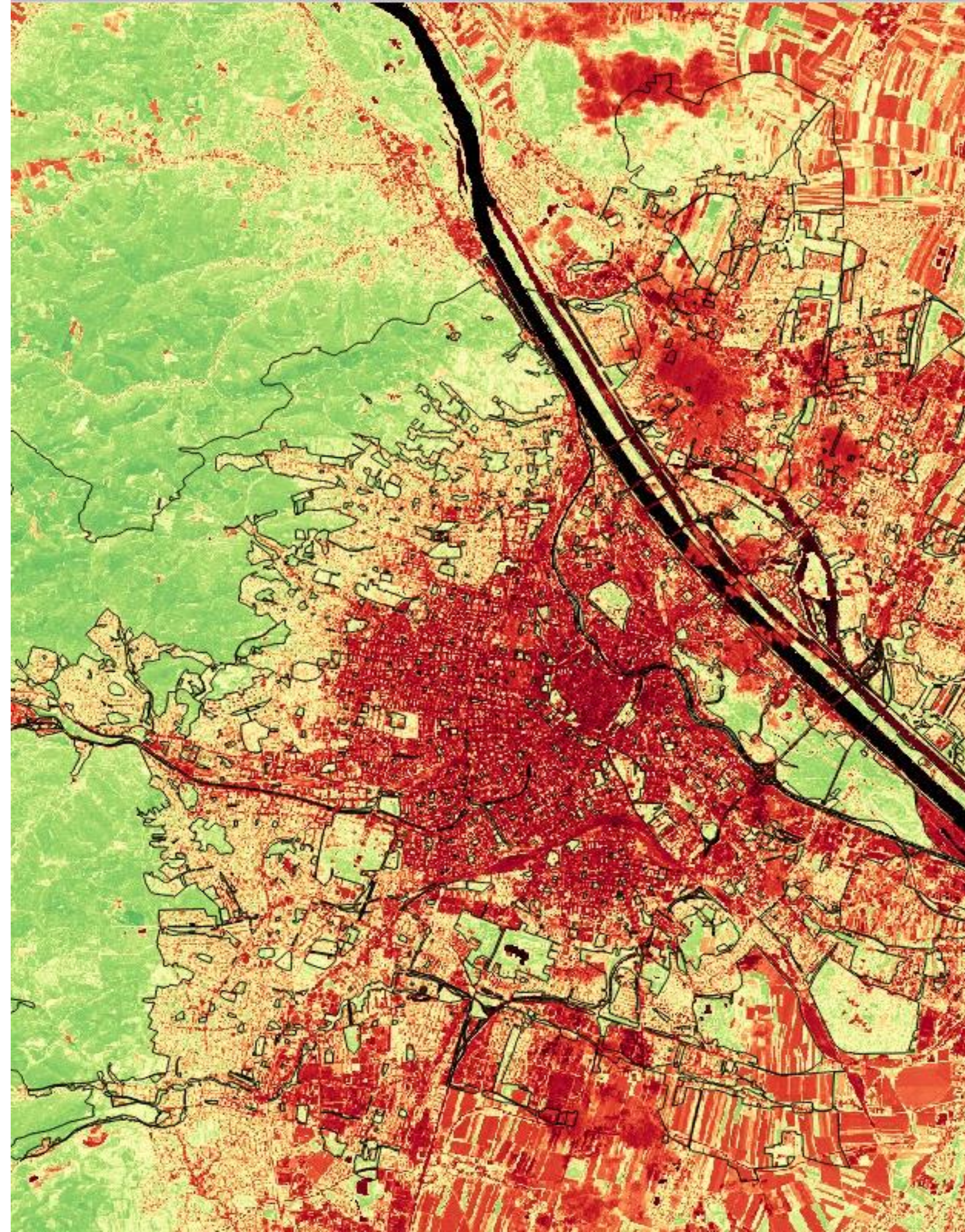


Cal/Val Potential

- Crowd can power large scale validation projects with quick turnaround
- Leveraging the networks of Citizen Observatories like LandSense, Groundtruth 2.0, GROW and SCENT



- Integration with ESA cal/val toolbox
- Openly accessible cal/val datasets for EO product delivery and updates



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