

# **Environmental Data collection using crowdsourcing : opportunities and challenges in the field of land cover and land-use**

Steffen Fritz

Food and Water

Ecosystem Services and  
Management

Group Leader: Earth Observation  
Systems

- What is IIASA

## Young Scientists Summer Program

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**IIASA's annual 3-month Young Scientists Summer Program (YSSP) offers research opportunities to talented young researchers whose interests correspond with IIASA's ongoing research on issues of global environmental, economic and social change. From June through August accepted participants work within the Institute's [research programs](#) under the guidance of IIASA scientific staff. Funding is provided through IIASA's [National Member Organizations](#).**



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# Crowdsourcing - Opportunities

- Outsourcing to the crowd (Howe, 2006)
  - E.g. Amazon's Mechanical Turk
  - Wikipedia

With geographic context termed Volunteered Geographic Information

- Open Streetmap
- Geo-wiki
- Different levels of participation (passive and active)

- **Citizen Science – Increasing interest by Governments - Empowerment**



**OpenStreetMap**  
The Free Wiki World Map

oldWeather



**Digitise pages**  
To earn points on each ship.  
Every page counts



**iSpot**  
your place to share nature

## Classify Galaxies

To understand how galaxies formed we need your help to classify them according to their shapes. If you're quick, you may even be the first person to see the galaxies you're asked to classify.



[Begin Classifying](#)

**eBird**



**Citizen Science Central**



**WIKIPEDIA**

# New possibilities

Technology



Mobile Phones  
Mobile Money

In-Situ



Interested Citizens  
Existing Communities

Value Added



Improved  
Environmental data





## STUDY ESTIMATES LAND AVAILABLE FOR BIOFUEL CROPS

Page 1 of 2

### Study Estimates Land Available for Biofuel Crops

By Science Daily,

January 19, 2011

Using detailed land analysis, Illinois researchers have found that biofuel crops cultivated on available land could produce up to [half of the world's current fuel consumption](#) -- without affecting food crops or pastureland.

Published in the journal Environmental Science and Technology, the study led by civil and environmental engineering professor Ximing Cai identified land around the globe available to produce grass crops for biofuels, with minimal impact on agriculture or the environment.

Many studies on biofuel crop viability focus on biomass yield, or how productive a crop can be regionally. There has been relatively little research on land availability, one of the key constraints of biofuel development. Of special concern is whether the world could even produce enough biofuel to

#### Article Index

[Study Estimates Land Available for Biofuel Crops](#)

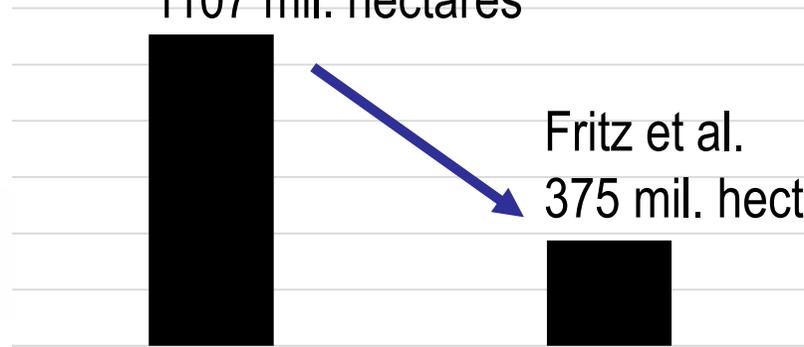
[Page 2](#)

[All Pages](#)

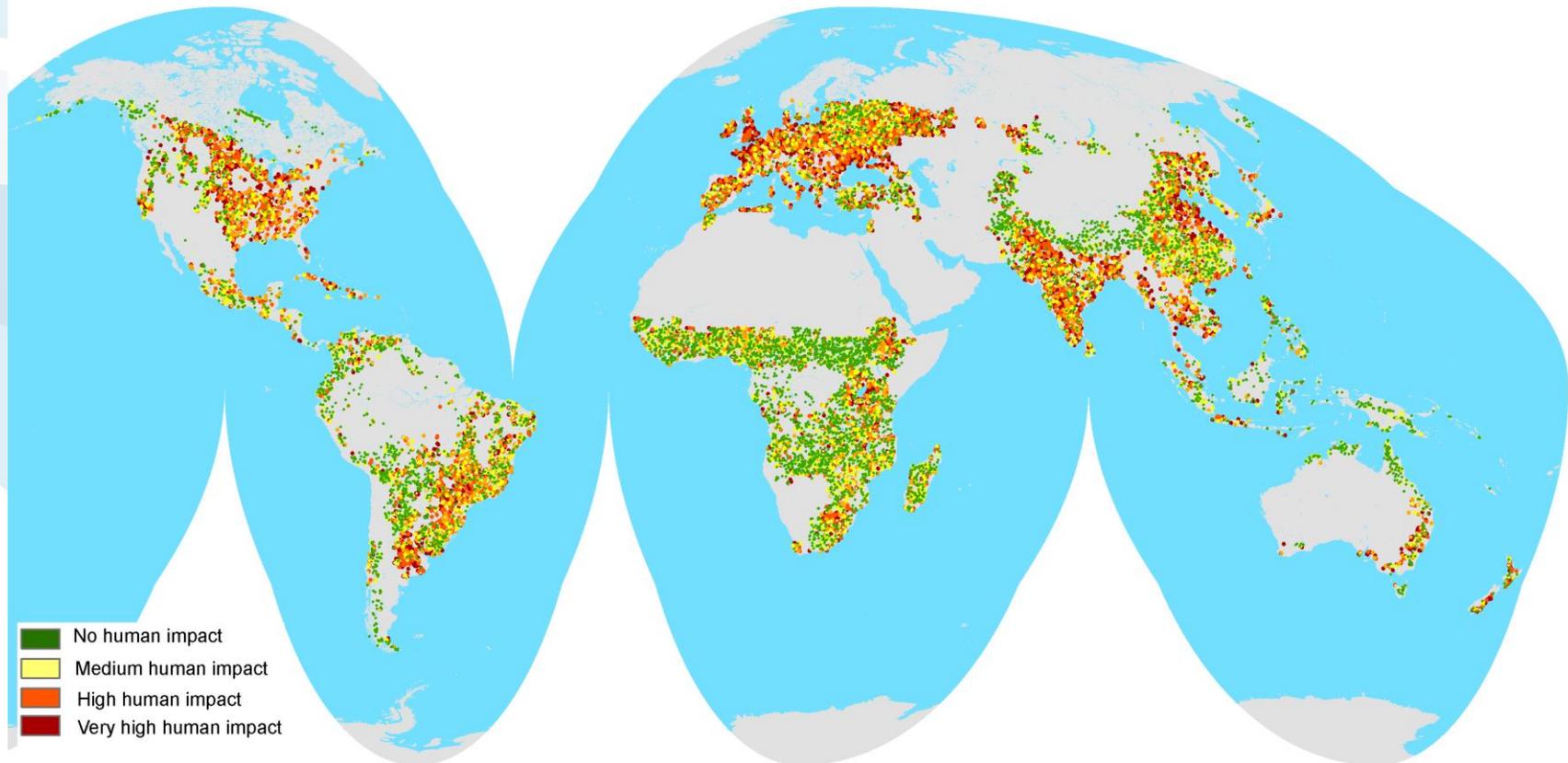


Downgrading recent estimates of land availability using crowdsourcing

Cai et al., 2011  
1107 mil. hectares



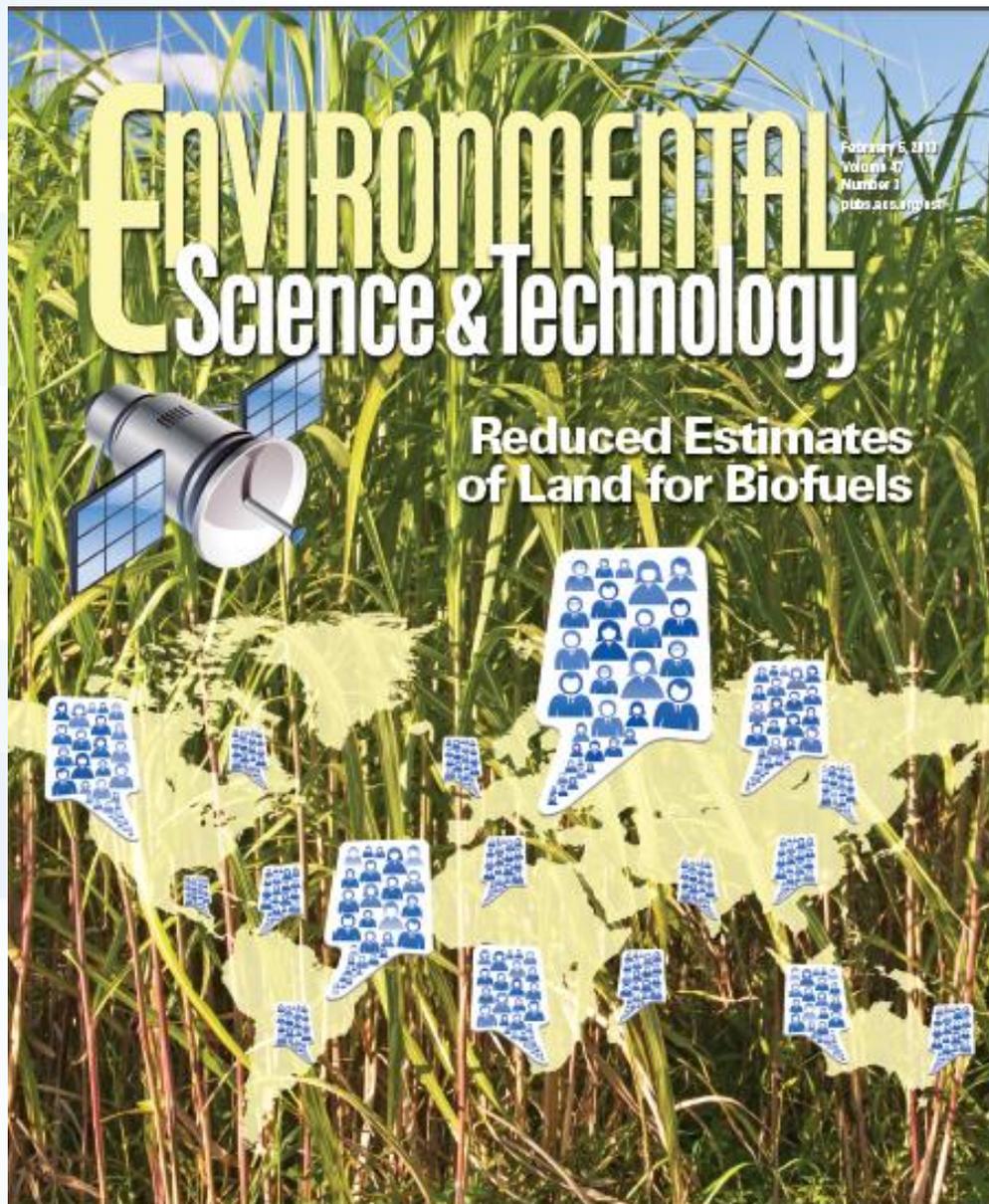
Fritz et al.  
375 mil. hectares



# ENVIRONMENTAL Science & Technology

February 5, 2010  
Volume 4  
Number 1  
pubs.acs.org/es

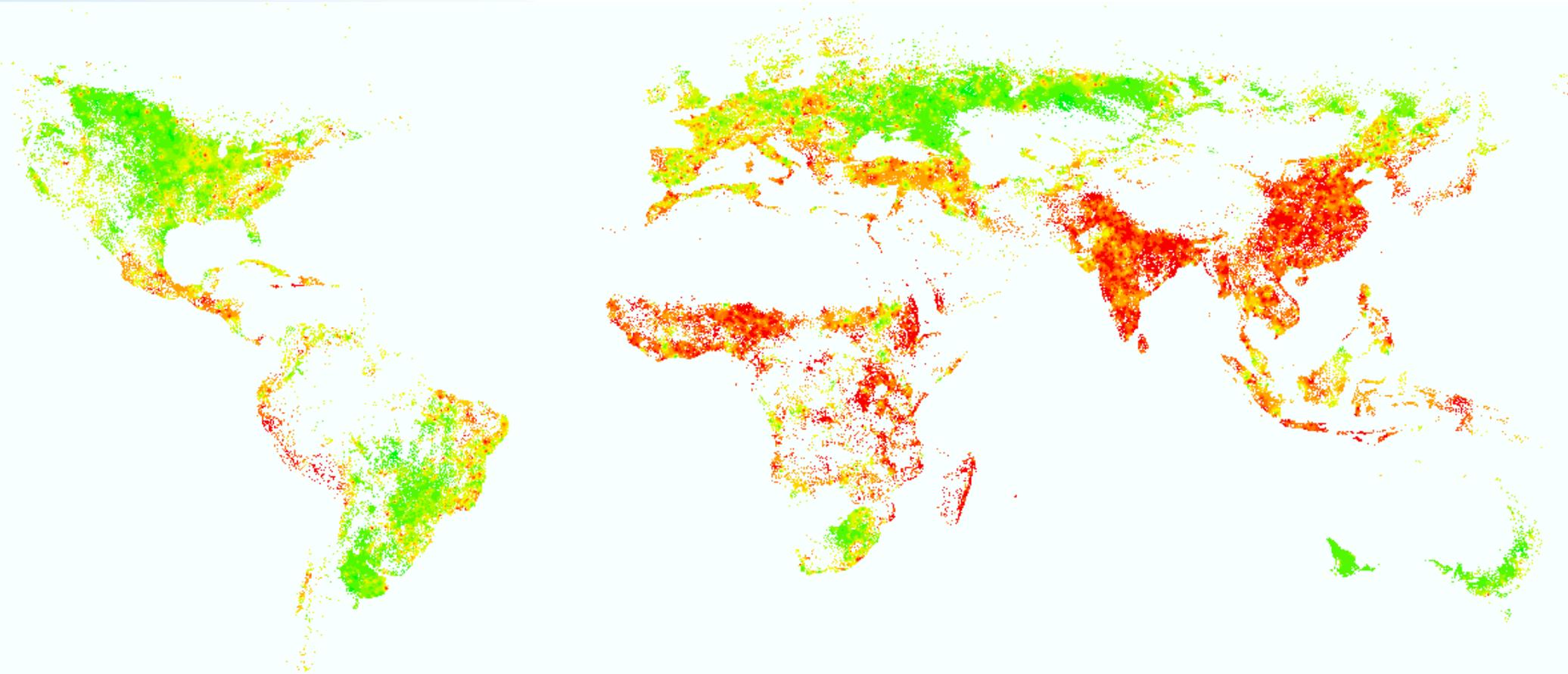
Reduced Estimates  
of Land for Biofuels



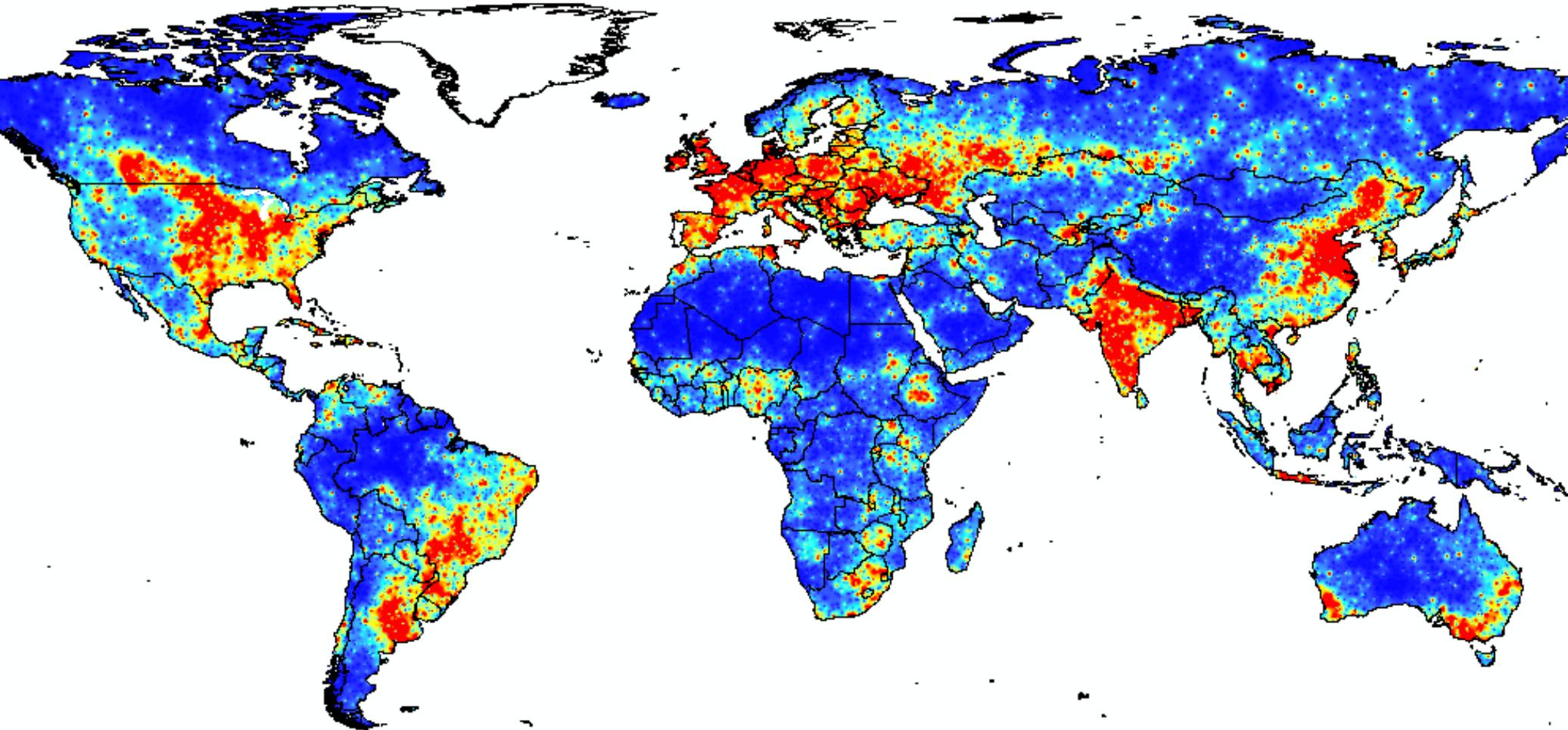
 ACS Publications  
MOST TRUSTED. MOST CITED. MOST READ.

[www.acs.org](http://www.acs.org)

# Field Size



# Human Impact / Wilderness



# HELP TO VALIDATE GLOBAL LAND COVER



- » Home
- » Instructions
- » Geo-Wiki branches
- » Publications
- » Download Data
- » Mobile Apps
- » Media
- » Supporting projects
- » Related projects
- » Data sources
- » Contact us
- » Disclaimer

## The Geo-Wiki Project

Tweet 0

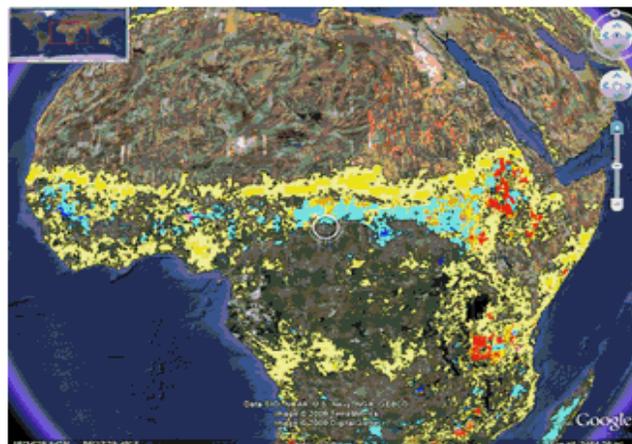
The **Geo-Wiki Project** is a global network of volunteers who wish to help improve the quality of global land cover maps. Since large differences occur between existing global land cover maps, current ecosystem and land-use science lacks crucial accurate data (e.g. to determine the potential of additional agricultural land available to grow crops in Africa). **Volunteers** are asked to review hotspot maps of global land cover disagreement and determine, based on what they actually see in Google Earth and their local knowledge, if the land cover maps are correct or incorrect. Their input is recorded in a database, along with uploaded photos, to be used in the future for the **creation of a new and improved global land cover map**.

## Participate in our USAID Hackathon Challenge

[View publication](#)

[Watch the tutorial video online](#)

[Download Data](#)



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## My Profile

number of validations  
**5088**

current rank  
**8**

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## Geo-Wiki top 5 validators

1	gipsyman	13640
2	Ahmed Harb Rabia	8699
3	Simone Ortner	8434
4	anka	7132
5	JP Ardila	5776

[View complete ranking](#)

Google Translate

Select Language



Gadgets powered by Google

SETTLEMENT

NONE

LOW

MED

HIGH

NONE



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LOW



MED



Refresh



Homepage

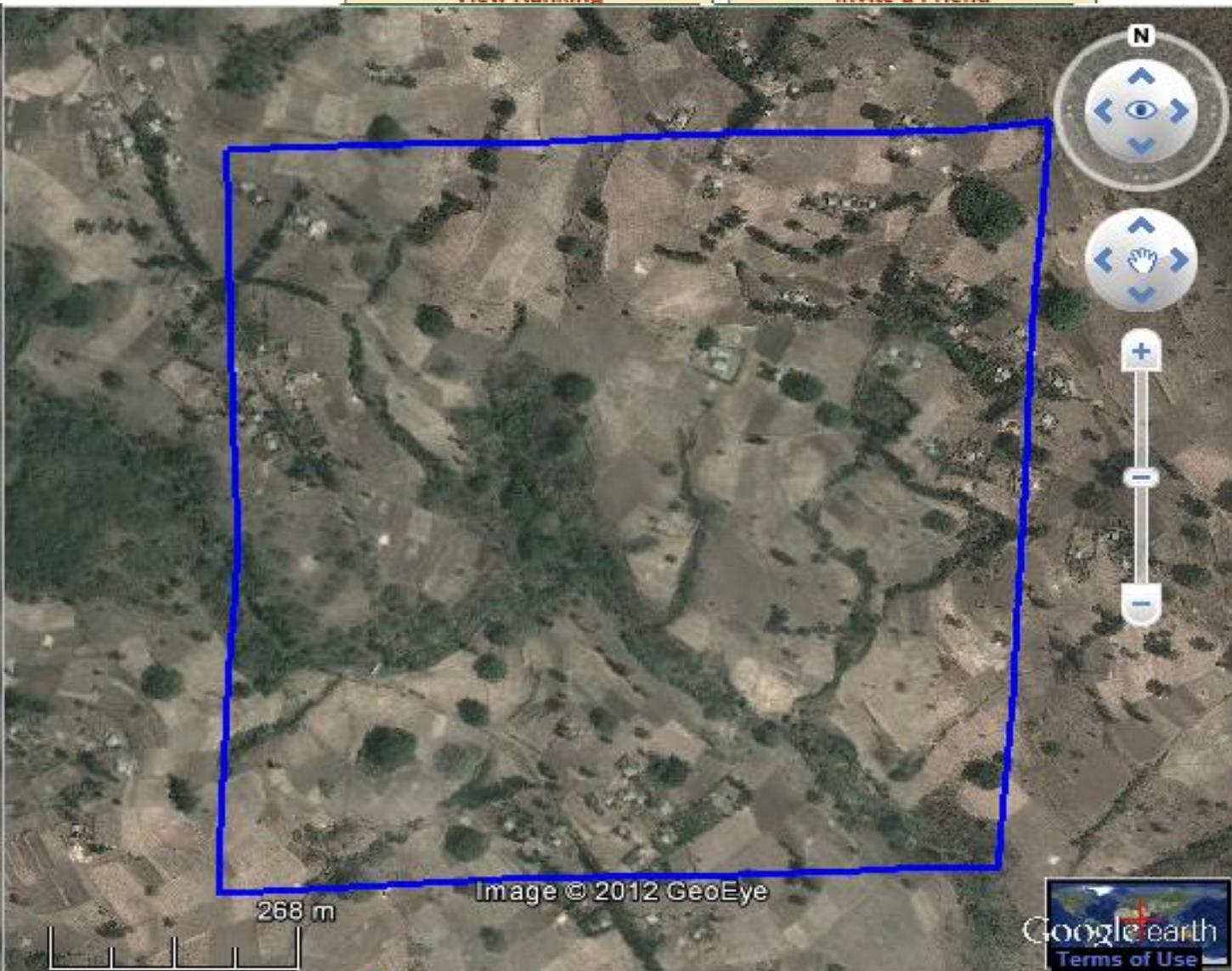
geolms@leeds.ac.uk

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Invite a Friend



Identify in the blue box:

Settlements:

none  low  med  high

Cultivated:

none  low  med  high

Confidence:

low  med  high

Submit your results:

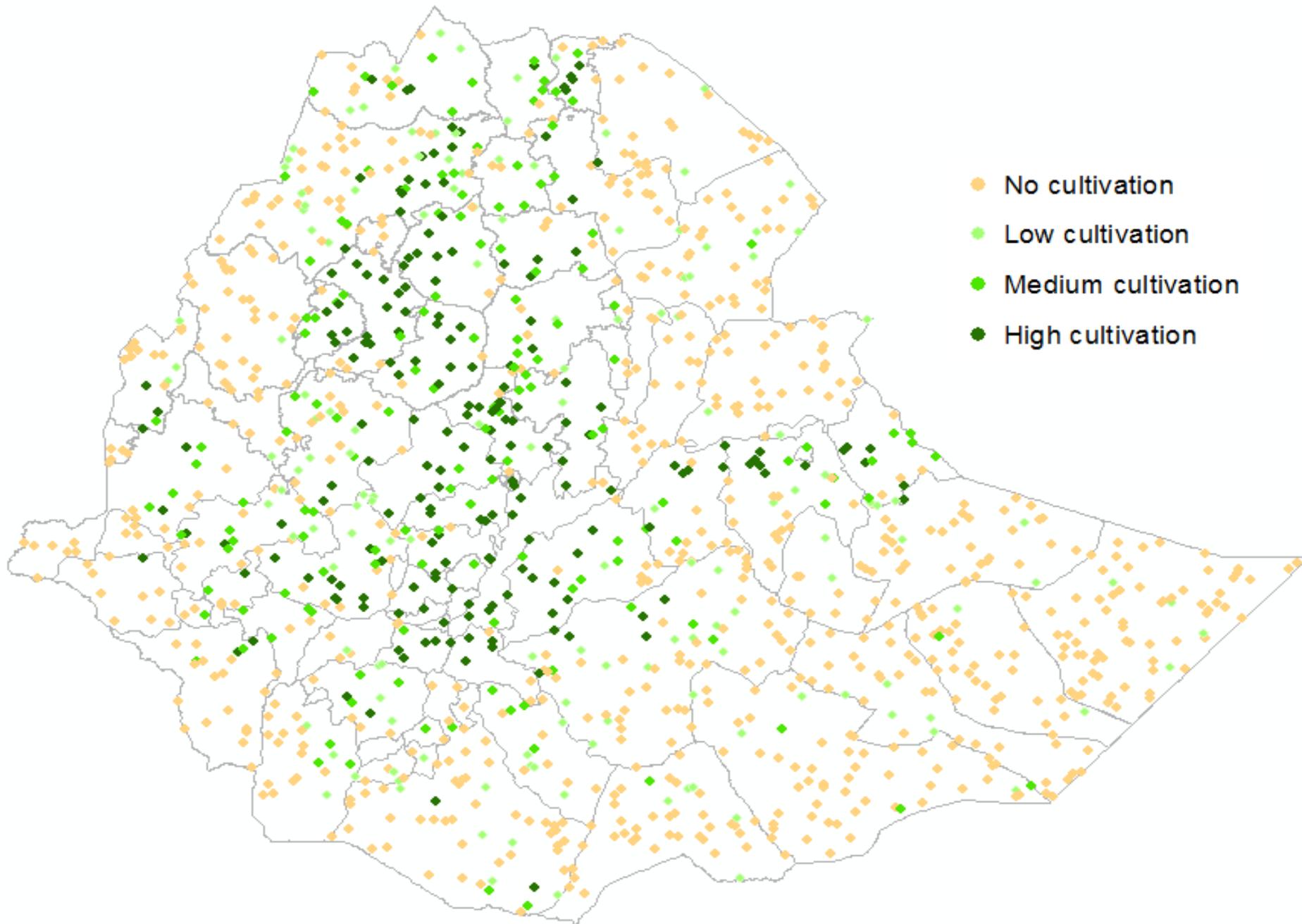
skipped

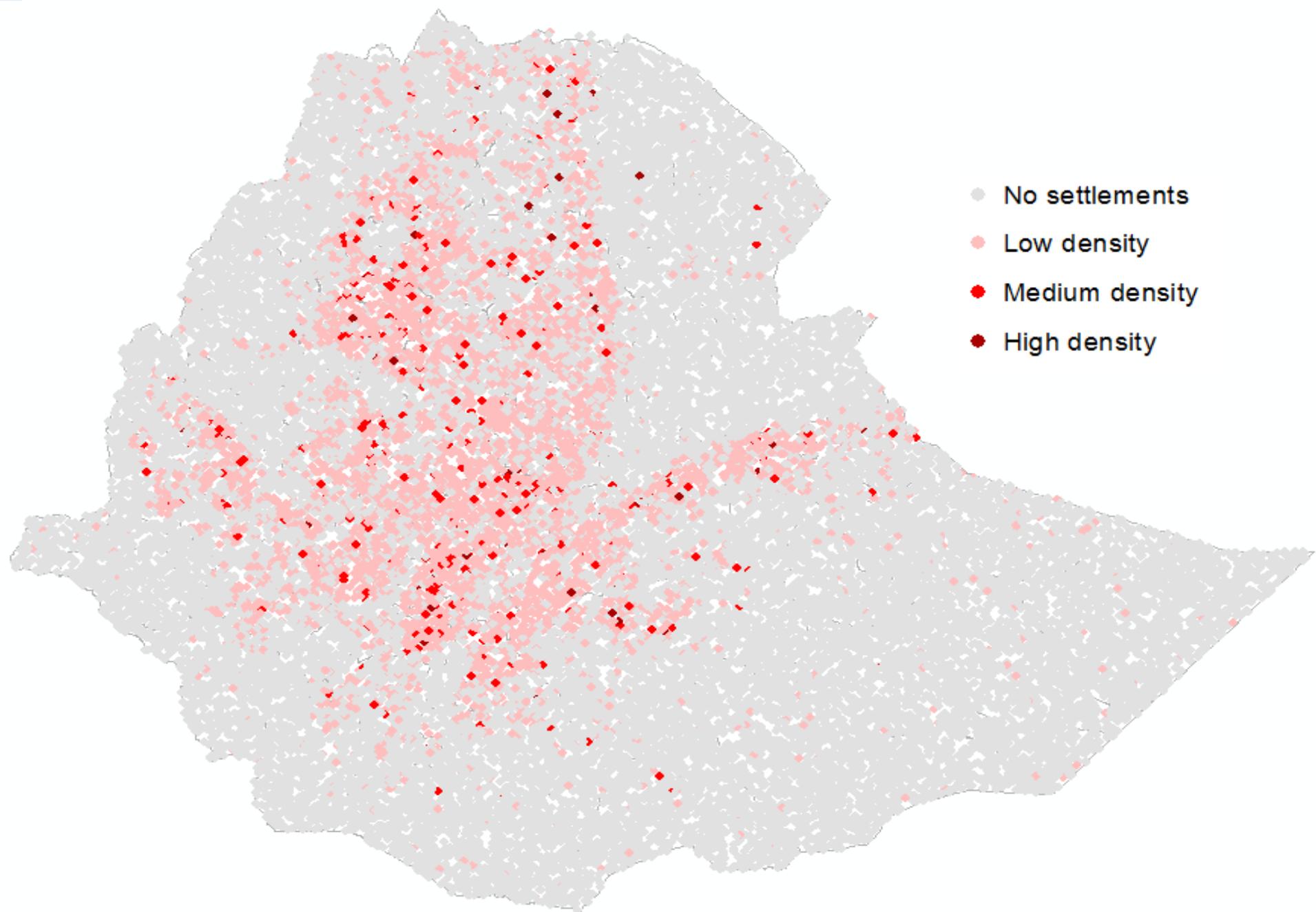
▶ Short instructions

▶ More Info and Ask Experts

Overall progress: Level: 6







# Geo-Wiki Family of Crowdsourcing Tools



# Challenges What incentives?

- Co-authorship
- Doing good - Helping Science
- Leaderboard
- Fun – Games
- Prices
- Money?
- Give the user something in return

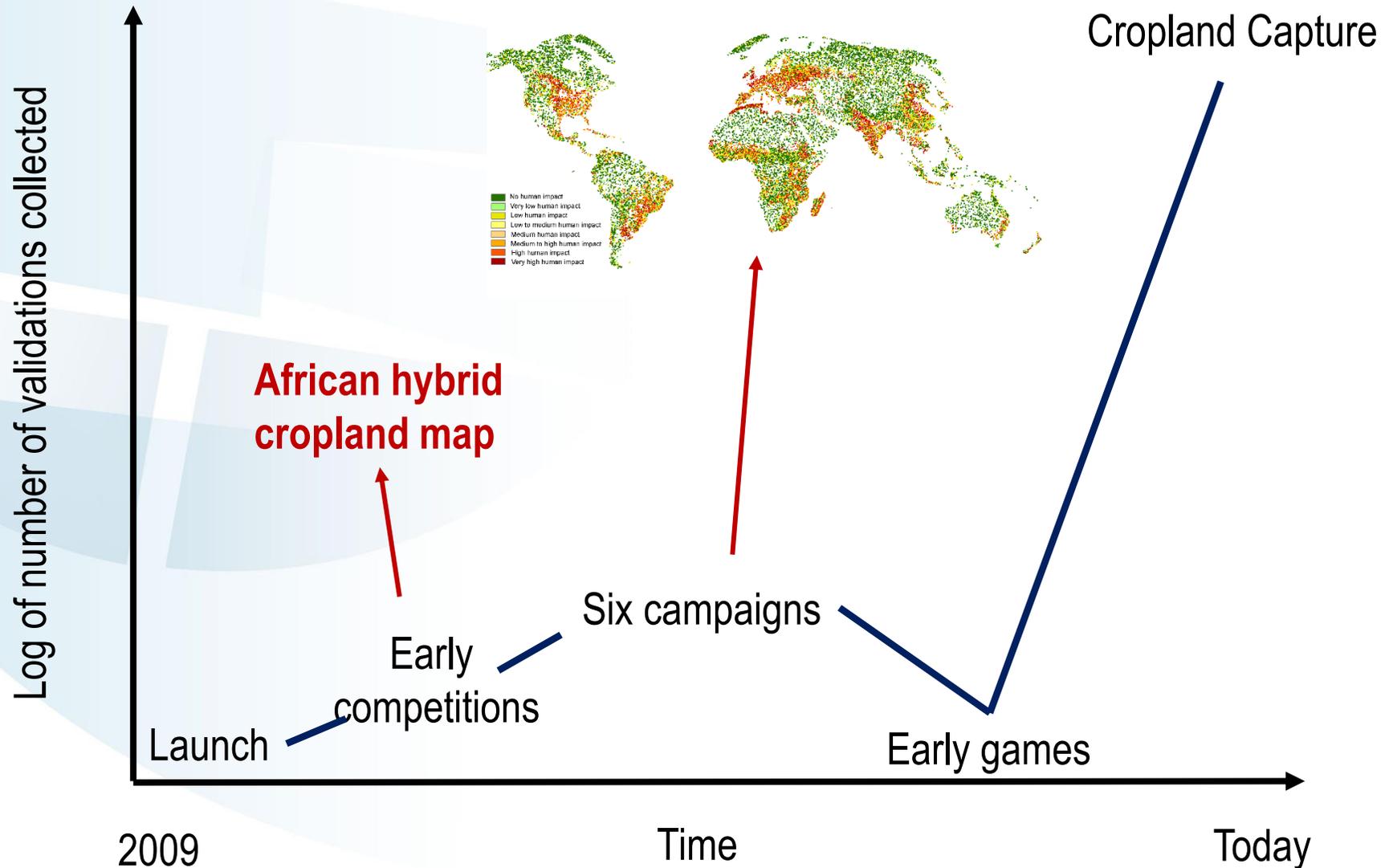
# Serious games

- Games with a purpose
  - Games for education
  - Games for training
  - Games for health
  - Games for science

# Top serious games Guardian

- [Phylo](#) - Make patterns and research diseases
- [Foldit](#) - Make a shape and understand proteins
- [Forgotten Island](#) - Study organisms to assess man's impact
- [Galaxy Zoo](#) - Classify galaxies to understand universe
- [Whale FM](#) - Listen to whales, help marine biologists
- [Cropland Capture](#) - Identify arable land to feed the world

# Evolution of Crowdsourcing

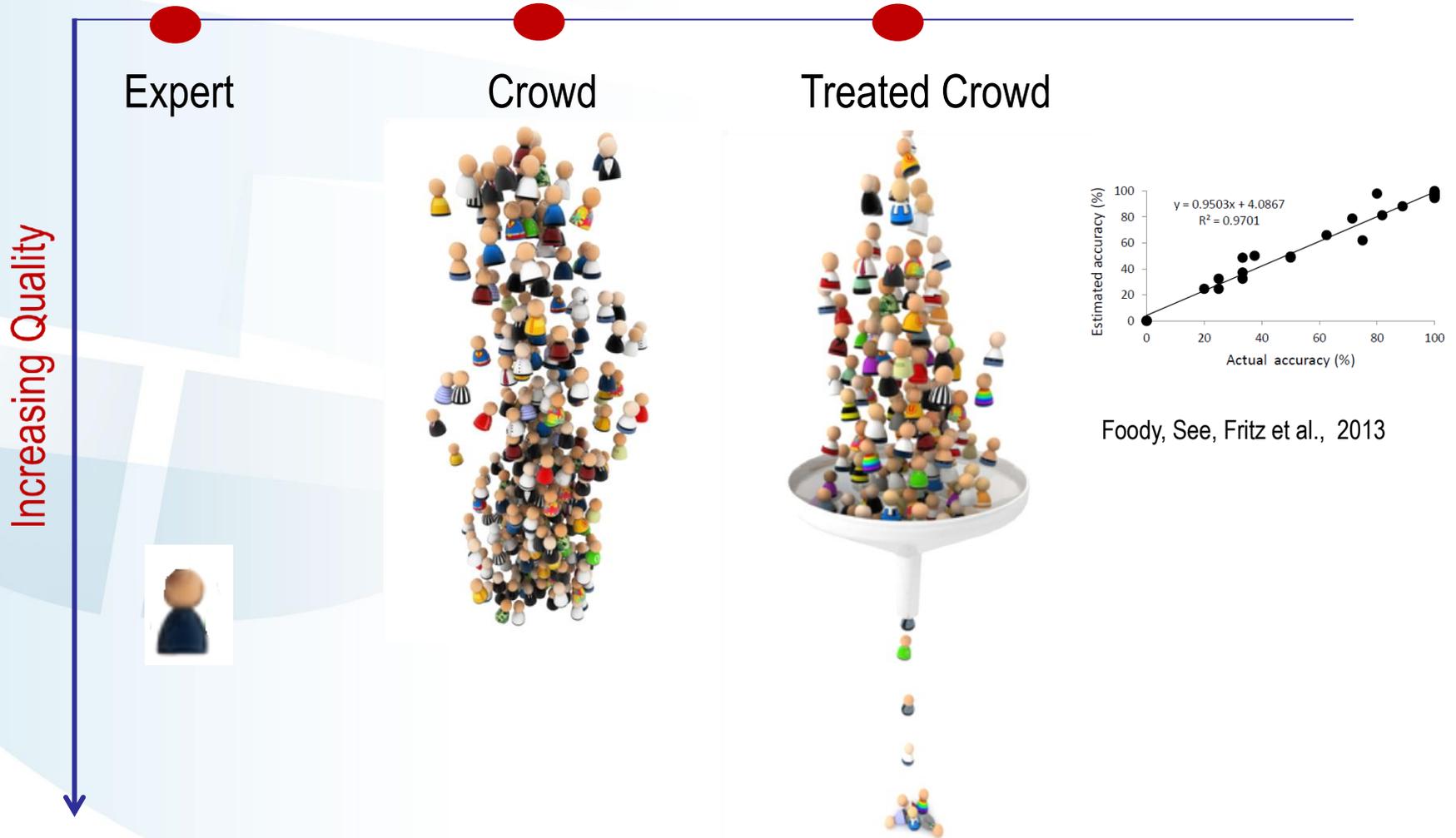


# Challenges - Incentives



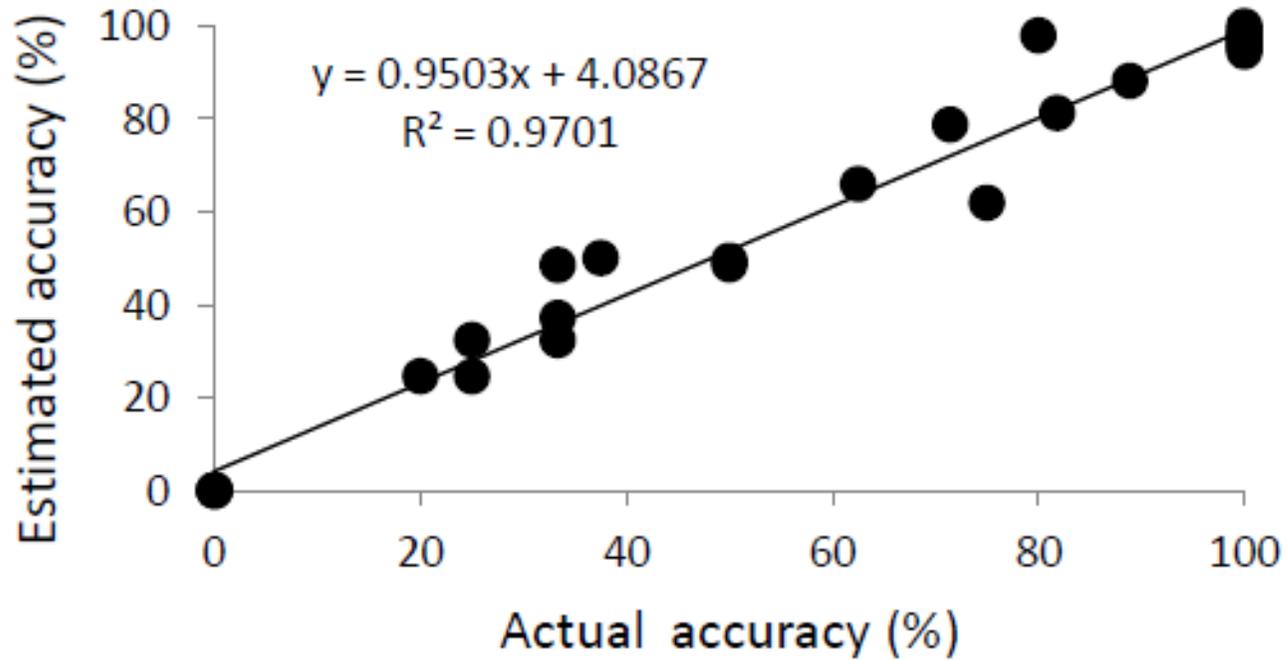
- Leaderboard
- Weekly prizes: one random classification is picked; the person who did this classification receives a prize (last 5 weeks)
- 3 final winners: at the end of the competition 3 winners were drawn to receive bigger prizes, e.g. a tablet and smartphone

# How can we gain confidence in the crowdsourced data?



Foody, See, Fritz et al., 2013

# Accuracy



Foody, See, Fritz et al., 2013

# Co-designing a Crowdsourcing Solution



Fun



Recognition



Personal Interest



Financial Incentives

Co-design of games, mobile applications and online communities  
- use of competitions, campaigns and mobile money

**Different target groups:**



OpenStreetMap



General Public



Students



Farmers

**In different countries:**

Austria

Kenya

- ▶ ESM Program
- ▶ Research Themes
- ▶ Models/Tools/Data
- ▼ Research Projects
  - ▶ Completed Projects
- ▶ Staff & Contact
- ▶ YSSP Program

**COST Action TD1202 is an EU funded inter-disciplinary networking activity that involves ~27 countries and seeks to enhance the role of citizen sensors in mapping.**



Accurate and timely maps are a fundamental resource but their production in a changing world is a major scientific and practical grand challenge. This EU funded COST Action seeks to rise to the challenge and enhance the role of citizen sensors in mapping activity.

## Cost Meetings

[Management Committee meeting 2015](#)

## Minutes

[Past COST Action meetings](#)

## Other Meetings

[VGI Workshop at GIScience](#)

[WUDAPT Workshop](#)



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## DOWNLOADS

- » [Action Fact Sheet](#)
- » [Memorandum of Understanding](#)
- » [Progress Report](#)
- » [Poster](#)
- » [Reference List](#)

## WORKING GROUPS

- » [WG 1 - Acquiring and Managing VGI](#)
- » [WG 2 - Understanding and Influencing contributors](#)
- » [WG 3 - Map production](#)
- » [WG 4 - Map validation activities](#)

## STSM'S

- » [Year 1](#)
- » [Year 2](#)

# Thank you!

- [fritz@iiasa.ac.at](mailto:fritz@iiasa.ac.at)
- [Geo-wiki.org](http://Geo-wiki.org)