Improving Cloud Detection in Satellite Imagery using a Citizen Science Approach

Inian Moorthy, Tobias Sturn, Matej Batič, Linda See, Grega Milčinski, Steffen Fritz

International Institute for Applied Systems Analysis

Sinergise Laboratory for Geographical Information Systems Ltd.

EARSel Symposium
July 2 | Salzburg

WeObserve EO4CO Workshop

@LandSense
@WeObserveEU

Motivation

- Clouds are an unavoidable and persistent issue in satellite-based optical imagery

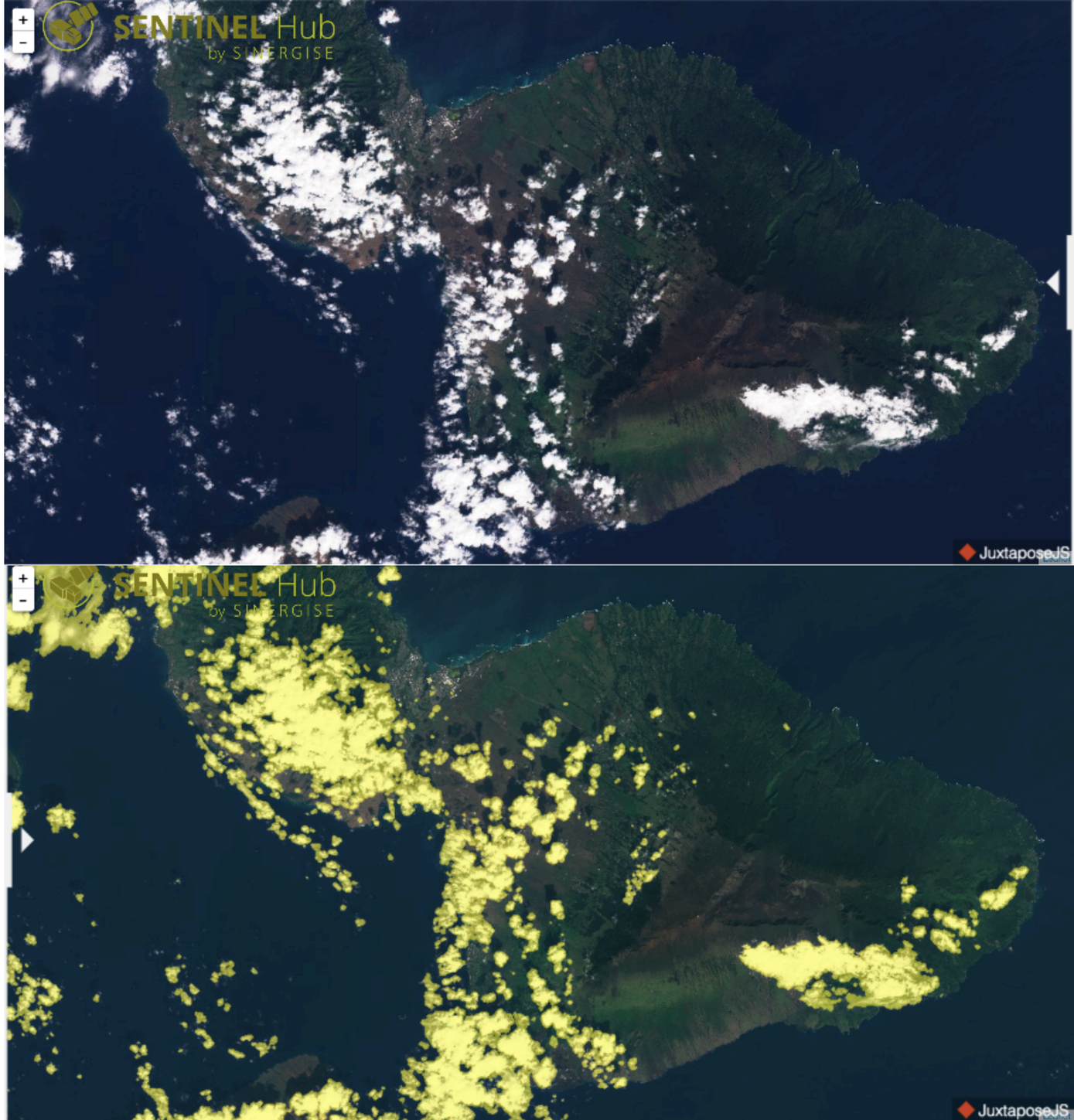
- Need for accurate and automated cloud and cloud shadow detection algorithms in the preprocessing phase

s2cloudless

- Single scene cloud detection algorithm relying on machine learning techniques
- Pixel-based approach that requires training and validation datasets

SENTINEL Hub by SINERGISE

https://github.com/sentinel-hub/sentinel2-cloud-detector
https://medium.com/sentinel-hub



Could crowdsourcing help improve cloud detection algorithms?

LandSense

A Citizen Observatory and Innovation Marketplace
for Land Use and Land Cover Monitoring

Connecting citizens with satellite imagery to transform environmental decision making

September 2016 → August 2020

LandSense.eu

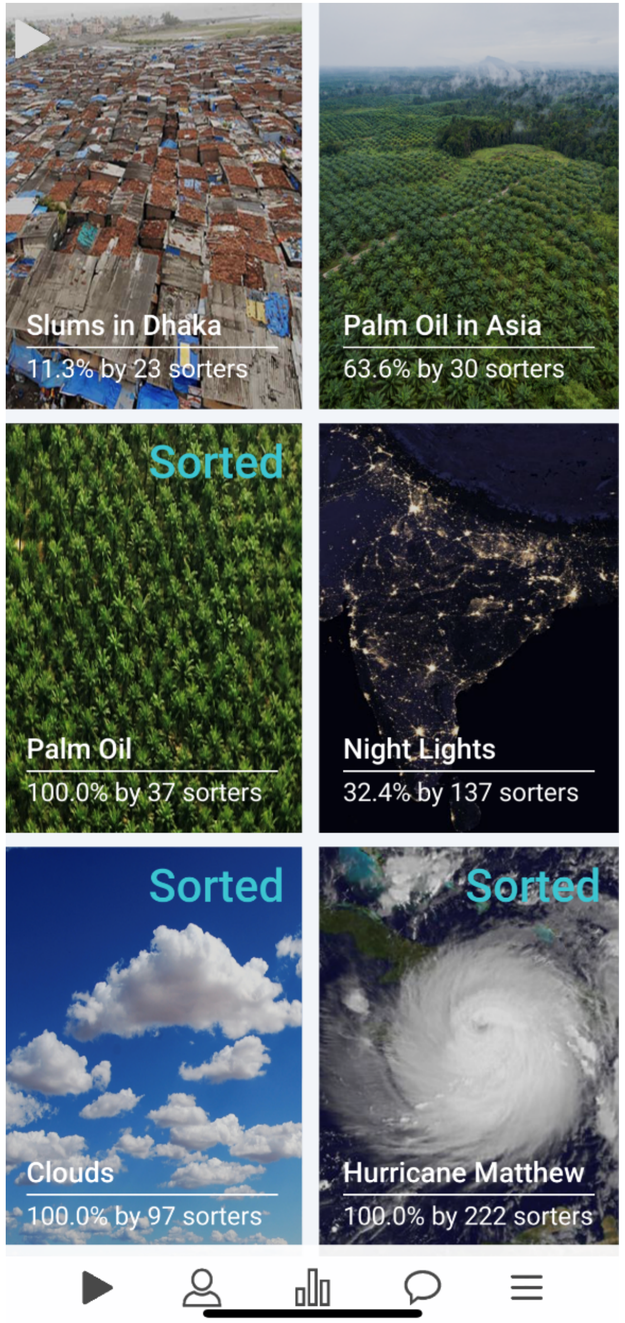
This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 689812

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.

Available on the App Store

Get it on Google play

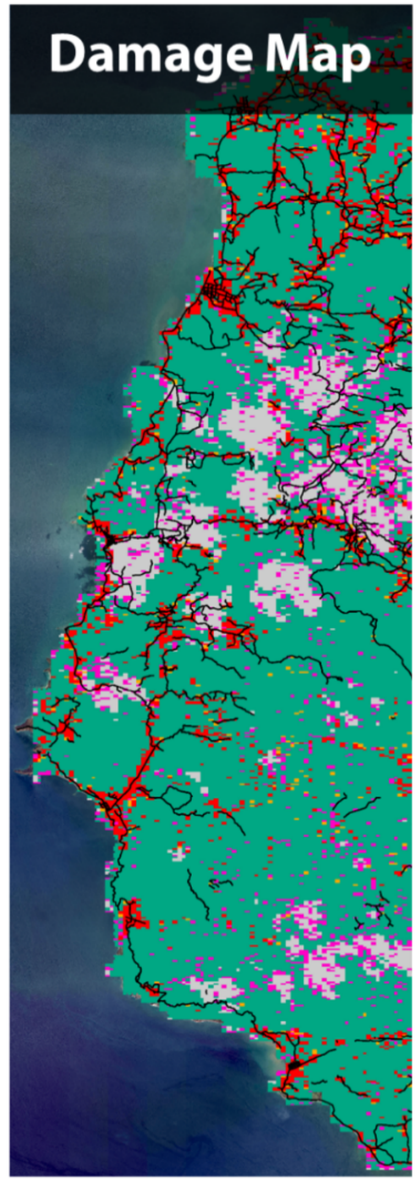


Picture Pile

Post-disaster damage mapping

179
volunteers

249K
validations



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

IIASA

HOT Humanitarian Open Street Map Team

esa European Space Agency

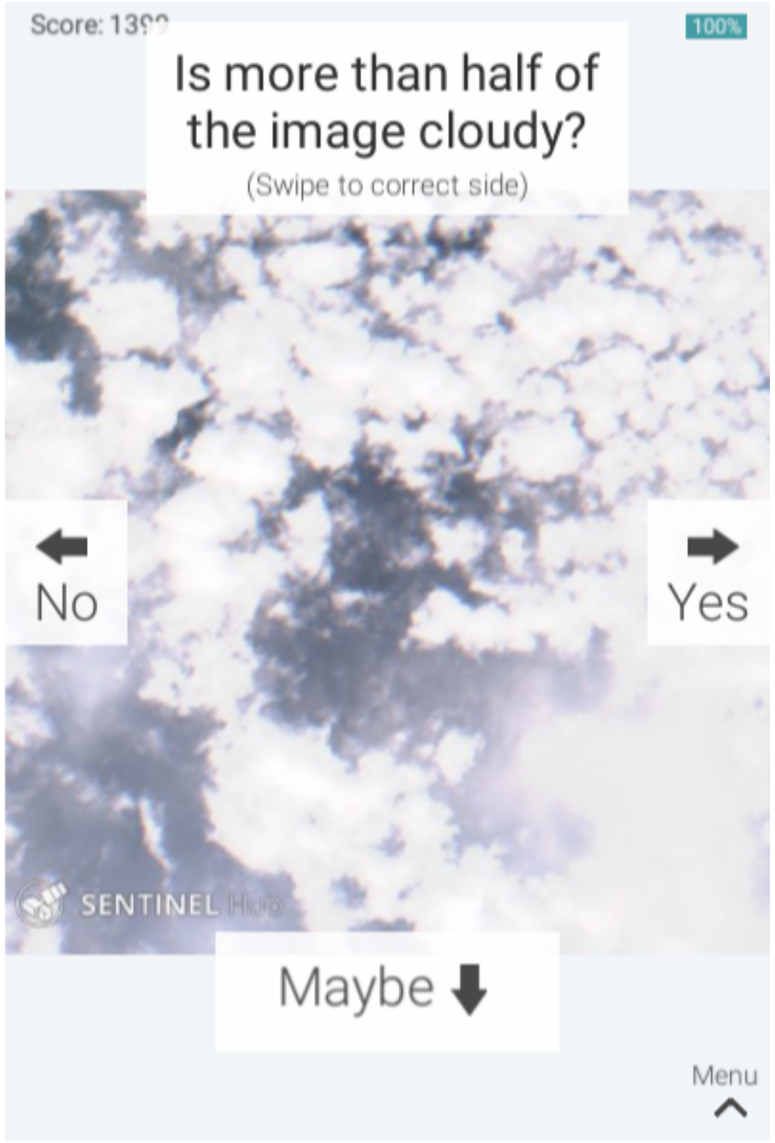
imperative space

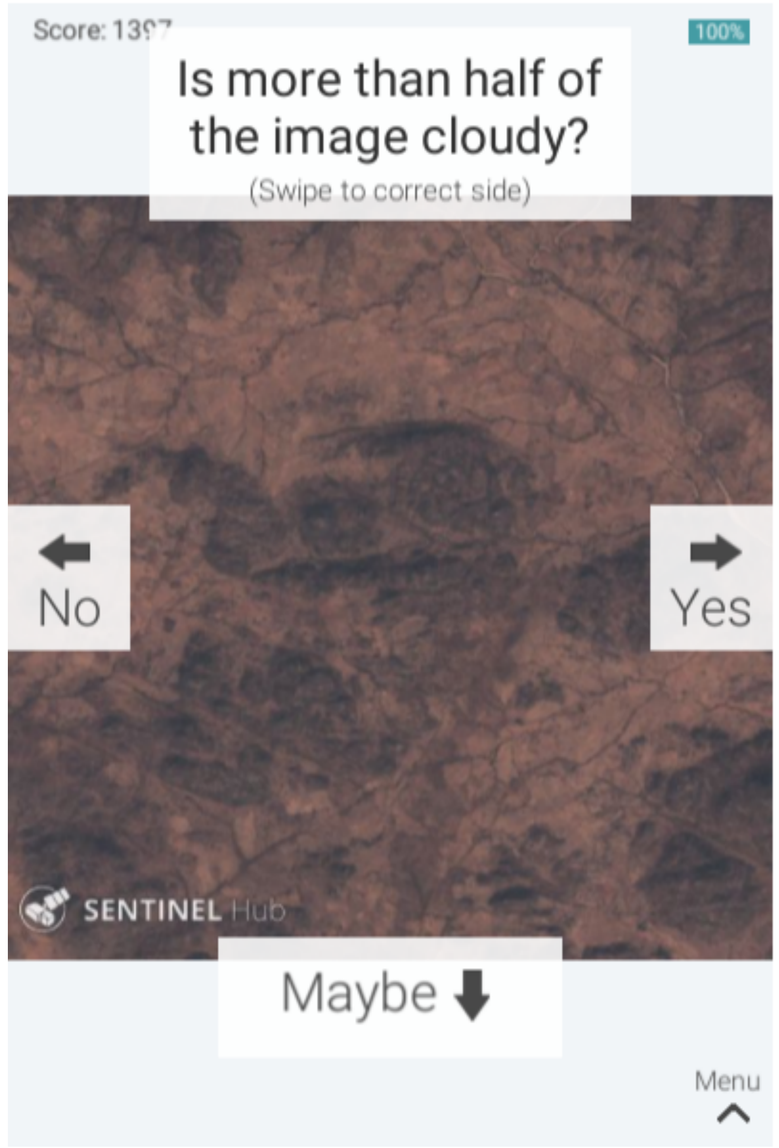
Picture Pile – Cloud Detection

97
volunteers

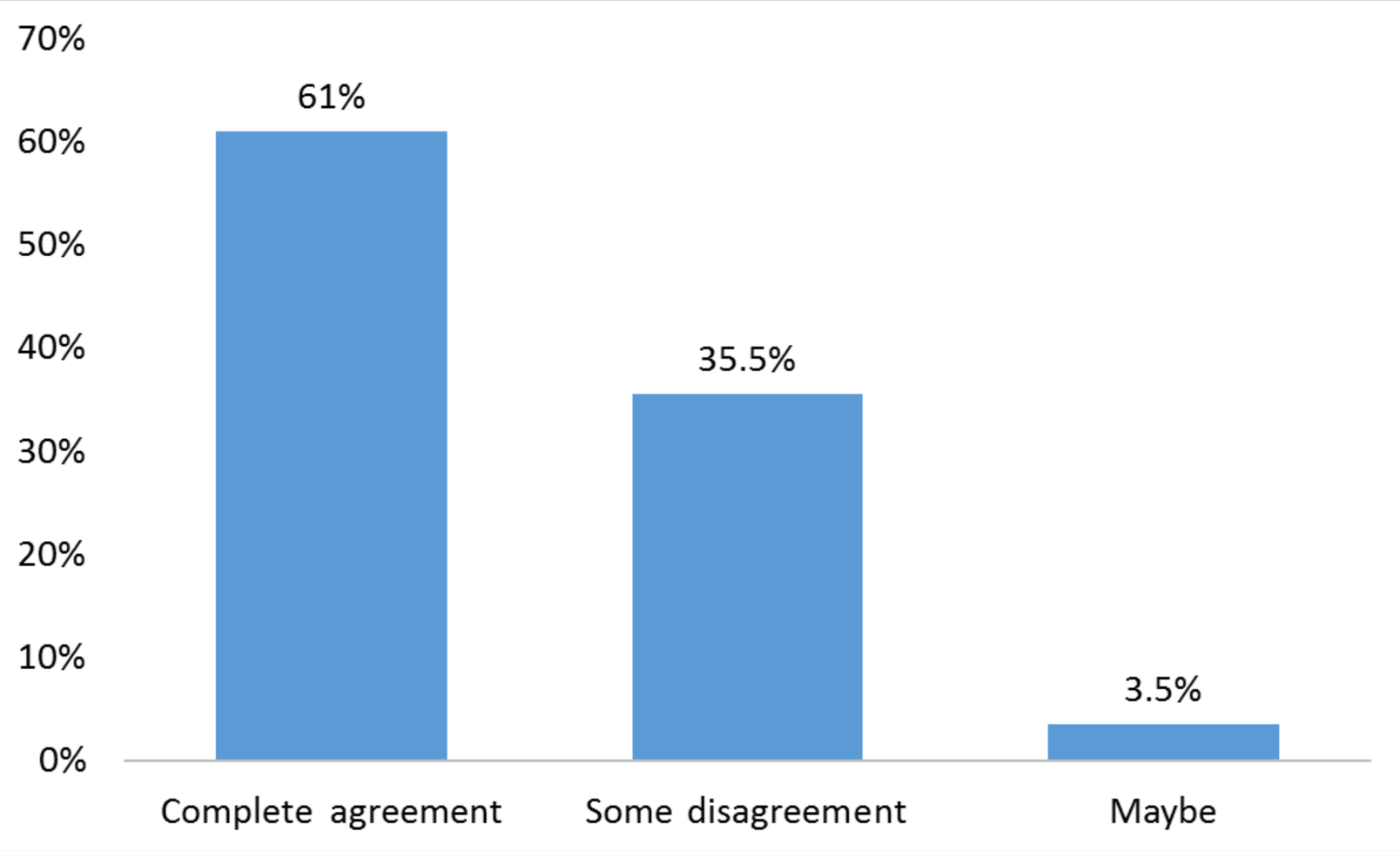
27K
unique images

272K
validations





Picture Pile – Cloud Detection



Quality Control

- Multiple volunteers per image
- Expert-classified control images are presented to volunteers at random

Next exploratory steps

- Volunteers identify regions of clouds/no clouds/partial clouds
- Shadows created by clouds
- Training and validation samples for machine learning

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