image CC-BY American Red Cross

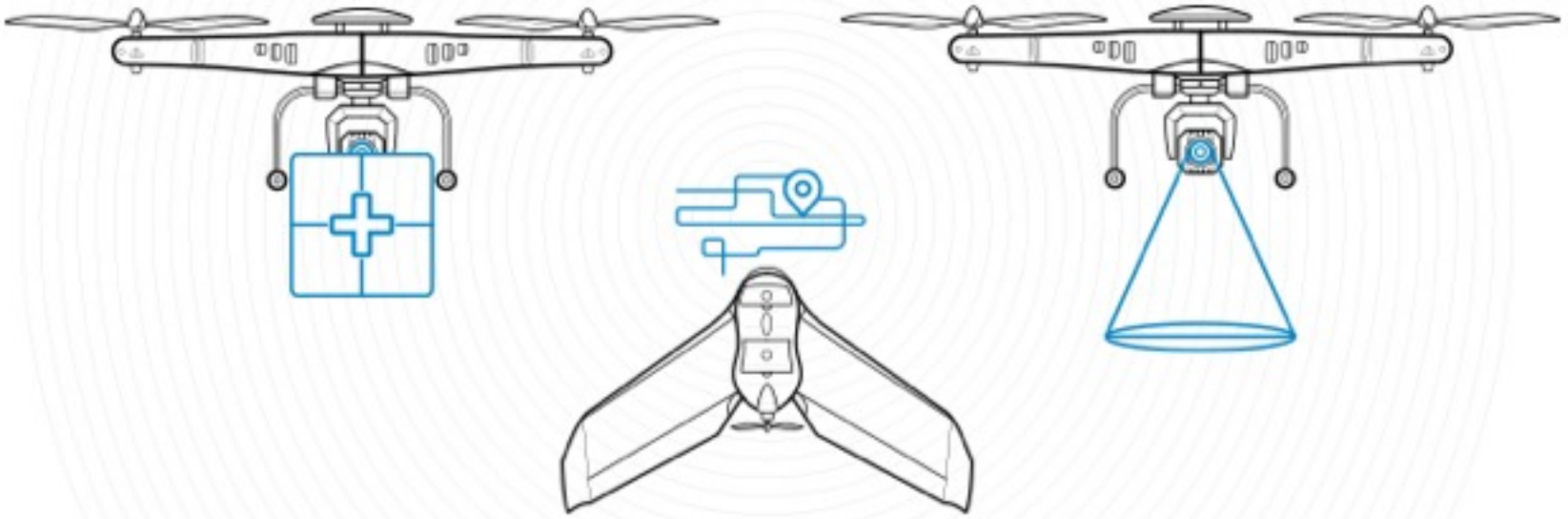
# Making mapping accessible with a low-cost, DIY drone

Dan Joseph

GEOG 596A, Spring 2, 2017

Dr. James O'Brien (advisor)

A **DRONE** by any other name...



# What **USE** is a drone?

image from https://www.droneregulations.info/

# Hobbyist & commercial

- Cinematography
- Racing
- Monitoring agriculture
- Rail line inspection
- Real estate marketing
- Volume measurement for stockpiles or holes
- Utility line or pipeline inspection
- Commercial cargo delivery?

# Humanitarian

- Mapping (response, resilience, development)
- Media communications
- Cargo delivery (health, emergency essentials)
- Environmental monitoring
- Land rights/ tenure/ documentation

# Are **HUMANITARIANS** interested in drones?

image from "Drones in Humanitarian Action"
by The Swiss Foundation for Mine Action (FSD)

FSD

What about **RULES** and **LAWS**?

American Red Cross

UAVIATORS
HUMANITARIAN UAV NETWORK

OCHA
United Nations
Office for the Coordination
of Humanitarian Affairs

unicef

WE
ROBOTICS

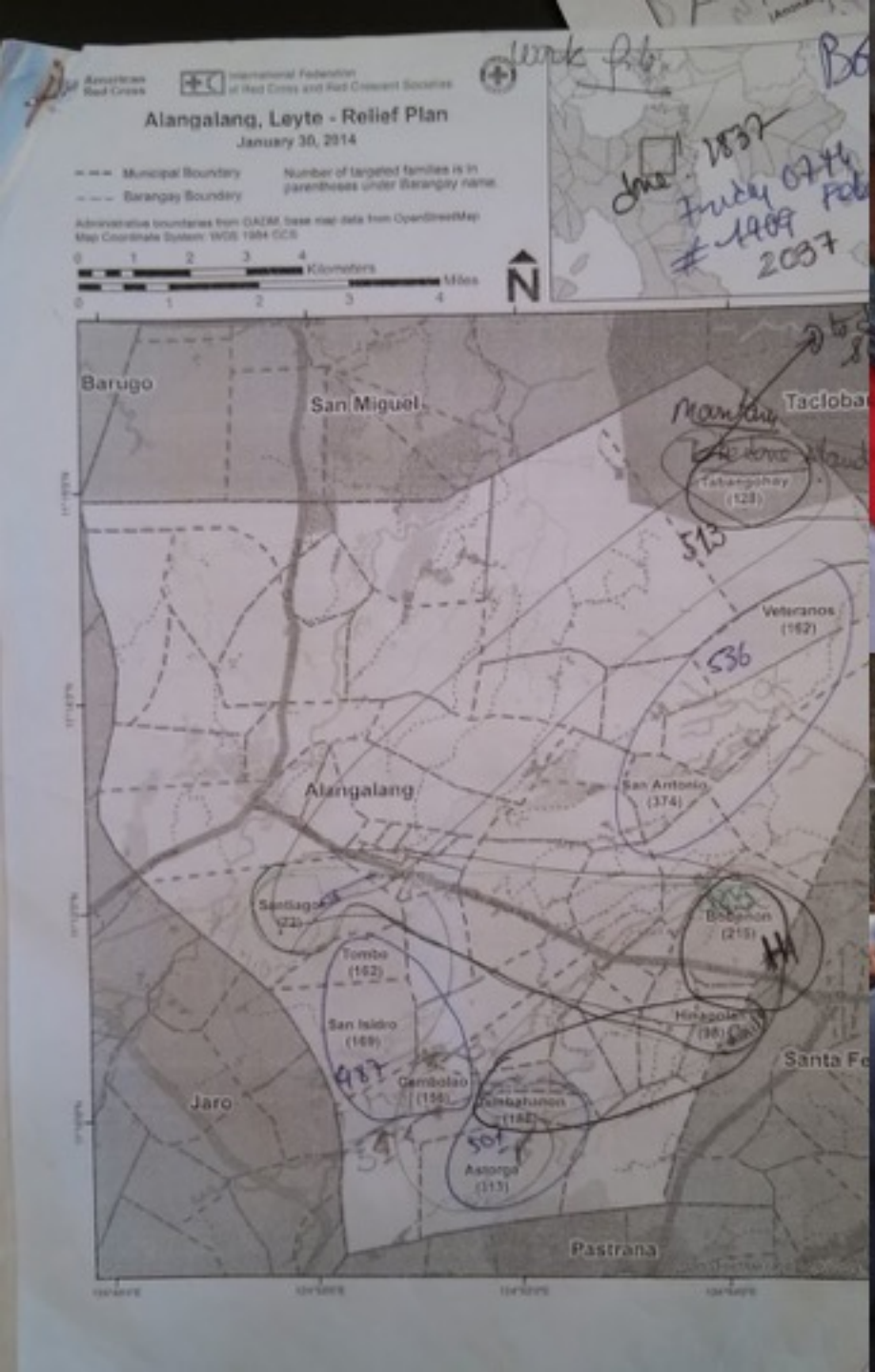
# Let's **MAP** with drones

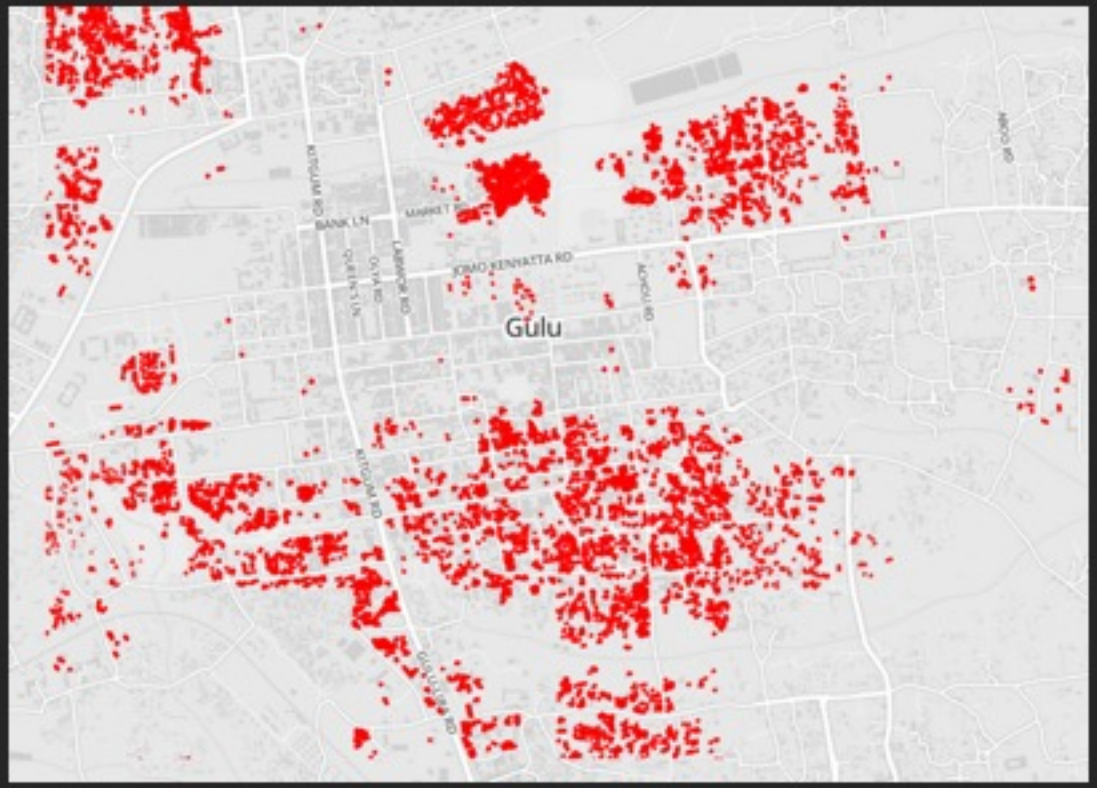
image CC-BY American Red Cross

top: City of Capetown 2015 aerial orthophotography; bottom: Bing aerial imagery

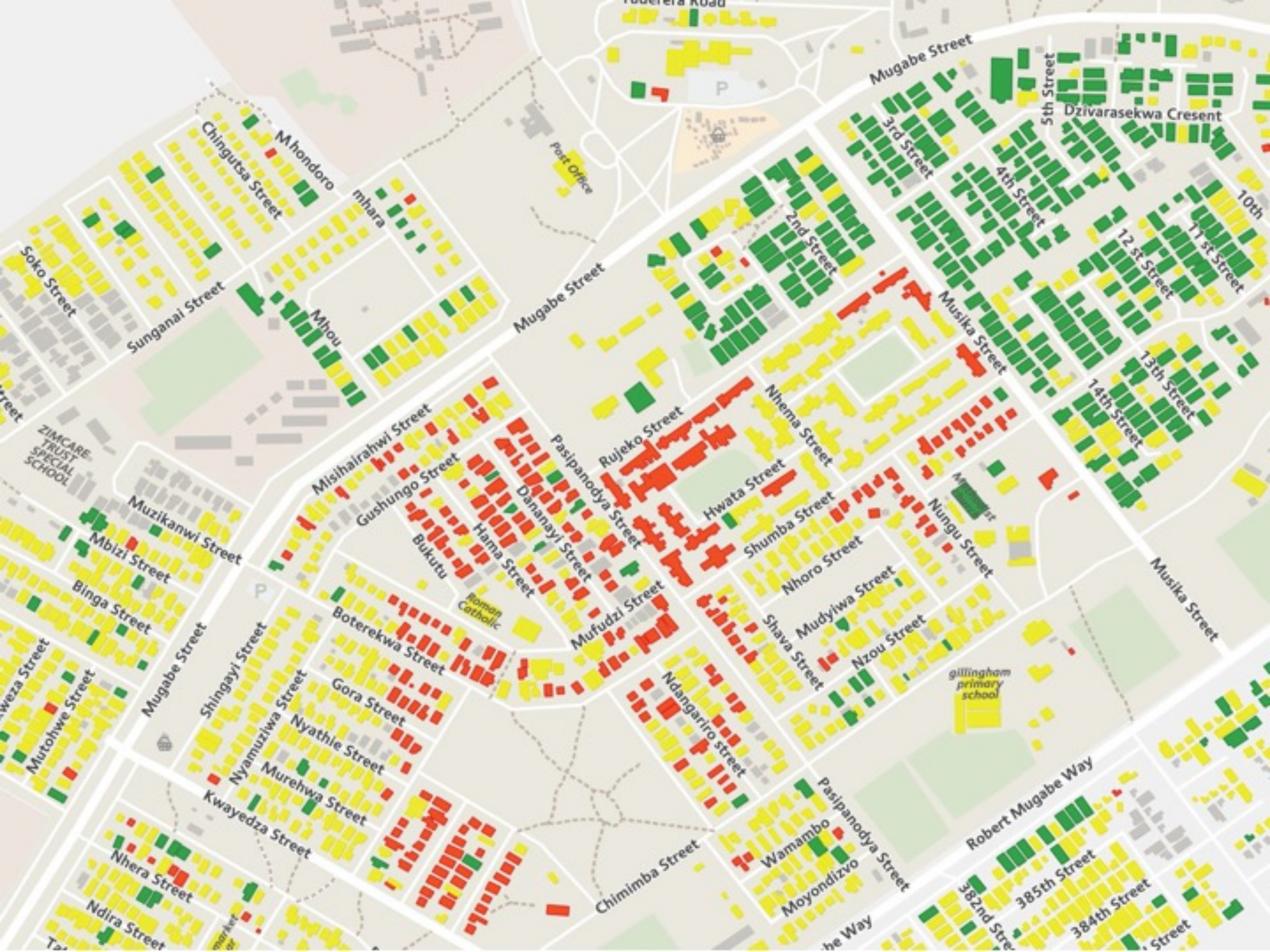
Imagery via Google - ©2017 CNES / Airbus

Imagery collected 2017-05-02 , CC-BY American Red Cross


American Red Cross
International Federation of Red Cross and Red Crescent Societies
Alangalang, Leyte - Relief Plan
January 30, 2014
Municipal Boundary
Barangay Boundary
Number of targeted families is in parentheses under Barangay name.
Administrative boundaries from GADM, base map data from OpenStreetMap
Map Coordinate System: WGS 1984 GCS
Kilometers
Miles
N
Barugo
San Miguel
Alangalang
Veteranos (162)
San Antonio (374)
Santiago (72)
Tombo (162)
San Isidro (169)
Jaro
Pastrana
Santa Fe




# Gulu fire risk analysis


Mugabe Street
Dzivarasekwa Crescent
5th Street
3rd Street
4th Street
2nd Street
10th
12 st Street
11 st Street
13th Street
14th Street
Musika Street
Post Office
Mhondoro
Chingutsa Street
Soko Street
Sunganai Street
Mhou
Misihairahwi Street
Gushungo Street
Pasipanodya Street
Rujeko Street
Nhema Street
Hwata Street
Shumba Street
Nungu Street
Nhoro Street
Mudyiwa Street
Shava Street
Nzou Street
Dananayi Street
Hama Street
Bukutu
Roman Catholic
Mufudzi Street
Boterekwa Street
Gora Street
Nyathie Street
Murehwa Street
Kwayedza Street
Shingayi Street
Nyamuziwa Street
Ndangariro street
Chimimba Street
Wamambo
Moyondizvo
Pasipanodya Street
Robert Mugabe Way
382nd Street
385th Street
384th Street
gillingham primary school
ZIMCARE TRUST SPECIAL SCHOOL
Muzikanwi Street
Mbizi Street
Binga Street
Mutohwe Street
Nhera Street
Ndira Street
P

# Challenges

image CC-BY Matthew Marek, American Red Cross

image CC-BY Dan Joseph

**smathermather** 10:32 AM

uploaded this image: **Image uploaded from iOS**

image CC-BY Matt Gibb, American Red Cross

image CC-BY Matt Gibb, American Red Cross

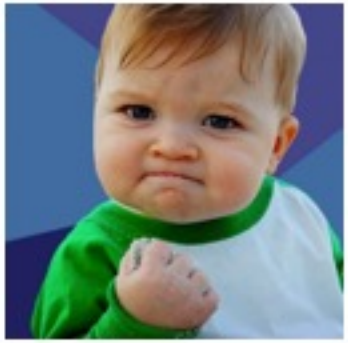
# Opportunity in DIY

Document, in a manner that allows others to learn from, replicate, and improve, the process of building a transportable, fixed-wing drone for imagery acquisition and mapping with a digital camera.

# Project scope

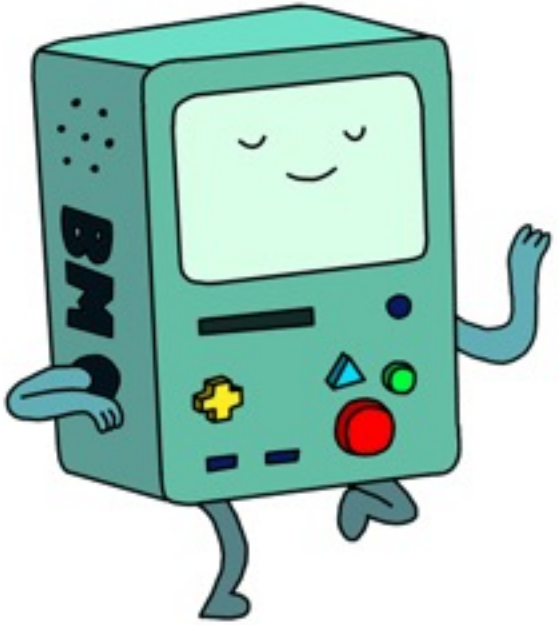
## yes

- Complete DIY walkthrough
- Accessible
- Open source
- Orthophoto output



## no

- Airframe optimization
- Survey-grade accuracy
- Special sensors
- Legal or ethical aspects




# Project deliverable: Walkthrough

# Supplies and equipment

images created by Davo Sime, Shmidt Sergey from Noun Project

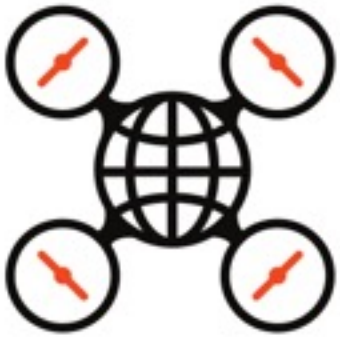
# Airframe construction

# Setup of electronics

image from http://charlottefpv.com/

# Automated flight

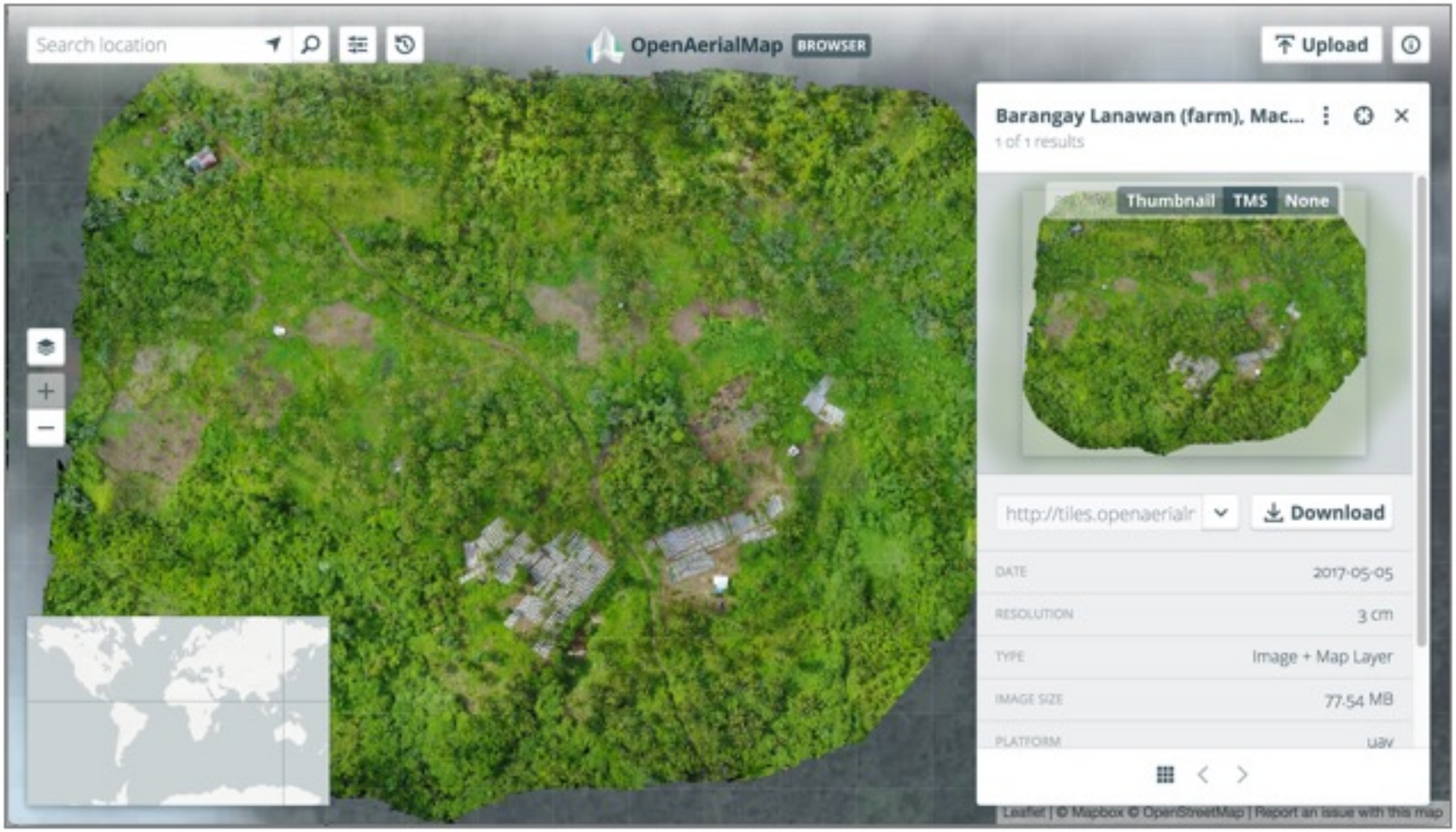
image from http://www.hex.aero/shop



OpenDroneMap

POSM

# Image processing




# Viewing/sharing data

# Project timeline

Thank you