



# Open Buildings

- I will be presenting two datasets today:
  - Open Buildings
  - Preview of a new Sentinel-2 based dataset we're releasing soon

# Building Detections

# Building Detections

Maps for building data are scarce in the developing world

- Often city municipalities don't have them



# Buildings Detections

- We want to create maps of all the buildings in the developing world because:
  - Urban planning
  - Population estimates for areas with infrequent census
  - **Humanitarian response**

157 million people

were reached by  
humanitarian  
organizations in 2022

Source: UNOCHA

30+ years

How long ago some  
countries did their last  
census

Source: UNFPA

# Open Buildings Dataset



# Open Buildings Dataset

What's different from what's already out there?

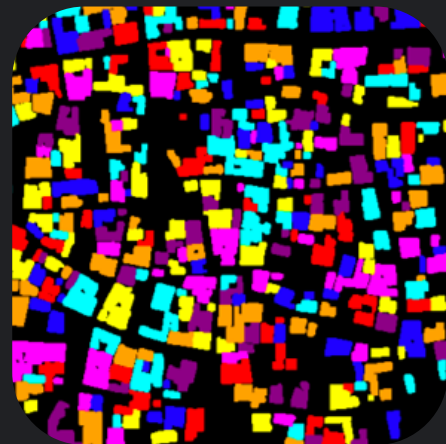
- Our model is built for the global south



Africa is a very diverse continent, and the detection of buildings is a wide-ranging task.



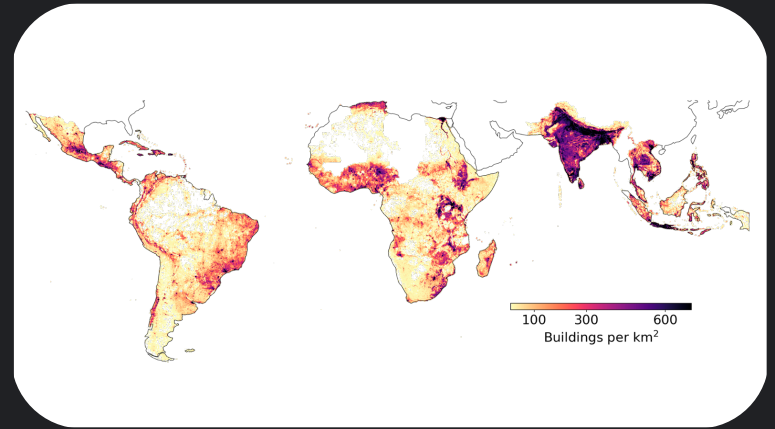
# How do we perform buildings detection?



Instance segmentation with U-Net / HRNet and simple post-processing.

# Impact

- On Google Maps: So far our data provides **40% of all buildings in the whole world**
- Latest version (released a few months) has ~1.8B building detections
  - *Covers 64% of the Global South*



# Other Impact

## Research community

- Researchers (>85 paper citations)
- African developer community outreach (e.g. AI bootcamp in Nigeria, Zindi competition)

## Humanitarian Response

- AI models for post disaster damage assessment
  - 2023 Turkey/Syria Earthquake
  - 2022 Pakistan Floods
- UN and Halo Trust
  - Finding count of displaced people
  - Landmine clearance



# Temporal Open Buildings

# Our upcoming release

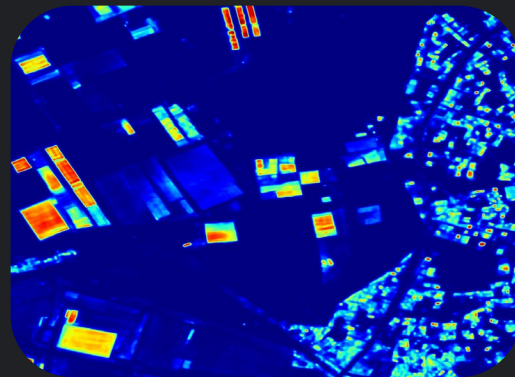
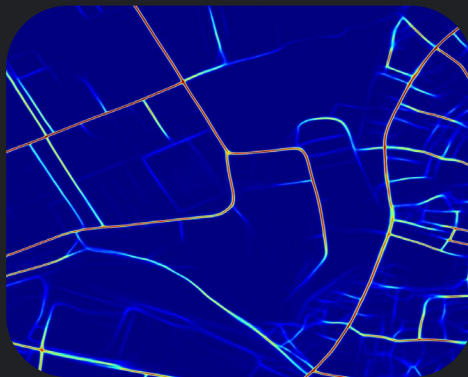
Sentinel2 imagery

## Advantages

- ~5 day revisit time
- World-wide coverage
- It's for free!

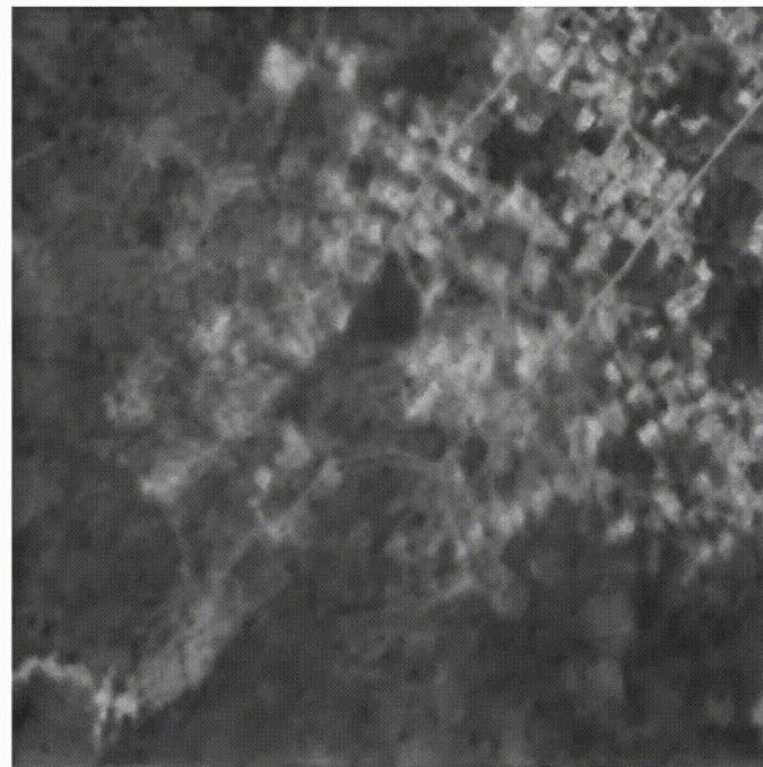
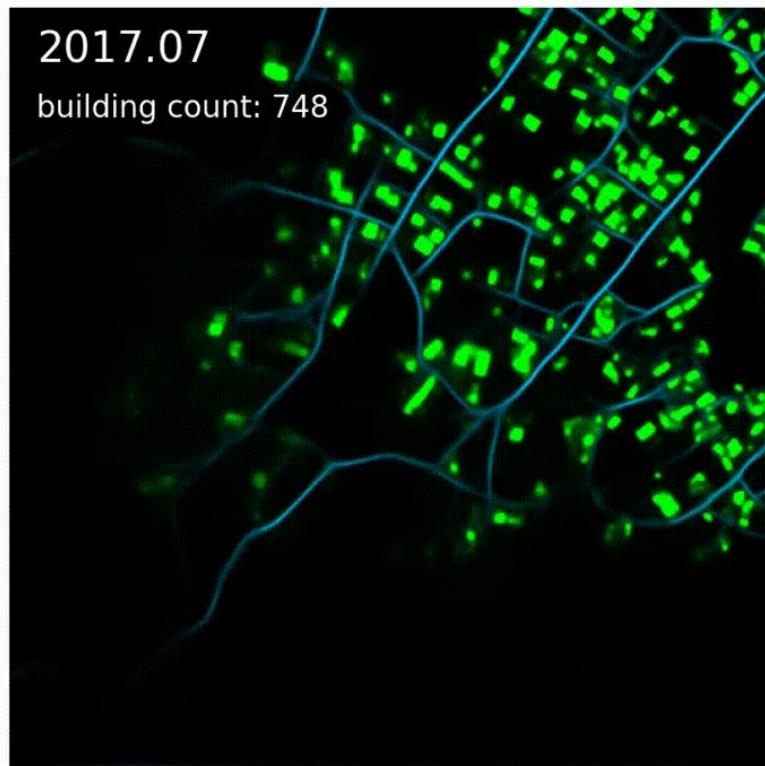
## Disadvantages

Low resolution: 10 meters  
per pixel



**What are the possibilities?**

# Historical and Temporal Building/Road Detections





# How Can I Use It?

Computer Science > Computer Vision and Pattern Recognition  
[Submitted on 26 Jul 2021 (v1), last revised 29 Jul 2021 (this version, v2)]  
**Continental-Scale Building Detection from High Resolution Satellite Imagery**  
Wojciech Sirko, Sergii Kashubin, Marvin Ritter, Abigail Annkah, Yasser Salah Eddine Bouchareb, Yann Dauphin, Daniel Keysers, Maxim Neumann, Moustapha Cisse, John Quinn

Identifying the locations and footprints of buildings is vital for many practical and scientific purposes. Such information can be particularly useful in developing regions where alternative data sources are scarce. In this paper, we present a model training pipeline for detecting buildings in satellite image analysis, using 50 cm satellite imagery in satellite image analysis, we study regularization, pre-training, self-training, and instance segmentation performance on a dataset of 100k satellite images across 100 countries, and we report novel methods for detection with this type of model, in self-training with soft KL loss (mAP results even on a wide variety of challenges to create the Open Buildings dataset footprints.



Paper

Earth Engine Data Catalog  
Home View all datasets Browse by tags Landsat MODIS Sentinel API Docs  
**Open Buildings V3 Polygons**



Dataset Availability  
2023-05-30T00:00:00Z - 2023-05-30T00:00:00Z


Dataset Provider  
Google Research - Open Buildings

Earth Engine Snippet  
FeatureCollection ee.FeatureCollection("google-earth-engine-datasets/open-buildings-v3-polygons")  
FeatureView ee.FeatureViewLayer("google-earth-engine-datasets/open-buildings-v3-polygons")




Earth Engine Catalog

**Open Buildings**  
A dataset of building footprints to support social good applications.



Building footprints are useful for a range of important applications, from population estimation, urban planning and humanitarian response, to environmental and climate science. This large-scale open dataset contains the outlines of buildings derived from high-resolution satellite imagery in order to support these types of uses. The project is based in Ghana, with an initial focus on the continent of Africa and new updates on South Asia, East Asia, Latin America and the Caribbean.

Explore FAQ Data for this dataset Download



Open Buildings Site

NOTE: This service is under active development. Certain features may not work or become unavailable at any time.

SOURCE COOPERATIVE  
SIGN IN / REGISTER

Browse

Google Open Buildings **Featured**  
Google's Open Buildings is an open access dataset containing the geometry of buildings across most of Africa, South Asia and South-East Asia. This version of the dataset is transformed to be partitioned by admin 1 boundaries and available in cloud-native geospatial formats (GPTILES, GeoParquet).  
Provided by Etchells • Published on July 05, 2023

Building footprints vector geoparquet pmtiles segmentation

```
root/  
├── geoparquet-admin1/  
├── geoparquet-1/  
├── v3/  
├── README.md  
├── google-open-buildings-v3-entiles  
└── google-open-buildings-pmtiles
```



Community

Maintained Datasets

Please reach out: [open-buildings-dataset@google.com](mailto:open-buildings-dataset@google.com)