Disruptors

Participatory Terrain Data and Modelling

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Enabling Delta Life

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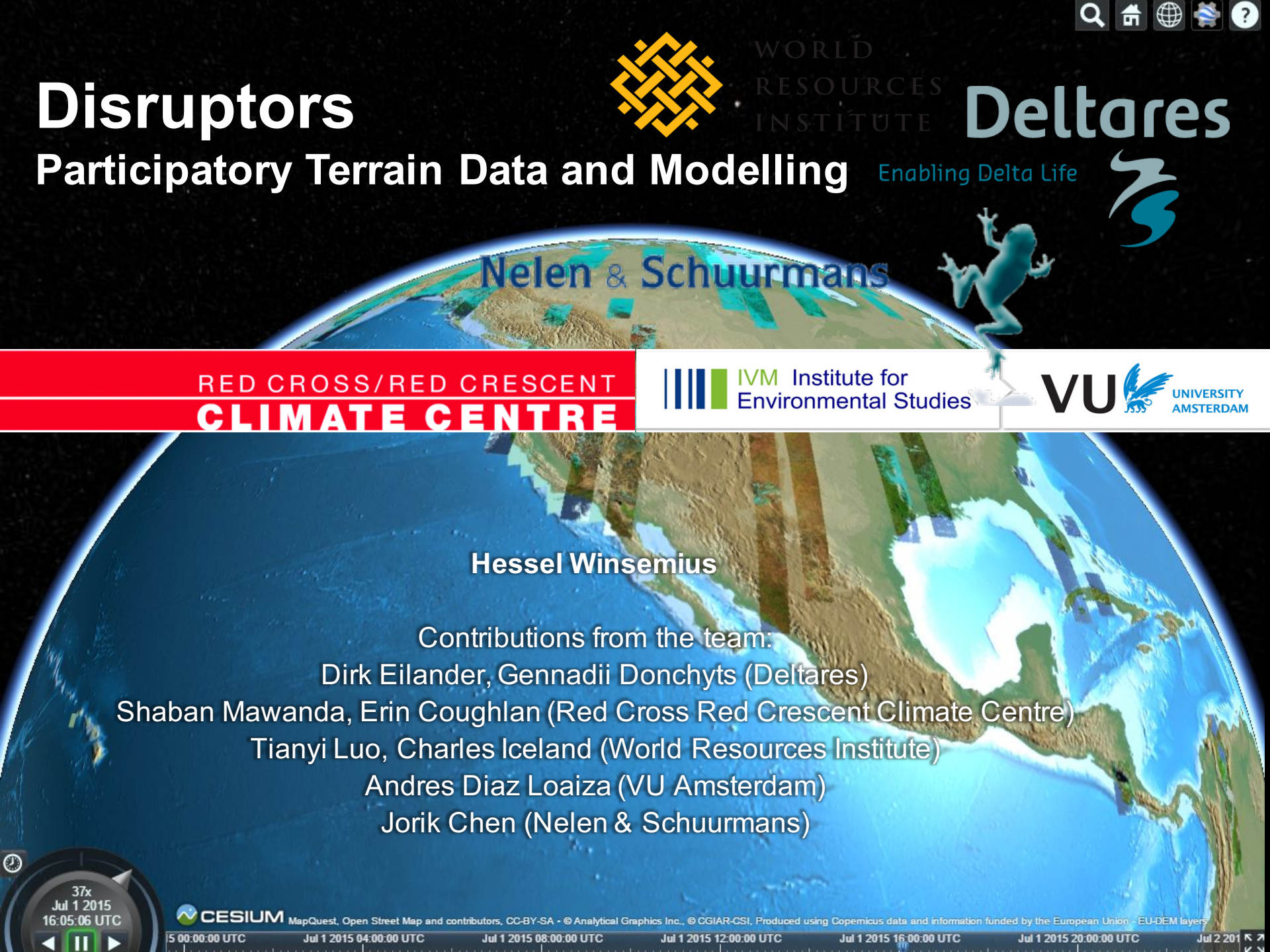
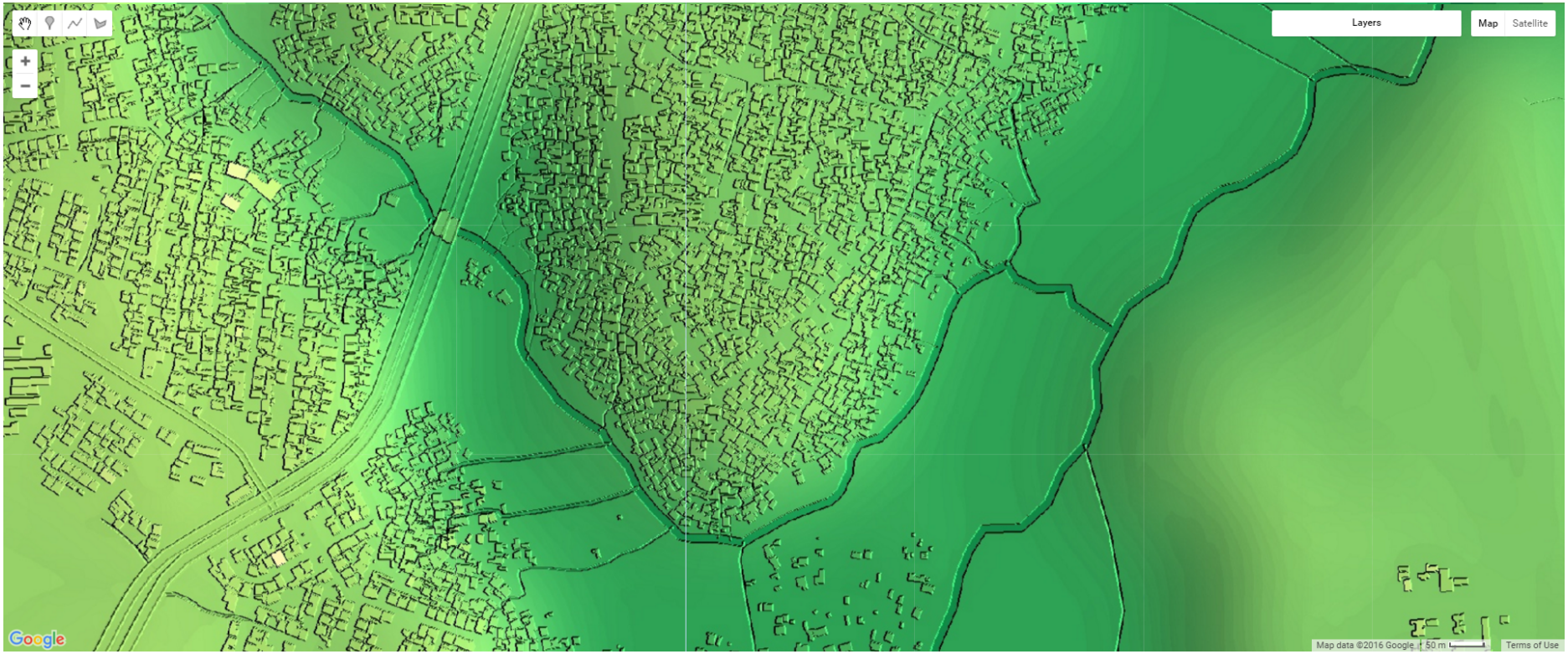


Are you wondering how we go from this…

….to this



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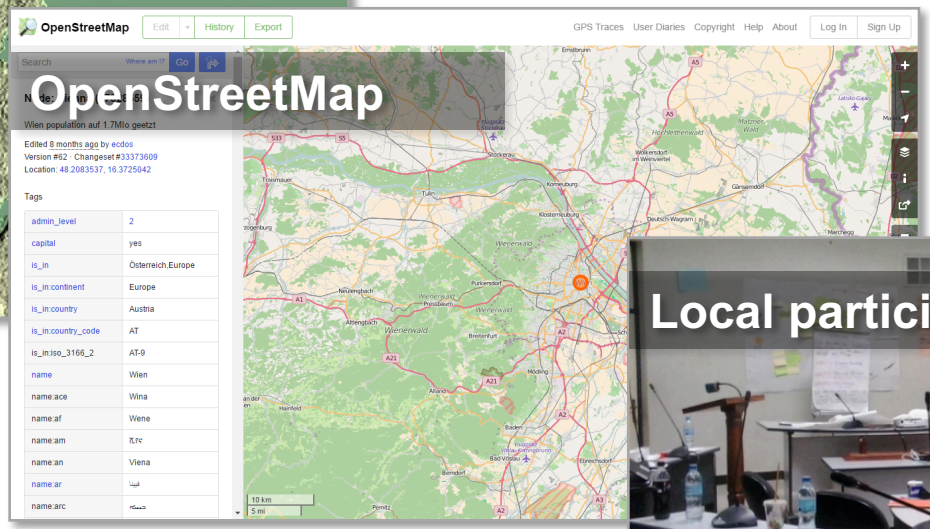
3 key words….



Google Earth Engine

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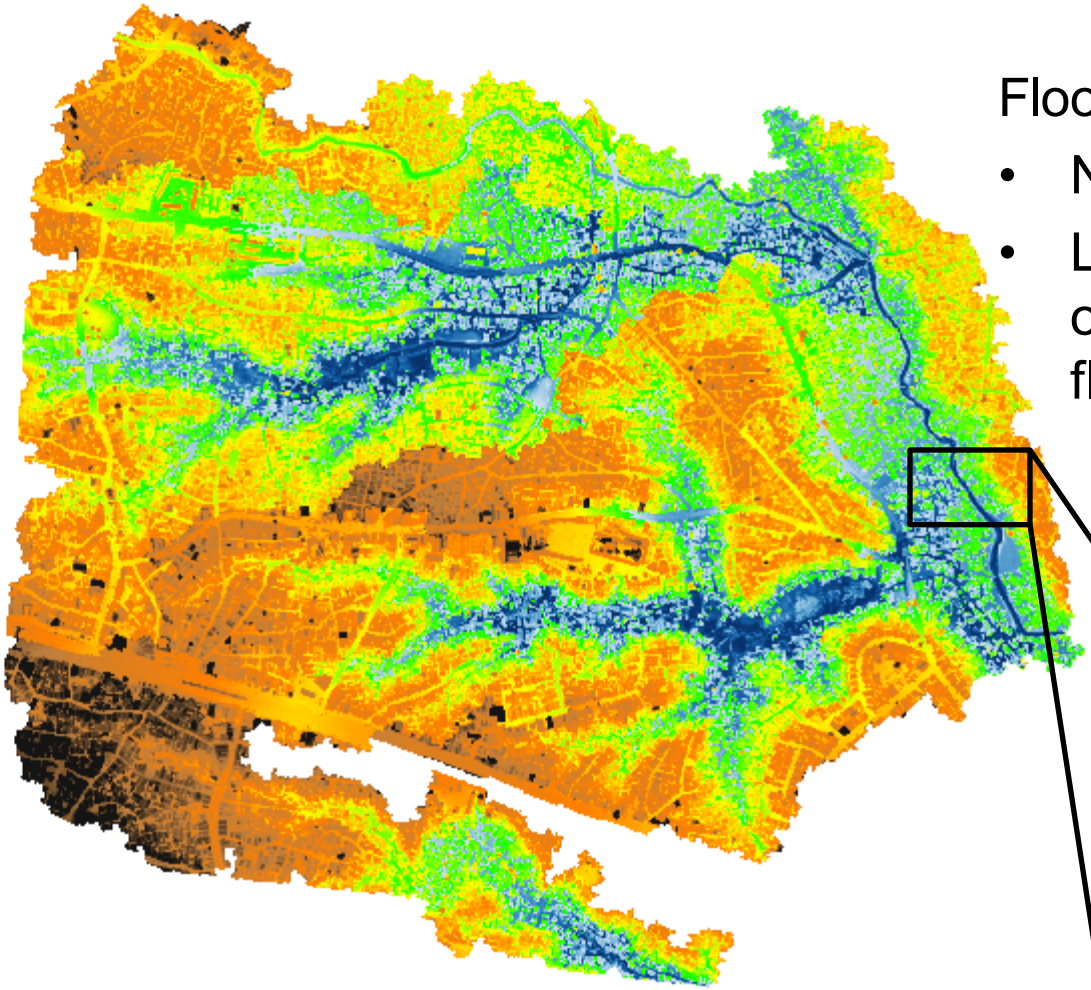
SRTM is somewhat noisy and coarse scale

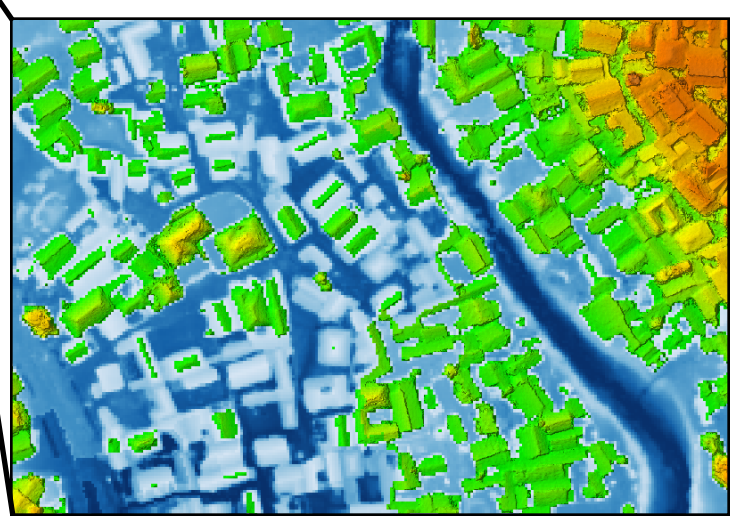
SRTM in Dar Es Salaam area

Terrain data requirements



Flood modelling with lidar

- Not globally available
- Lidar only observes the top of terrain (not where water flows)



Terrain data requirements – more than resolution

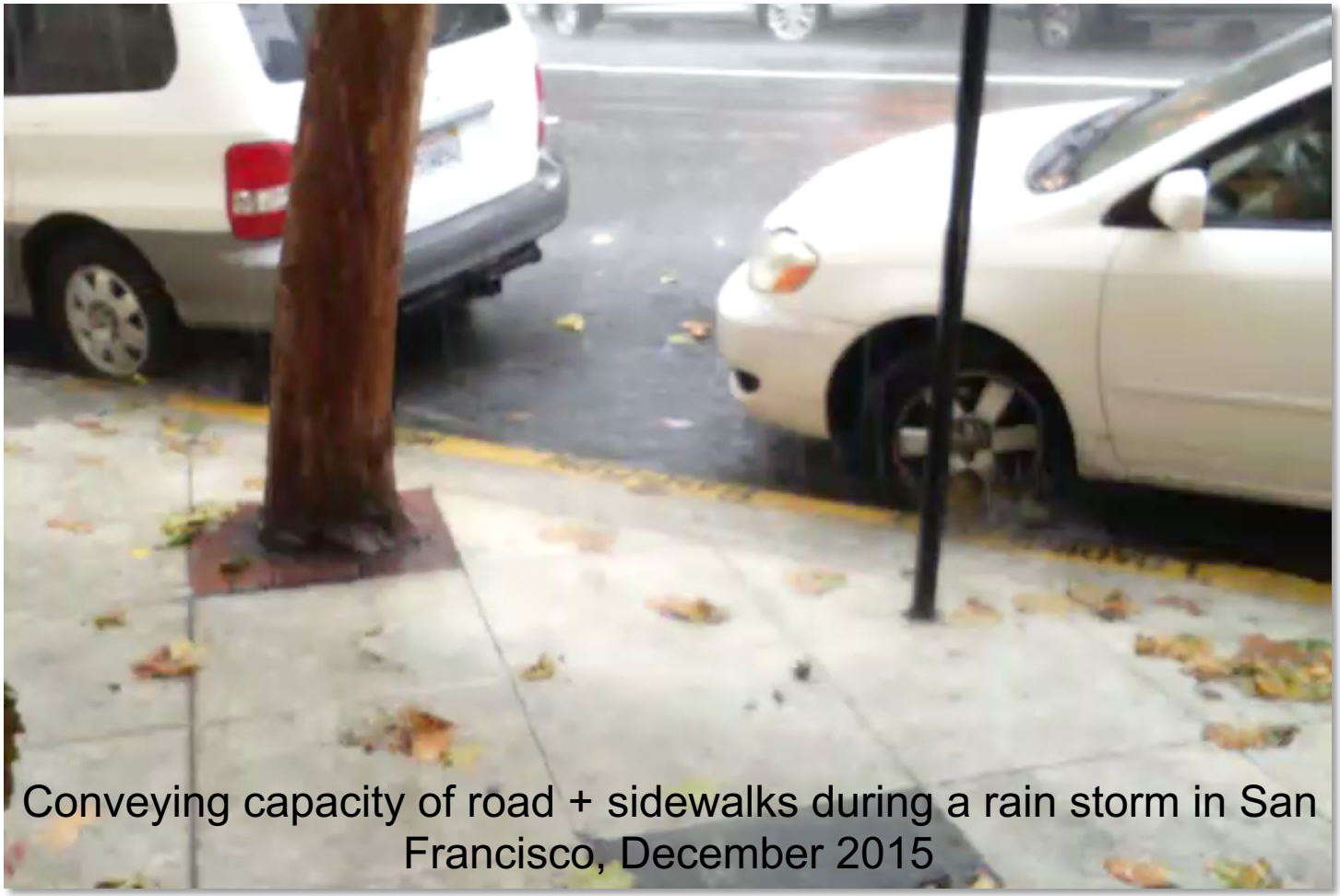
Where can water flow? Requires detail!

Elevated roads

Ditches (covered or not)

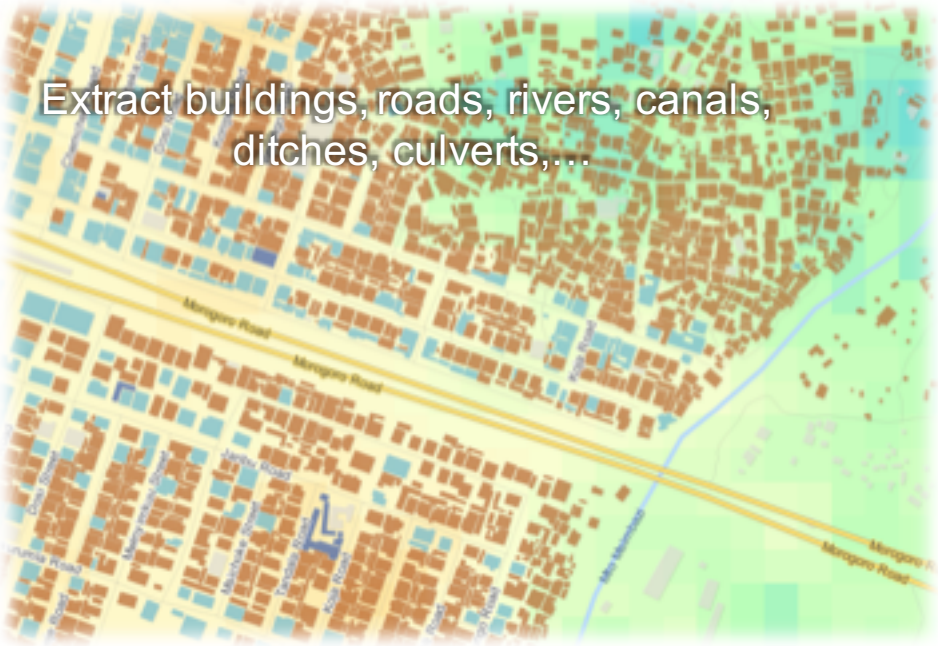
Complex vertical geometries

Important to consider sidewalks and building thresholds



Conveying capacity of road + sidewalks during a rain storm in San Francisco, December 2015

OpenStreetMap



Rapidly growing free vector map

World file is about:

- ~30 GB compressed
- ~250 GB uncompressed
- ~54 000 GB rendered tiles

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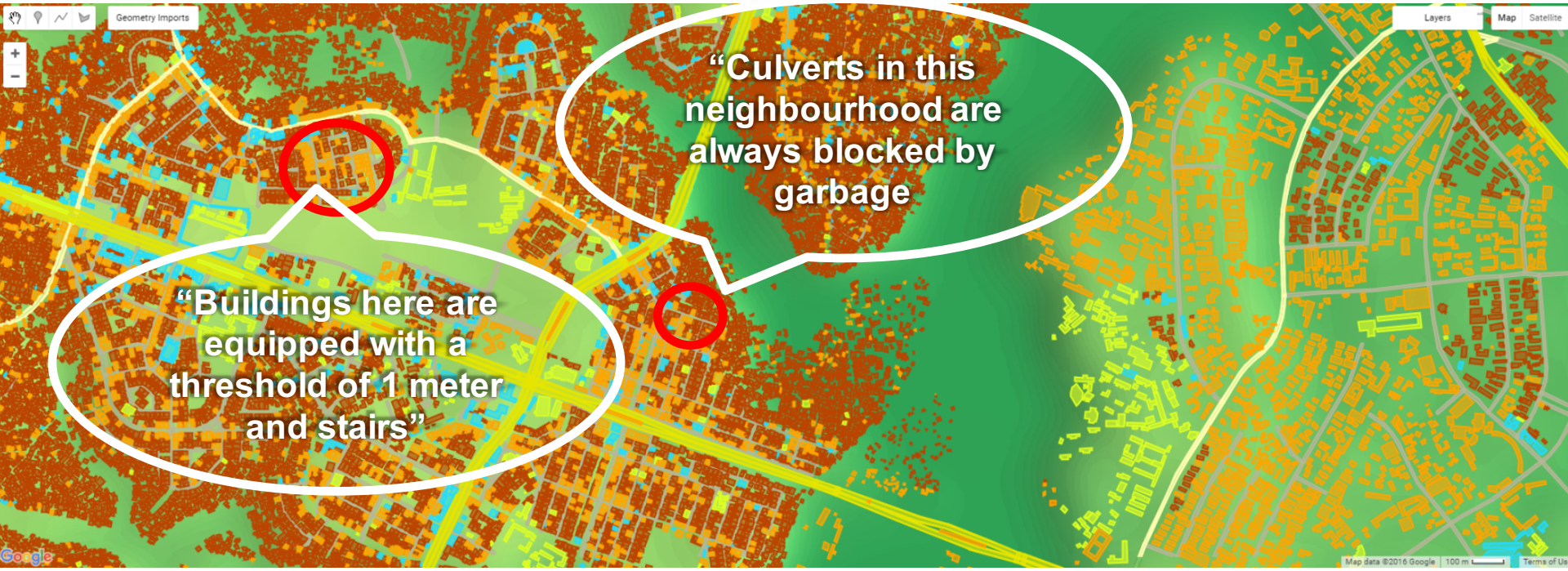
Game changer – Google Earth Engine



Terrain synthesis **on-the-fly**

- Implication: **work with stakeholders** to improve terrain data
- **Ownership** and **understanding**

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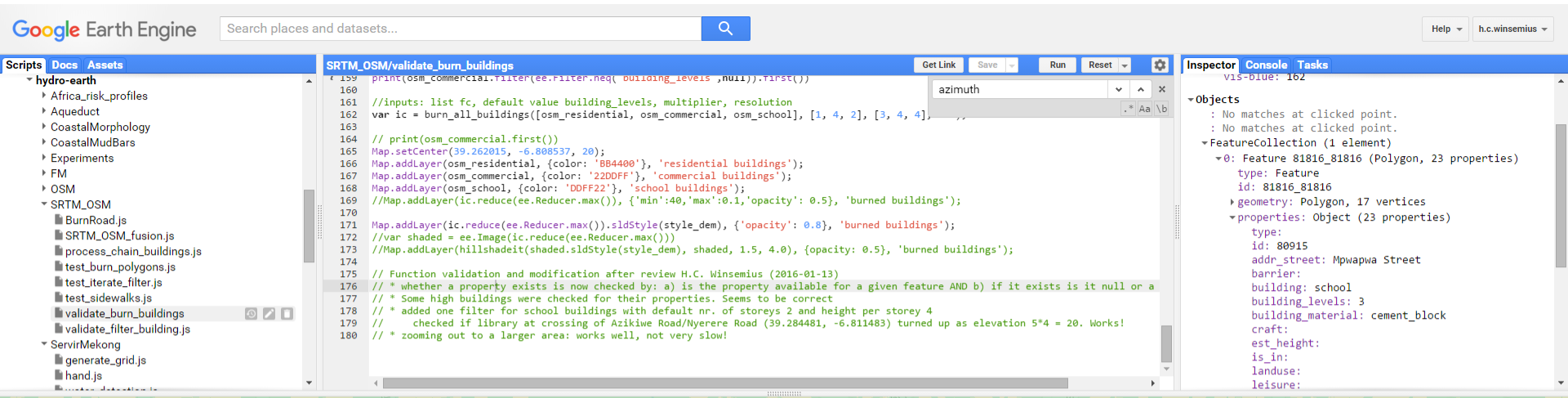

- Add filters
- Modify default values
- (Re)generate terrain data
- Export to GeoTIFF

School (with surrounding commercial and residential building)

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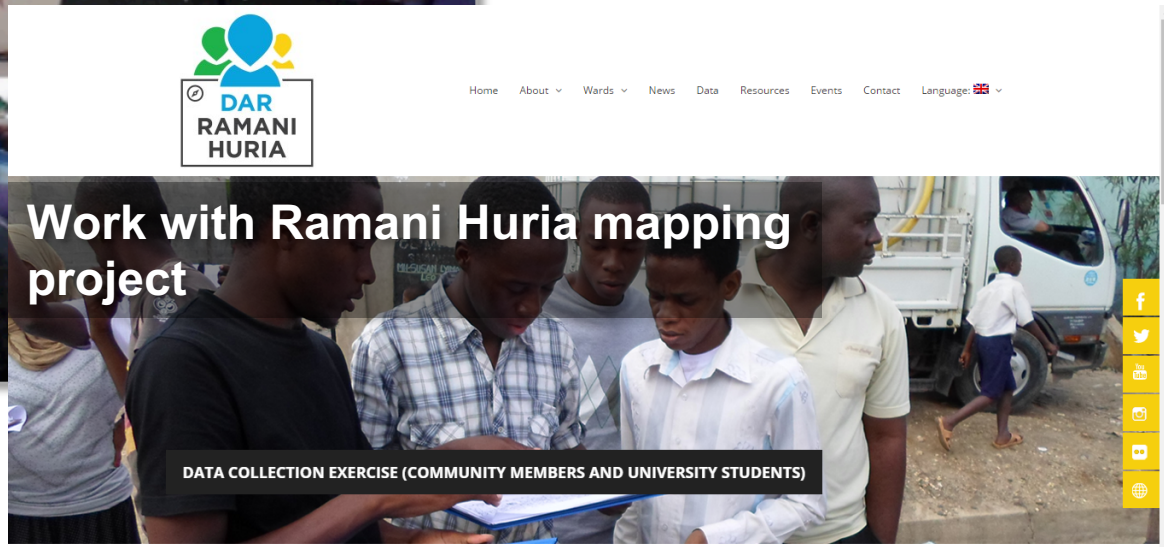
Workshop with stakeholders Dar Es Salaam



http://ramanihuria.org/

Improve terrain data on the fly

COMMUNITY MAPPING FOR FLOOD RESILIENCE

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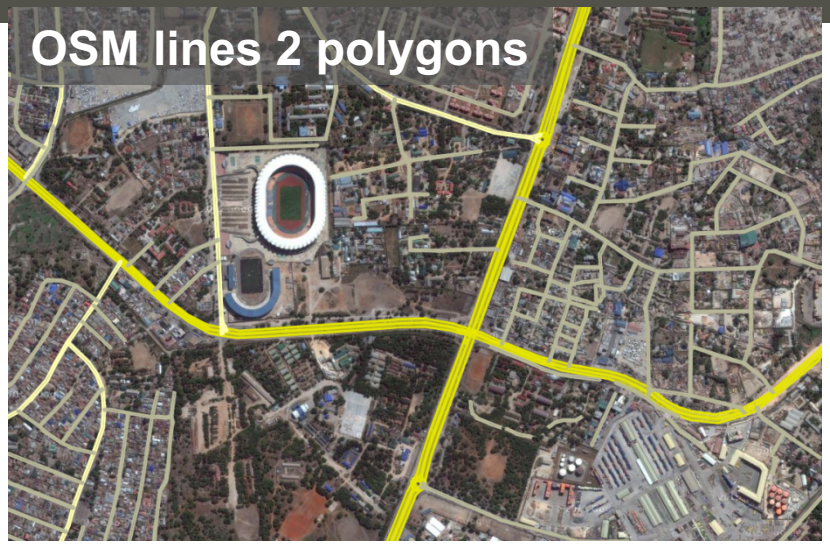
Example for buildings – use of attributes

Building heights: Use amount of stories

- Brown: one story buildings
- Yellow: high buildings

Roads



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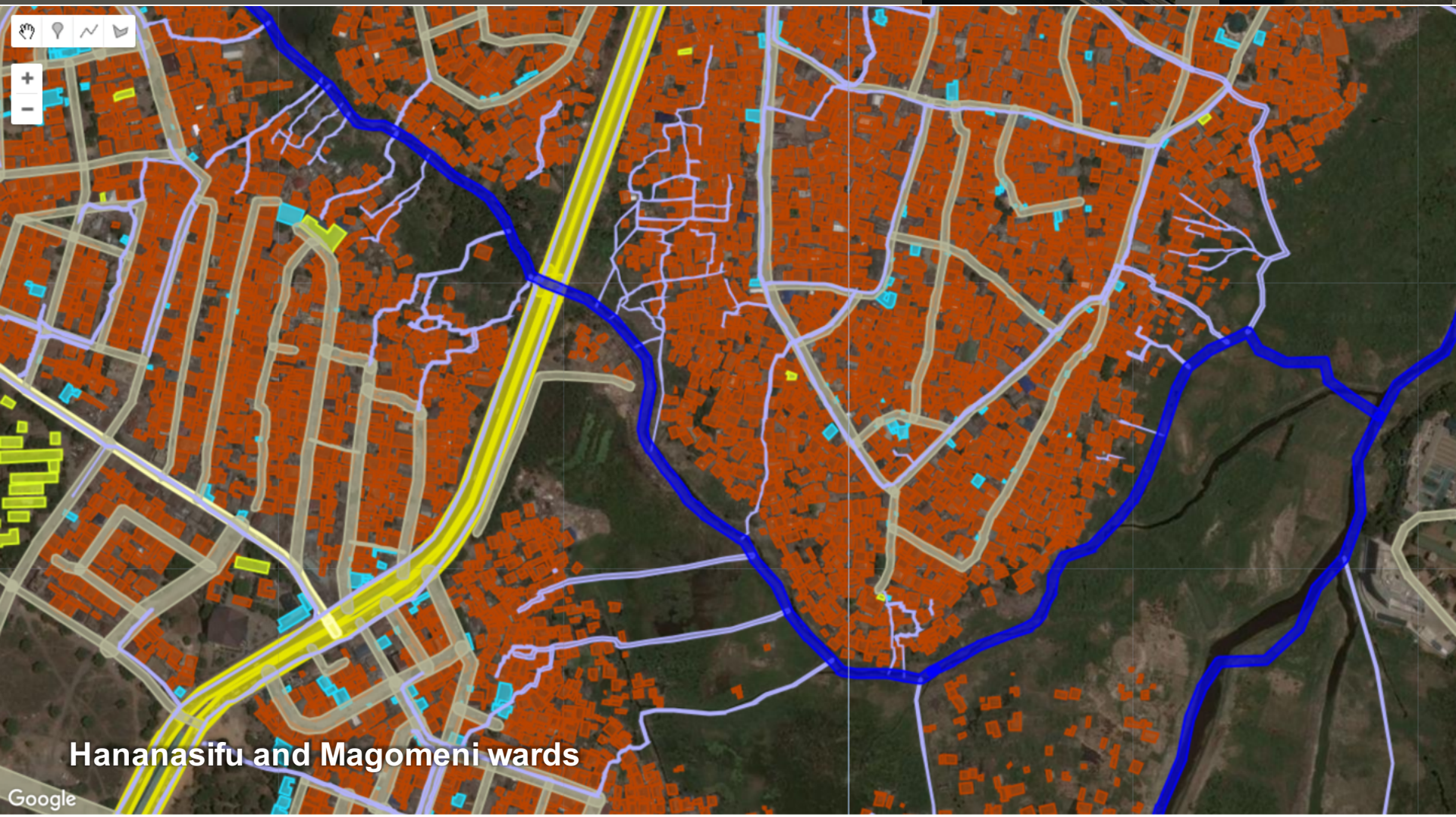
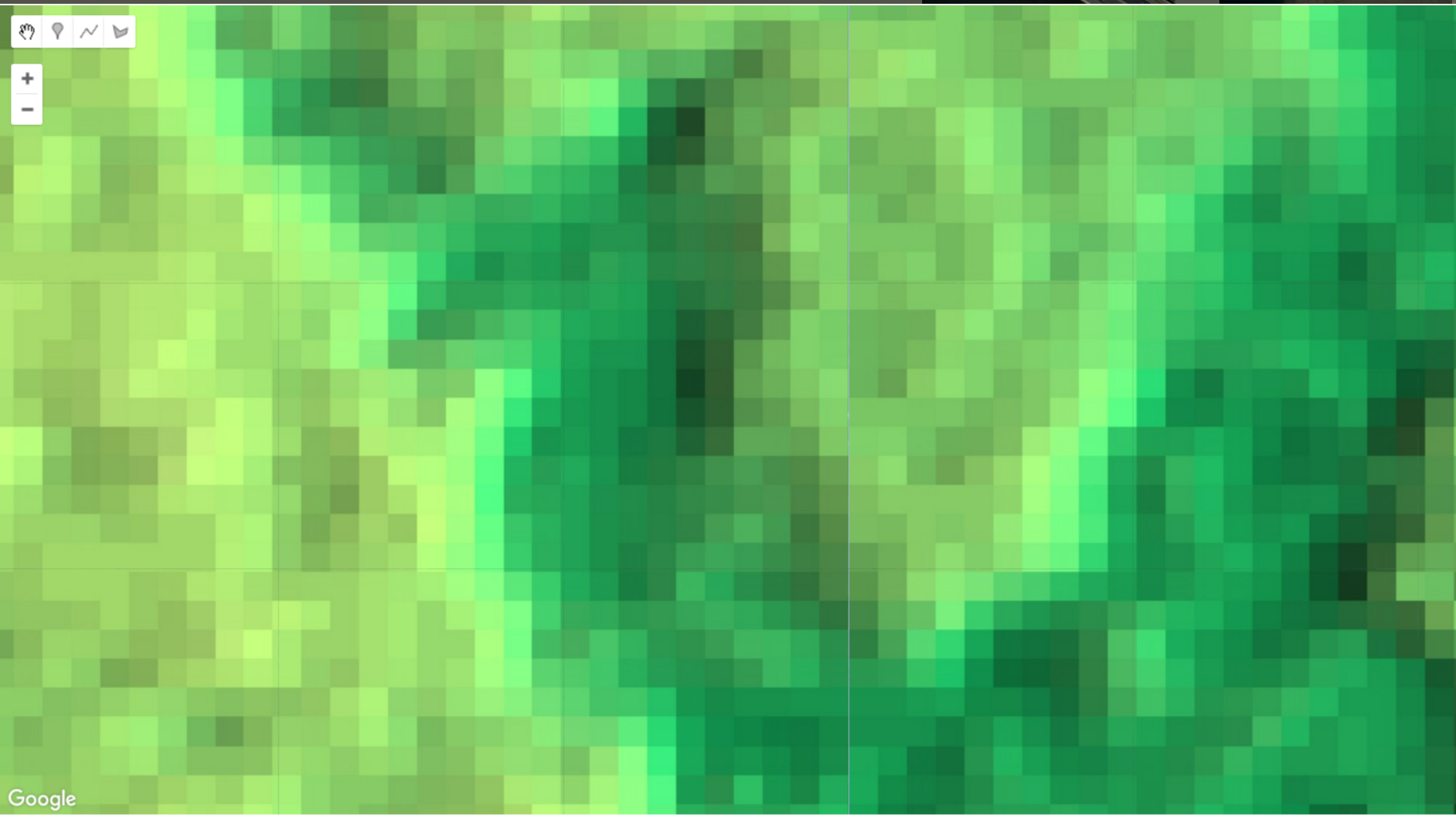
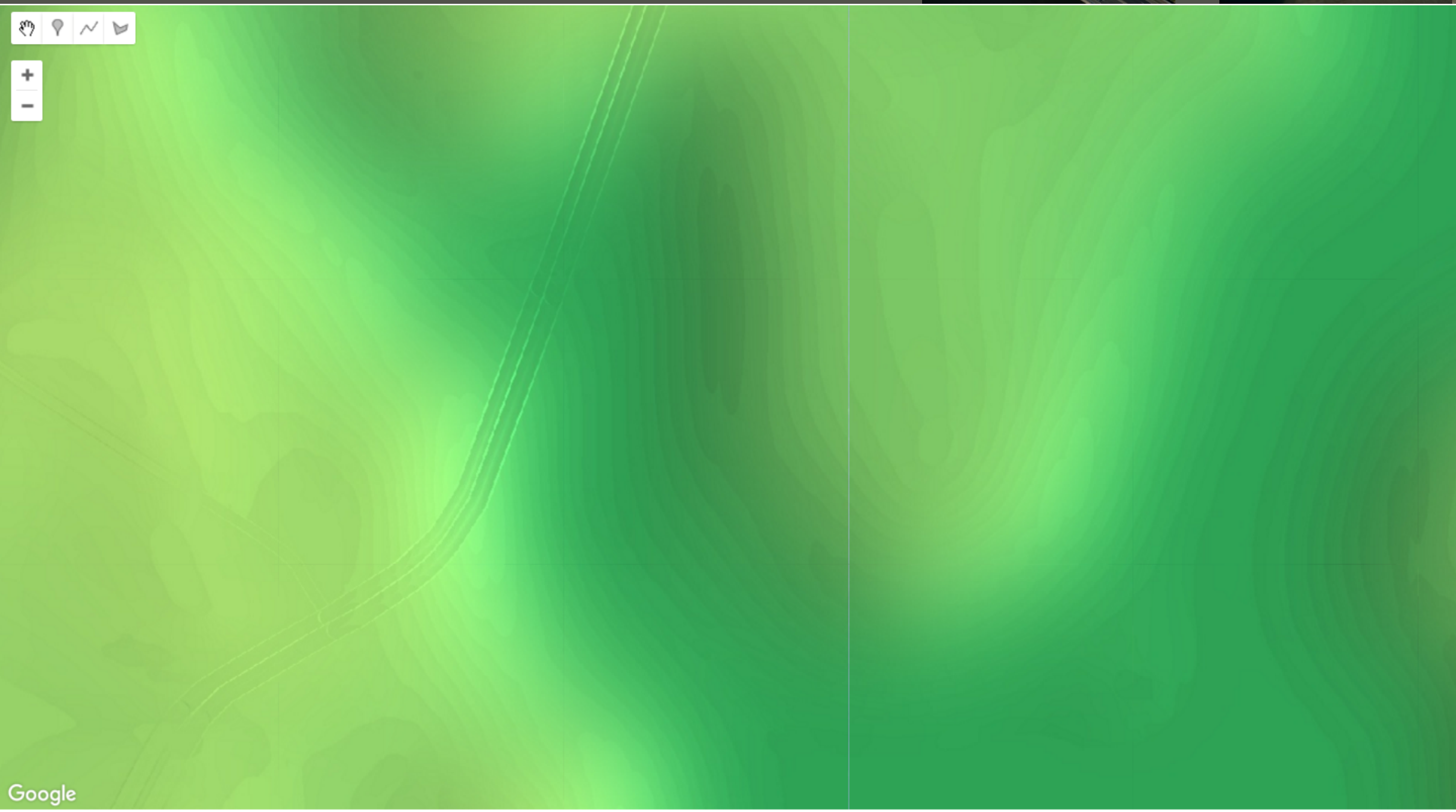
Results – OSM vector data



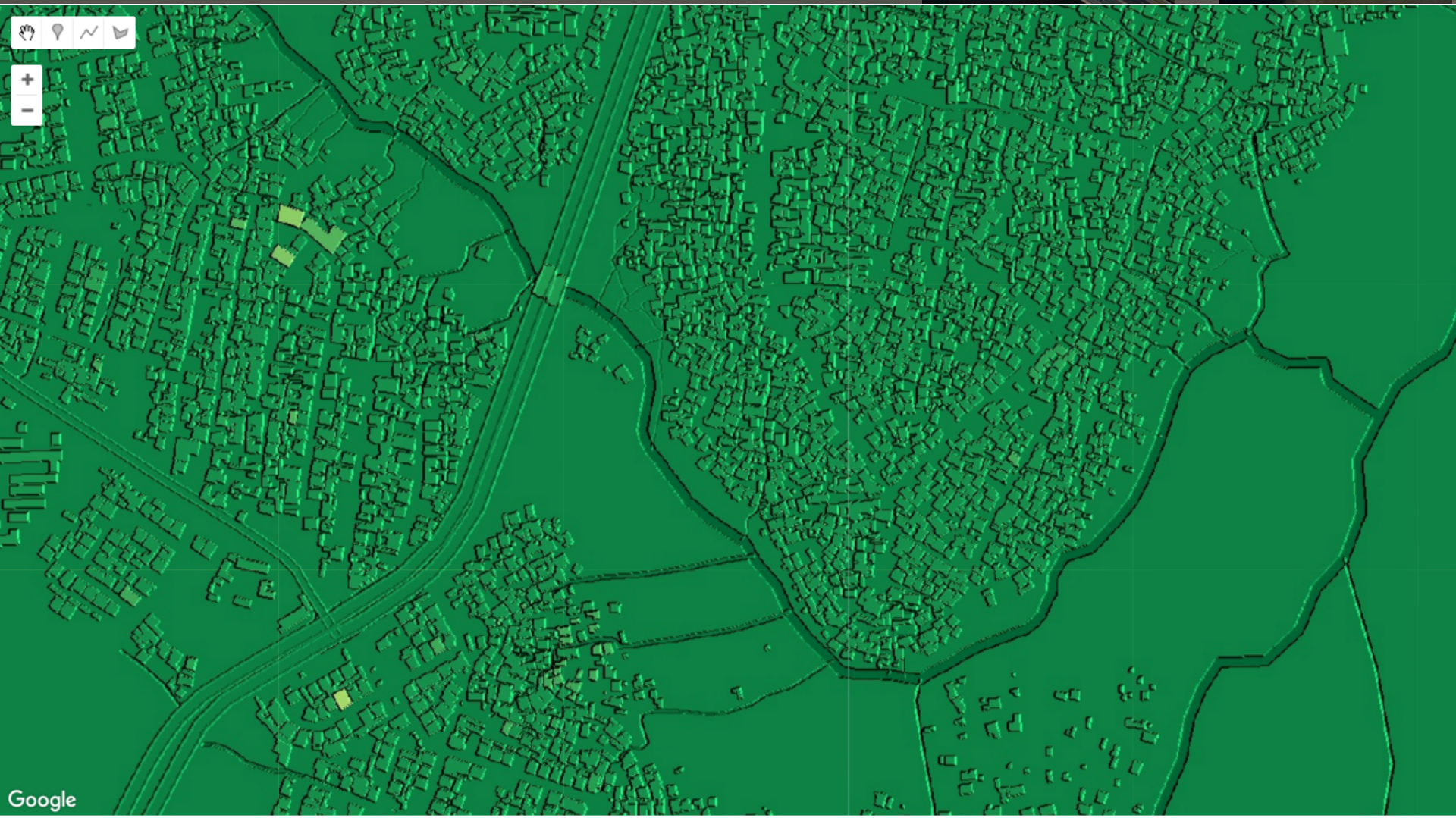
Results – SRTM elevation data



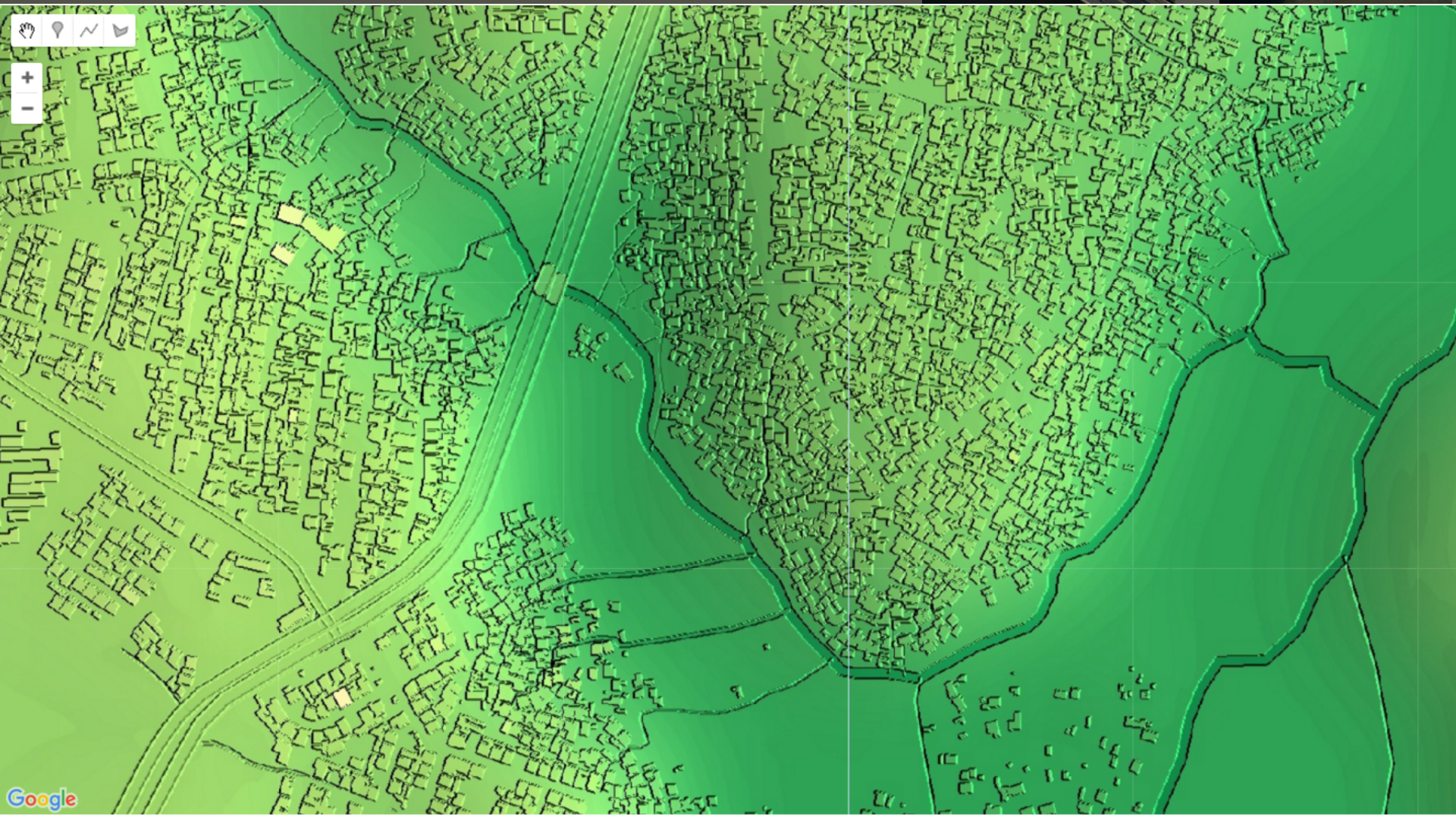
Results – smoothed SRTM



Results – OSM object height map

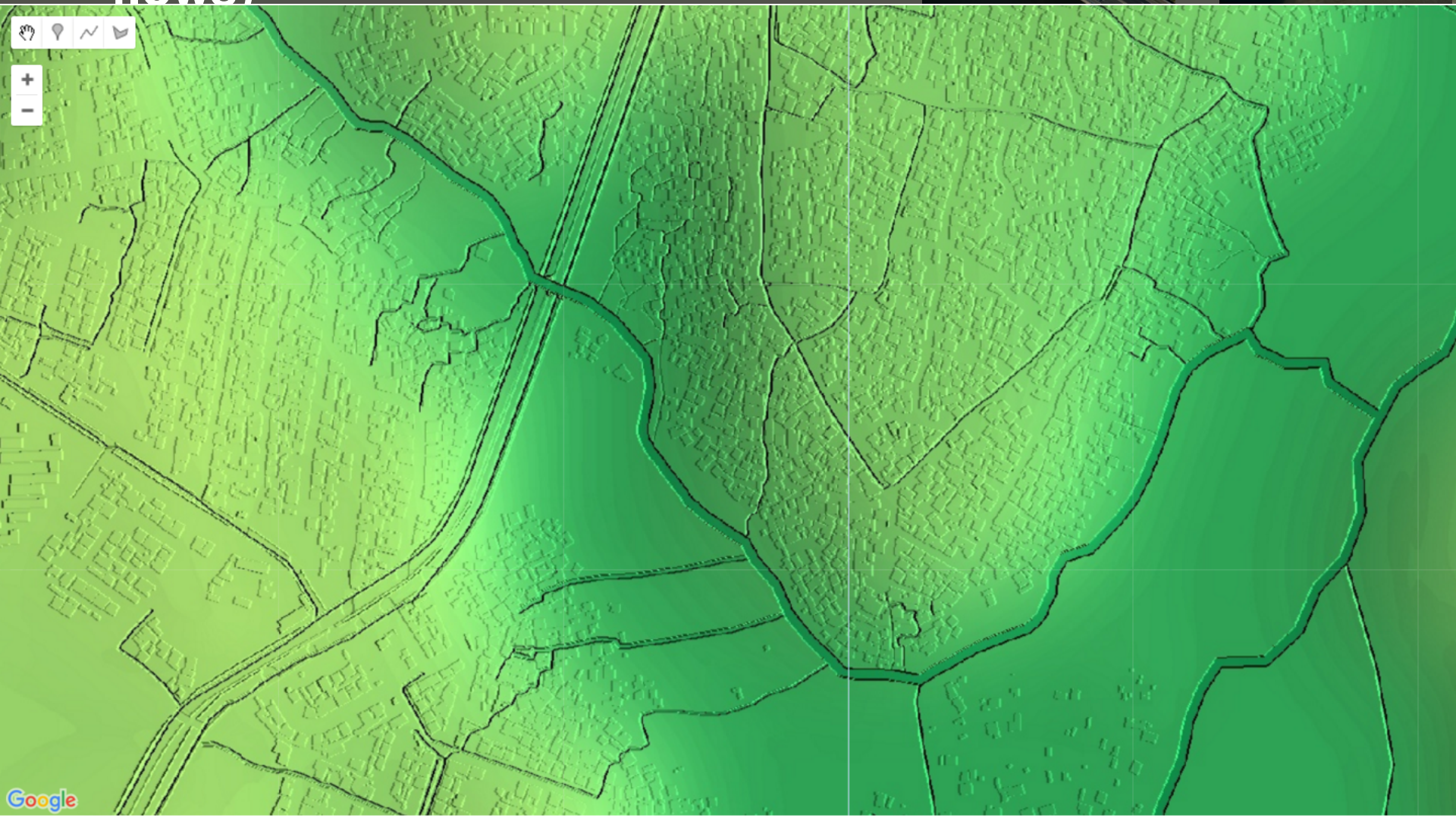


Results – Digital Surface Model (as the crow flies)



Results – OSM threshold level map

Results – Digital Hydro Elevation Map (as the water flows)



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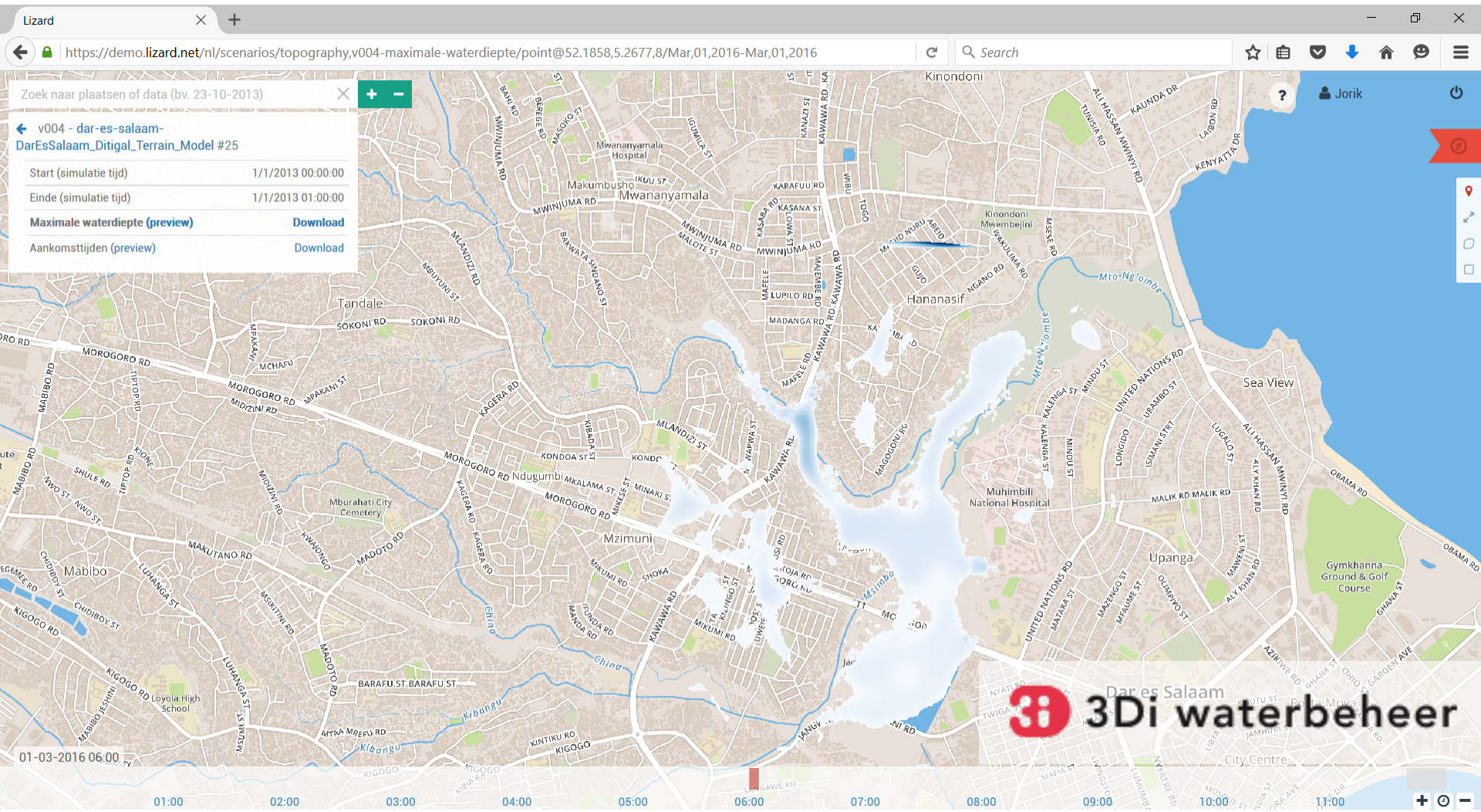
Results – first flood simulation (using 3Di)



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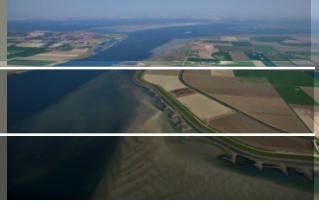
Conclusions



Conclusions and outlook

1. We are able to synthesize terrain data (0.5 meter) with a fusion between crowd-sourced data from OpenStreetMap and generally available satellite terrain data
2. So far accomodation of:
    1. Buildings (thresholds)
    2. Roads (including straightening and sidewalks)
    3. Open water bodies
    4. Ditches and culverts
3. We can utilize terrain in pluvial flood simulations with 3Di
4. We will pilot if we can assess changes, improvement, scenarios in the terrain with local stakeholders