Water monitoring with Very High Resolution satellite imagery

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Christian F Clough - Planet
Ramesh Nair - Planet
Giovanni Marchisio - Planet

A. Monitoring of Urban Growth in High Flood Risk Areas

B. Mapping and monitoring intermittency of water streams

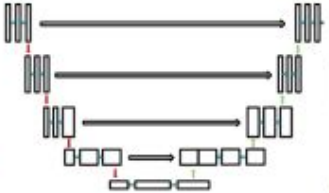
URBAN PLANNING

Monitoring of Urban Growth in High Flood Risk Areas

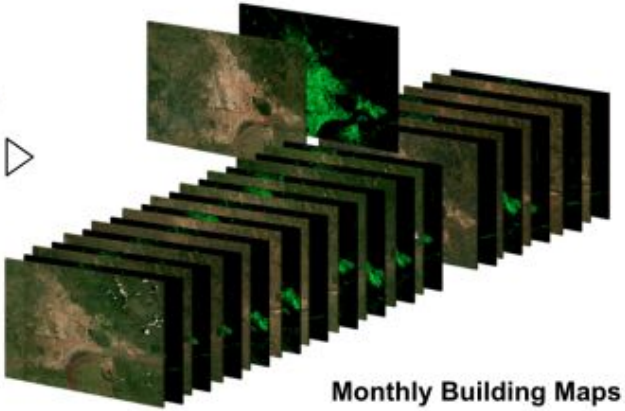
WORKFLOW

for Monitoring Urban Growth in High Flood Risk Areas

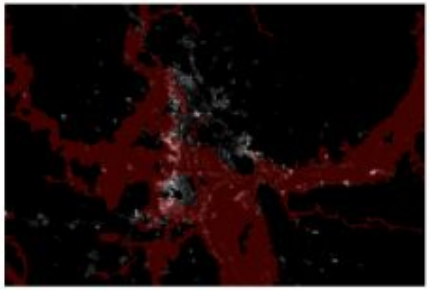
Daily, Global Imagery



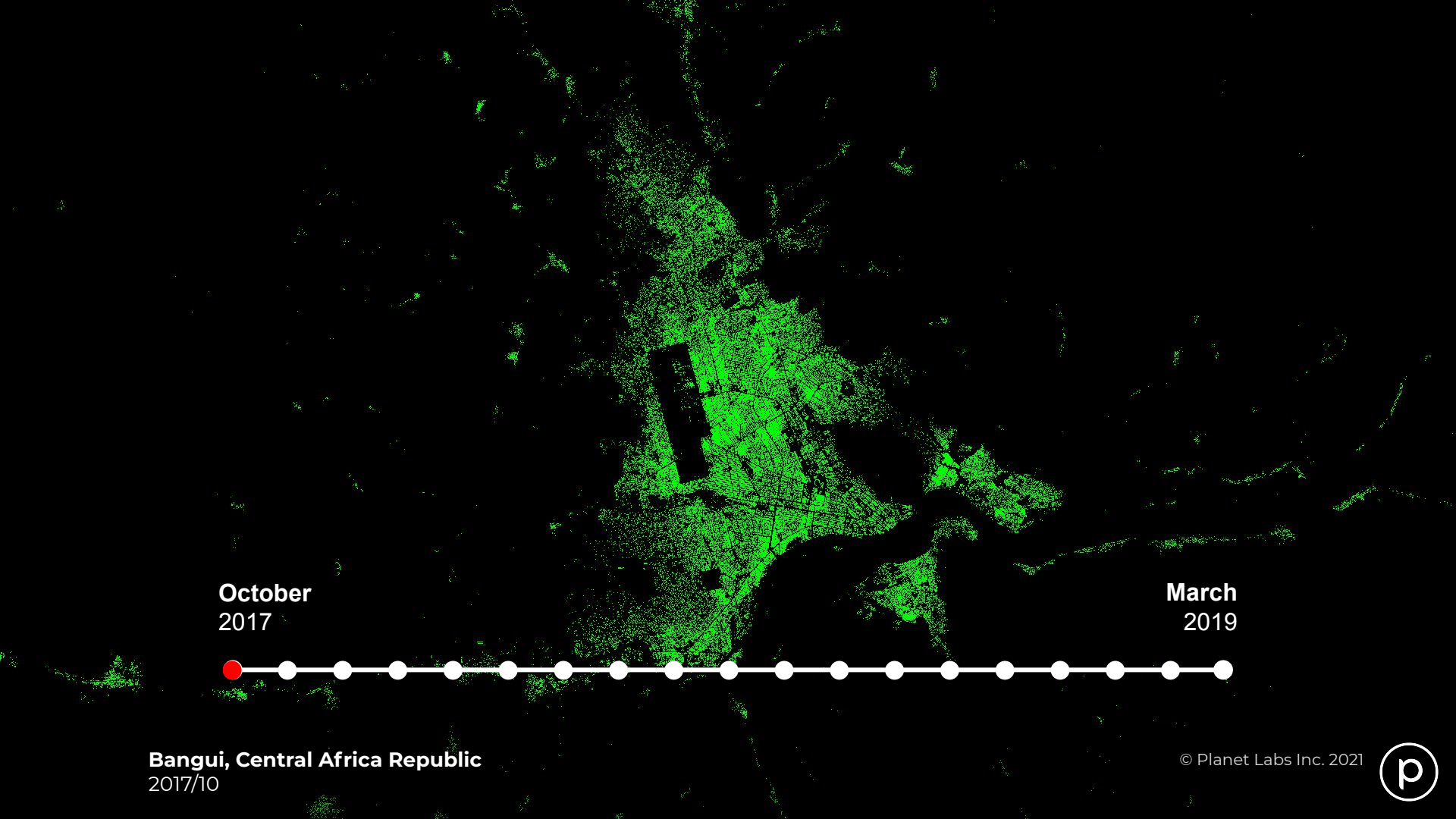
U-Net Building Segmentation model



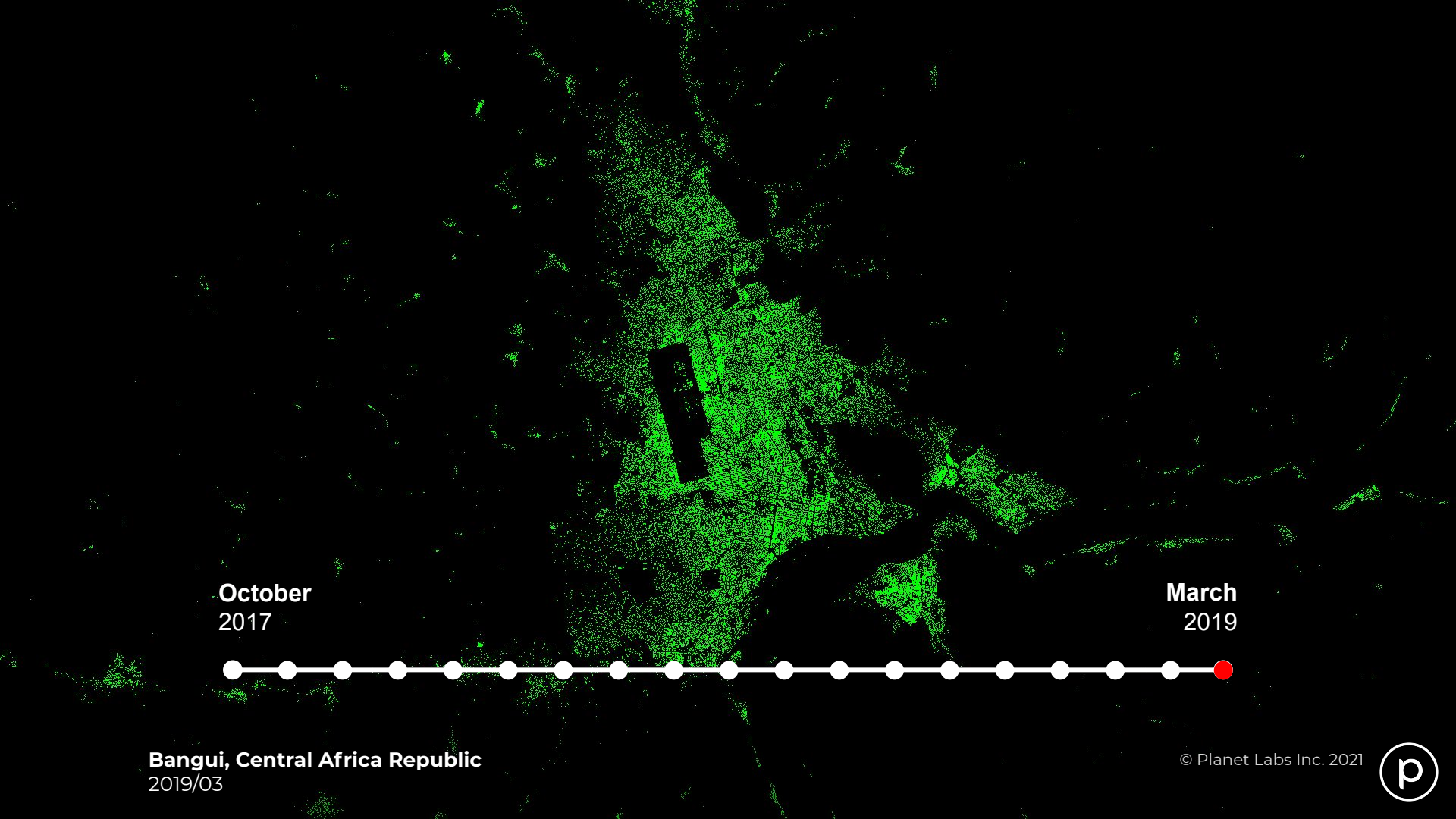
Monthly Building Maps



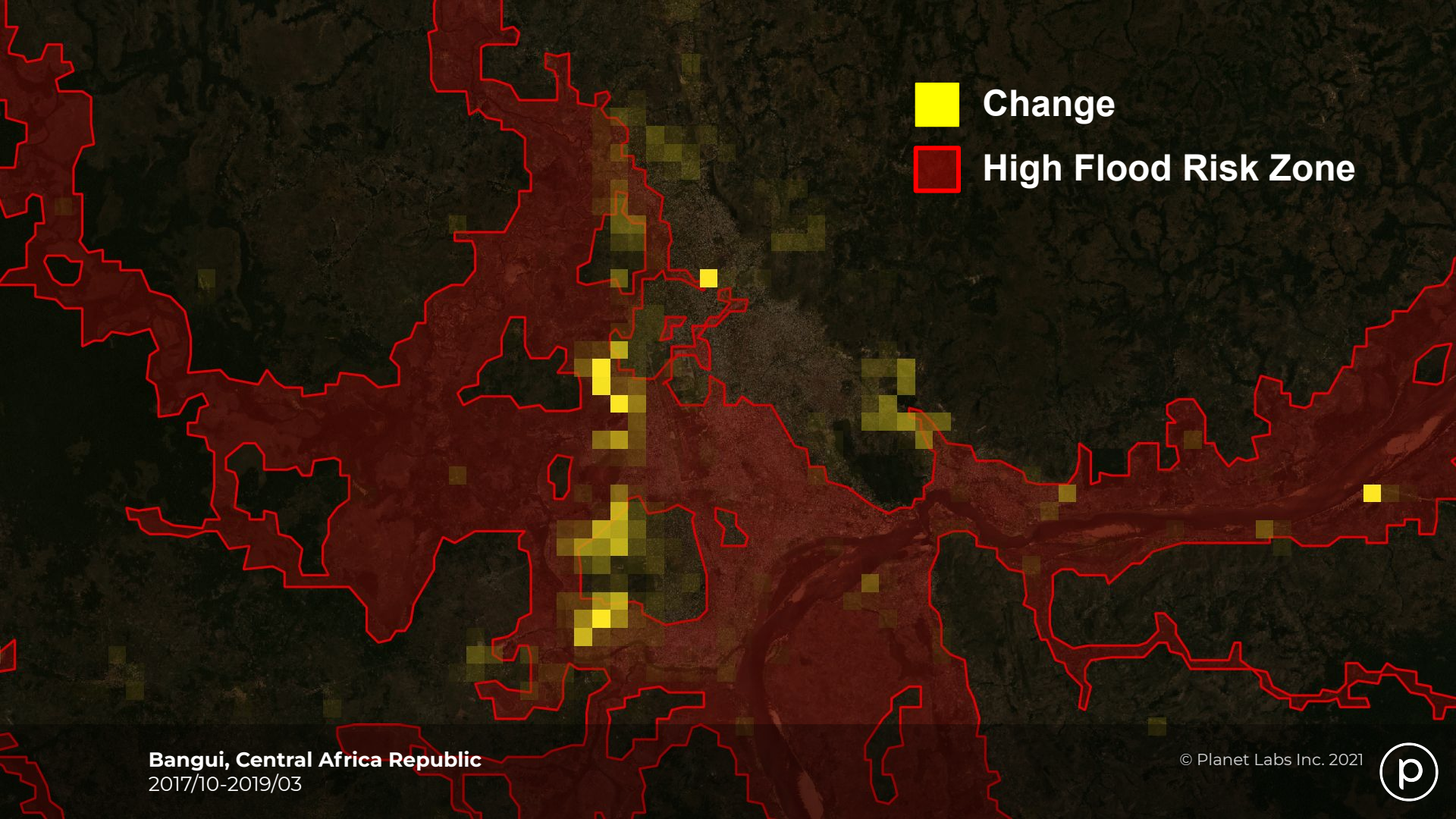
Building Change + 3rd-party flood risk map (red) = valuable insights for urban planning



Bangui, Central Africa Republic
2017/10



Bangui, Central Africa Republic
2019/03



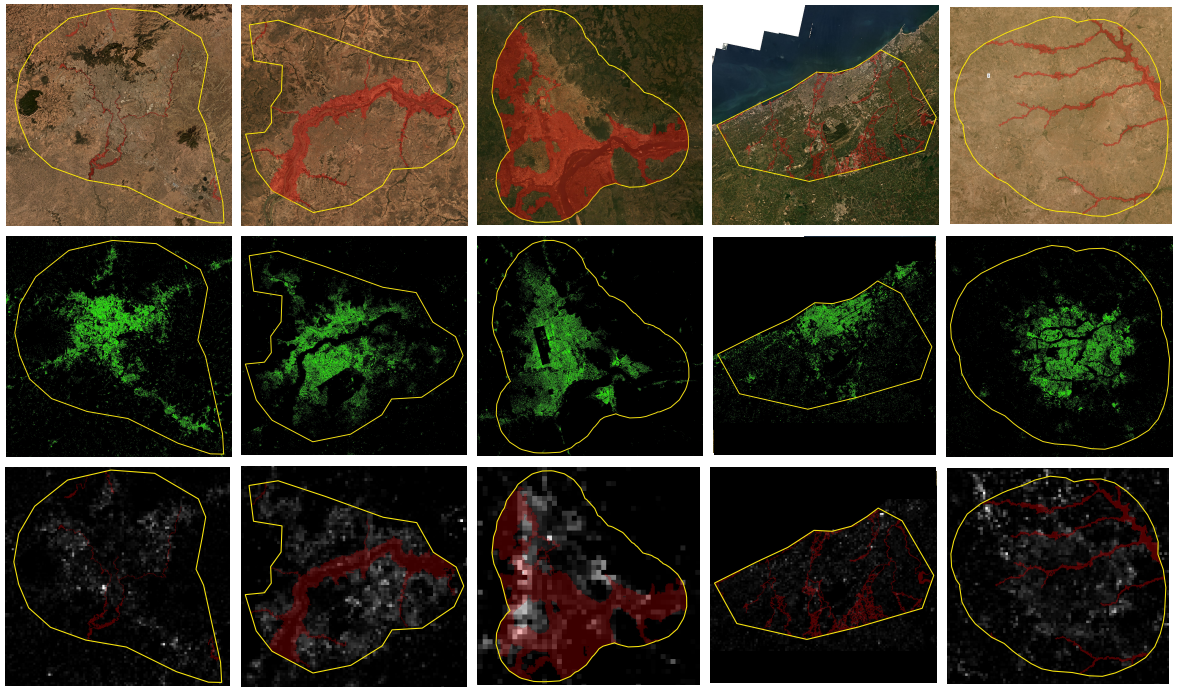
Bangui, Central Africa Republic
2017/10-2019/03

URBAN PLANNING

Imagery + Flood risk

Building Segmentation

Building Change
10/2017-03/2019



Addis Ababa
Ethiopia

Bamako
Mali

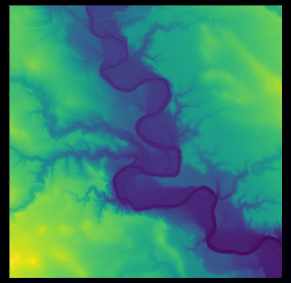
Bangui
Central African Republic

Casablanca
Morocco

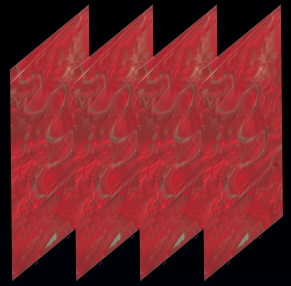
Ouagadougou
Burkina Faso

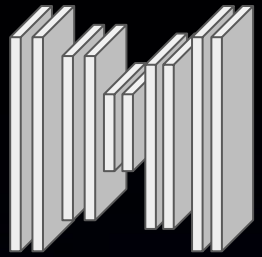
Pix2Streams Dynamic Hydrology Maps from Satellite-LiDAR Fusion

[arXiv: 2011.07584]



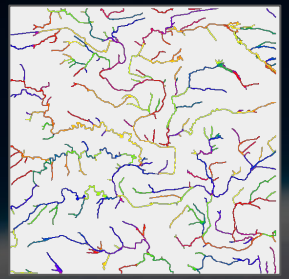
Terrain





Imagery with high temporal & spatial resolution

Water probability map

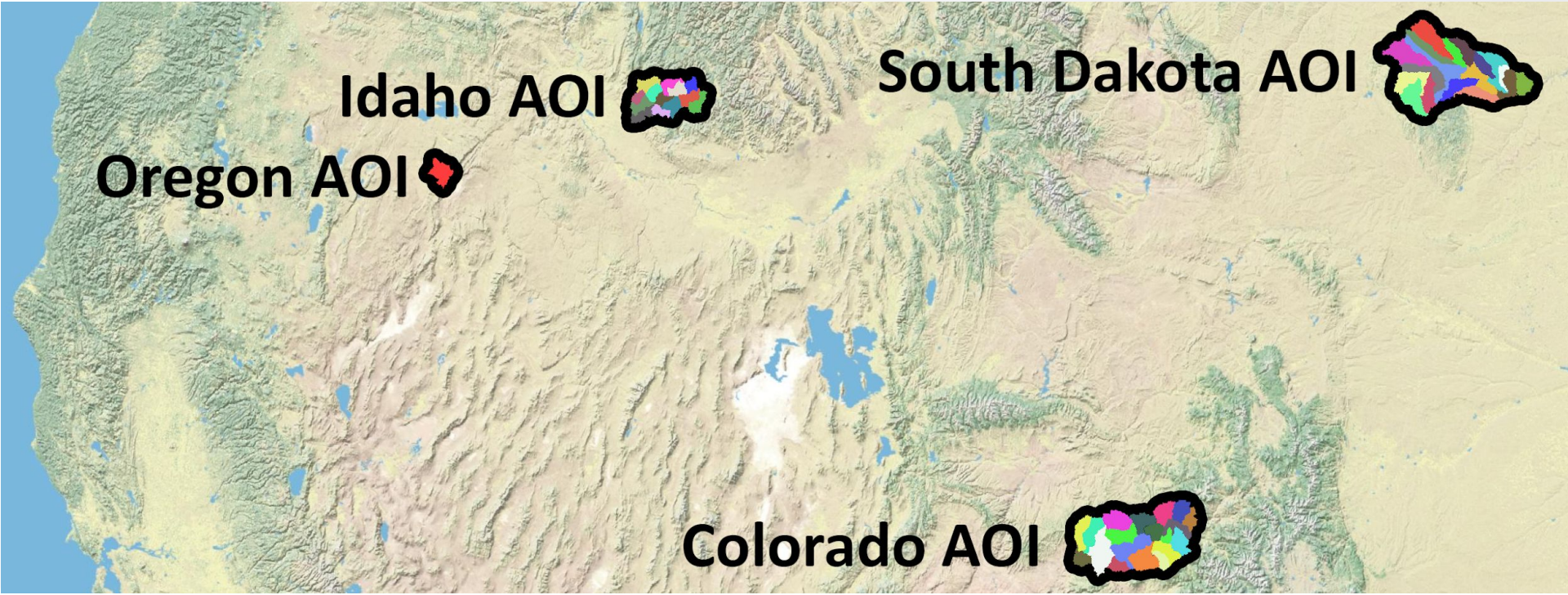


Reaches

% Water per reach

Areas of Interest (AoI)

https://frontierdevelopmentlab.gitlab.io/fdl-us-2020-droughts/xstream/folium_locs_wotus.html



FDL FRONTIER DEVELOPMENT LAB

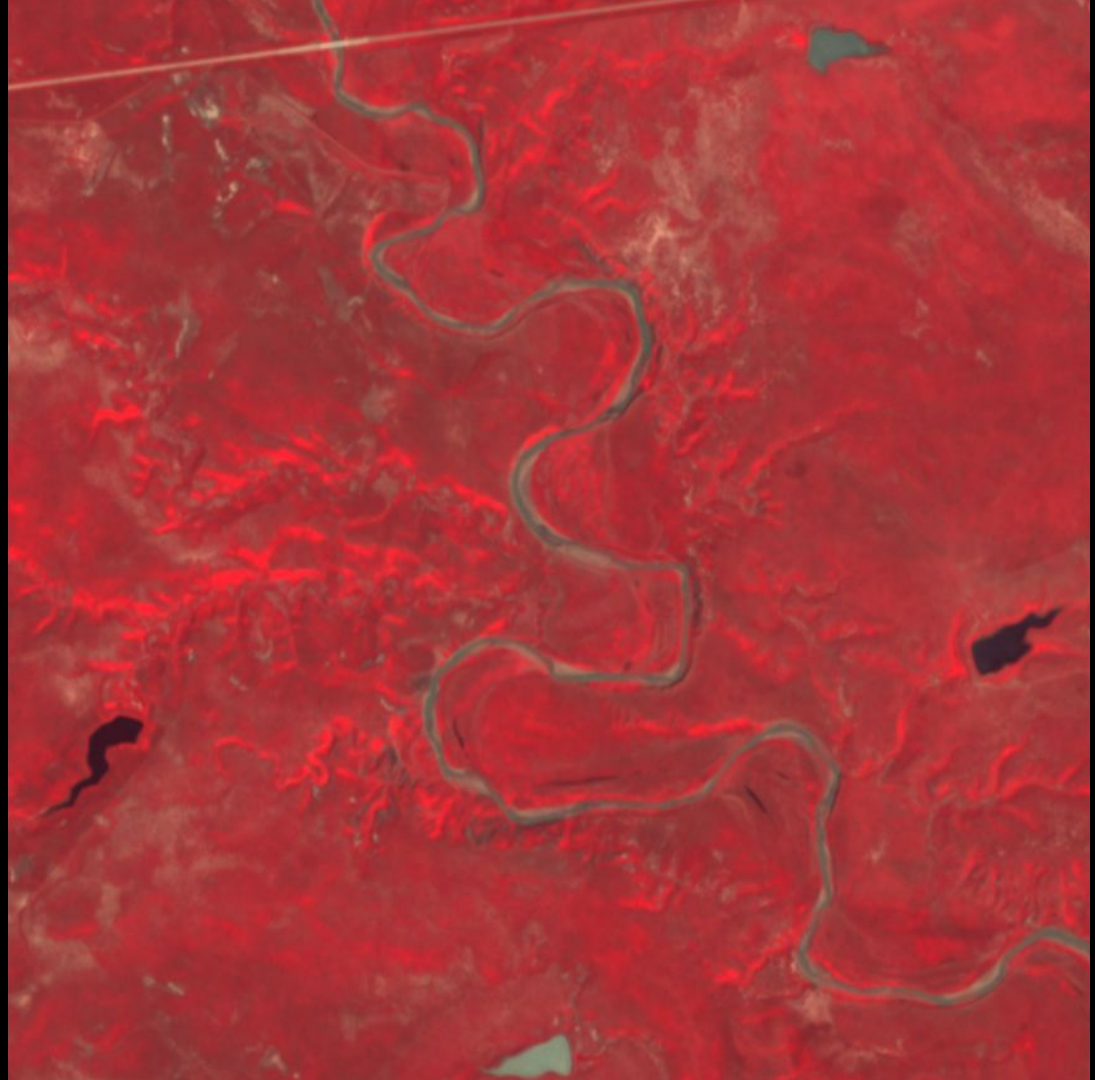
Google Cloud USGS MAYO CLINIC LUXEMBOURG SPACE AGENCY LOCKHEED MARTIN MIT Portugal intel IBM NVIDIA planet. SETI INSTITUTE

Pix2Streams:

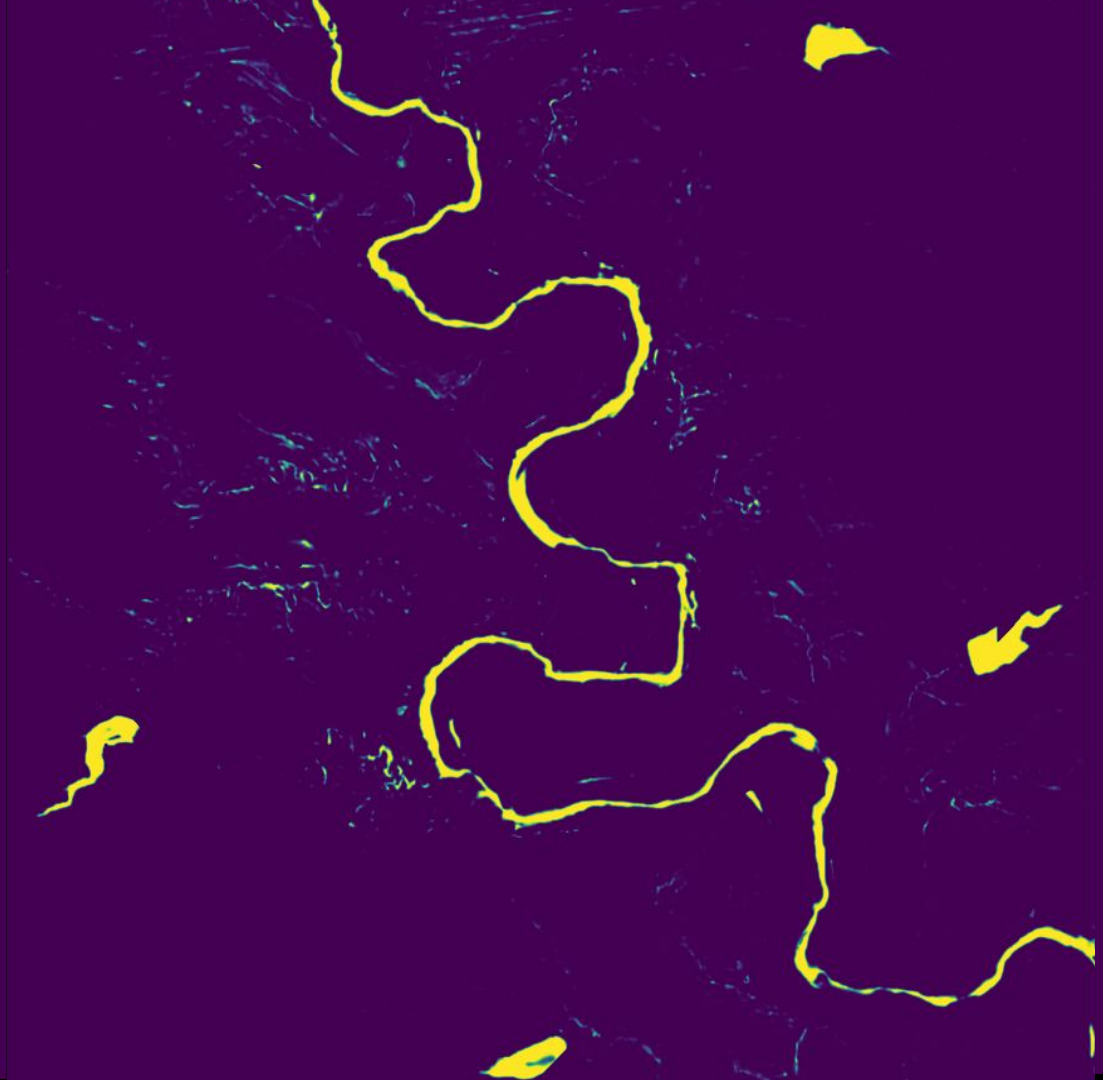
to reaches.

From pixels,

satellite

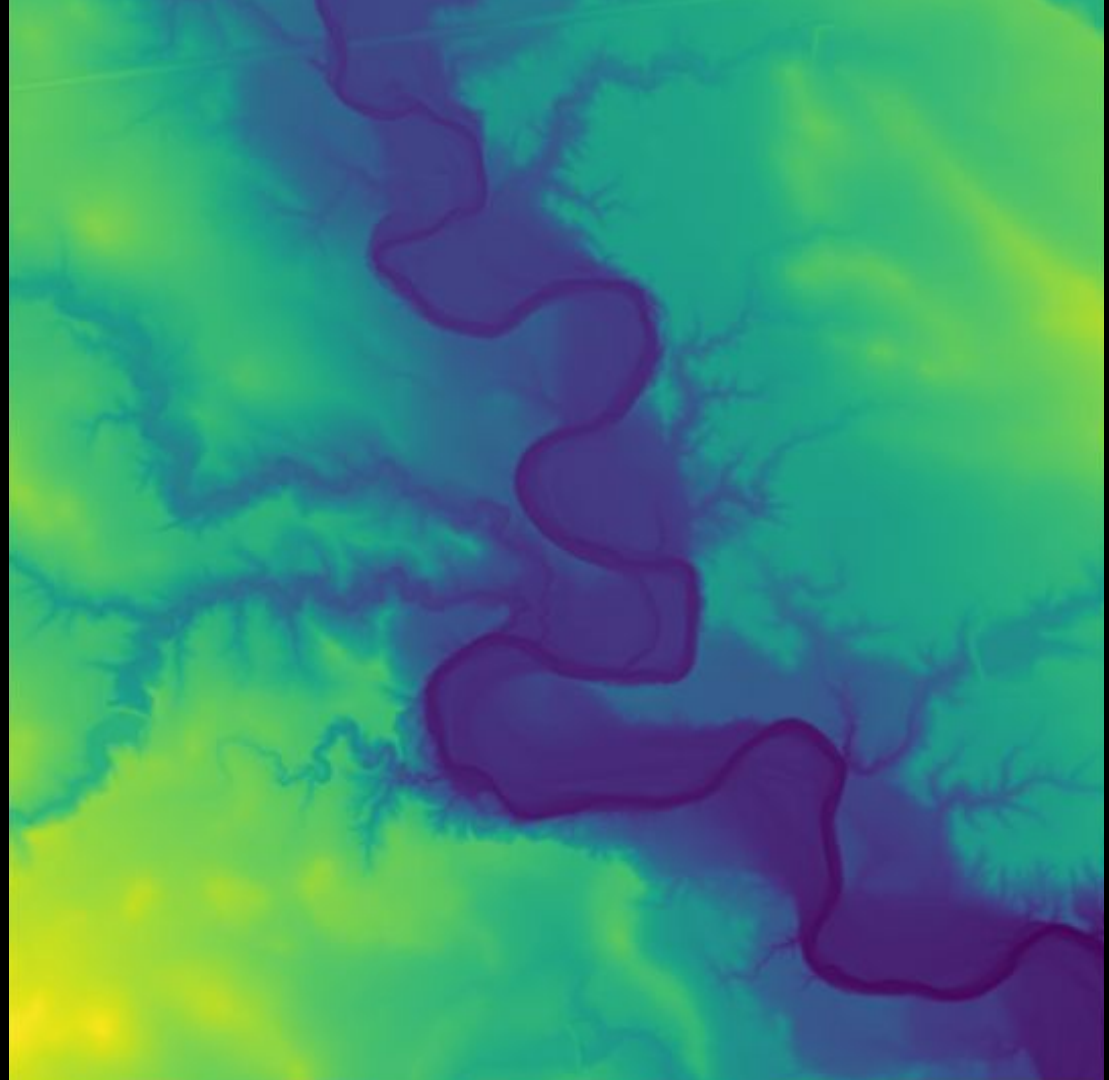


neural net



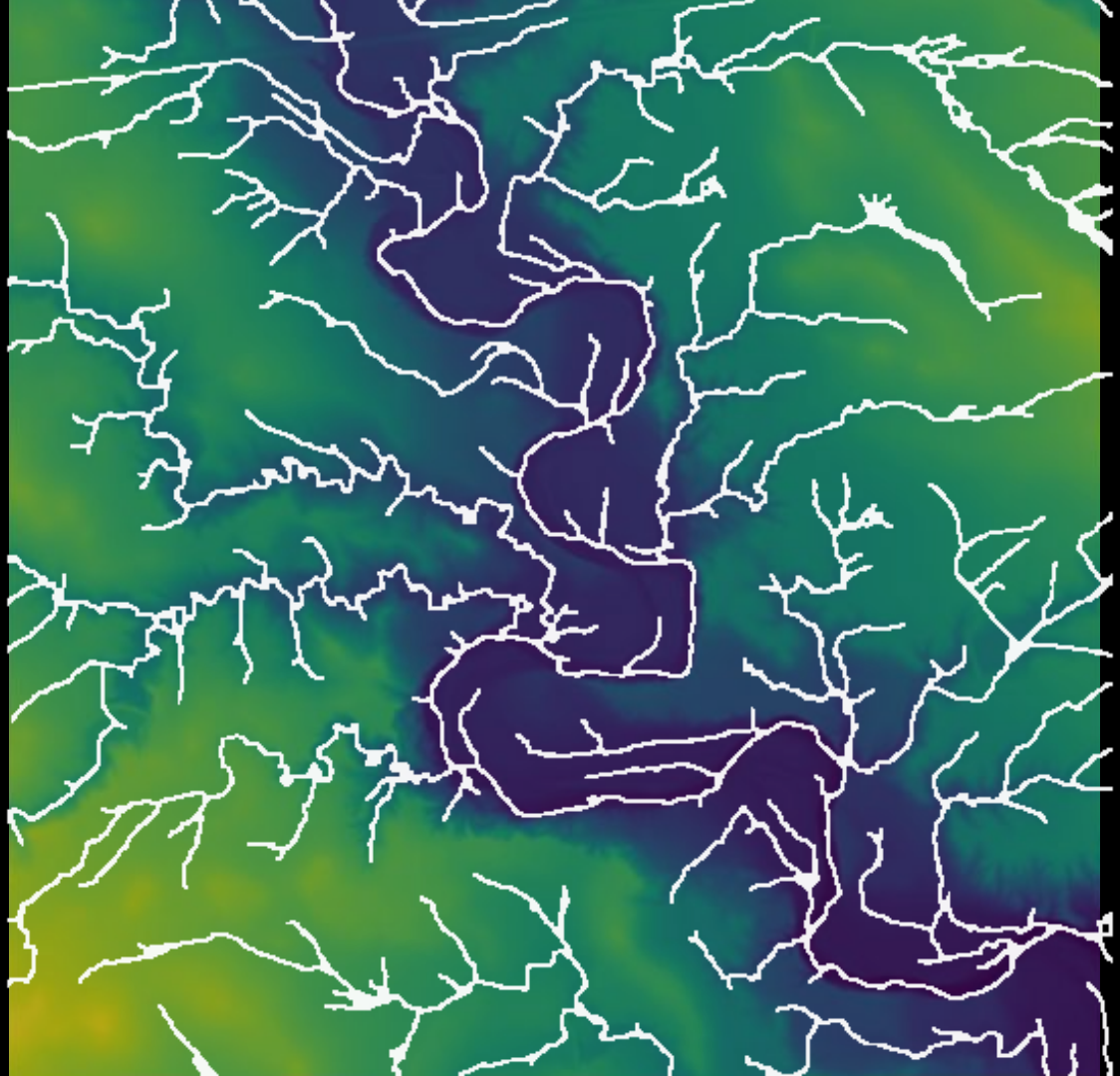
elevation

(LiDAR)

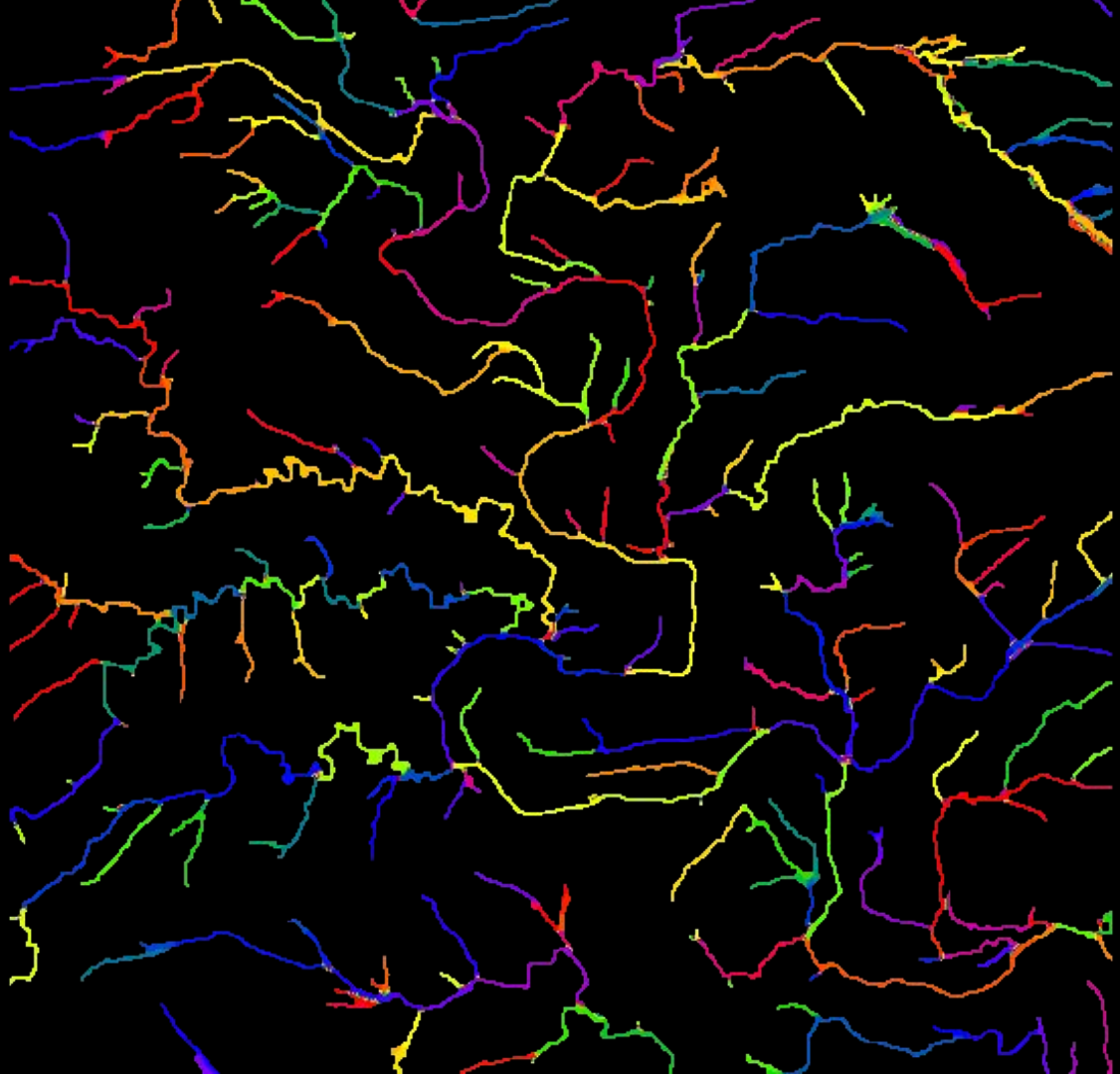


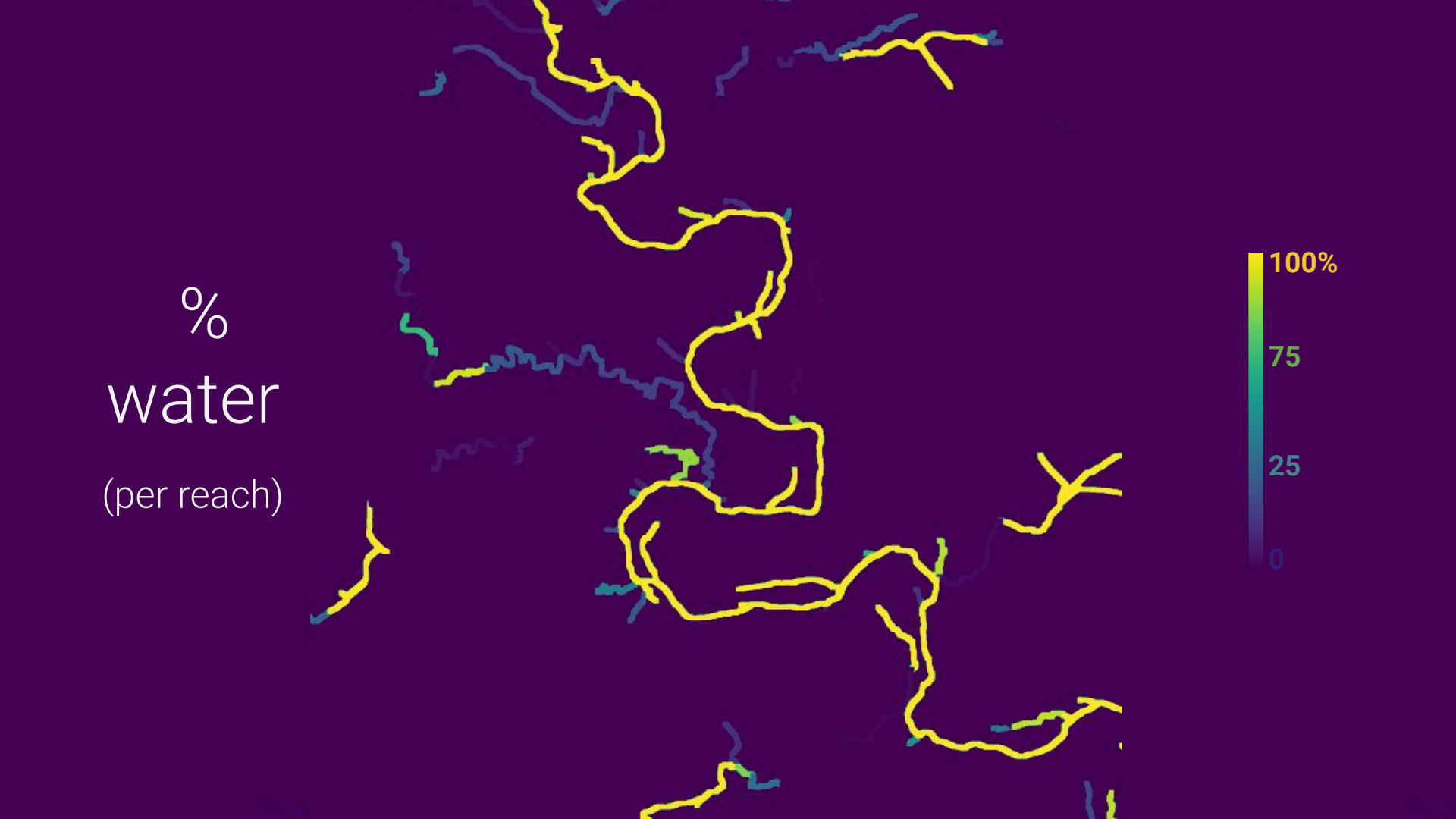
400 m
300
200
100

flow line

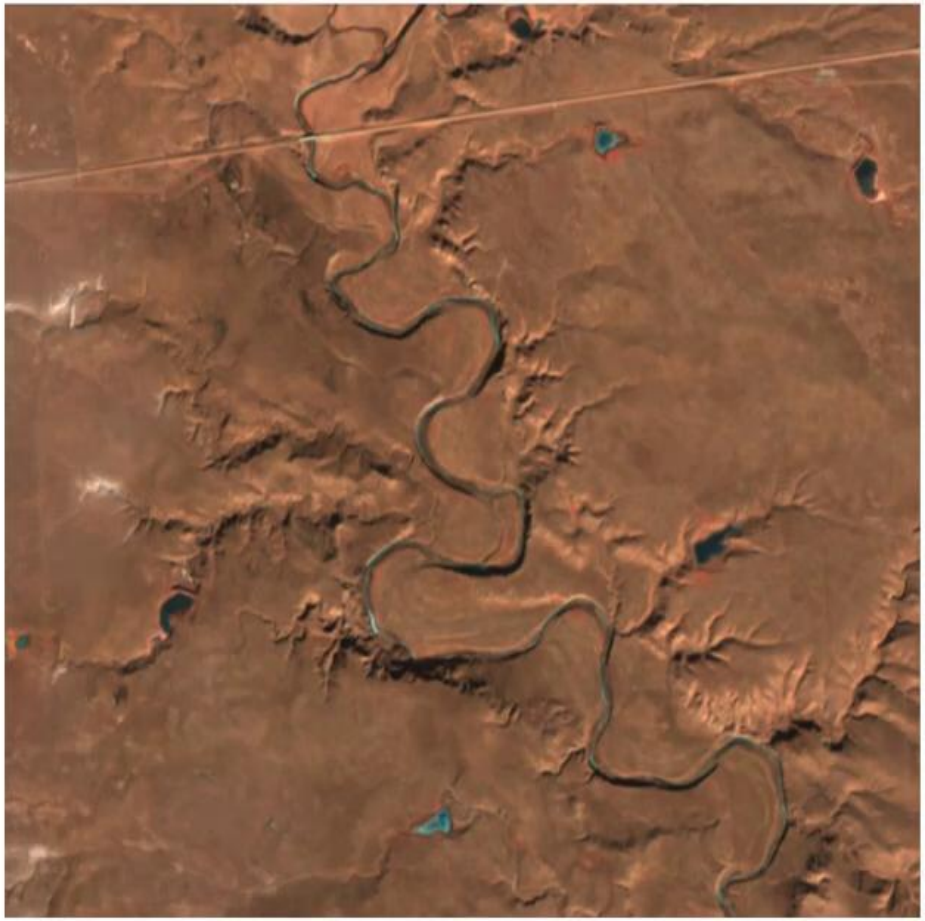


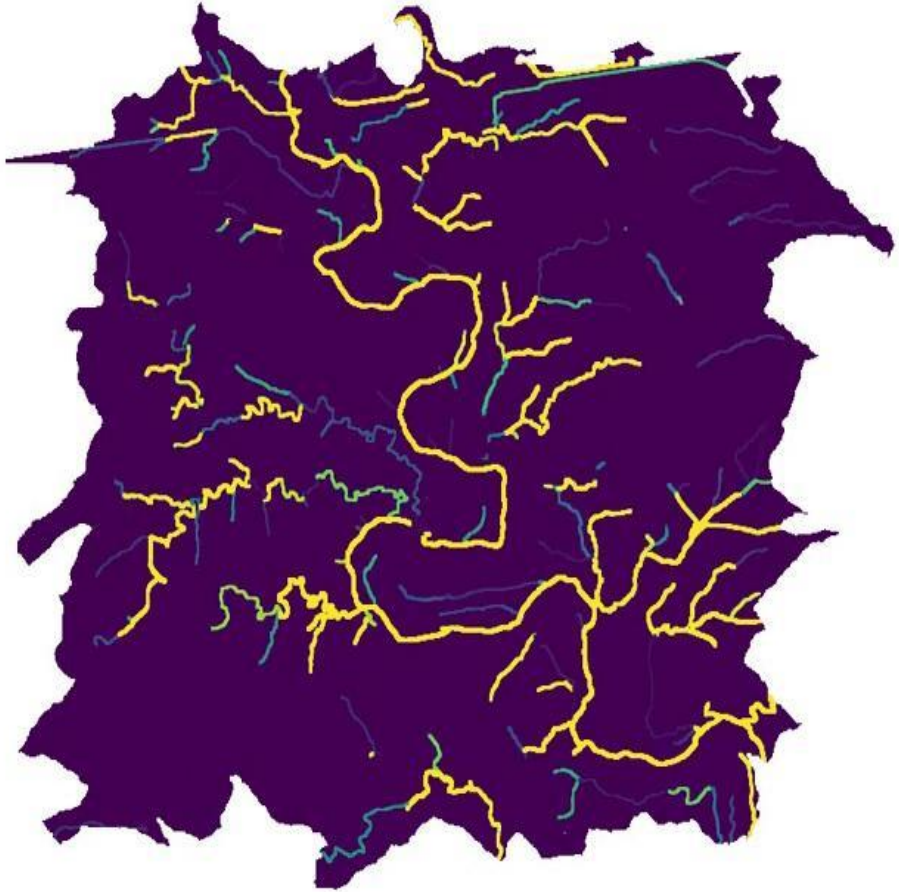
reach




%
water
(per reach)
100%
75
25
0

2019-01-23





Pekel et al. 2016

pix2streams

Contributions

1. Building monitoring over high-risk flood areas.
2. **Pix2Streams [arXiv: 2011.07584]:** A fundamentally new data-driven hydrology map at the reach level, by fusing the pixel-level output of the Planet model with the synthetic valley network derived from the DEM.

References

- [Pix2Streams paper]
- Clough. C., R Nair, J, Martinez Manso, M. George and G. Erinjippurath, *Planetary Scale Monitoring of Urban Growth in High Flood Risk Areas*, ICLM 2019 Workshop
- Marchisio, G. and M. George, *Large Scale Spatiotemporal Analytics from Daily Global Coverage of the Earth's Landmass*, ESA Phi-Week 2019