Pinpointing the Power Grid

Sajjad Anwar
@geohacker

development SEED

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HOT Humanitarian OpenStreetMap Team

PHR

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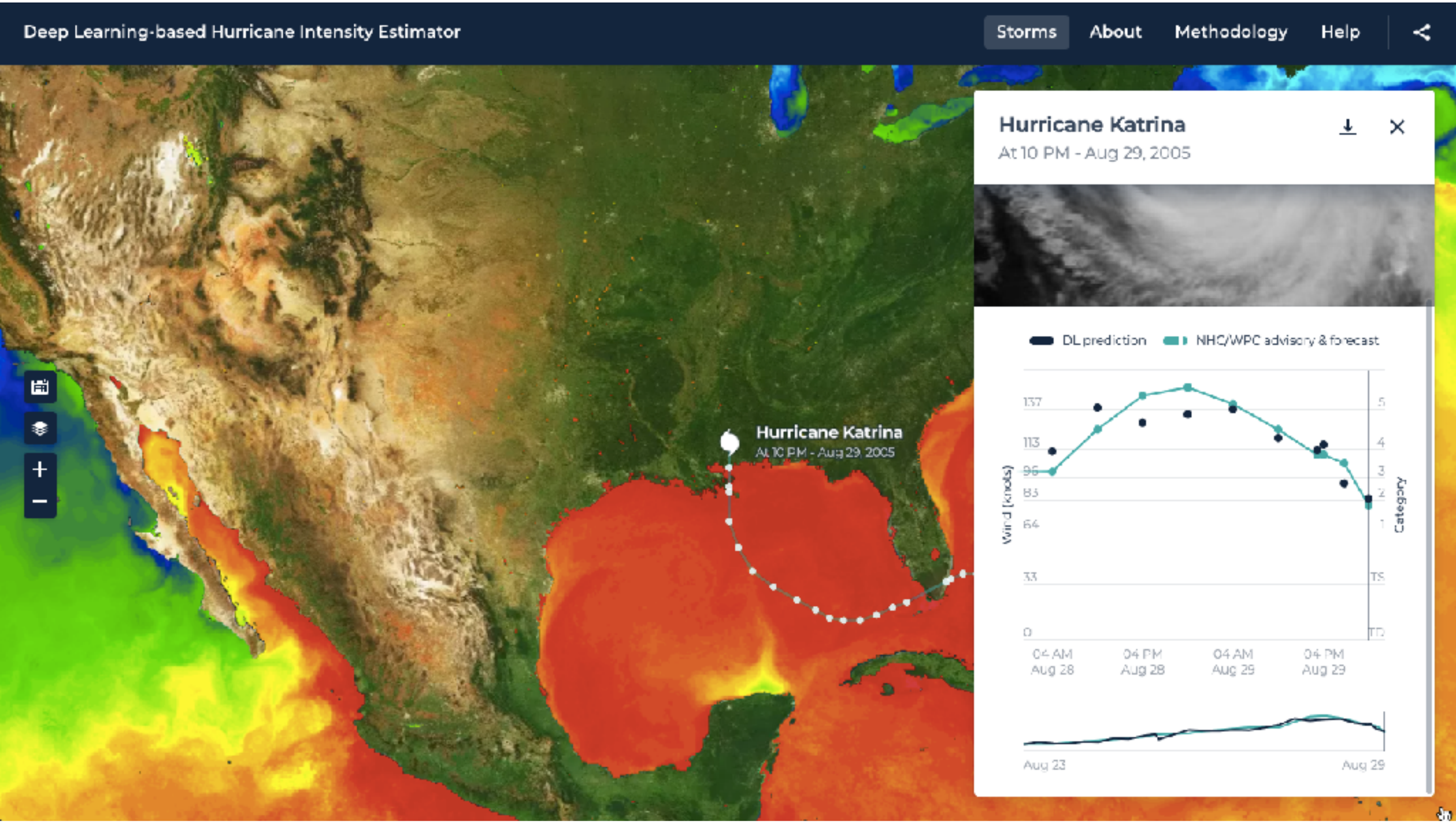
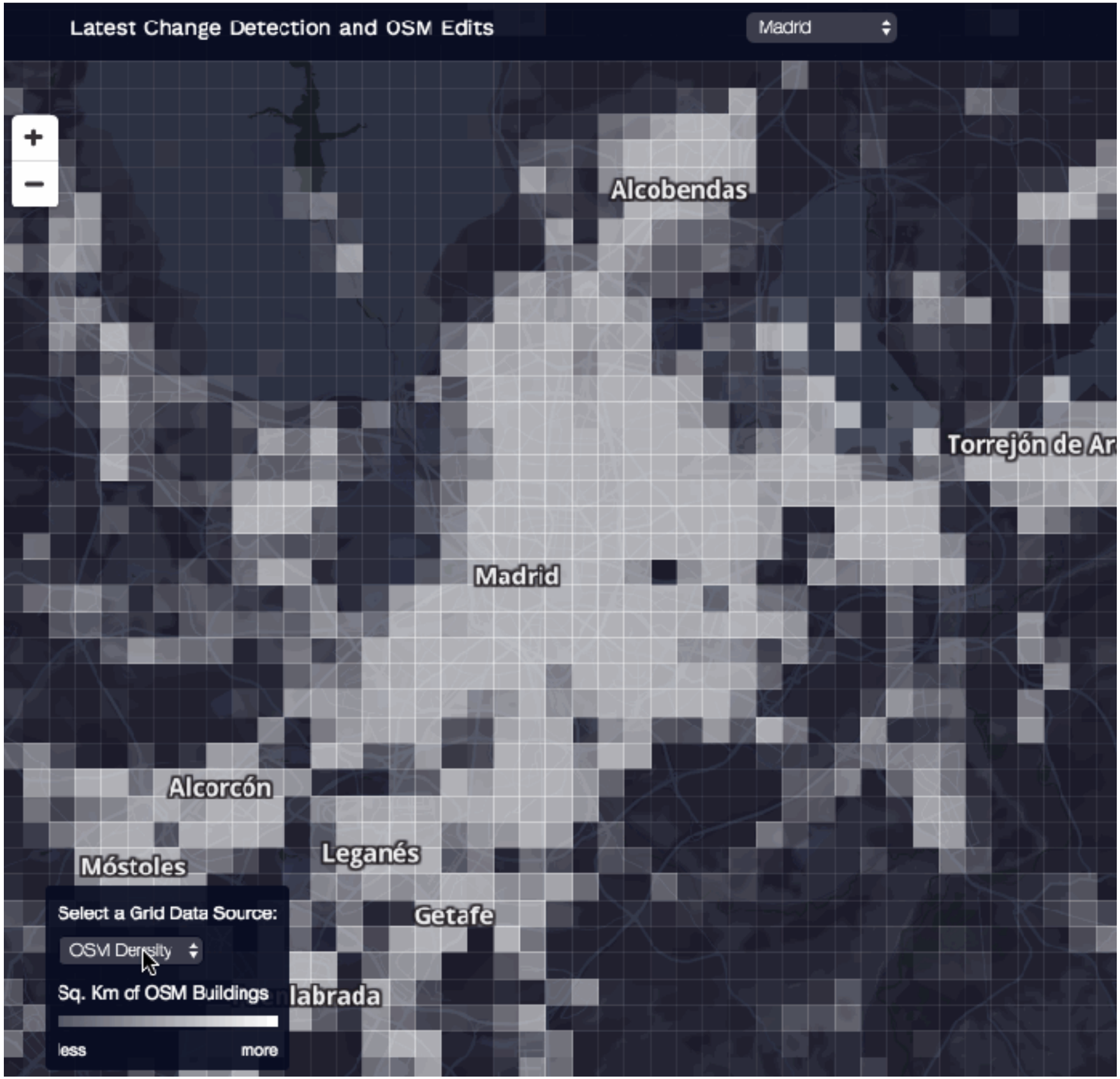
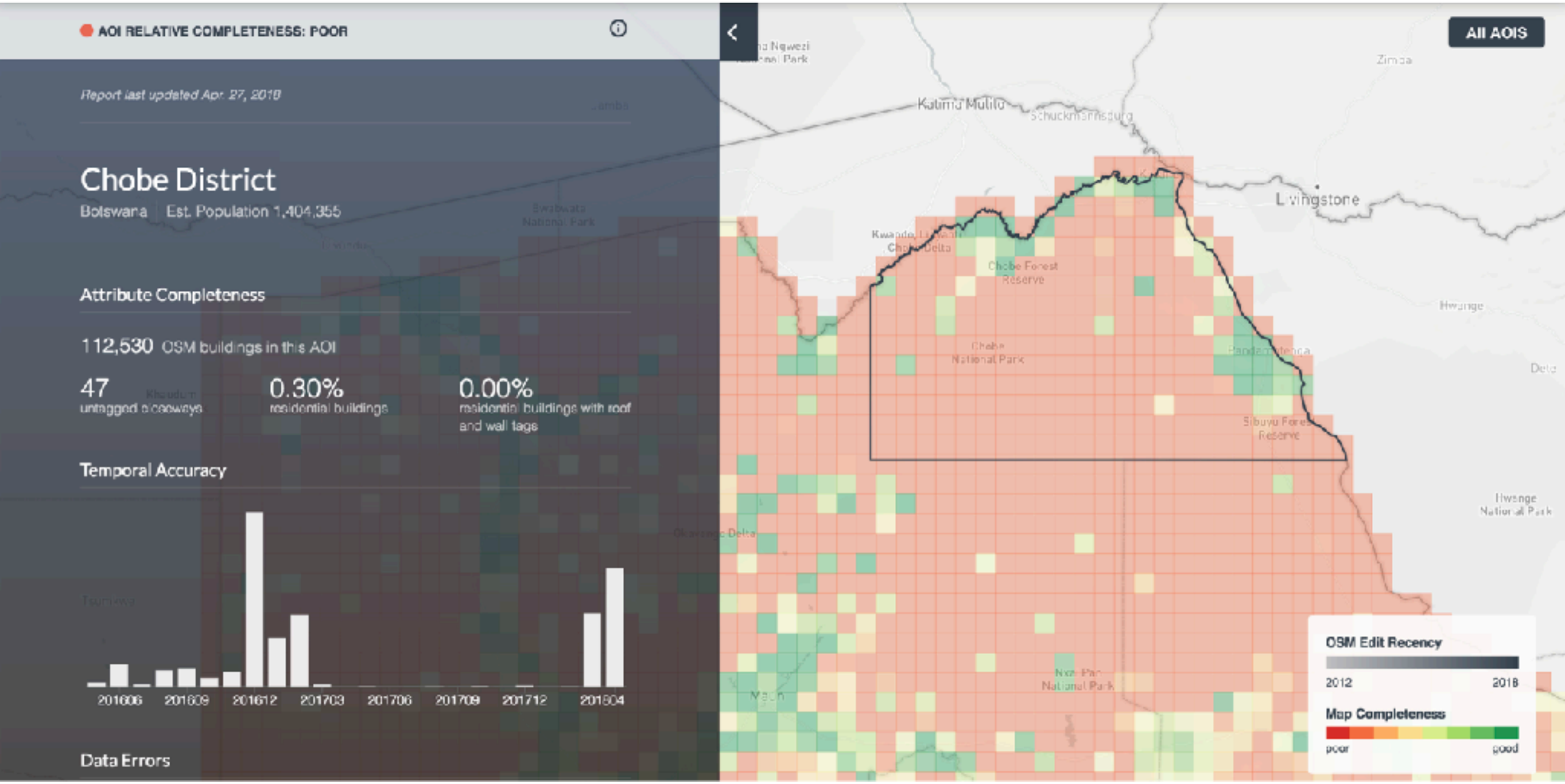
NASA

CARNEGIE ENDOWMENT FOR INTERNATIONAL PEACE


Deep Learning-based Hurricane Intensity Estimator
Storms
About
Methodology
Help
Hurricane Katrina
At 10 PM - Aug 29, 2005
Hurricane Katrina
At 10 PM - Aug 29, 2005
DL prediction
NHC/WPC advisory & forecast
Wind [knots]
Category
137
113
96
83
64
33
0
5
4
3
2
1
TS
TD
04 AM Aug 28
04 PM Aug 28
04 AM Aug 29
04 PM Aug 29
Aug 23
Aug 29



https://developmentseed.org/blog/2018/05/15/sensing-urban-change/



https://developmentseed.org/blog/2018/06/11/hot-analytics/

Pinpointing the Power Grid

Ian Muttoo CC BY SA

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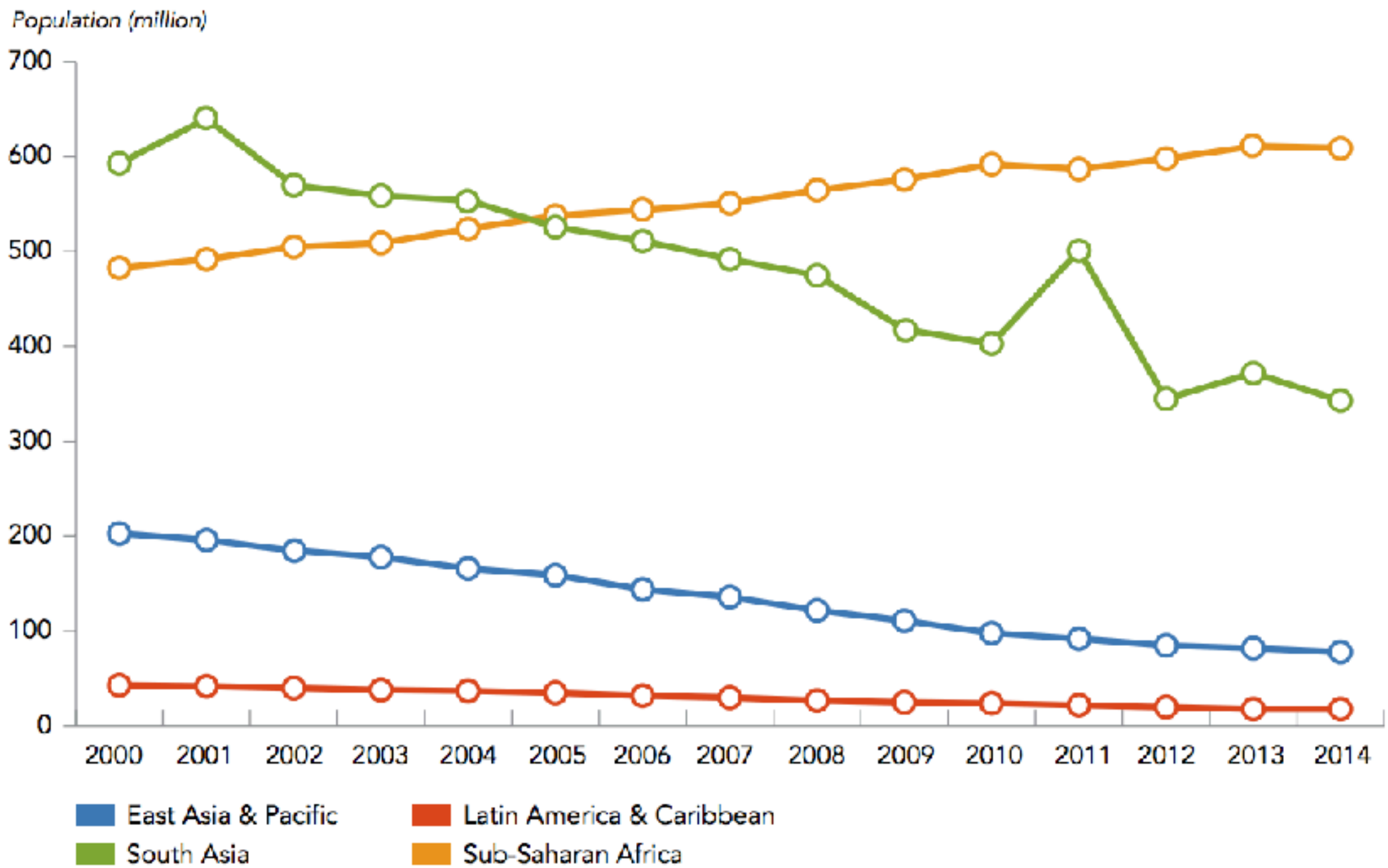
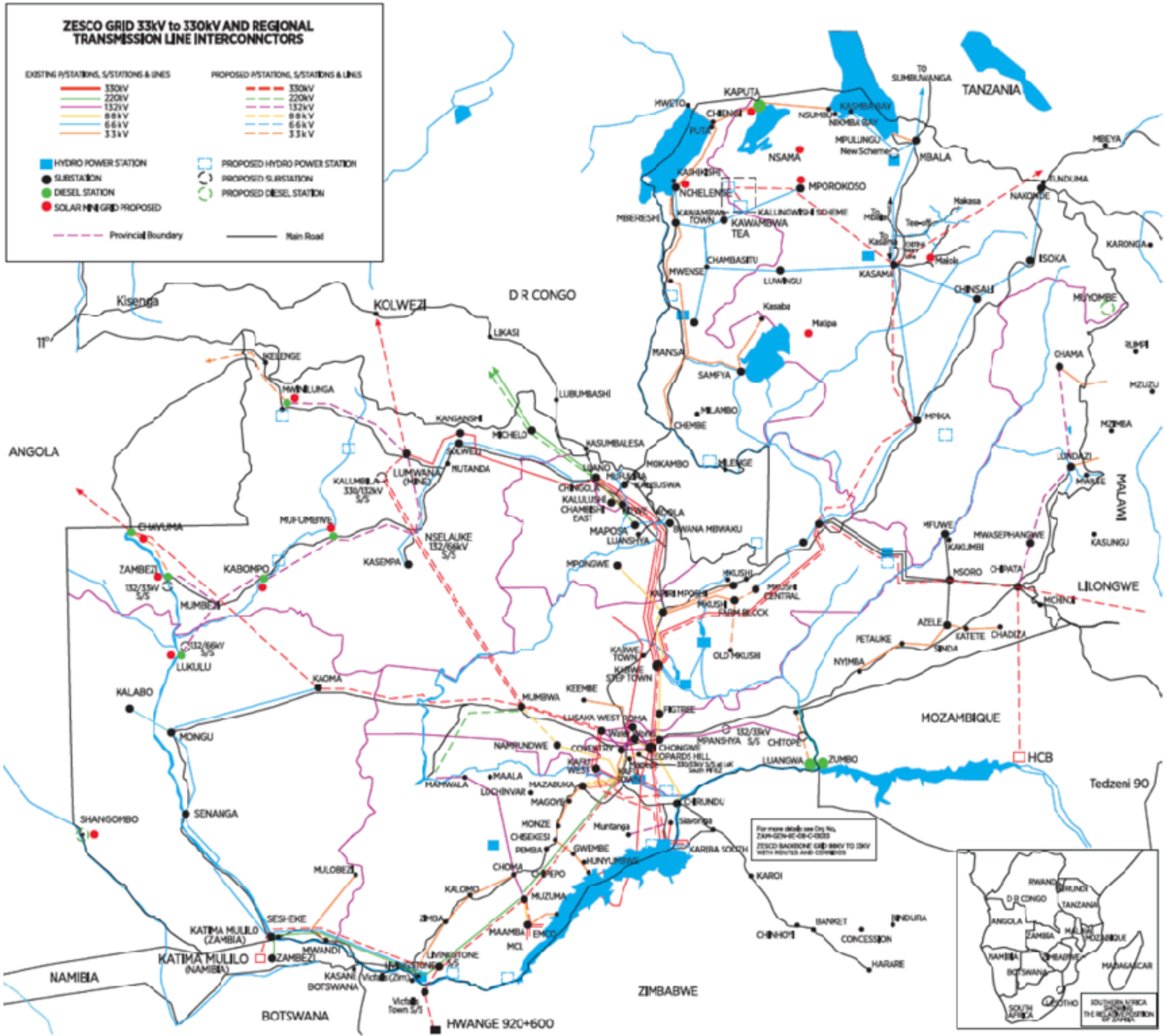
STATE OF ELECTRICITY ACCESS REPORT 2017

Health
Education
Food security
Climate change
Gender equality
Poverty reduction



Source: Data from IEA and World Bank 2017


ZESCO GRID 33kV to 330kV AND REGIONAL TRANSMISSION LINE INTERCONNCTORS
EXISTING P/STATIONS, S/STATIONS & LINES
330kV
220kV
132kV
88kV
66kV
33kV
PROPOSED P/STATIONS, S/STATIONS & LINES
330kV
220kV
132kV
88kV
66kV
33kV
HYDRO POWER STATION
SUBSTATION
DIESEL STATION
SOLAR MINI GRID PROPOSED
PROPOSED HYDRO POWER STATION
PROPOSED SUBSTATION
PROPOSED DIESEL STATION
Provincial Boundary
Main Road
TANZANIA
D R CONGO
ANGOLA
NAMIBIA
BOTSWANA
ZIMBABWE
MOZAMBIQUE
MALAWI
Kisenga
KOLWEZI
LIKASI
LUBUMBASHI
KAPUTA
KASHIKISHI
NOHELENGE
MPOROKOSO
NSAMA
MBALA
KASAMA
MPIKA
ISOKA
NAKONDE
MBEYA
KAWAMBWA TOWN
KAWAMBWA TEA
KALLINGWESHI SCHEME
CHAMBASHI
MWENSE
LUWINGU
CHINSALI
MUYOMBE
CHAMA
MANSA
SAMFYA
MILAMBO
CHEMBE
MOKAMBO
KASUMBALESA
KANSANSHI
MICHELO
MUTANDA
LUMWANA (MINE)
KALUMBILA 330/132kV S/S
NSELAUKE 132/66kV S/S
KASEMPA
MUJI-UMBWE
CHAVUMA
ZAMBEZI
132/33kV S/S
KABOMPO
MUMBEZI
132/66kV S/S
LUKULU
KALABO
MONGU
SENANGA
SHANGOMBO
KAOMA
MULOBEZI
SESHEKE
KATIMA MULILO (ZAMBIA)
KATIMA MULILO (NAMIBIA)
MWANDI
KASANE
Victoria Falls (Zim)
Victoria Falls Town S/S
HWANGE 920+600
LIVINGSTONE S/S
MAAMBA
MCL
EMCO
ZIMA
KALOMO
MUZUMA
CHIPEPO
CHOMA
MONZE
CHISEKESI
PEMBA
GWEMBE
HUNYUMBWE
Muntanga
Siavonga
KARIBA SOUTH
KAROI
CHINHOYI
BANKET
CONCESSION
HARARE
BINDURA
LILONGWE
MCHINJI
KASUNGU
MZIMBA
MZUZU
LUNDAZI
MAKALE
KARONGA
LUNDUMA
MBEYA
MPULUNGU New Scheme
KASHIBA BAY
NIKOMBA BAY
TO SUMBUWANGA
MWETO
CHIENGI
PUTA
NGUMBO
MBERESHI
KAWAMBWA TEA
Makasa
Tesoli
Kasama
Mako
Kasaba
Matipa
LUSAKA WEST
ROMA
CHOONGWE
LEOPARDS HILL
MPANSHYA S/S
CHITOPE
LUANGWA
ZUMBO
HCB
Tedzeni 90
NAMPUNDWE
MAALA
LOCHINVAR
MAZABUKA
MAGOYE
MAHWALA
KAFUE WEST
KAFUE TOWN
CHIRUNDU
KABWE TOWN
KABWE STEP TOWN
KEEMBE
MUMBWA
PIGTREE
MPONGWE
MKUSHI
MKUSHI CENTRAL
MKUSHI FARM BLOCK
OLD MKUSHI
KAPIRI MPOSHI
MAPOSA
LUANSHYA
LUANO
MUFULIRA
KANSUSWA
CHINGOLA
KALULUSHI
CHAMBISHI EAST
NDOLA
BWANA MBWAKU
MIFUWE
KAKUMBI
MWASEPHANGWE
MSORO
CHIPATA
MCHINJI
AZELE
KATETE
CHADIZA
SINDA
PETAUKE
NYIMBA
For more details see Drg. No. ZAM-GEN-RE-08-C-09033
ZESCO BACKBONE GRID 88kV TO 330kV WITH ROUTES AND CORRIDORS
RWANDA
BURUNDI
D R CONGO
TANZANIA
ANGOLA
ZAMBIA
MALAWI
MOZAMBIQUE
NAMIBIA
ZIMBABWE
BOTSWANA
MADAGASCAR
SOUTH AFRICA
LESOTHO
SOUTHERN AFRICA SHOWING THE RELATIVE POSITION OF ZAMBIA

power=tower

For towers or pylons carrying high voltage electricity cables. Normally constructed from steel latticework.

Comparison list (0 items) Filter: No filter

XAPI JOSM Level0 Editor Overpass turbo

Overview | Combinations | Map | Wiki | Projects

Overview

Type	Number of objects	
All	10 845 900	0.21%
Node	10 845 580	8.14%
Way	320	0.00%
Relation	0	0.00%

These features are really hard to see.

Pakistan

1,009,303 km2

50 million z18 tiles

Nigeria

927,886 km2

40 million z18 tiles

Zambia

777,773 km2

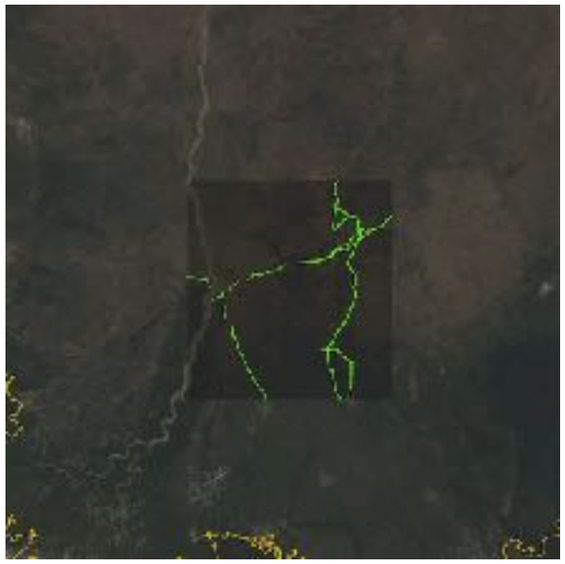
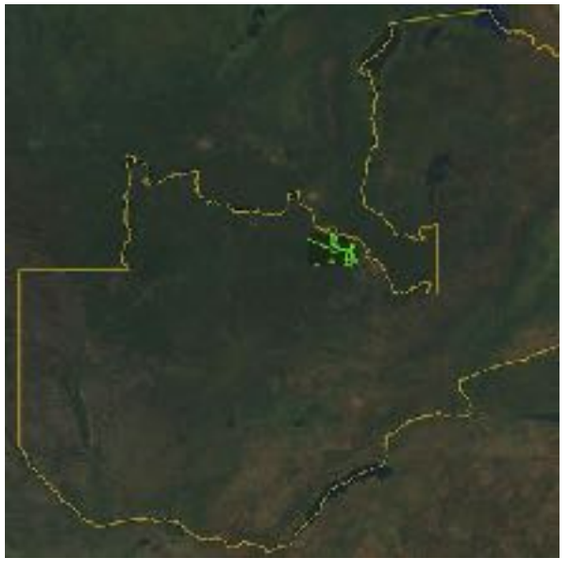
34 million z18 tiles

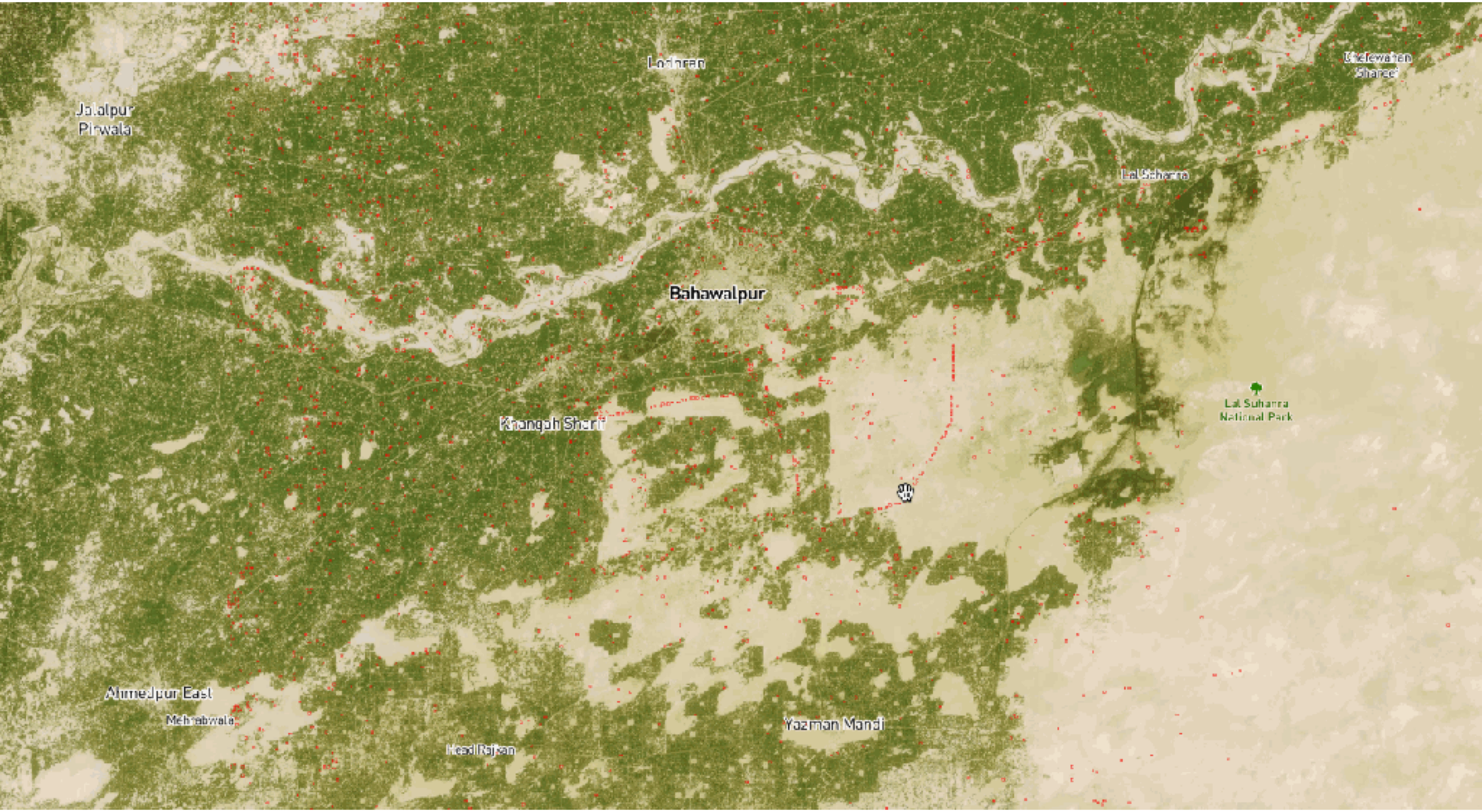
Humans >> Machines

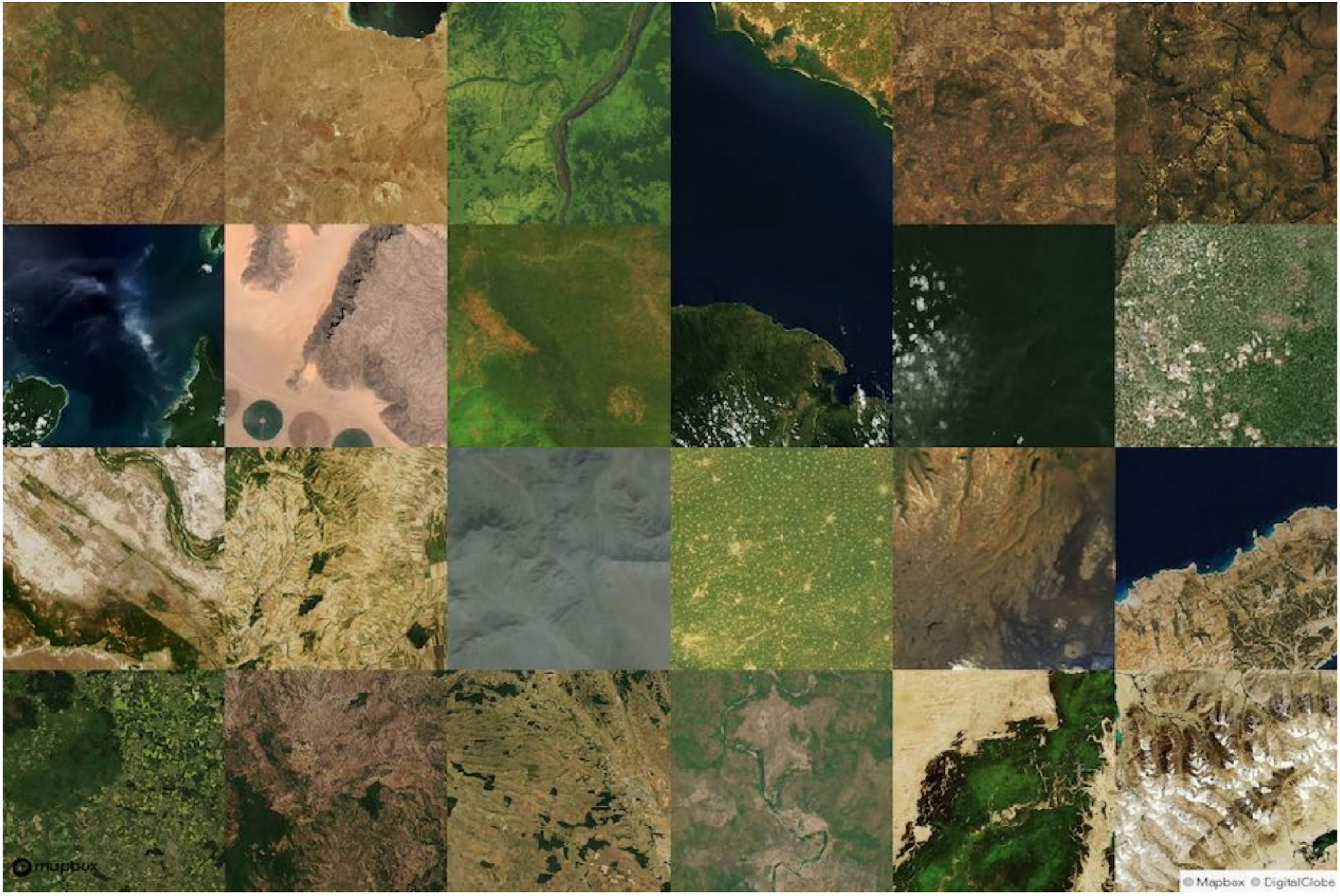
AI x IA

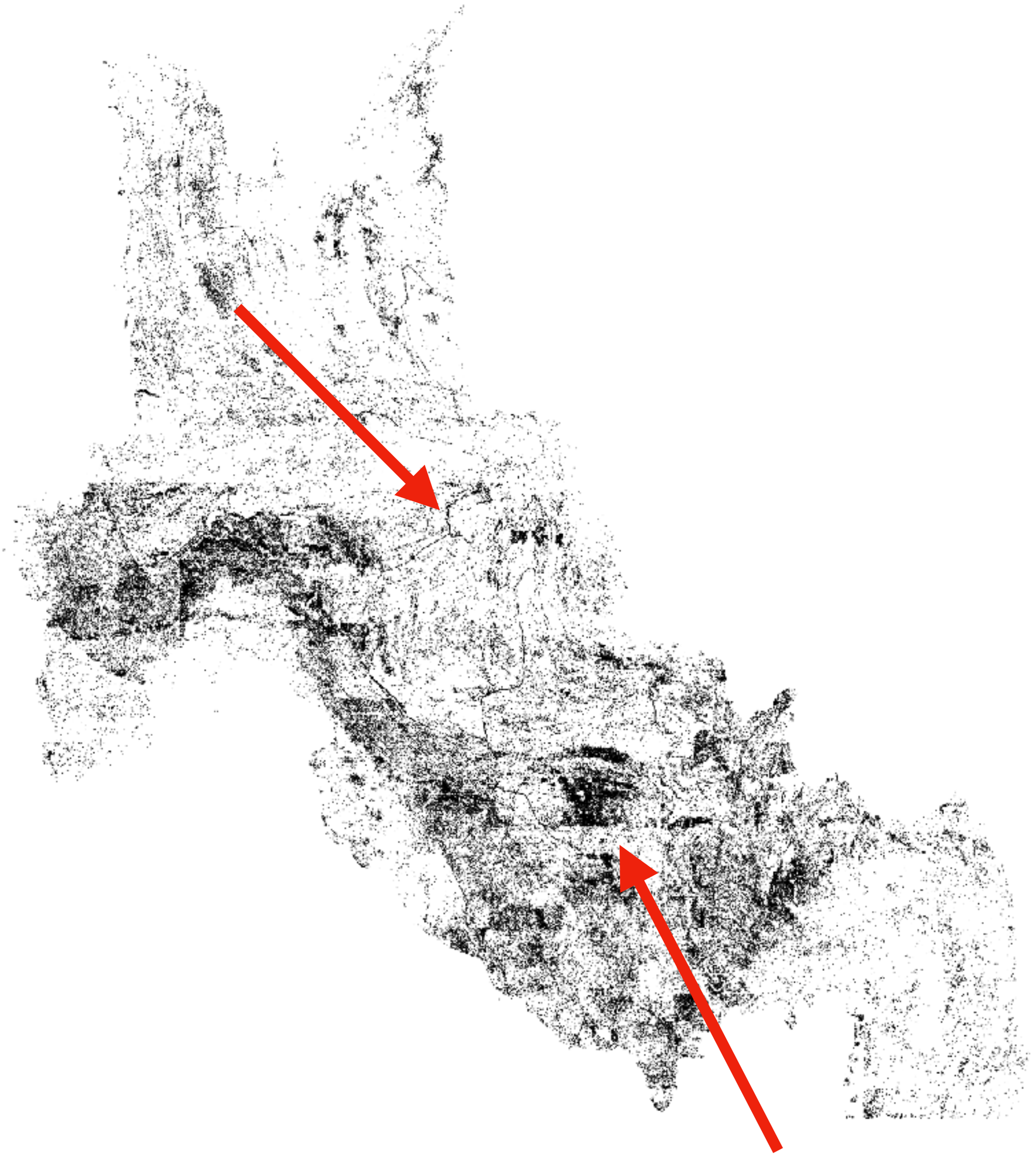
Machines point

Humans map


Lodhran
Jalalpur Pirwala
Bahawalpur
Khanqah Sharif
Lal Suhanra National Park
Ahmedpur East
Mehrabwala
Yazman Mandi
Head Rajkan


mapbox
© Mapbox © DigitalGlobe



Tasking Manager + to-fix + JOSM

TASKING MANAGER Contribute Learn About What is New? English geohacker

Instructions

Entities to map

Power station, Substation, Towers, Electricity lines

Changeset Comment

#mapping-hv-infrastructure in Pakistan

Imagery

tms[22]:https://{switch:a,b,c,d}.tiles.mapbox.com/v4/digitalglobe.0a8e44ba/{zoom}/{x}/{y}.png?access_token=pk.eyJ1IjoiZGlnaXRhbGdsb2JlIiwiY5I6ImNqOGRmNW9qZjBudmgzMnA1a294OGRtNm8ifQ.06mo-nDisy4KmqjYxEVwQw

What objects do we need to map?

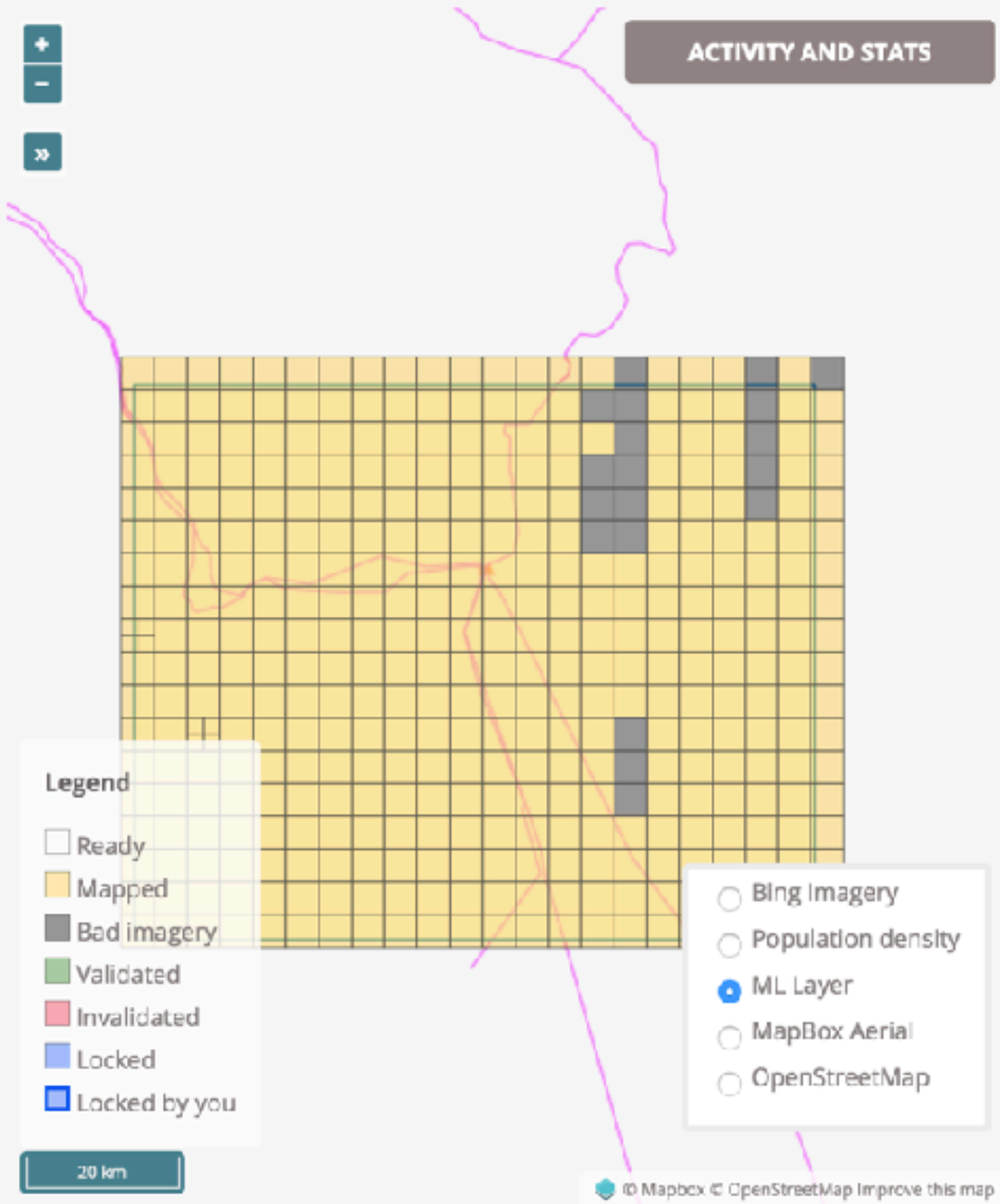
- Substation
- Towers
- Electricity lines (optional)

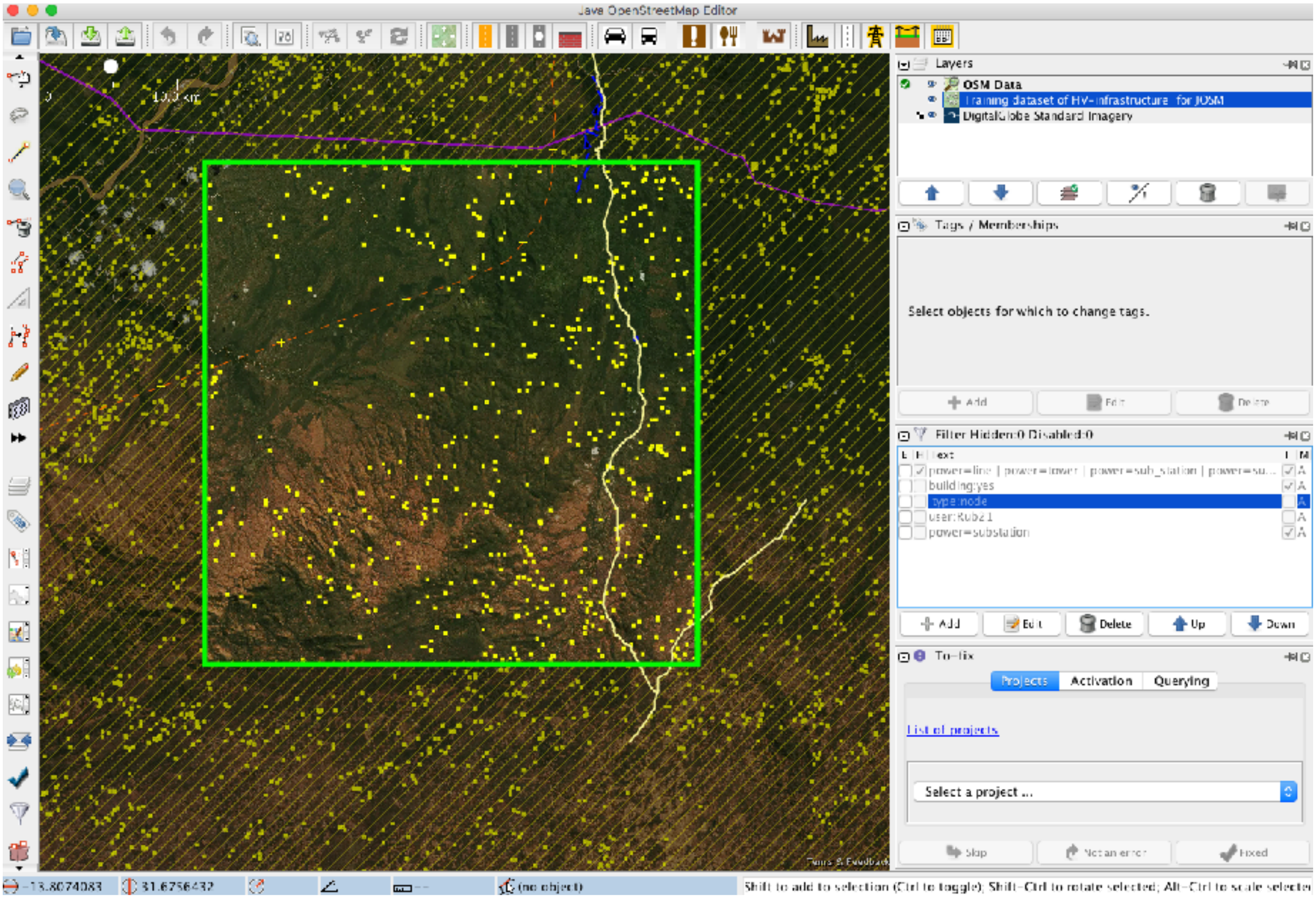
What satellite imagery should we use?

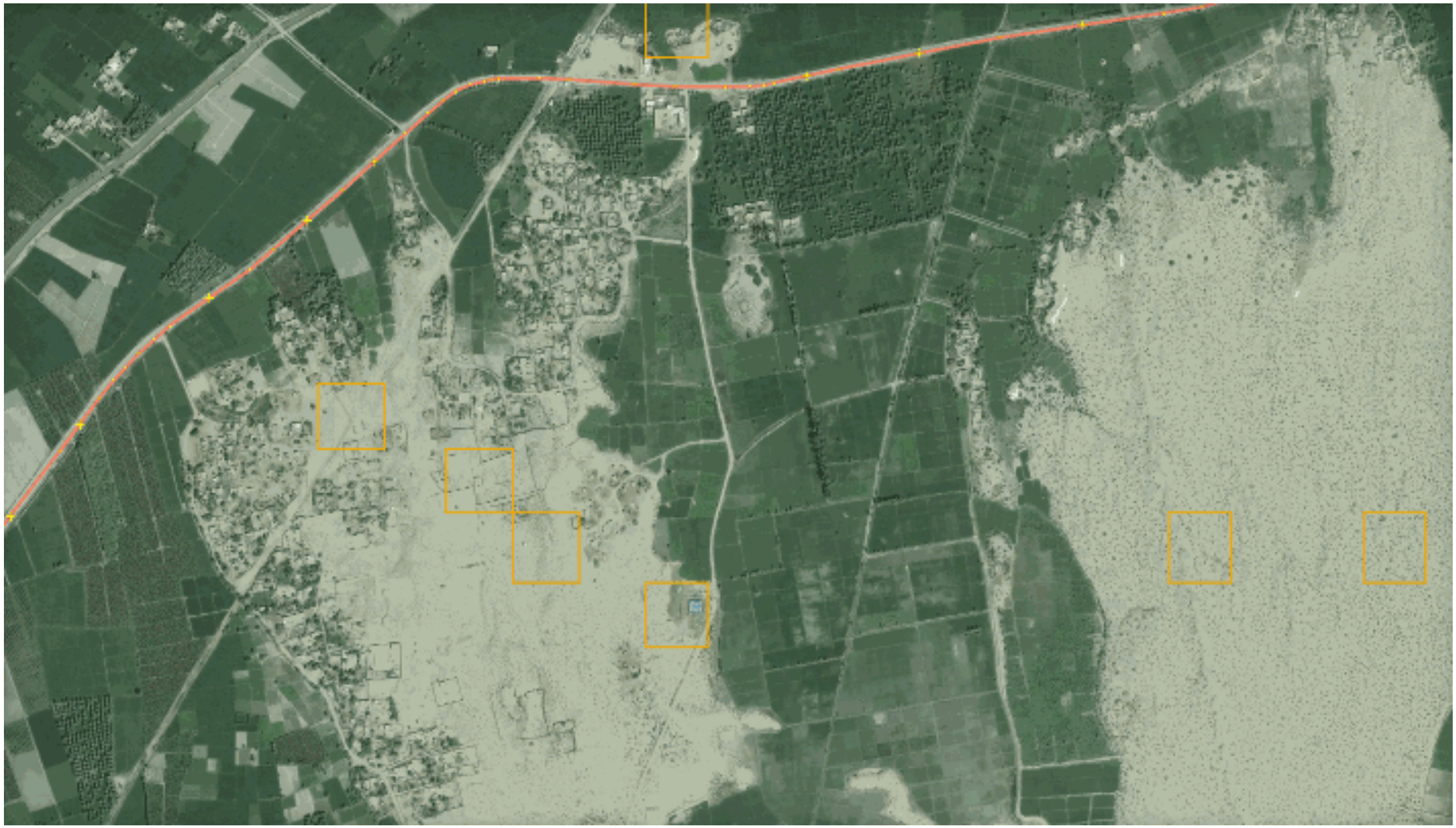
- DigitalGlobe's standard

Note:

You can check other satellite images if you are doubting DigitalGlobe's standard, this

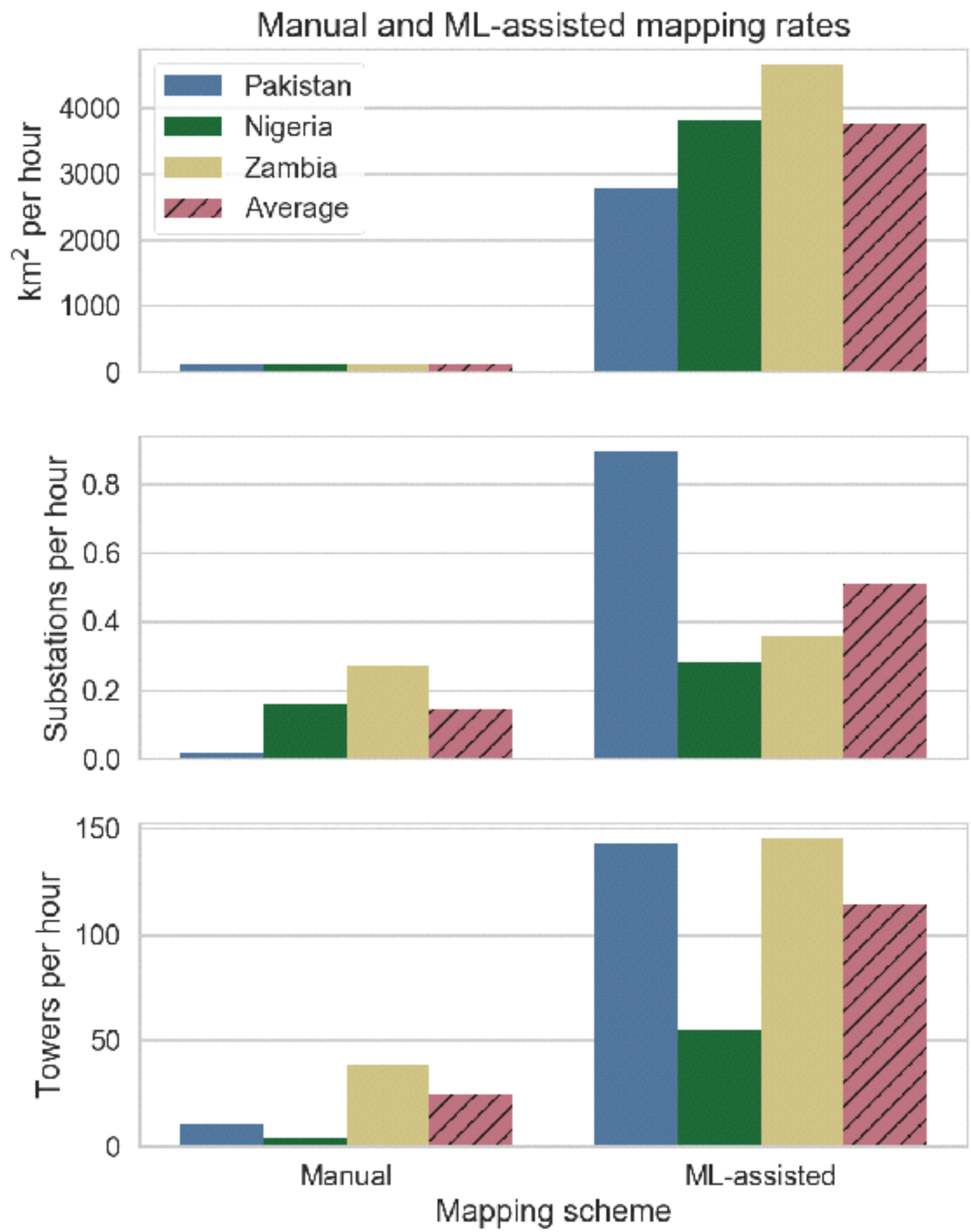


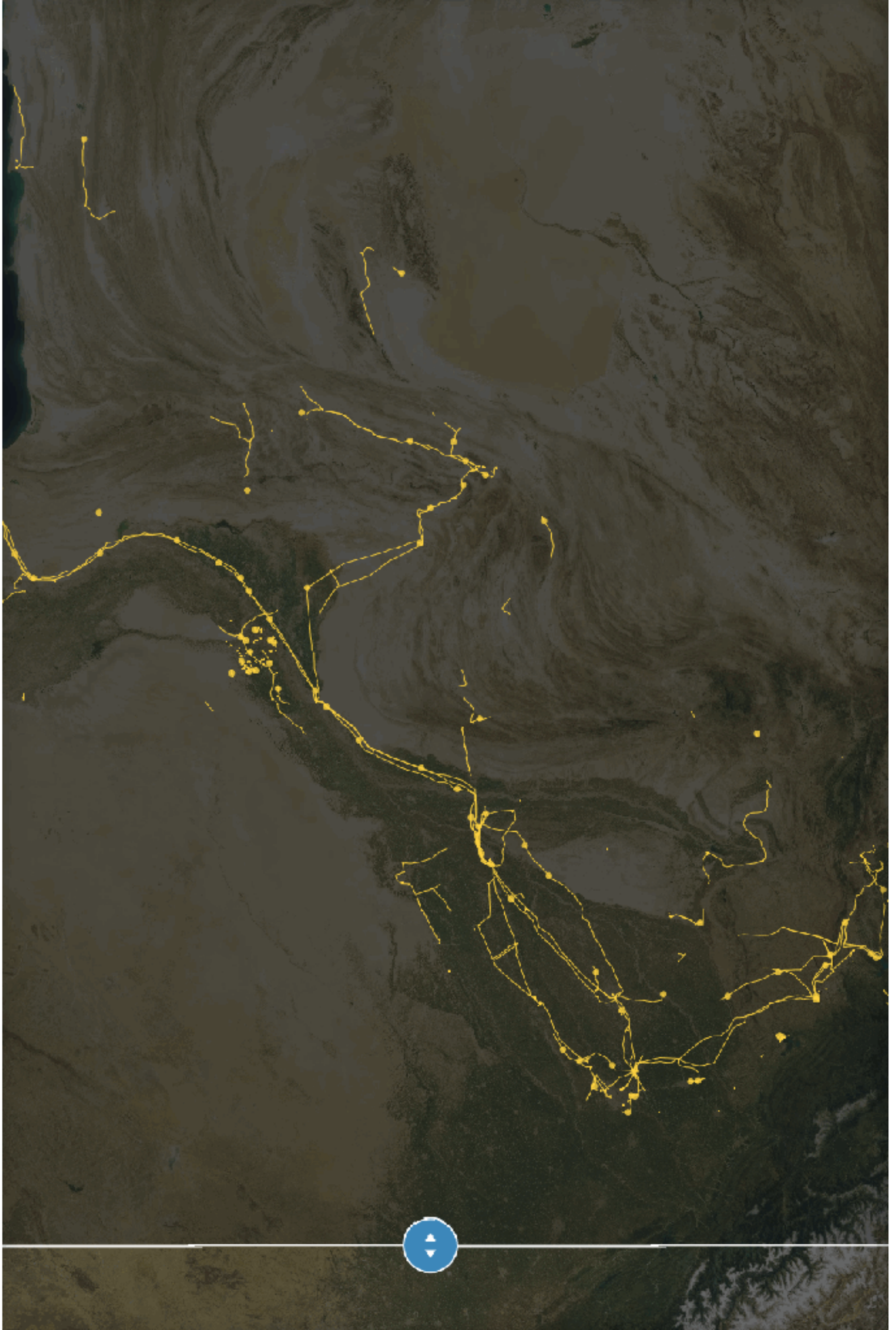

Java OpenStreetMap Editor
Layers
OSM Data
Training dataset of HV-infrastructure for JOSM
DigitalGlobe Standard Imagery
Tags / Memberships
Select objects for which to change tags.
Add
Edit
Delete
Filter Hidden:0 Disabled:0
power=line | power=tower | power=sub_station | power=su...
building:yes
type:node
user:Rub21
power=substation
Add
Edit
Delete
Up
Down
To-fix
Projects
Activation
Querying
List of projects
Select a project ...
Skip
Not an error
Fixed
(no object)
Shift to add to selection (Ctrl to toggle); Shift-Ctrl to rotate selected; Alt-Ctrl to scale selecte



Average mapping speed/hour

33.4x





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