IN-HOUSE MODELS:

- Vanuatu Cellphone Data
- Random Walk for Nigeria Internal Displacement

VANUATU Cellphone Data

- From September 2013 to December 2006
- About 10 GB of information
- More than 120 Millions of Records of about 200 K different userIDs
- A single record per user per day

Location accuracy:

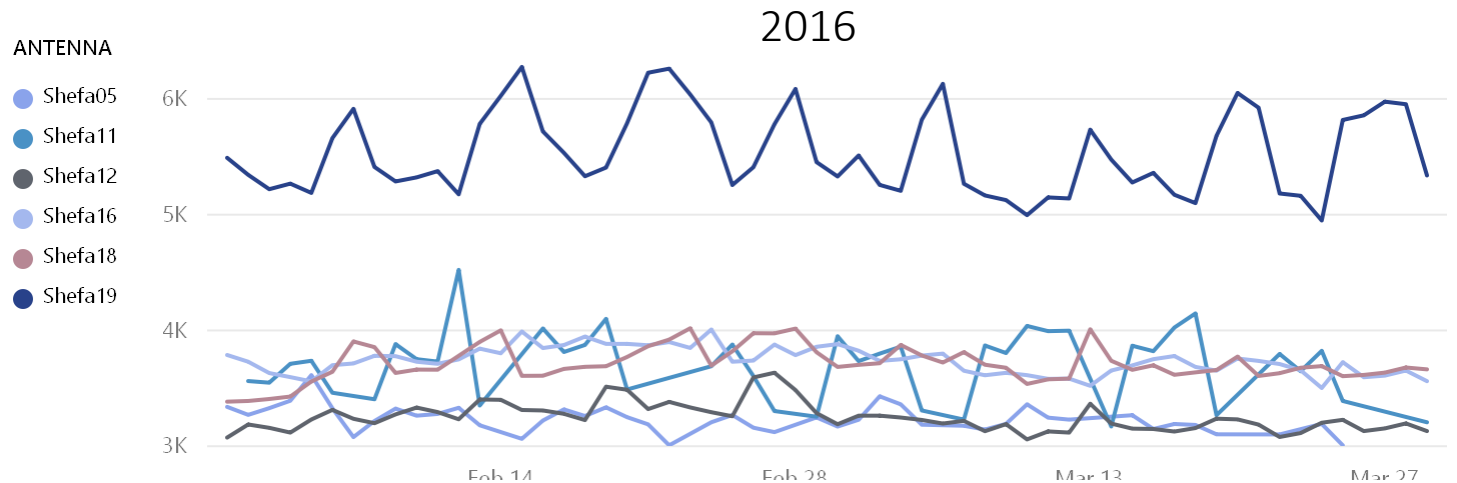
- Per Antenna (78 in before 2015, 99 in 2016)

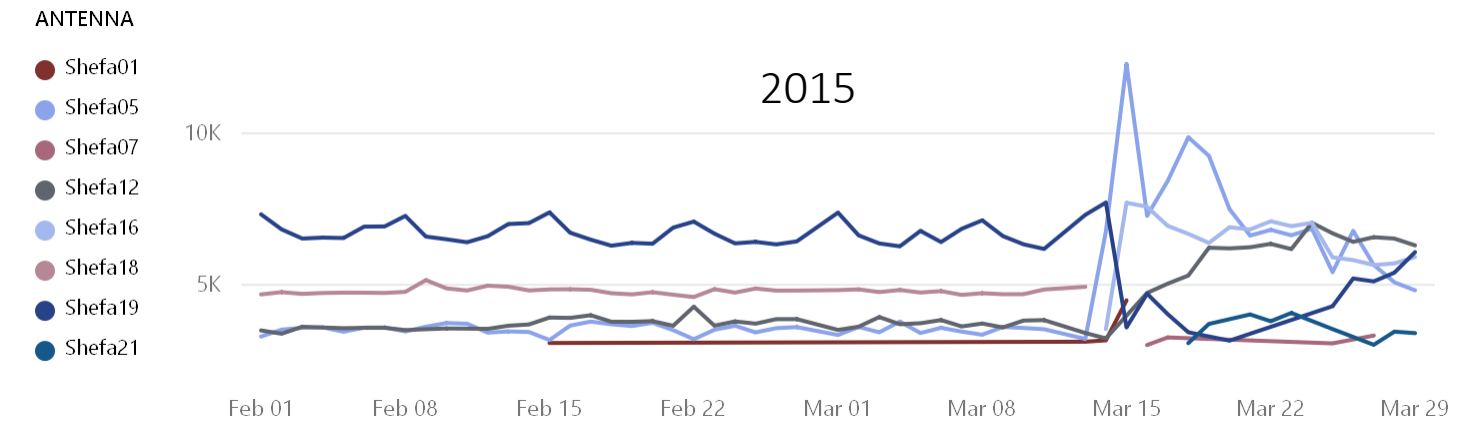
Implementation:

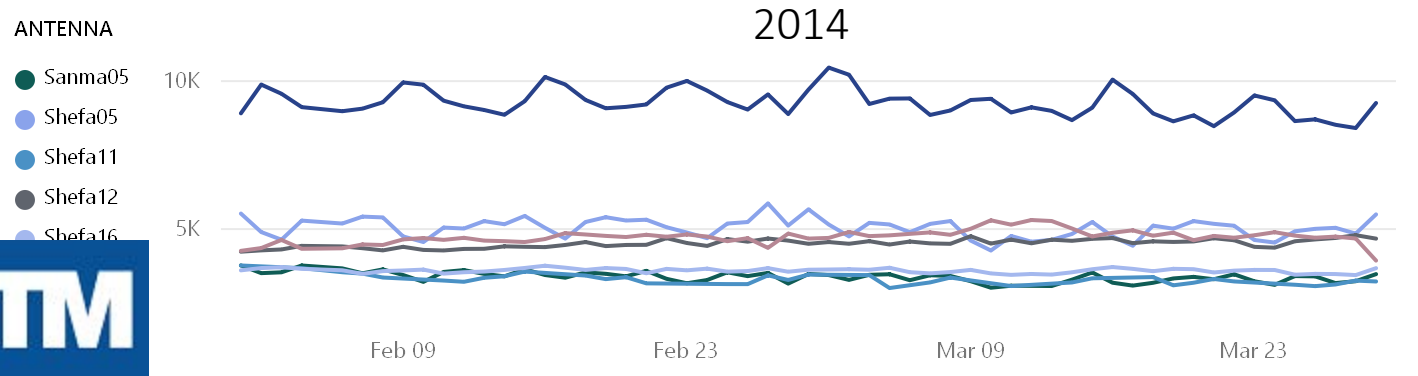
- Parallel Python + JavaScript Platform + PowerBI

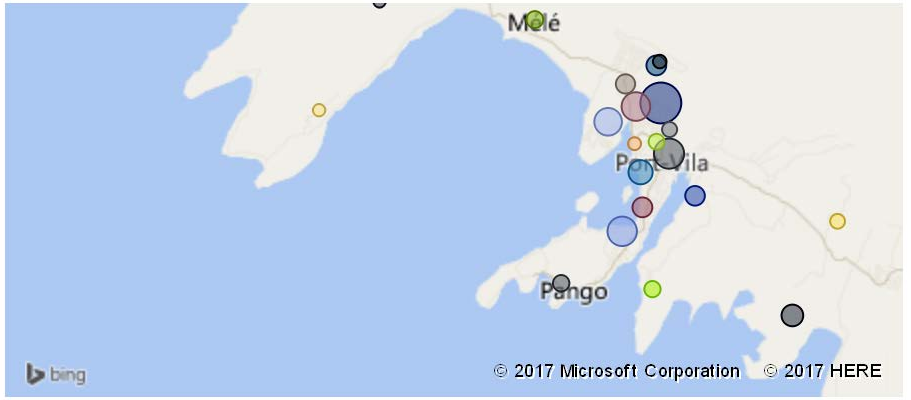
Mobile phone calls as a proxy for population

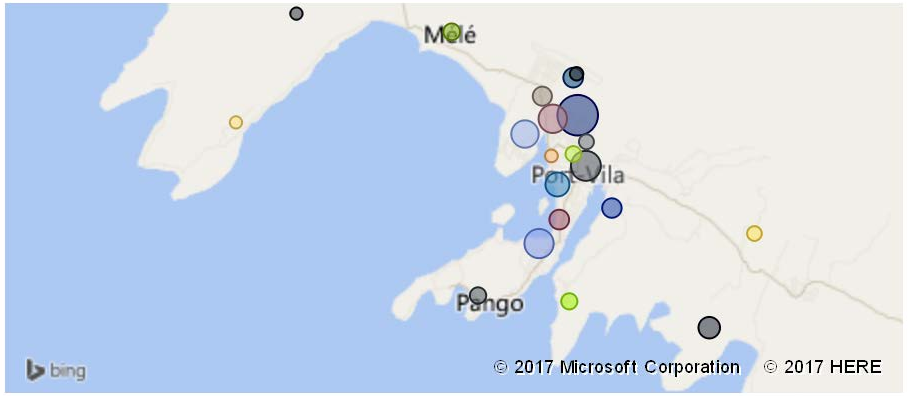
Number of calls per Antenna

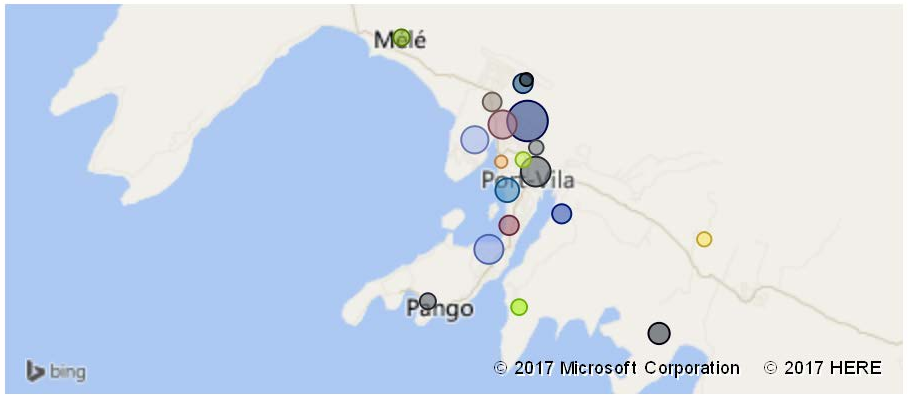






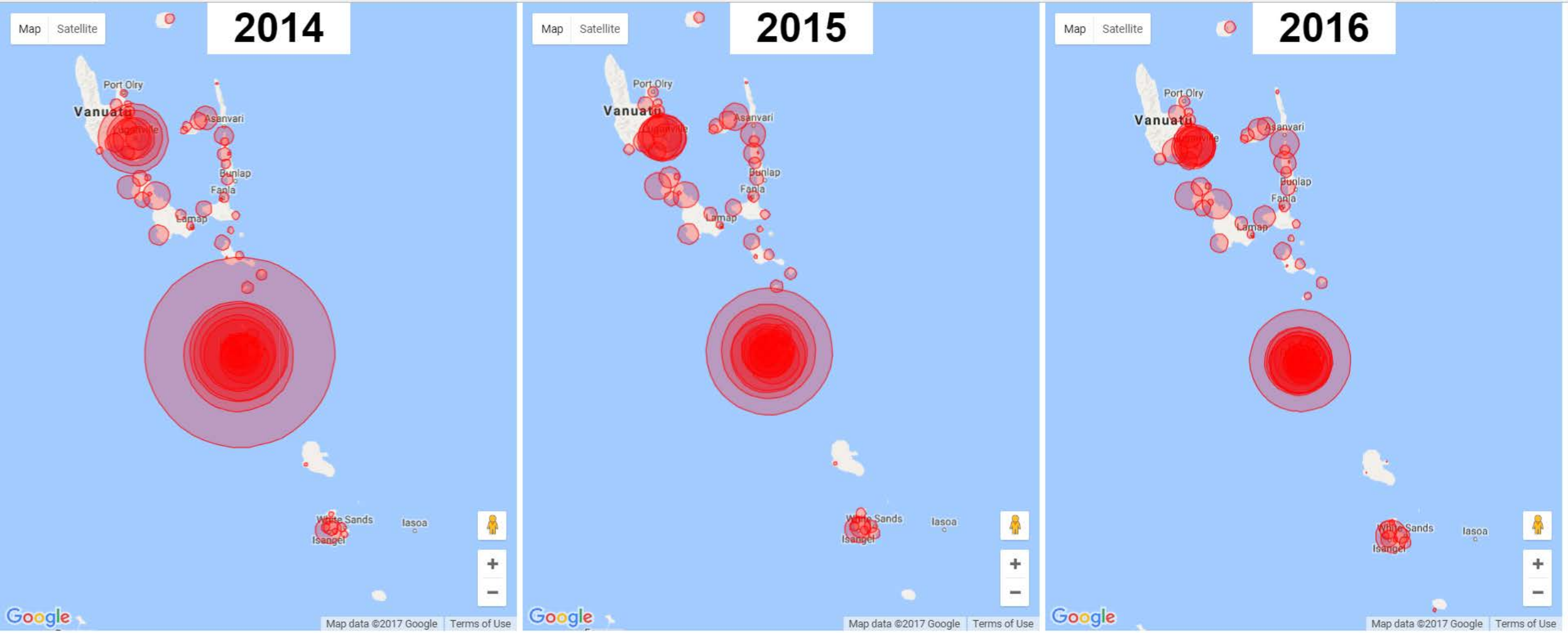




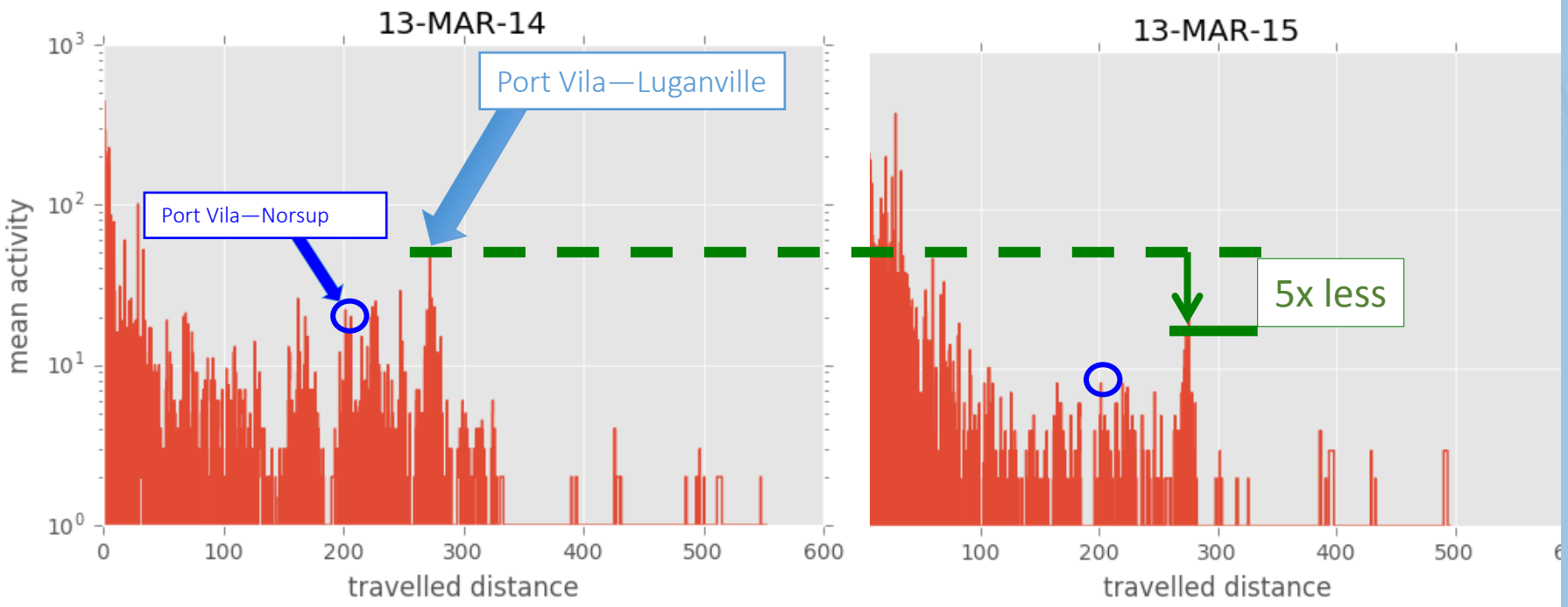


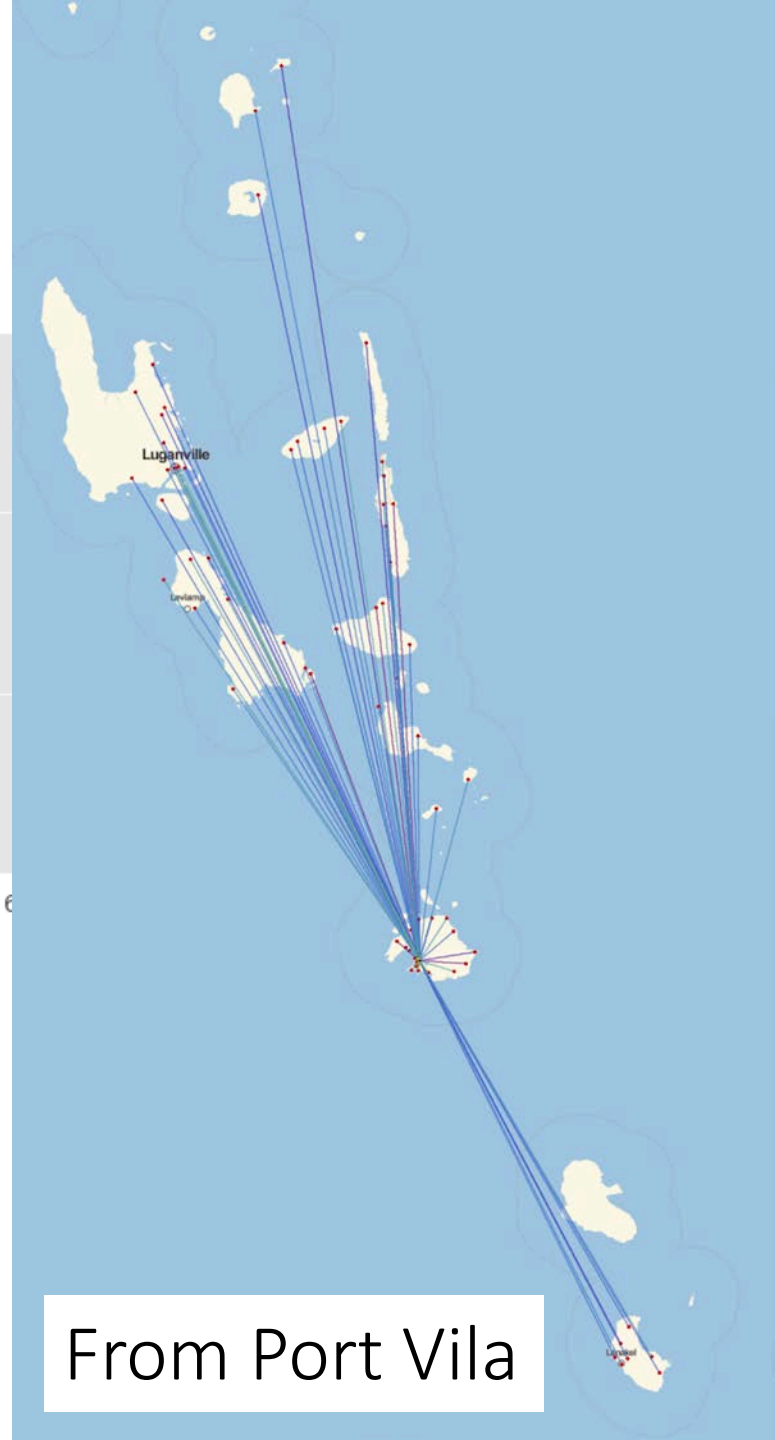
IOM • OIM DTM

Visualization of Activity: number of mobile phone calls



Paths analysis:
Mobility tracking using Mobile phone calls



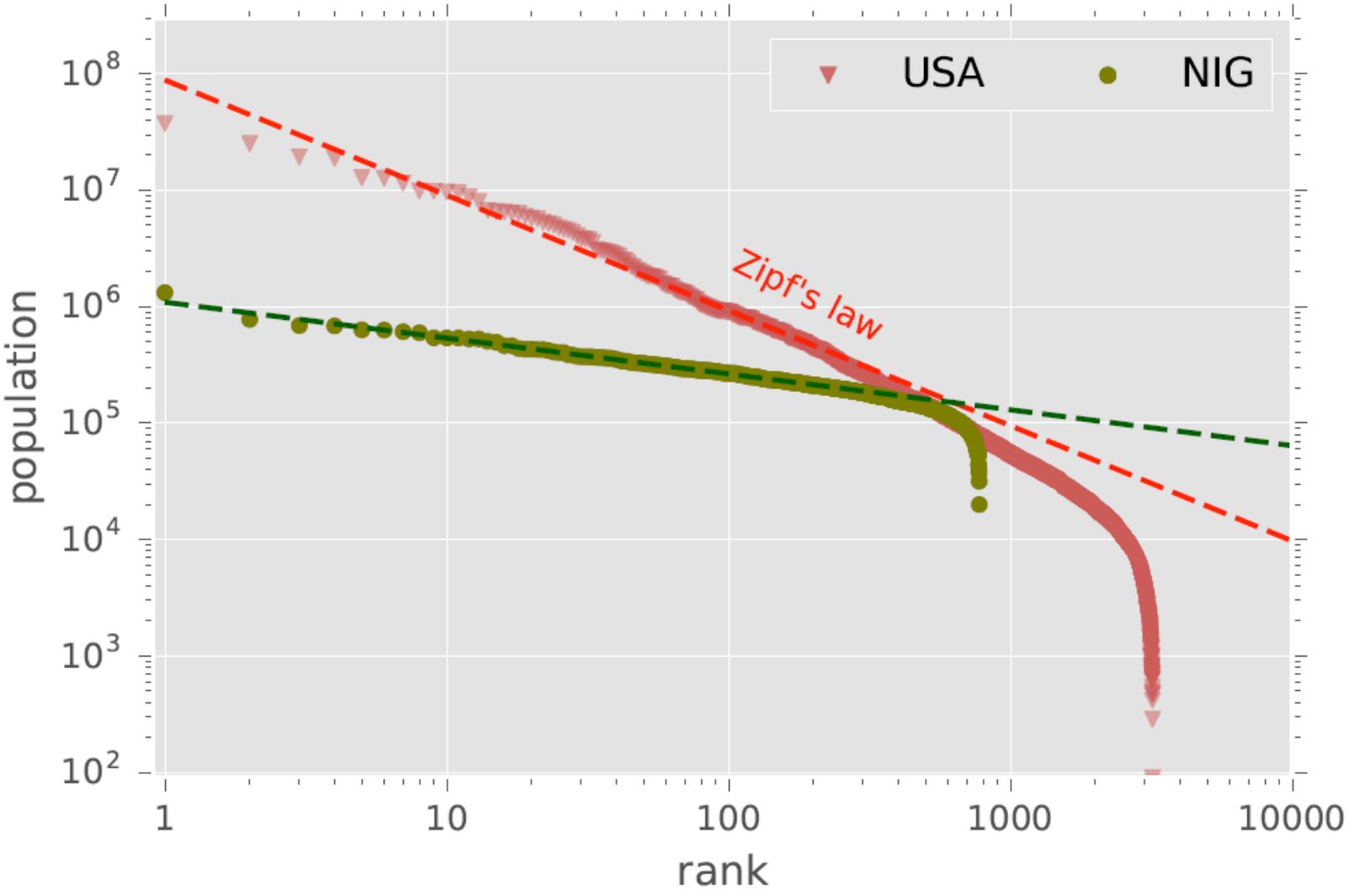


No userID data during Cyclone Pam ☹

Nigeria Random Walk Model

- No accurate model for conflict driven displacement
- Different from Natural Disaster: Does not follow usual trends
- Datasets:
  - DTM Baseline (13 Rounds)
  - ACLED Nigeria (acled.org monitoring events)
  - WorldPop Nigeria

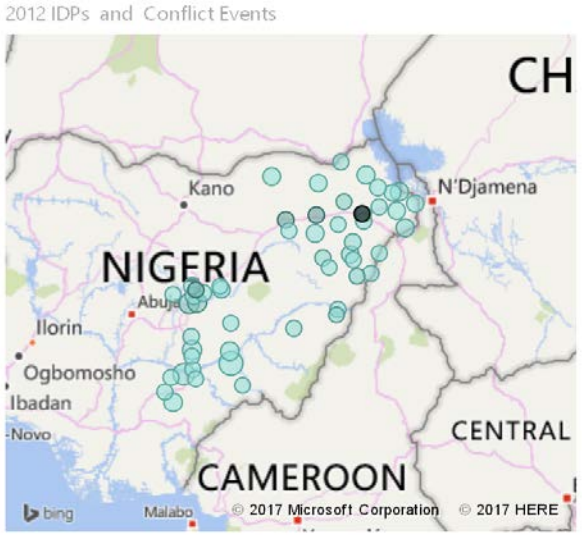
Nigeria does not follow usual population patterns



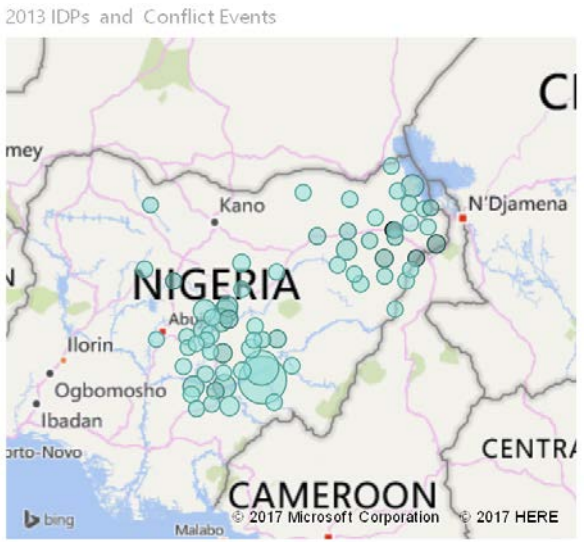
IDPs vs Conflict Events

2011

2012



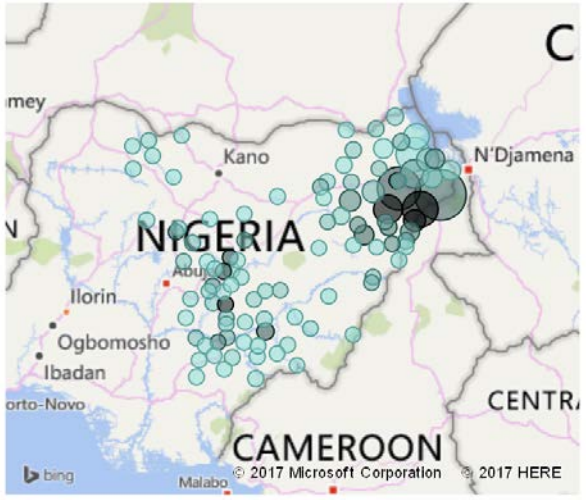
2013



IDPs (bubble size)

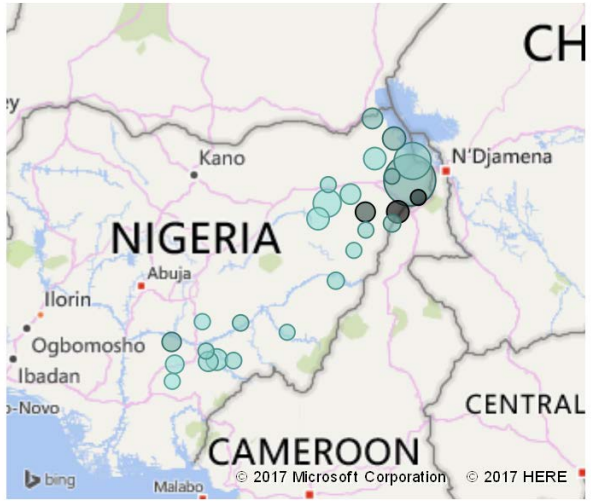
Conflict events:
(color saturation)

2014

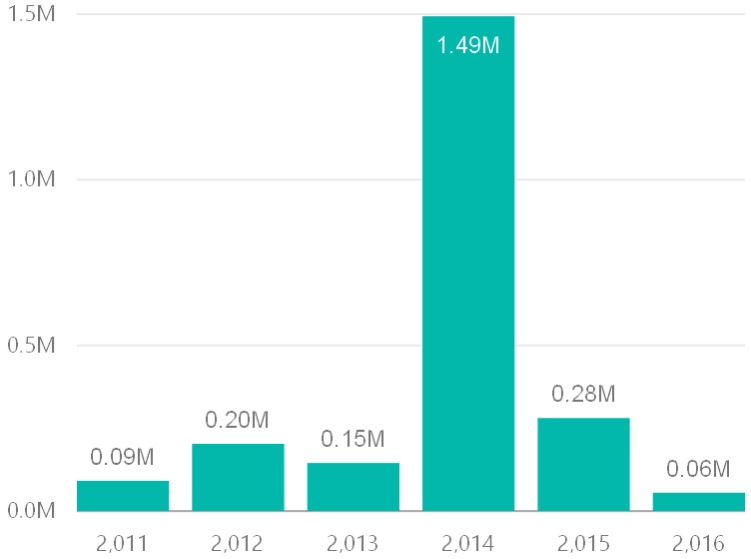


2015

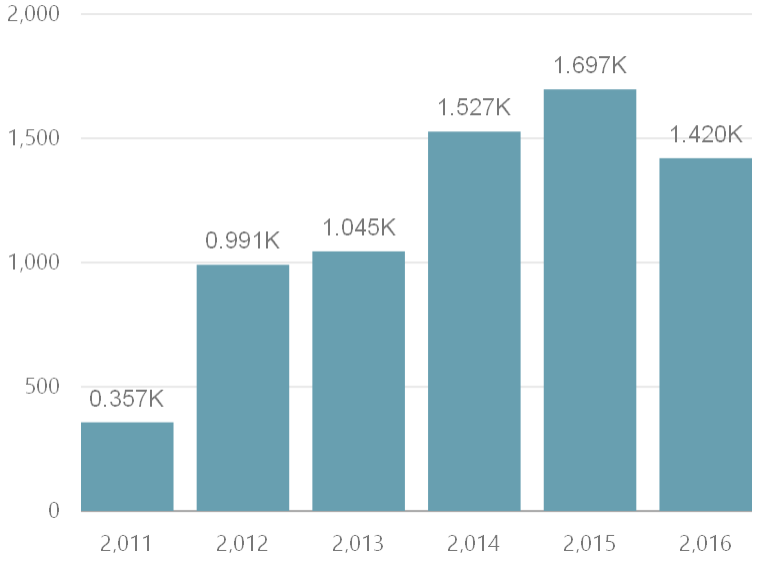
2016



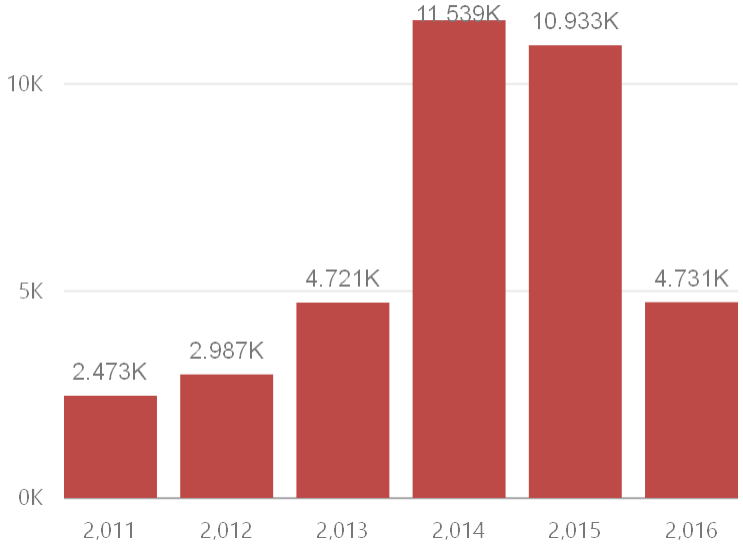
IDPs



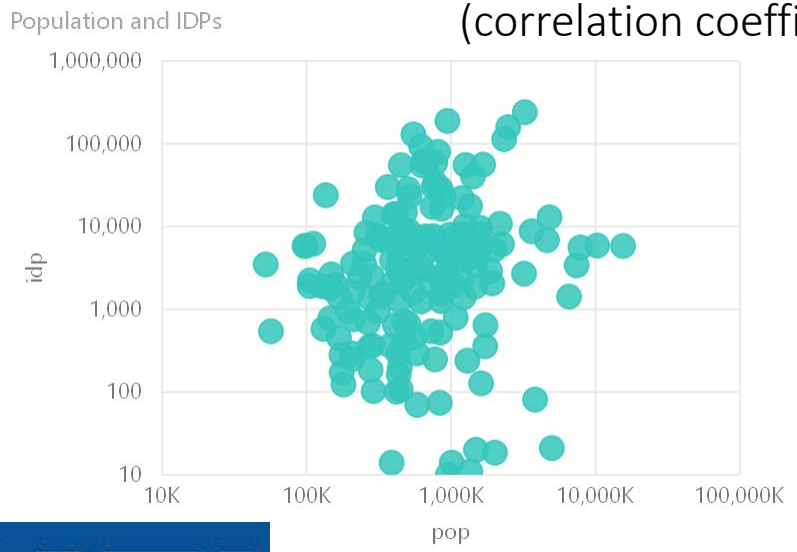
Conflict events

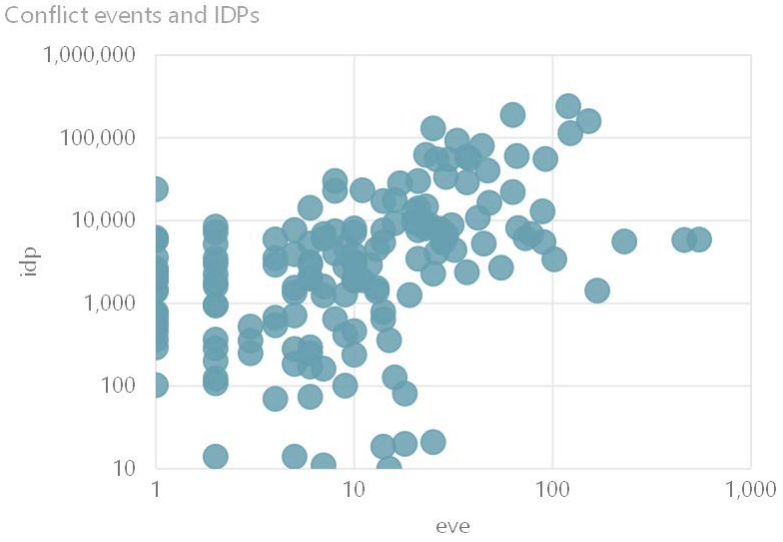


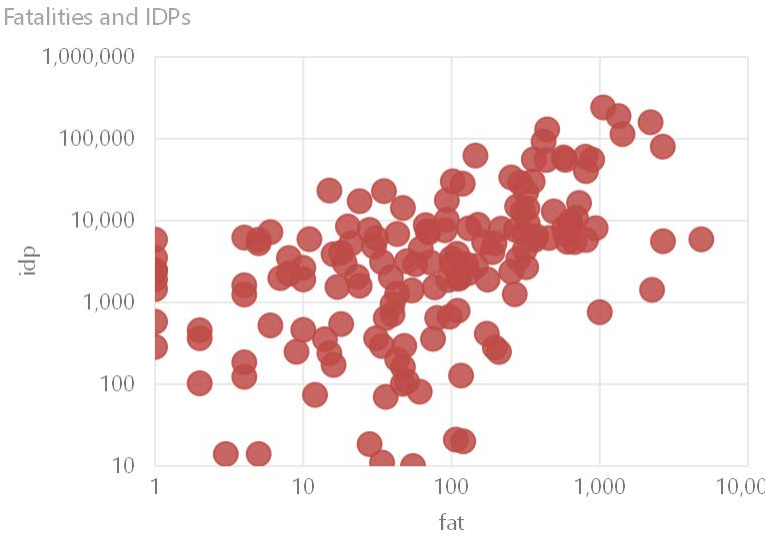
Fatalities



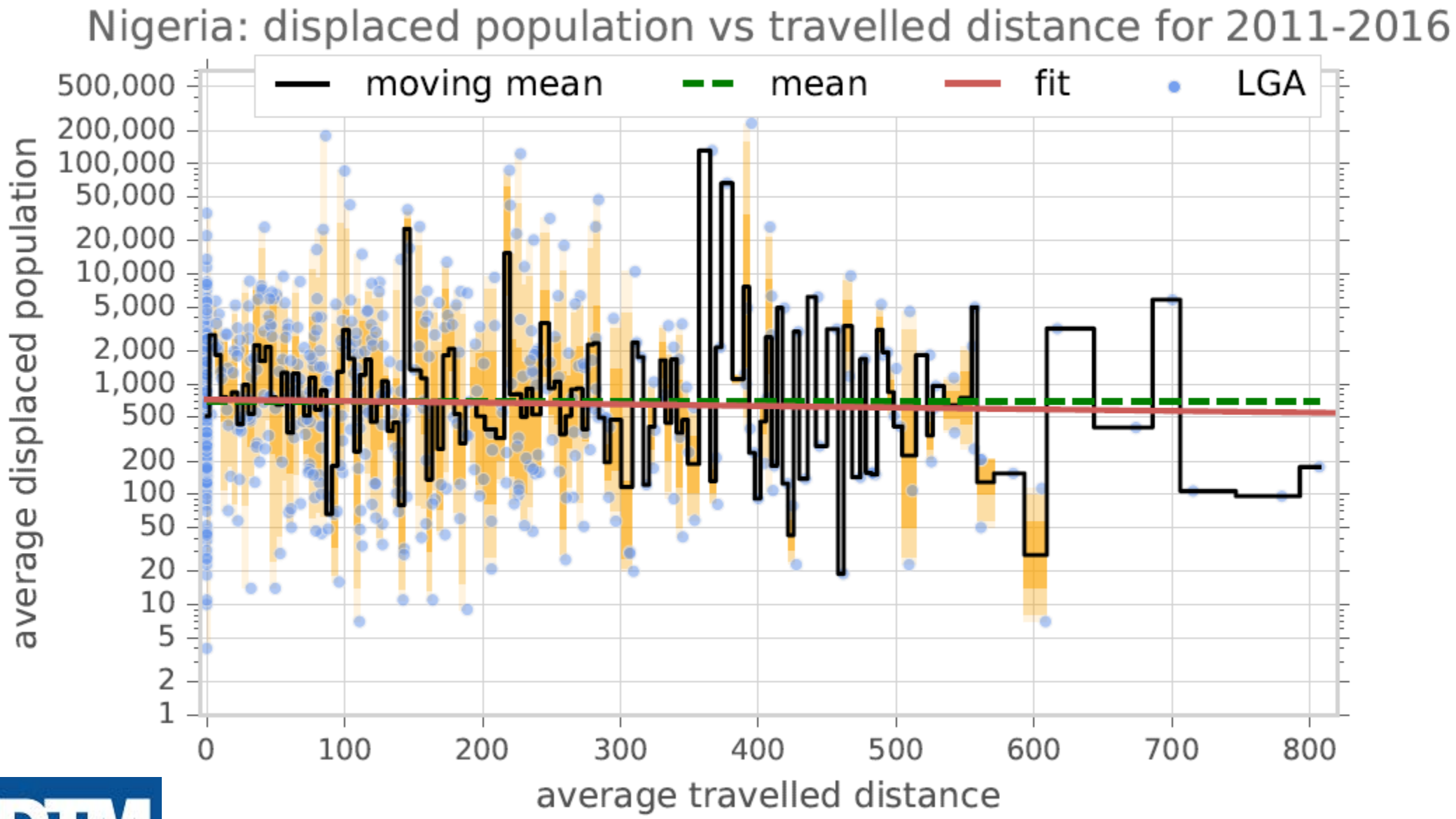
IDPs have NO dependence on Number Conflict Events or Fatalities (correlation coefficients less than 0.2)







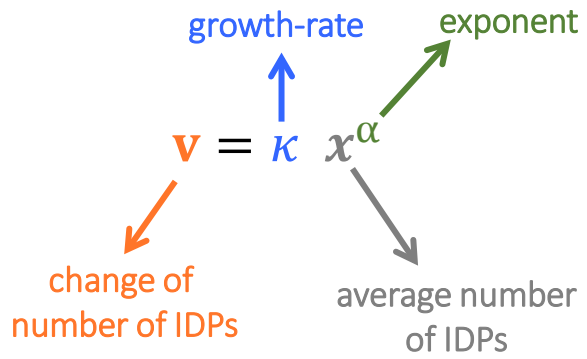
No Gravity rule: Displacement does not decreases with distance



Gibrat's law of Proportional growth:

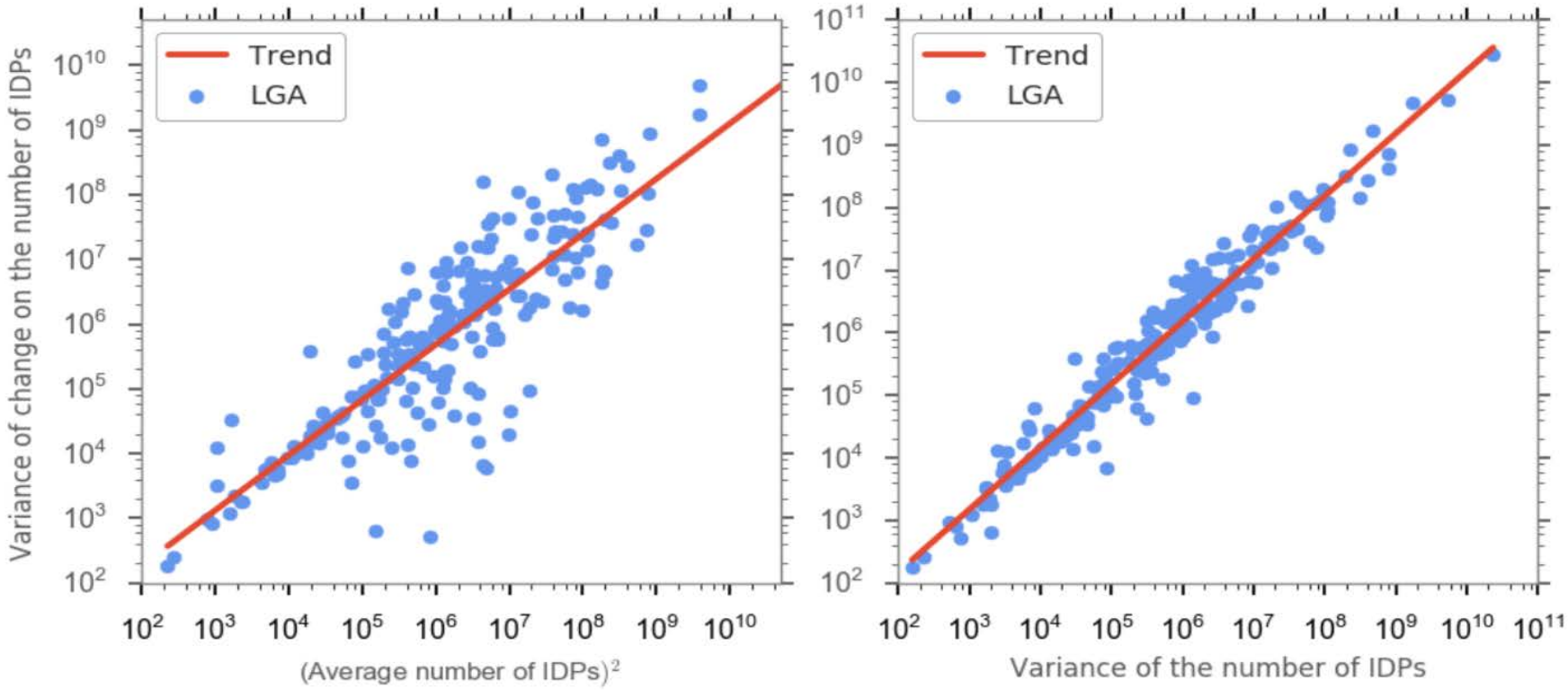
- IDPs change according to the average number of IDPs.

Data confirms the equation of motion

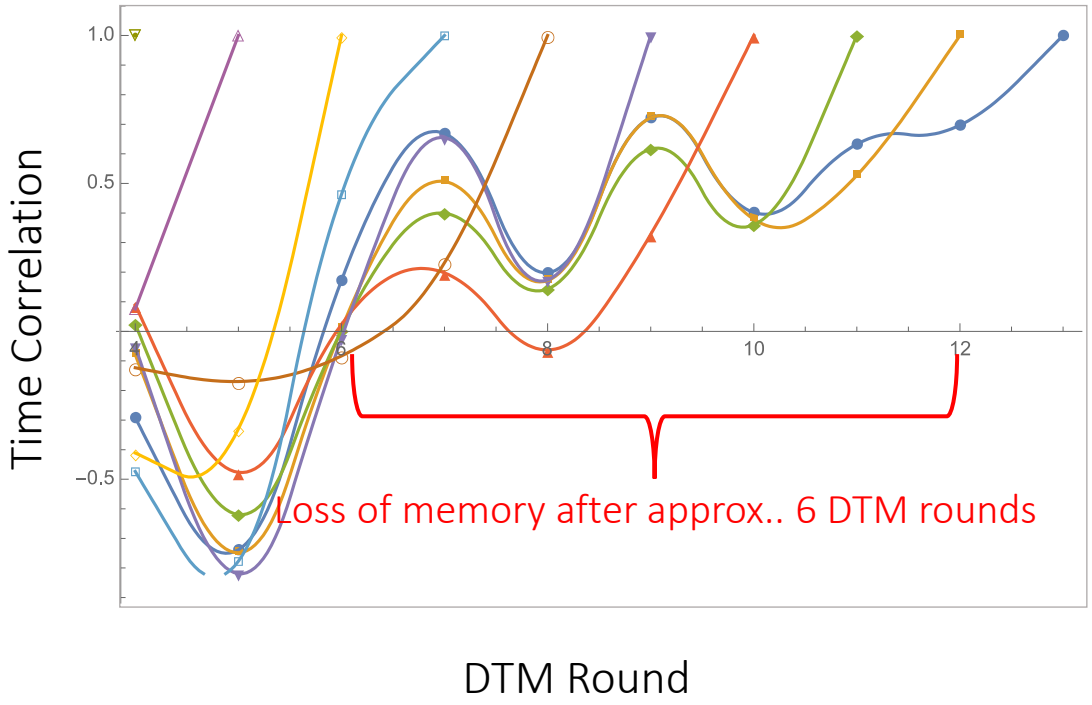


with $\alpha = 1$.

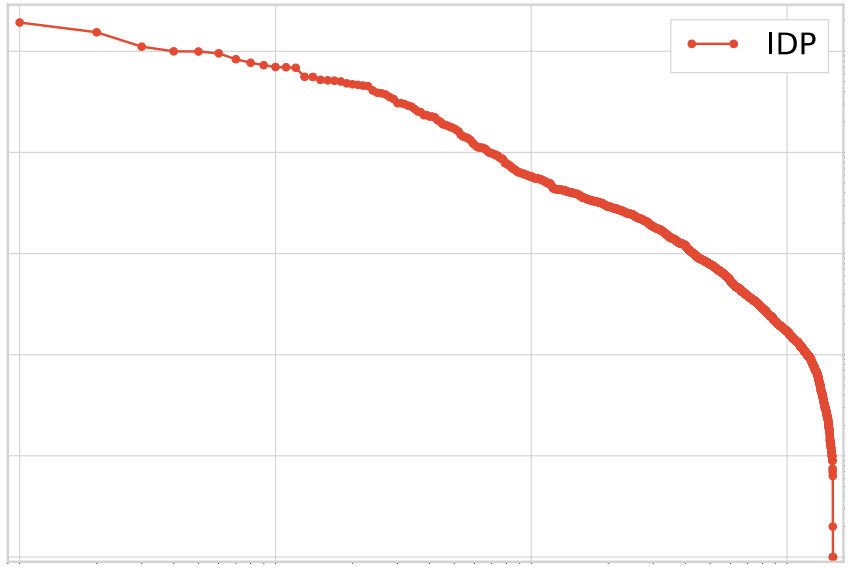
(known as Gibrat's Law of proportionate growth)



Time correlation as predictability window

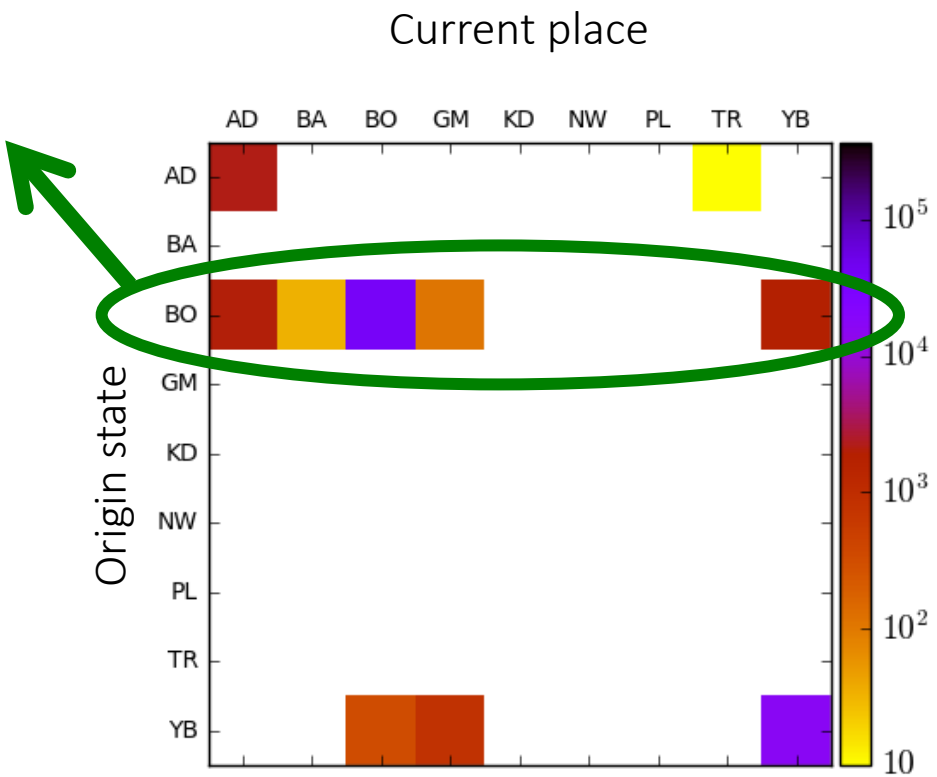


IDPs follows a pattern similar than population within a country



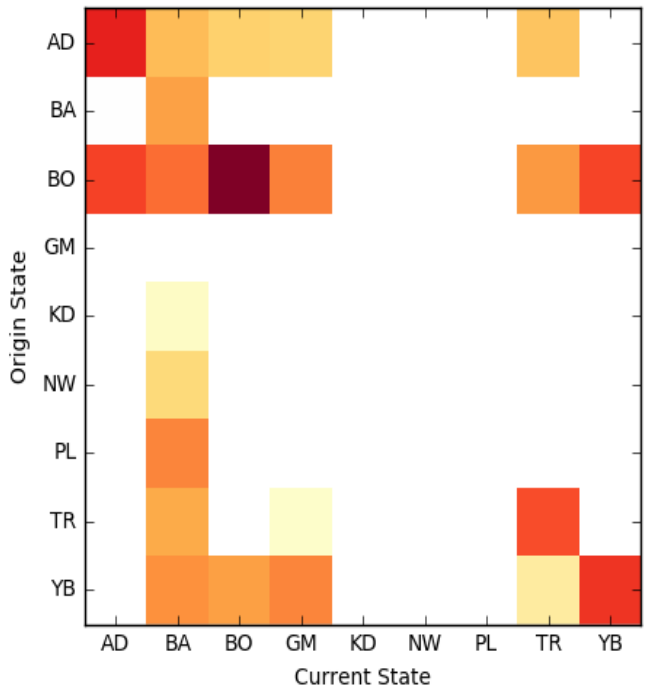
Interpretation of the IDP matrix per state

IDP flux departing from Borno State

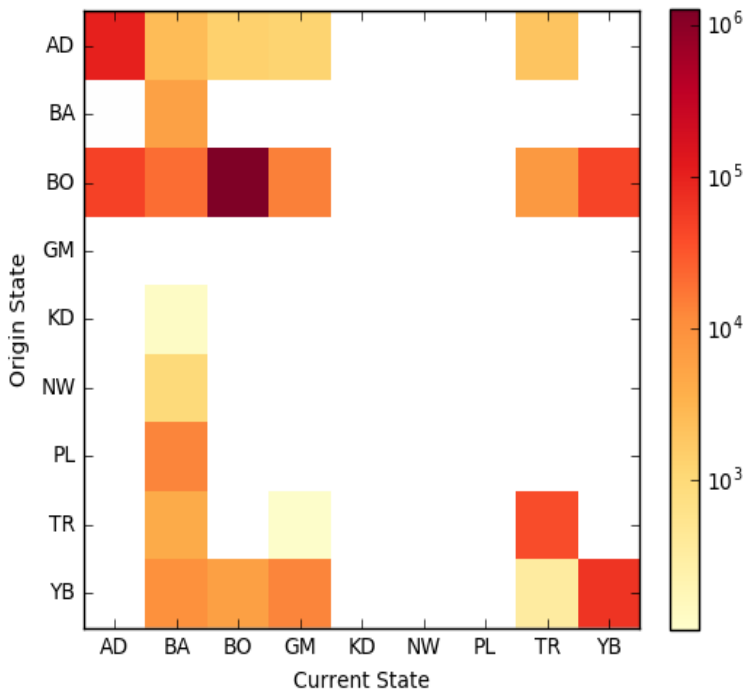


Results: Predicting Round XIII figures from previous Rounds (difference are minute, see % error for highlight it)

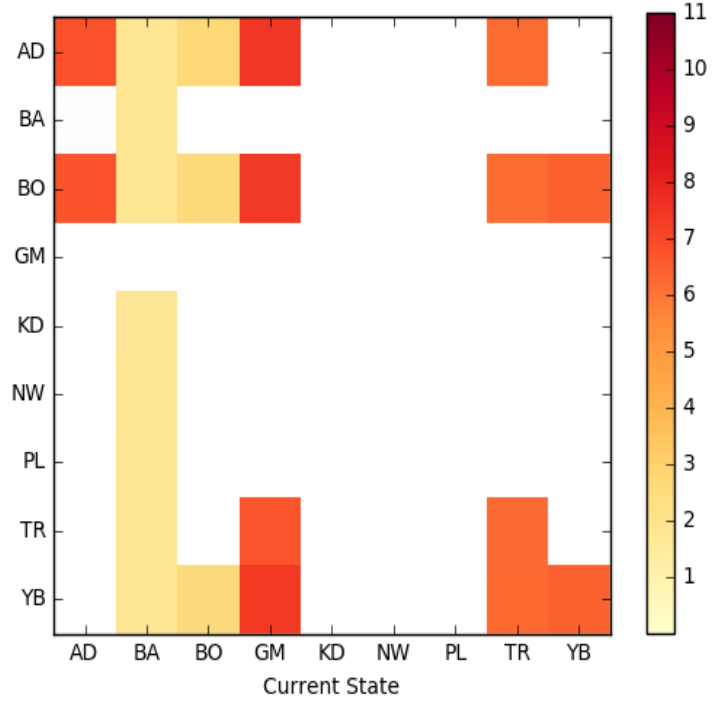
Actual XIII DTM data



Output of Numerical Simulation

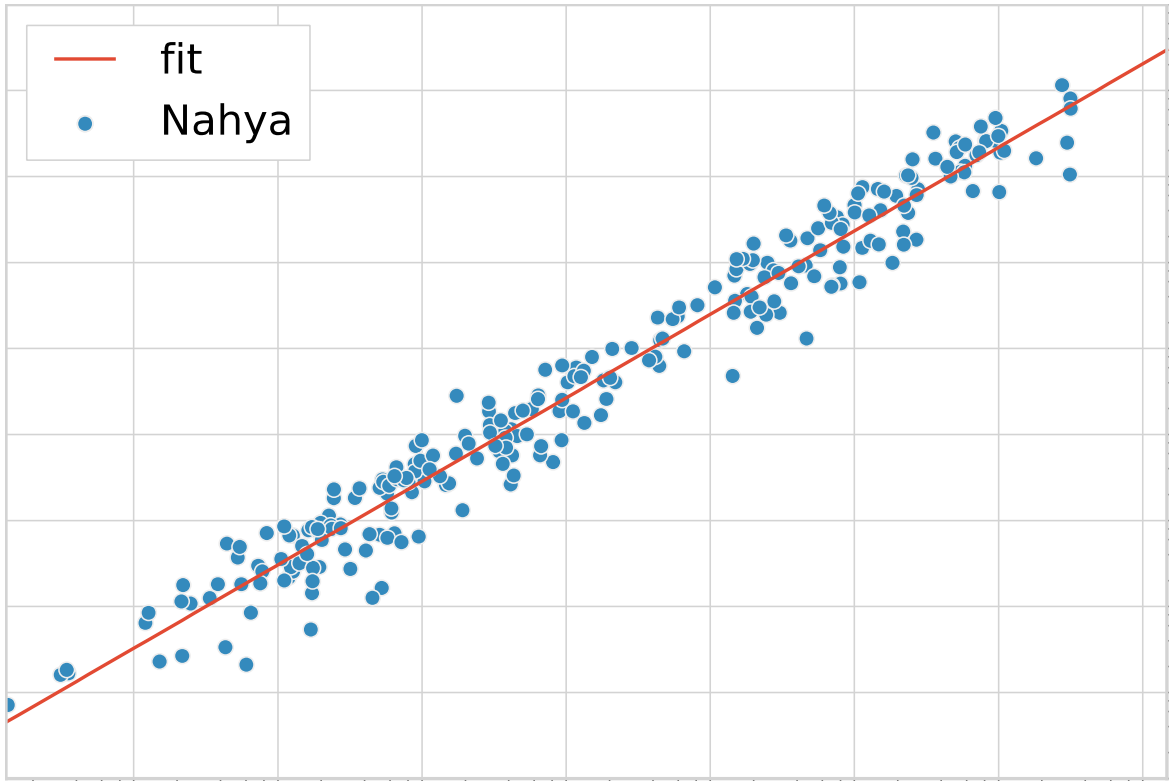


% Error



Prediction only for LGA with data, No prediction for new events

Syria Mobility Dynamics Monitoring dataset



Other approaches:

- Unsupervised learning (geospatial classification of sites with events)
- In progress