

Using satellite imagery to measure and promote sustainable development

Marshall Burke

Stanford University | AtlasAI

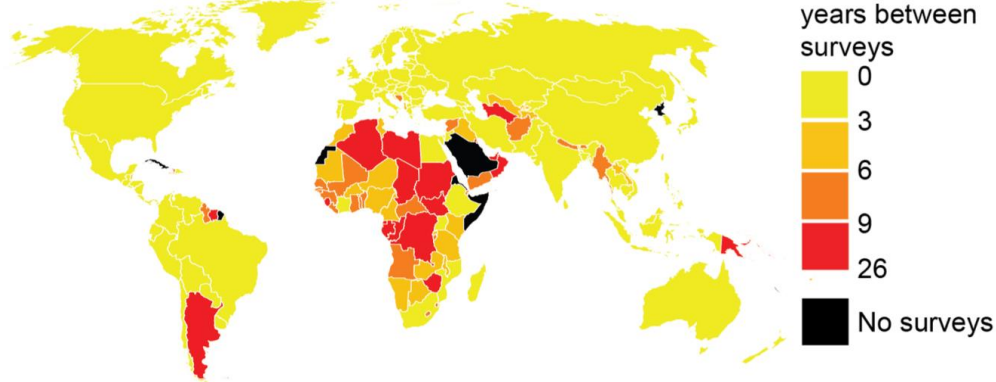
With thanks to collaborators David Lobell, Stefano Ermon, Chris Yeh, Anthony Perez, Anne Driscoll, Apoorva Lal, and many others

Traditional measurement technology

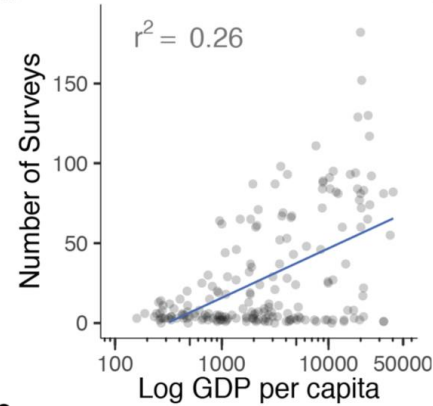


Traditional measurement technology – SDG1

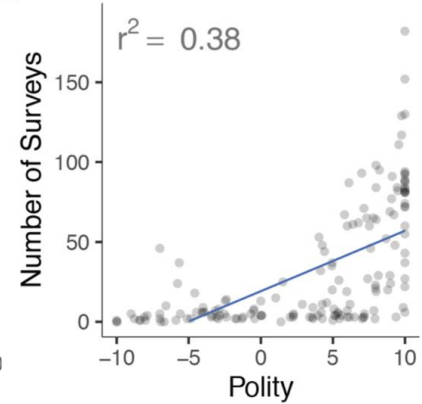
a Nationally-representative economic surveys



b



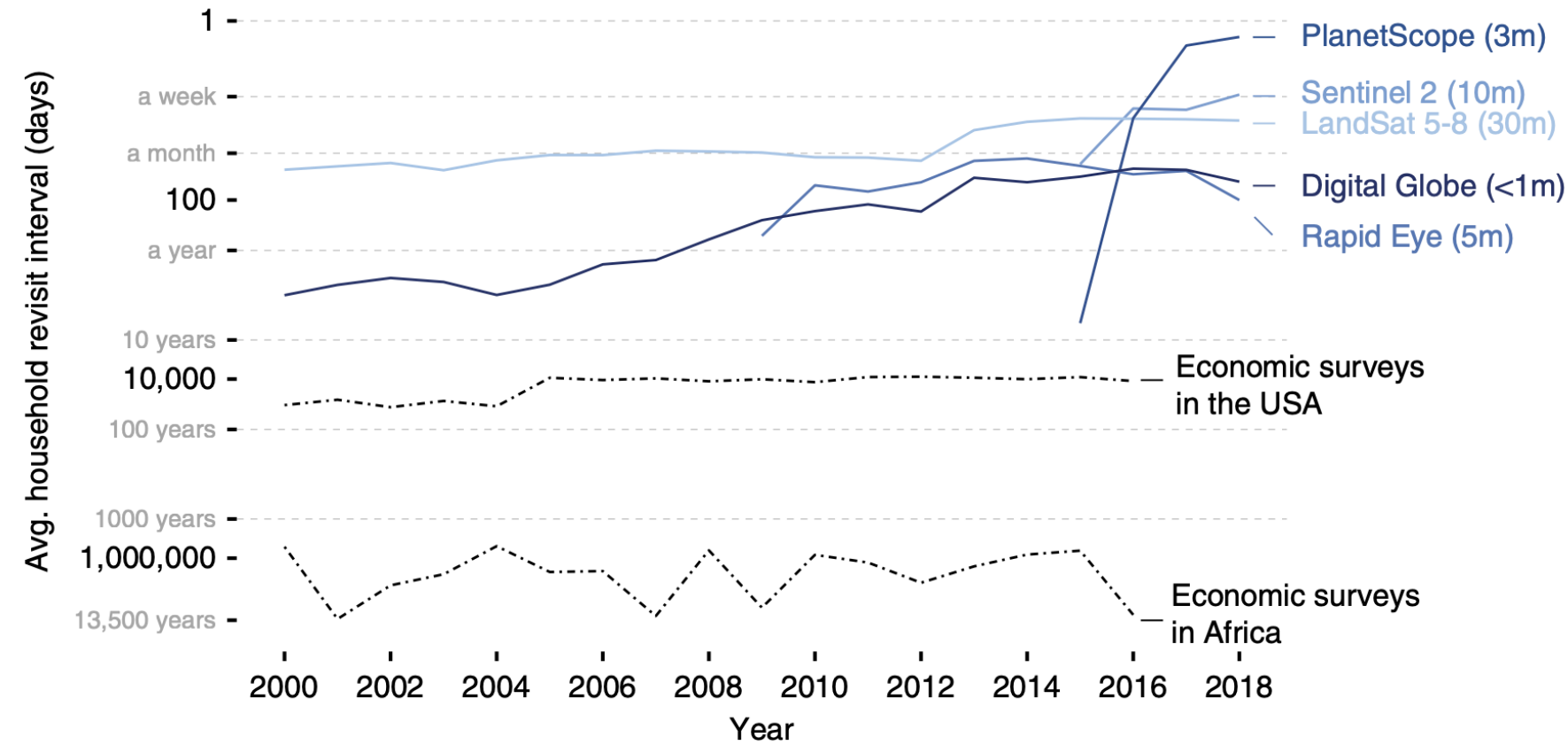
c



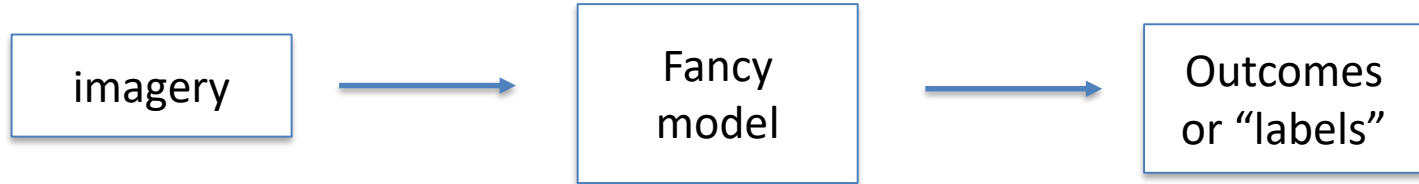
Nationally-representative consumption expenditure surveys:

- Critical
- Typically no spatially disaggregated data are public
- Infrequent in places we really care about: lower income, more autocratic

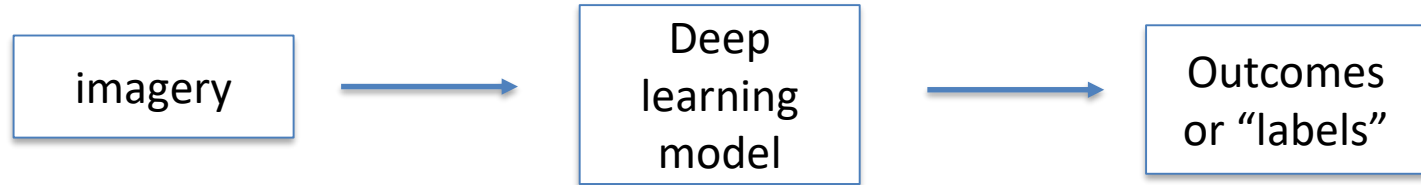
Satellite and survey revisit rate over time in Africa



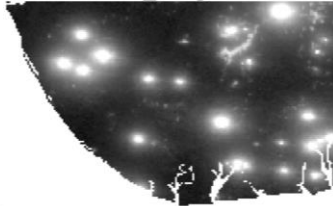
Can satellites help?



Can satellites help?



b - NL imagery



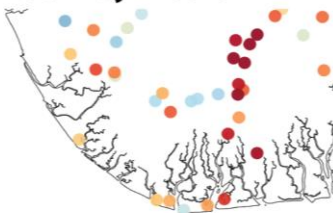
Input: Nighttime lights (500m)

d - MS imagery



Input: Multispectral optical imagery (Landsat, 30m)

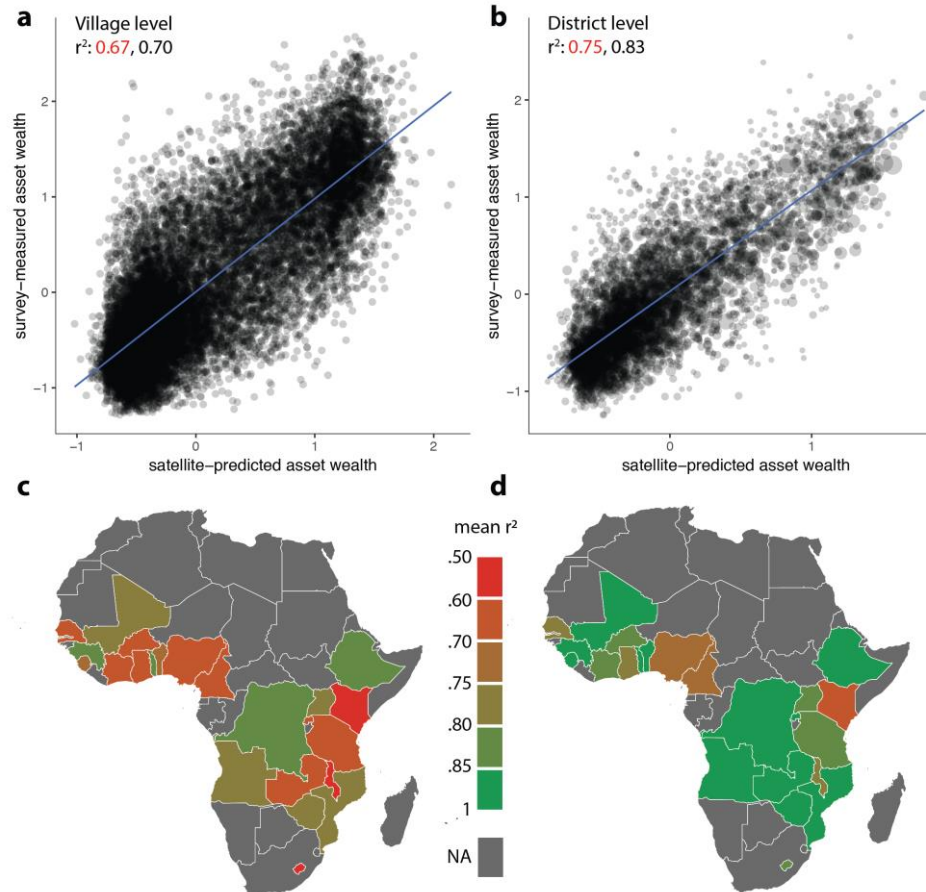
f - Survey wealth



Labels: village-level wealth estimates from 500k households, 20k villages from Demographic and Health surveys

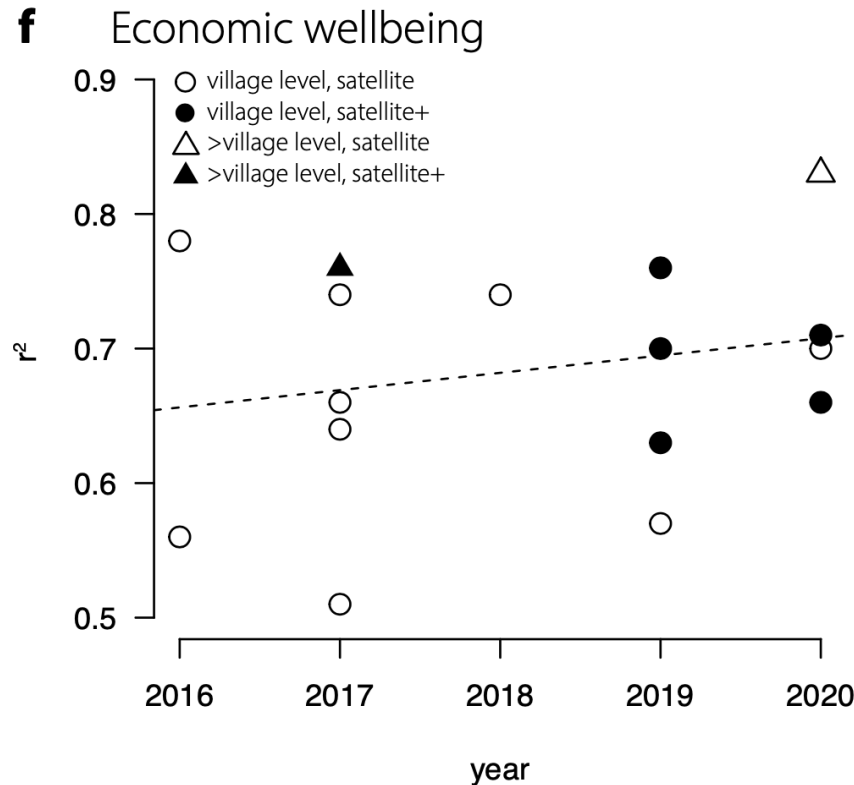
Satellites do a good job in predicting asset wealth

Wealth predictions on held-out countries



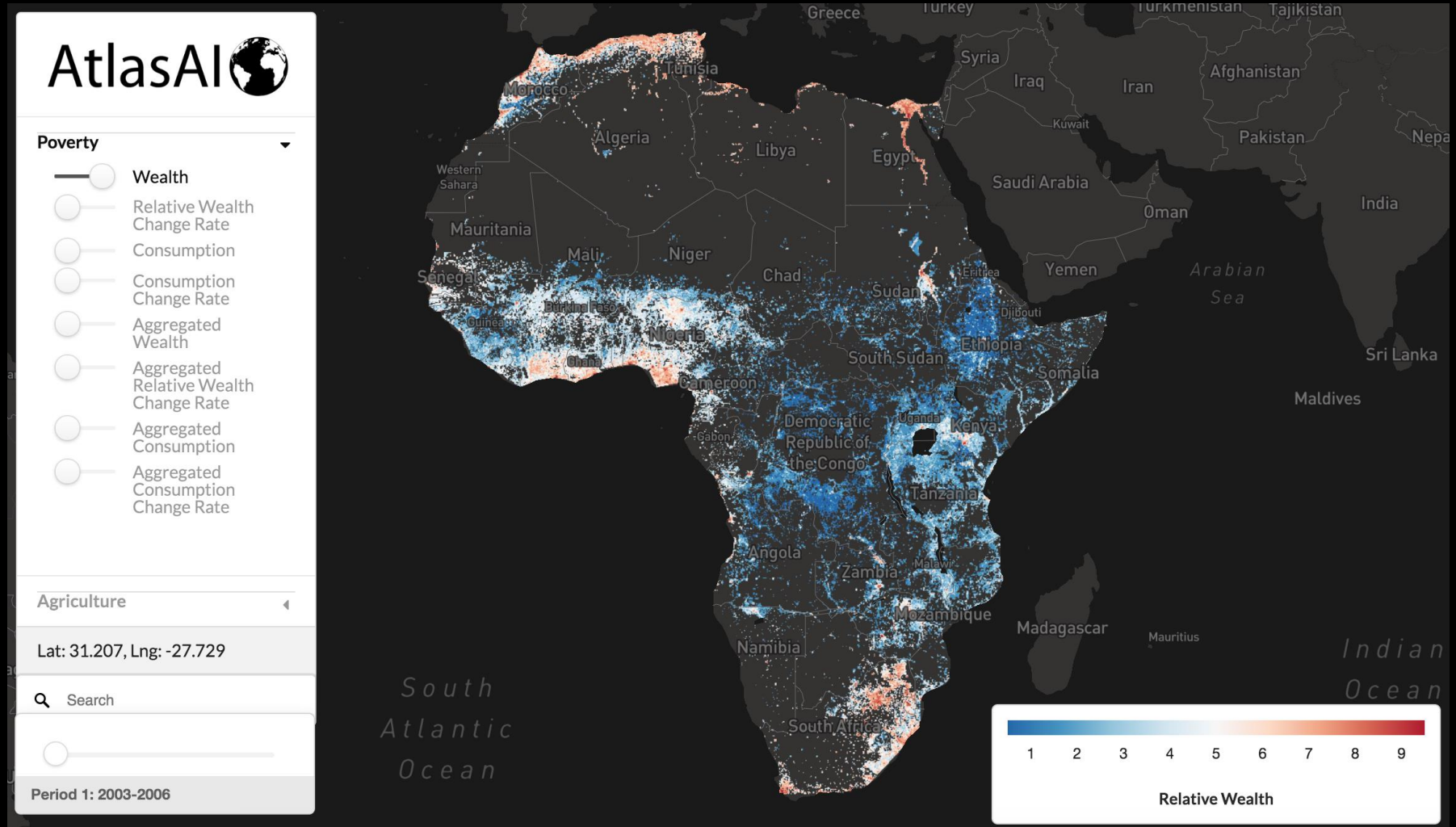
Satellites do a good job in predicting asset wealth

Compilation of all published studies predicting asset wealth from imagery



- Most studies explain 70% of variation in ground data with satellites
- Combining satellites with other data (e.g. cell phones, social media info) seems to help

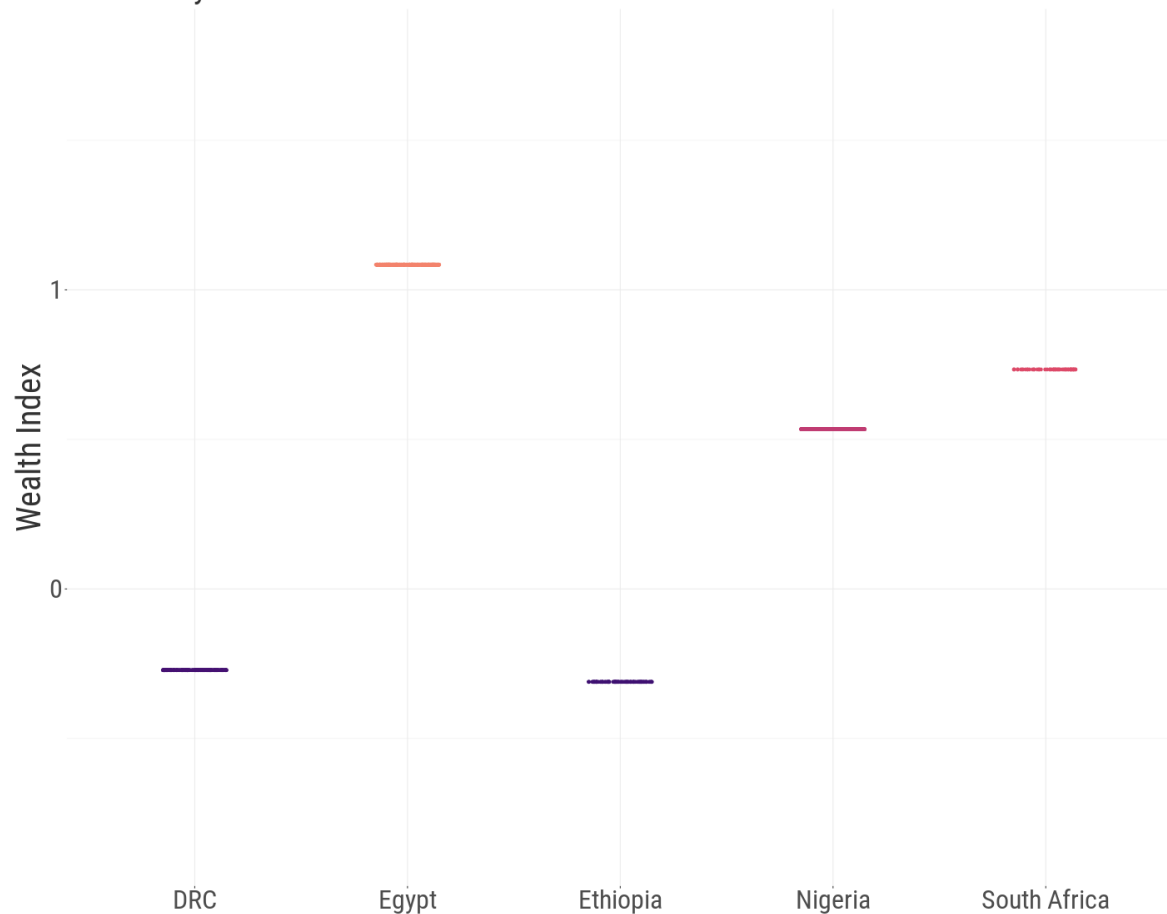
Estimates can be scaled



Scaled estimates enable new insights

Atlas Wealth Index (2015 - 2018)

1 : Country



Much more (65%) of the total variation in wealth is *within* countries rather than between them!