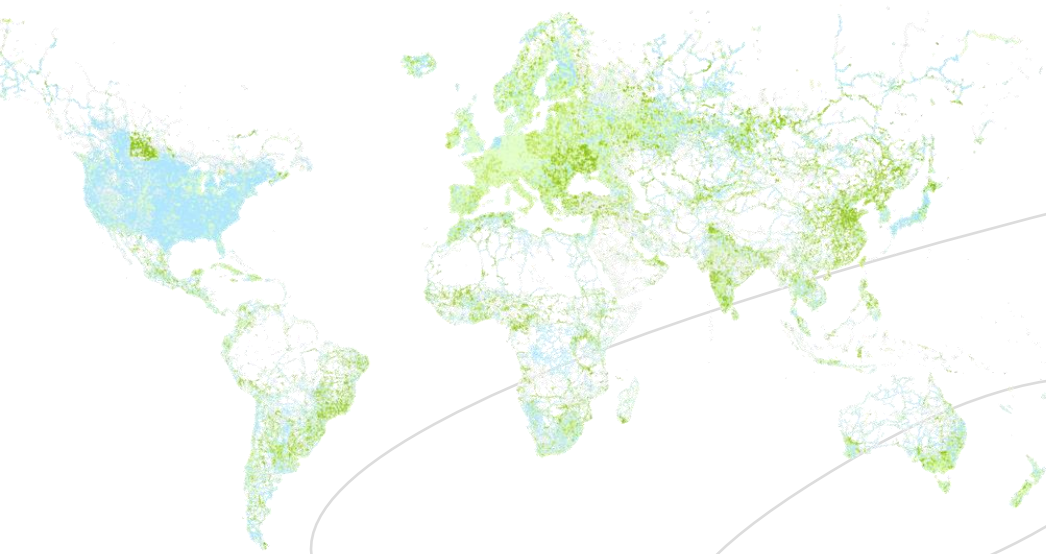

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Simon Gröchenig, Richard Brunauer, Karl Rehrl

Digging into the History of VGI Datasets

Results from a Worldwide Study on OpenStreetMap Mapping Activity

Presentation @ LBS2014

Motivation and Idea

- How can you assess the mapping progress of a global VGI dataset?

Beginning	Active Time	End
A few volunteers start mapping geographic data	Many volunteers are contributing data	No more map features are created

No data is created

Global Mapping Progress in VGI datasets

- Global statistics (number of contributors, features, …)
  - (OSM Wiki, 2014)
- Many detailed analyses for countries or smaller regions
  - (Mooney and Corcoran 2013; Neis et al. 2013; Steinmann et al. 2013)

- Mapping activity difficult to measure due to unpredictable variables like
  - Data imports (Zielstra et al. 2013)
  - Mapping parties (Mooney and Corcoran 2013)
  - Unforeseen events (Neis and Zielstra 2014)
  - Demographic characteristics (Hakley 2010)

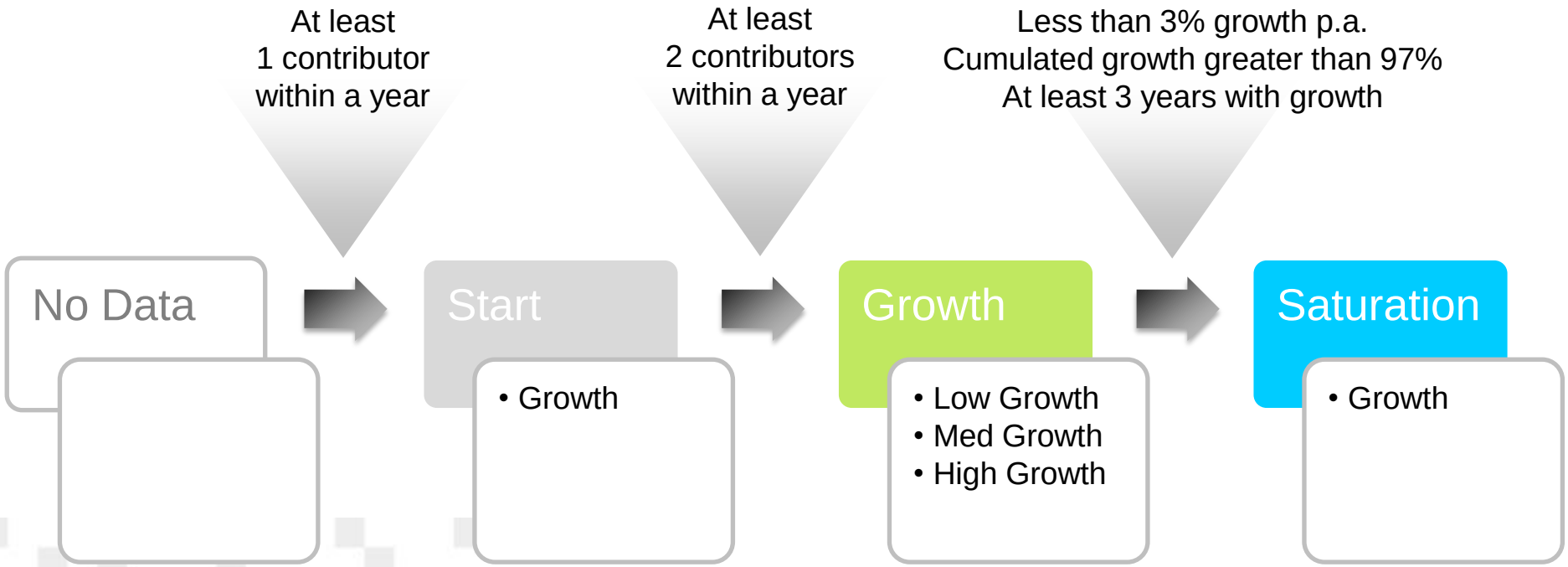
Global Mapping Progress in VGI datasets

- Analyze global mapping progress based on VGI community activity
  - Also peripheral regions are considered
  - Each region is treated equally which allows comparisons
  - Detect different kinds of mapping behavior

- Our approach
  - Analyzing community activity over time periods
  - Detecting sequences of activity stages from *Start* via *Growth* to *Saturation*
  - Using *Saturation* as an indicator for data completeness
  - *No Data* where no data has been created

VGI Datasets and their Mapping Progress

- 4 Activity Stages of VGI datasets
  - Per evaluation area
  - Heuristic rules



Evaluation Data

- OpenStreetMap
- All continents
  - Divided in zones based on UTM
- Hexagon Raster (diameter: 20 kilometers)
  - Hexagon raster can be used worldwide
- Feature Types
  - Street (motorway, trunk, primary, secondary, tertiary, unclassified, residential, living street)
  - Building

Continents ▶ ▶ ▶

Hexagon Raster ▶ ▶

OSM-Data

Data Preparation of the VGI Dataset

- OSM History Dataset from 2014-01-06
- VGI Actions are extracted
  - Create Feature
  - Delete Feature
- Actions are aggregated per hexagon, year and feature type
  - Growth = Create actions – Delete actions

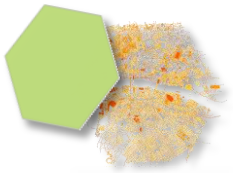
Timestamp	Action	OSM ID
2008-01-17	AcCreate	354
2008-01-18	AcCreate	375
2009-11-02	AcCreate	411
2009-11-02	AcDelete	358
2011-09-30	AcCreate	784
2011-09-30	AcCreate	795
2013-05-01	AcCreate	1147

Overall Growth Value

- $6 - 1 = 5$

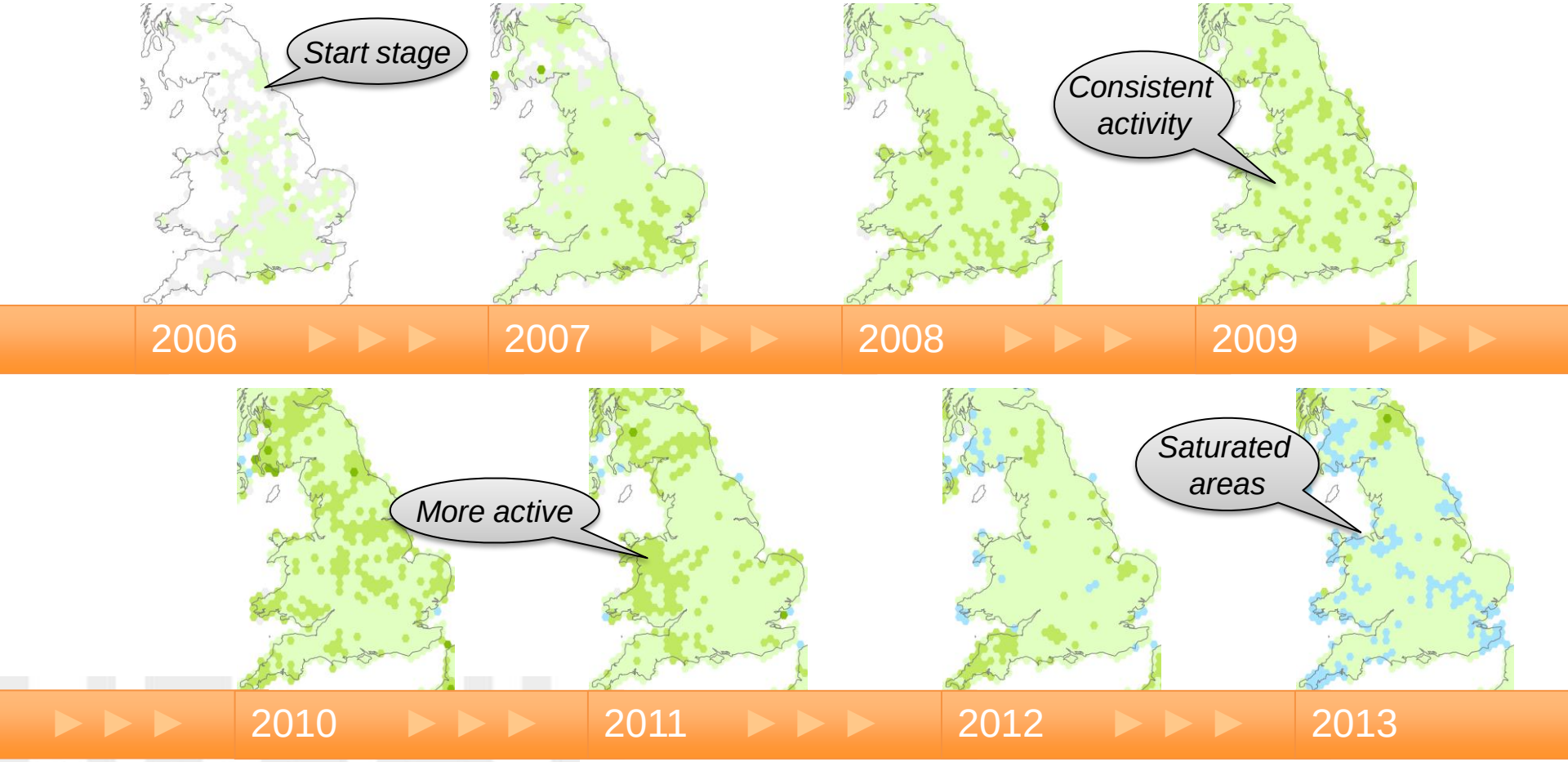
Relative Growth Value in 2013

- $1/5 = 0.20 \quad \Rightarrow 20\%$

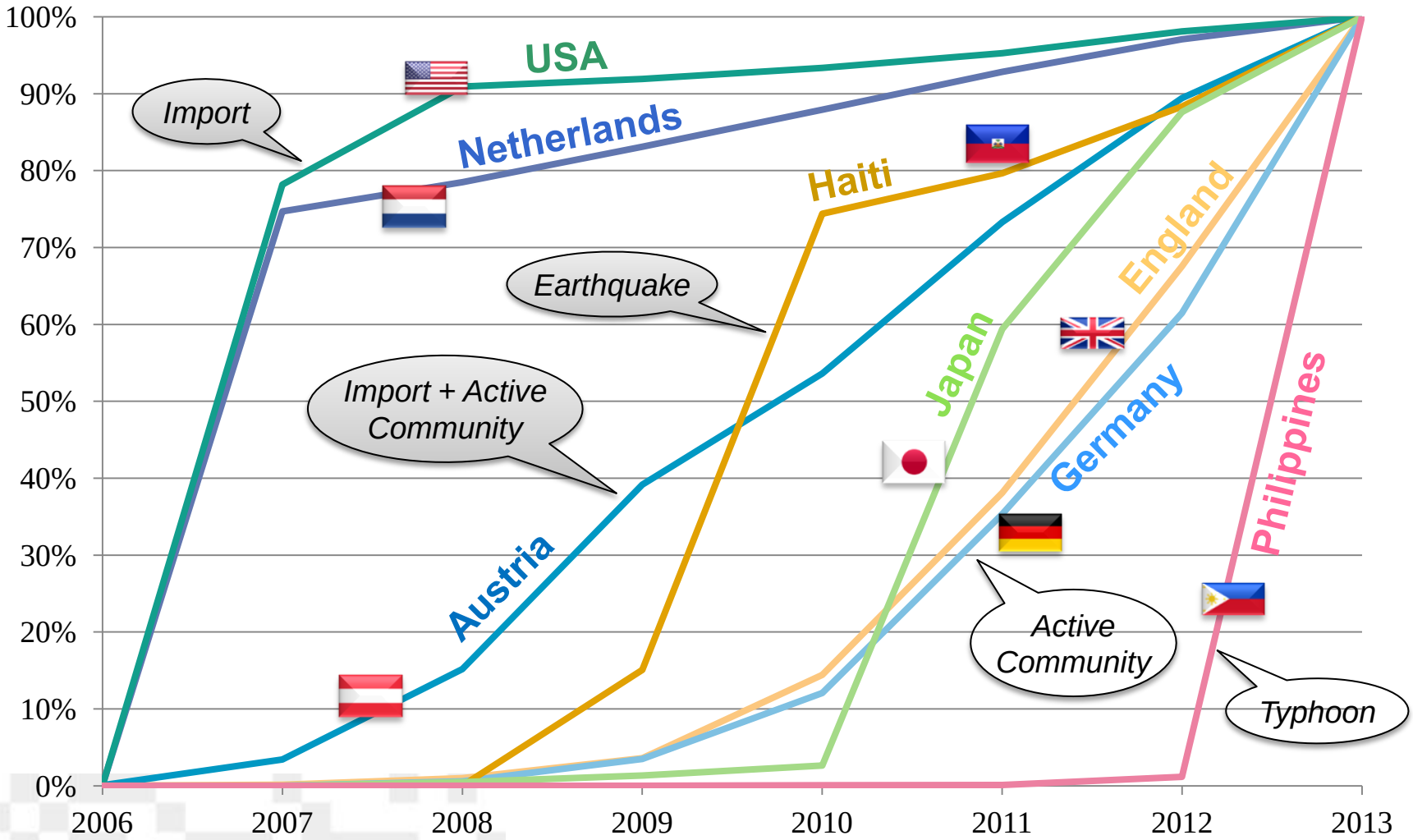


Activity Stages over Time Periods

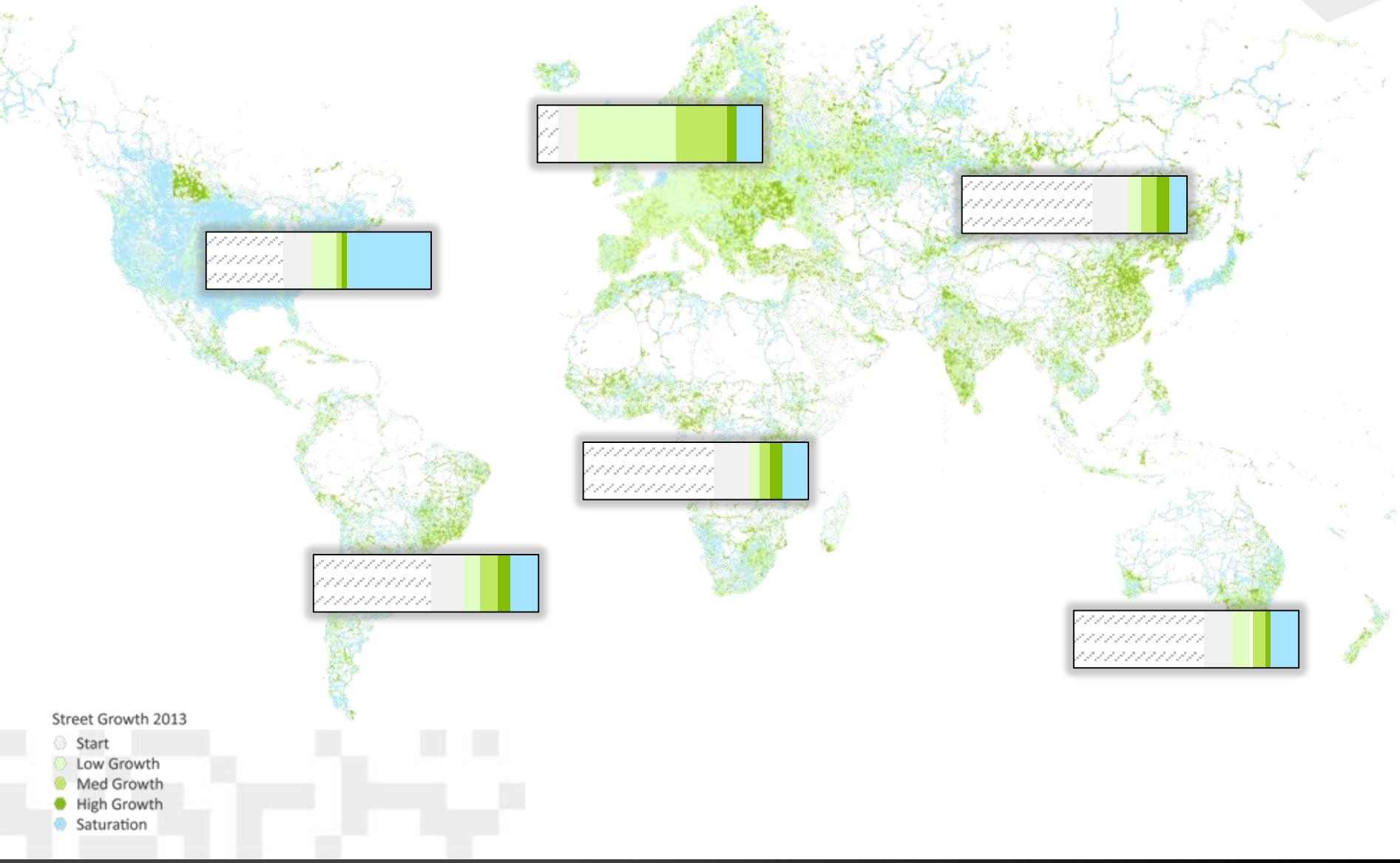
- Example: Streets of England/Wales between 2006 and 2013



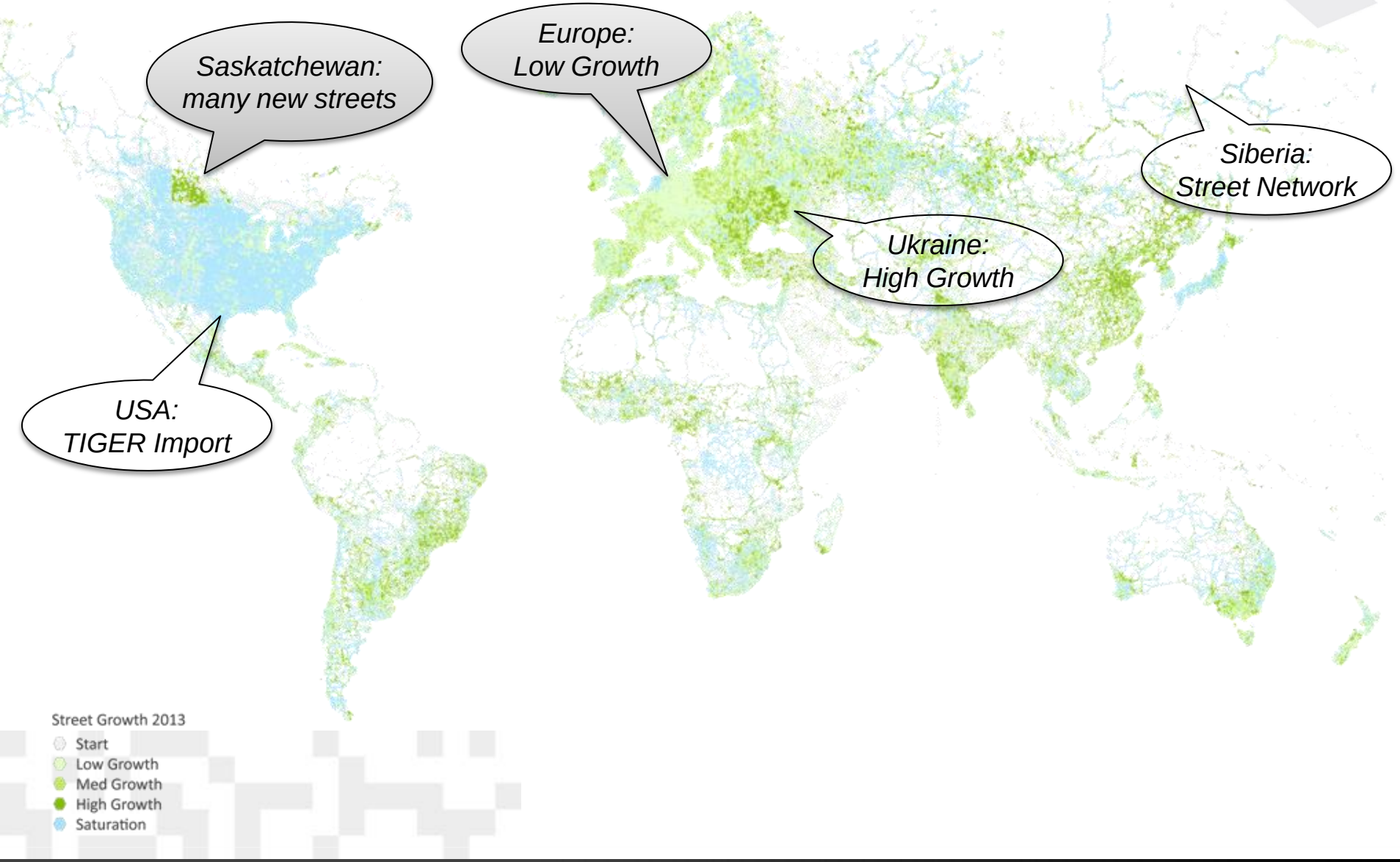
Time Series showing cumulated Growth



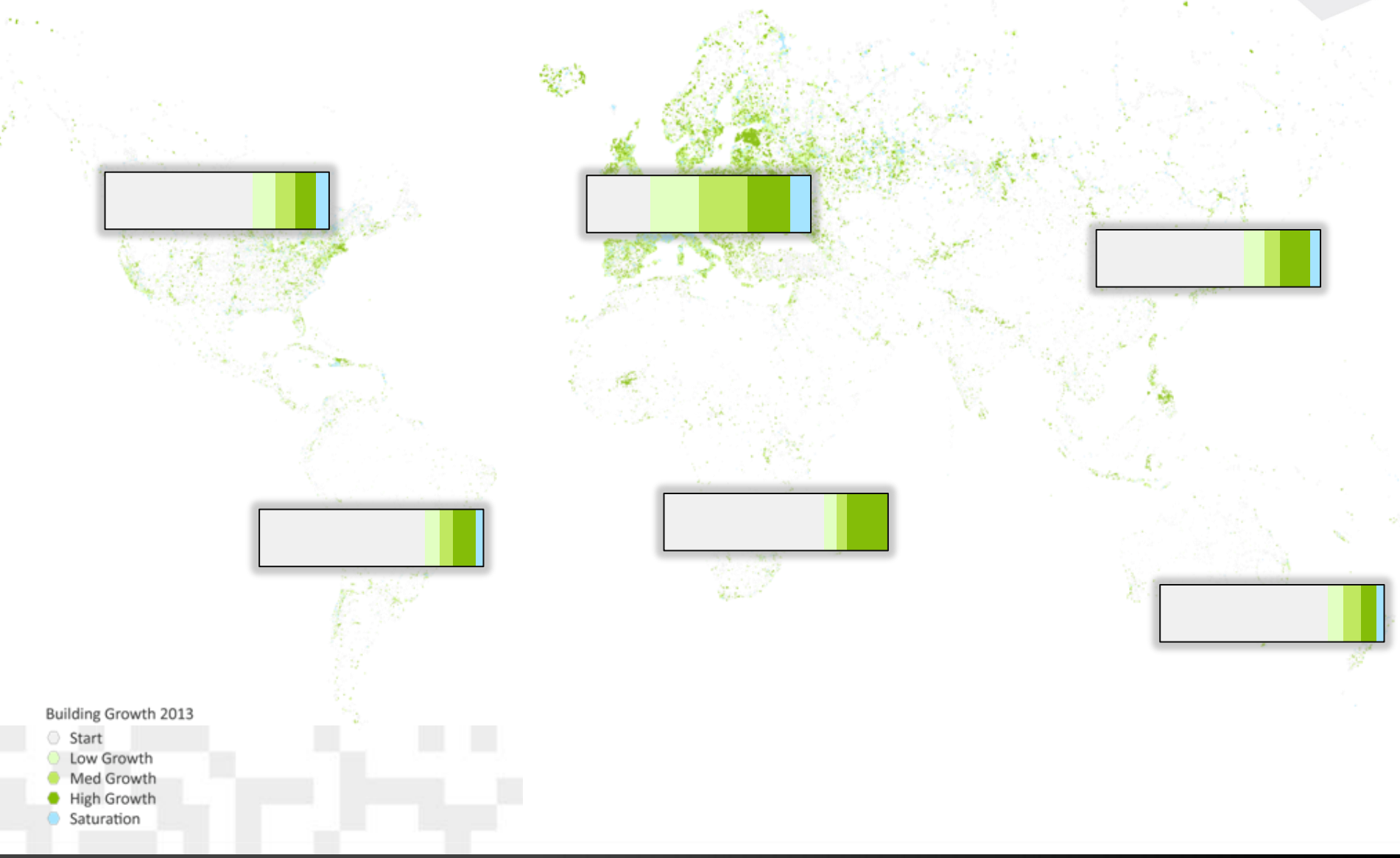
Worldwide Mapping Progress of Streets in 2013



Worldwide Mapping Progress of Streets in 2013



Worldwide Mapping Progress of Buildings in 2013

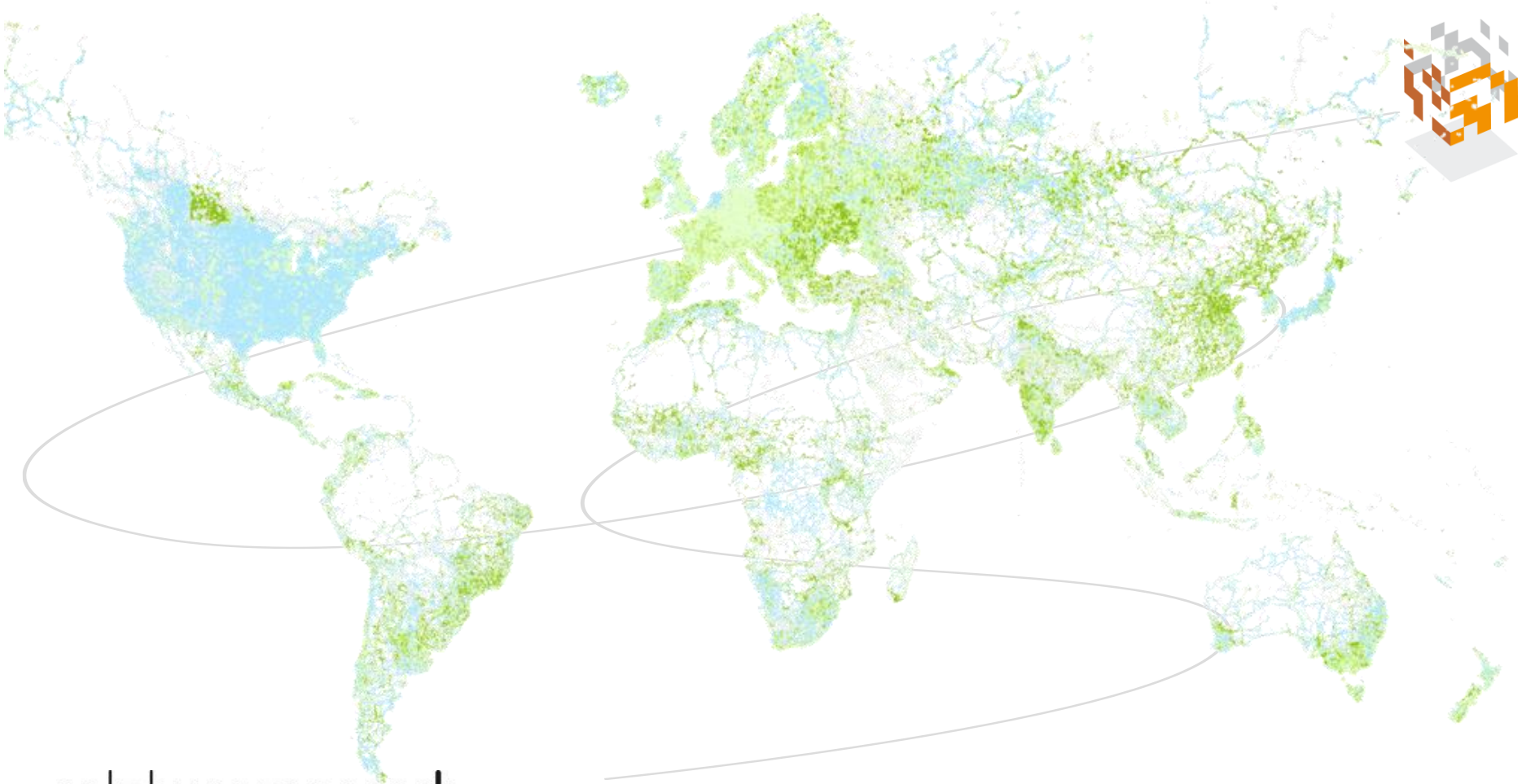


Worldwide Mapping Progress of Buildings in 2013

Conclusions

- Mapping progress of VGI datasets can be estimated by analyzing community activity
- Results outline that …
  - Significant differences in mapping progress (OSM)
    - Europe profits from well-established community
    - Data imports can be easily detected (*High Growth*)
      - Negative consequences if inactive community (USA)
    - Other regions are influences by unexpected events (Humanitarian OSM Team)
  - Before using VGI data, an analysis of the mapping history should be conducted

- Future work
  - Consider data maintenance
    - Especially interesting for areas with *Saturation*



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