

# Assessing OSM building data and its potential to reduce uncertainty in natural catastrophe exposure models across Europe

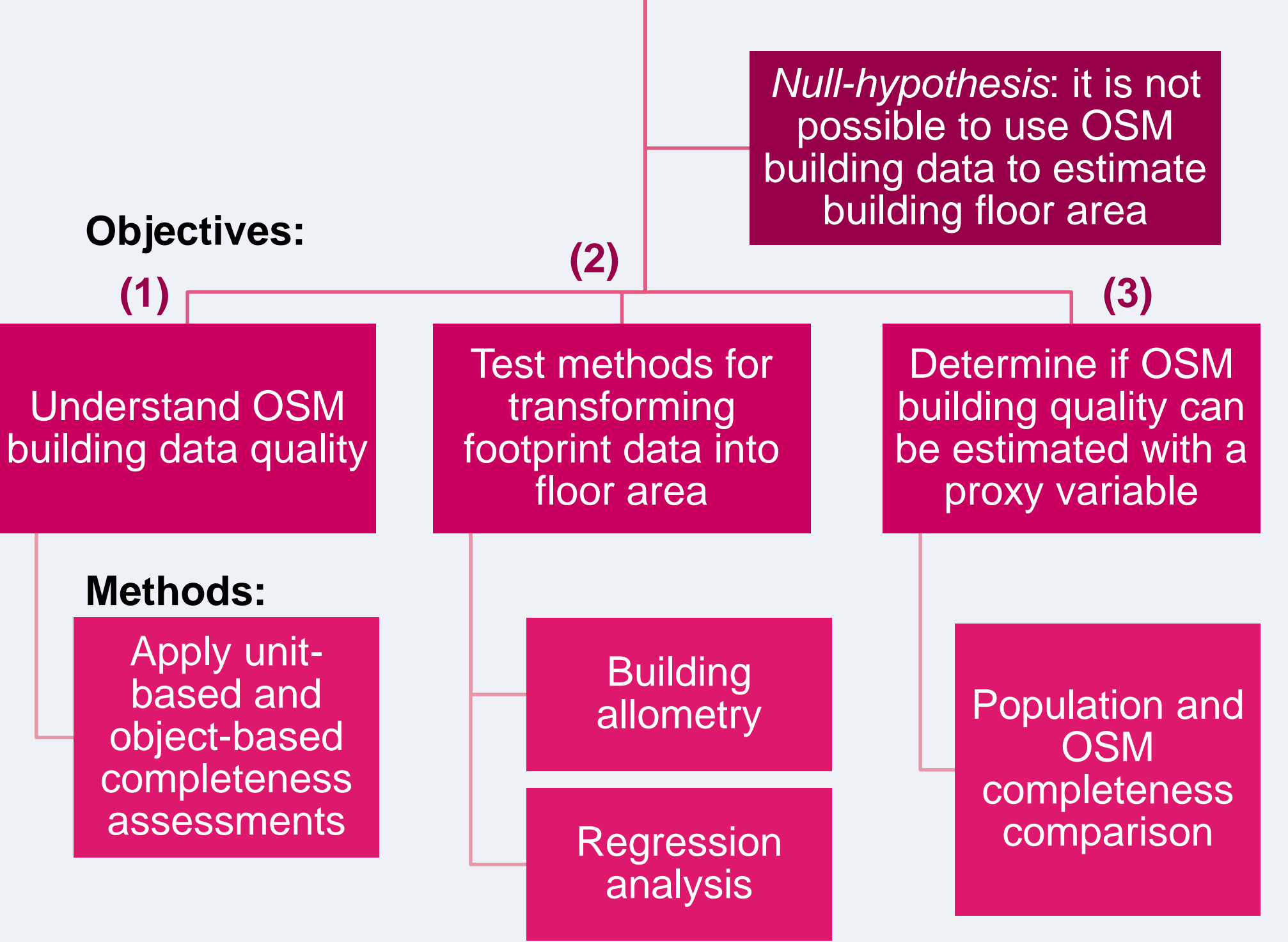


## Introduction

- In natural catastrophe exposure models, consistent floor area information remains one of the most challenging metrics to acquire[i].
- OpenStreetMap is a growing, global, database with building information.
- This study was conducted under the supervision and support of Risk Management Solutions (RMS), to investigate how OSM building data might be used to reduce uncertainty in natural catastrophe exposure models across Europe.

## Research Question:

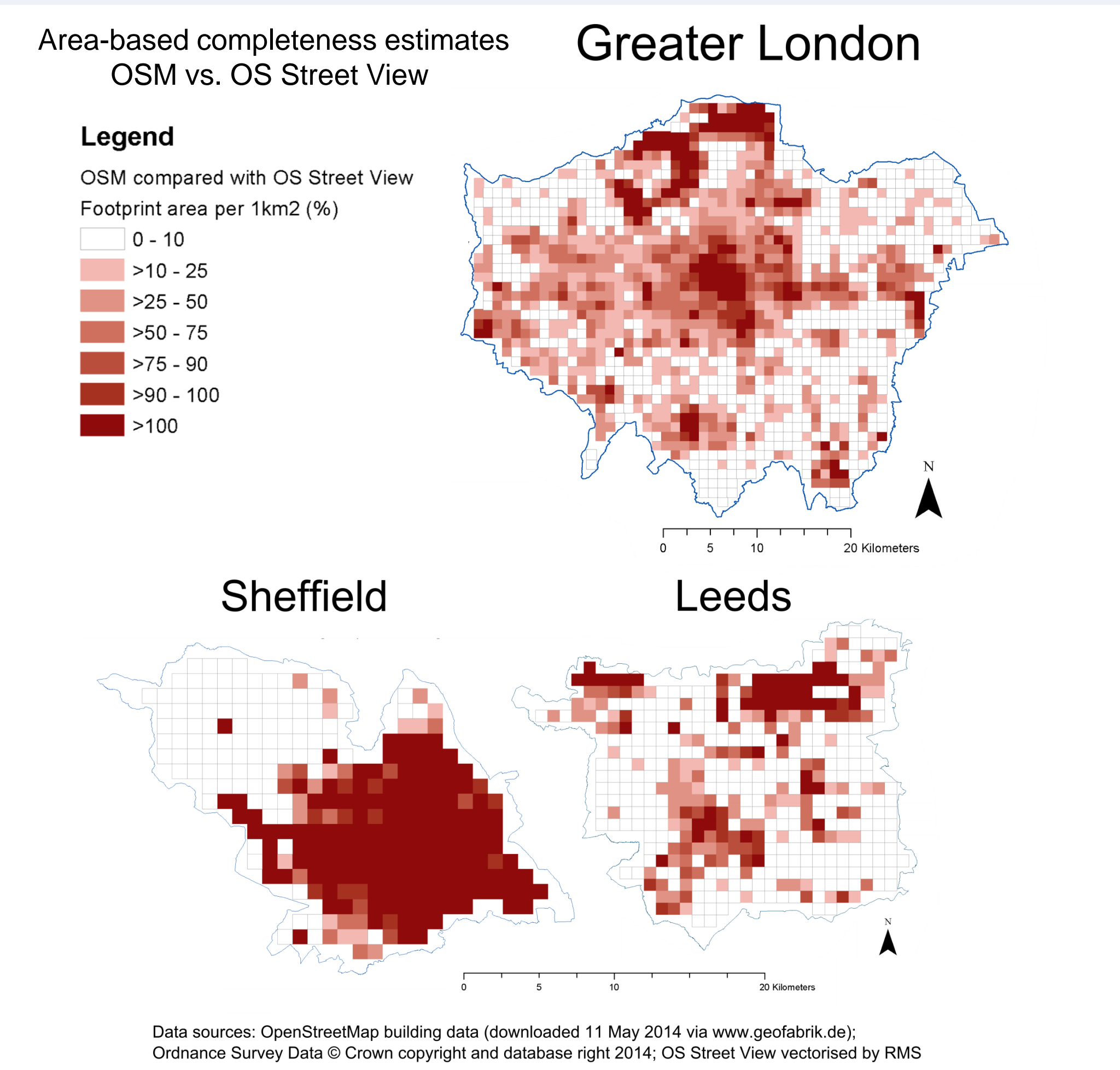
Can OSM building data be used to reduce uncertainty in natural catastrophe exposure modelling across Europe, and if so, how?



## Results

### (1) Understanding OSM building data quality

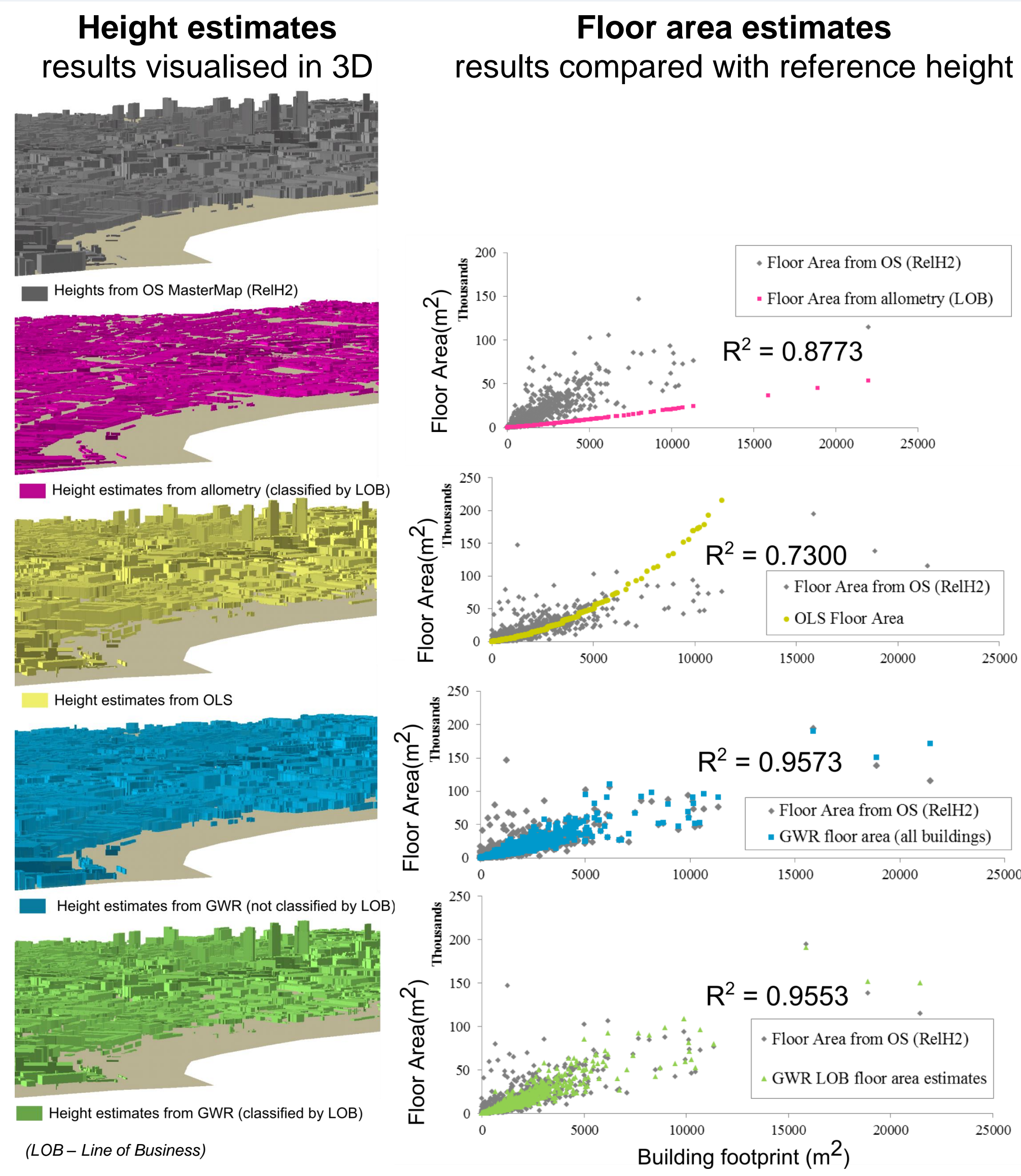
- Unit-based area assessments were most informative in the context of estimating floor area.
- Object-based assessments underestimated OSM building completeness and were influenced by data precision and accuracy



## Results (cont.)

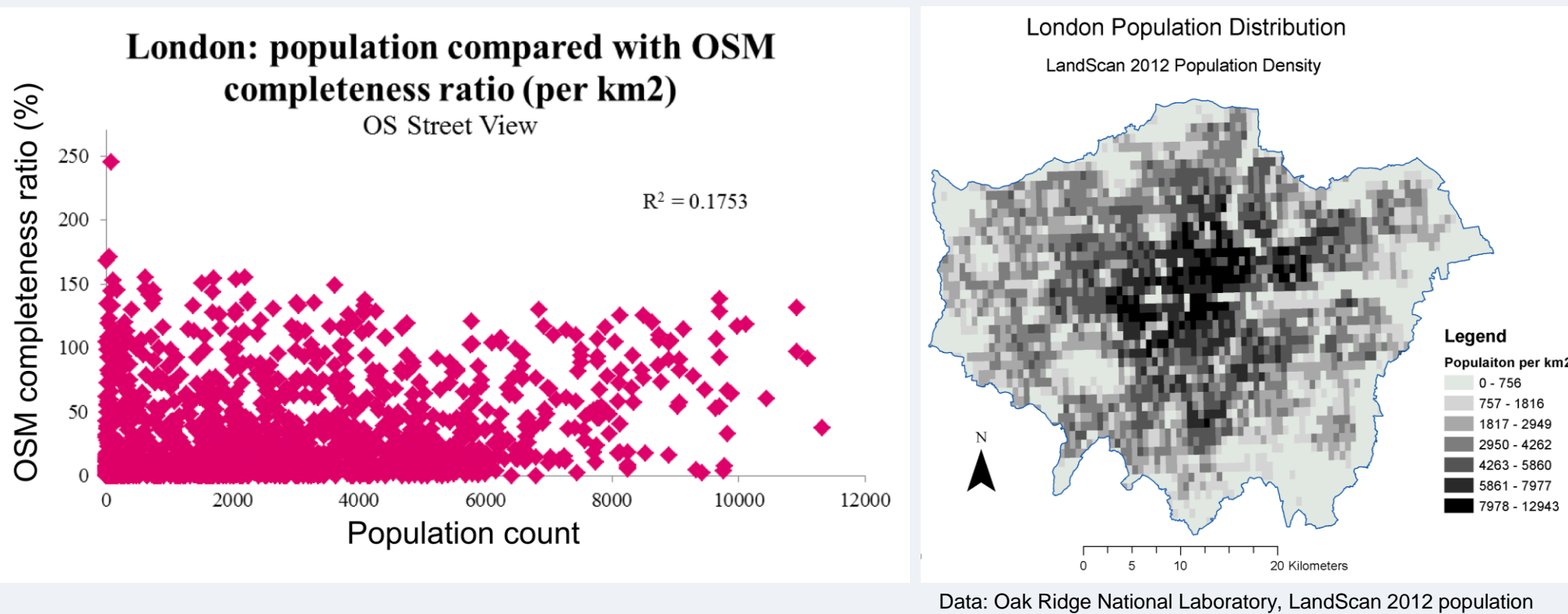
### (2) Transforming footprint data to floor area

- Most building floor area values were underestimated.
- There was no significant correlation between building footprint and height.
- Allometry, Ordinary Least Squares (OLS) and Geographically Weighted Regression (GWR) floor area estimates were all significantly correlated with reference estimates ( $R^2$  values >0.7).



### (3) Determining if OSM building quality can be estimated with a proxy variable: population density

- There was no correlation between OSM area-based completeness estimates and population density. *London example:*



## Conclusions

- It may be possible to estimate building floor area based on OSM building footprints; however without a reliable proxy for OSM completeness it will be challenging to quantify uncertainty in floor area estimates.
- OSM building completeness and quality is variable between UK cities. Area-based assessment methods are most relevant to OSM completeness assessments in the context of floor area estimates.
- There is no correlation between OSM area completeness and population density. Alternative proxy variables based on physical features should be investigated in future work.

[i] Christopoulou, K., 2013. *UK Non Residential EED Development*, London: RMS, Internal Document.  
Data sources: OpenStreetMap building data (downloaded 11 May 2014 via www.geofabrik.com; Ordnance Survey Data © Crown copyright and database right 2014; OS Street View vectorised by RMS; Oak Ridge National Laboratory LandScan 2012 population.