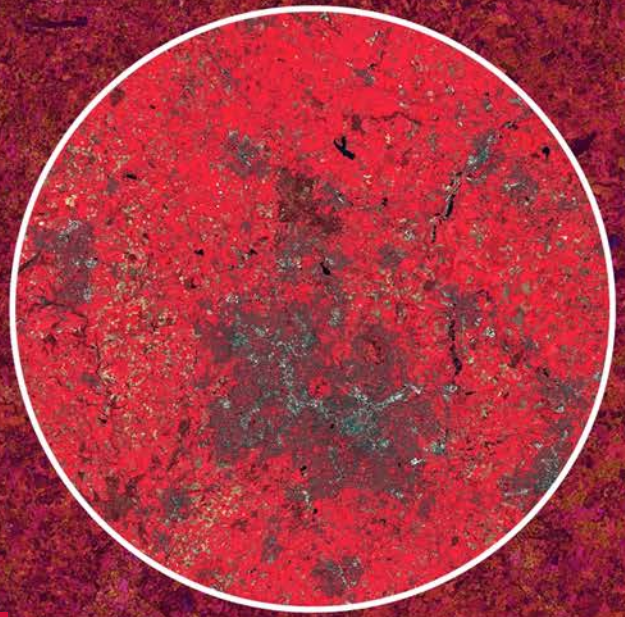
National Centre for Earth Observation
NATURAL ENVIRONMENT RESEARCH COUNCIL

UNIVERSITY OF LEICESTER

esa

→ 8th ADVANCED TRAINING COURSE ON LAND REMOTE SENSING

10–14 September 2018
University of Leicester | United Kingdom



Urban Mapping - Practical

Sebastian van der Linden, Akpona Okujeni, Franz Schug

11/09/2018

Study area

- City of Berlin, Germany
- 891,68 km²
- 3.52 Mio inhabitants
- 52° 31′ N, 13° 24′ O
- ~ 0.5 Mio street trees
- Extensive park areas and urban forests
- Abundant digital information freely available: http://fbinter.stadt-berlin.de/fb/

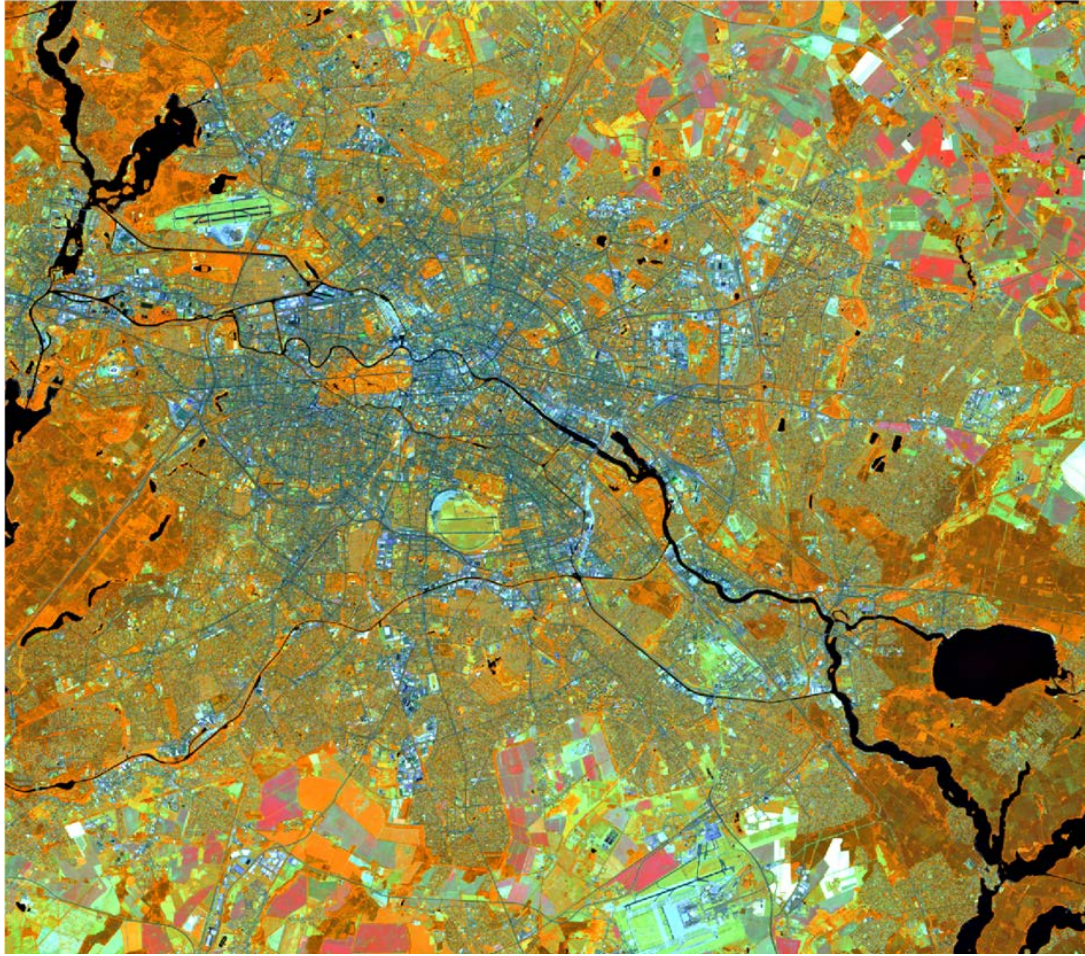
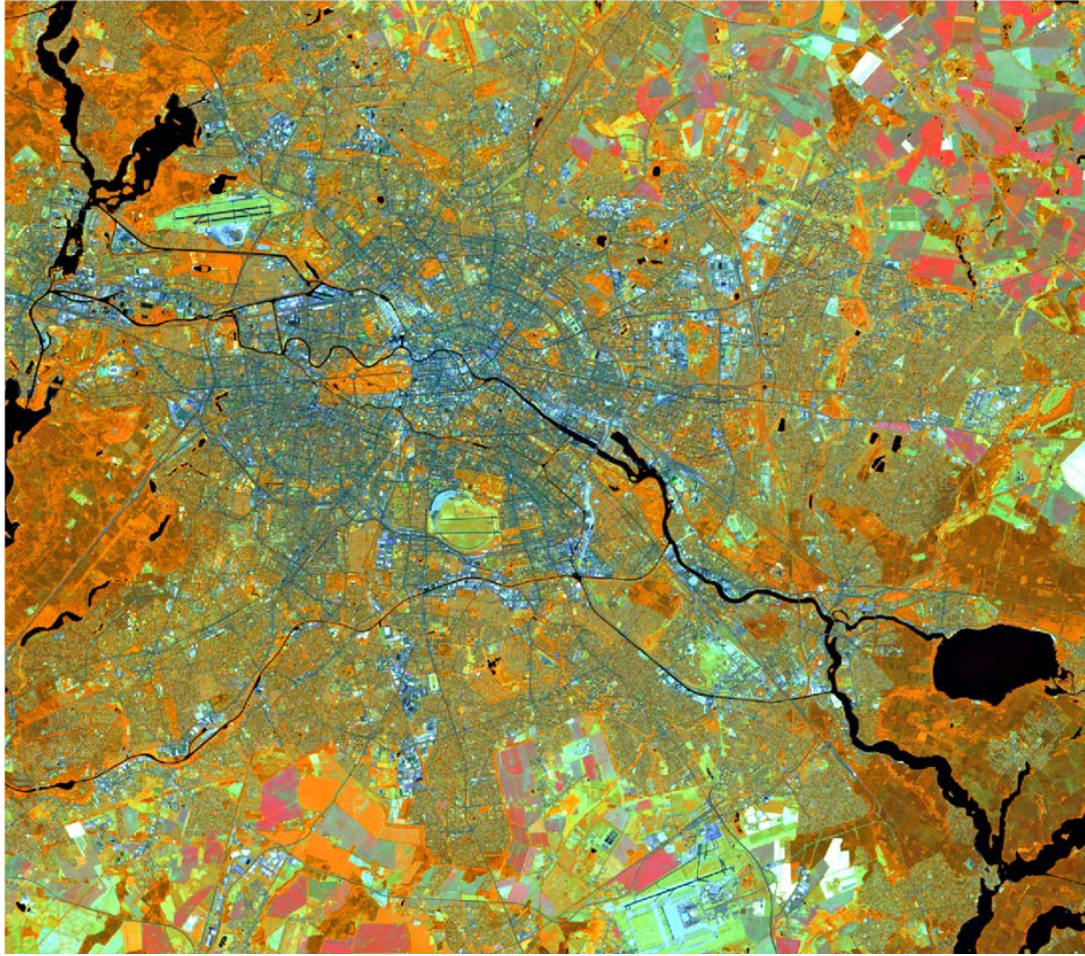


Image data

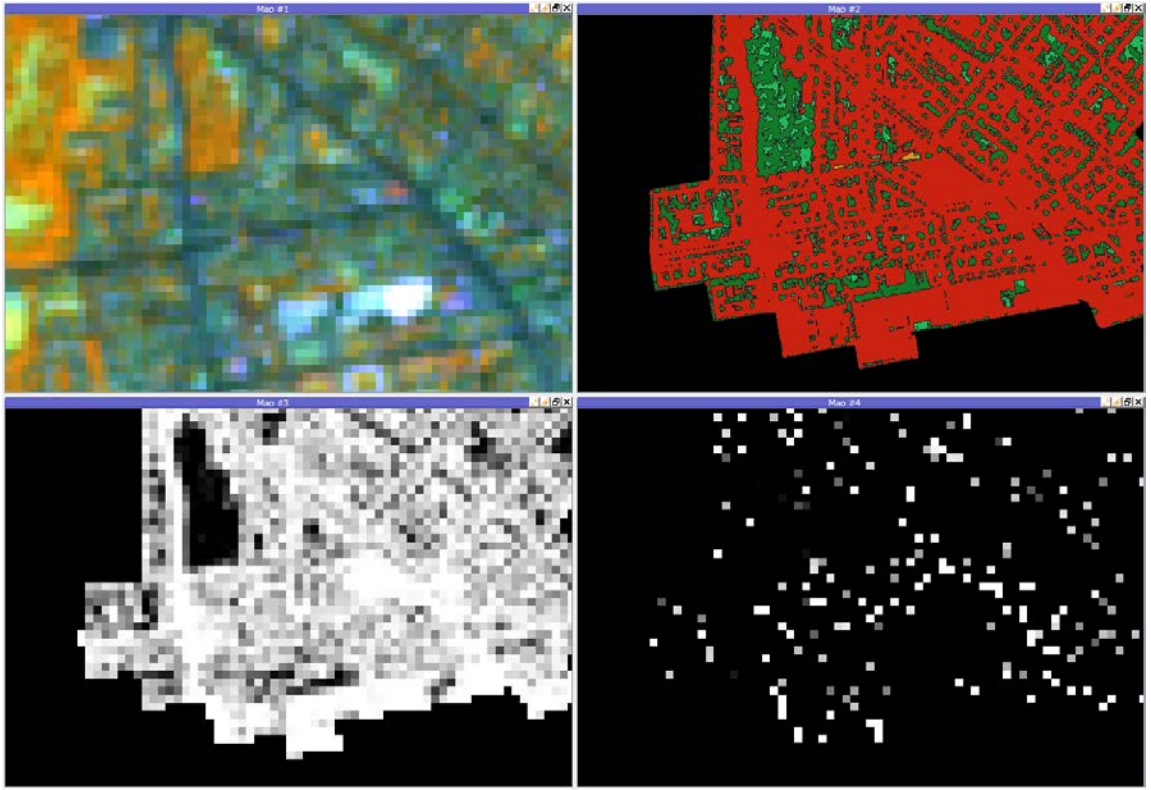
- Sentinel-2A
- 04 July 2015
- 9 spectral bands at 20 m spatial resolution
- Level 2a after Sen2Cor preprocessing



Reference data

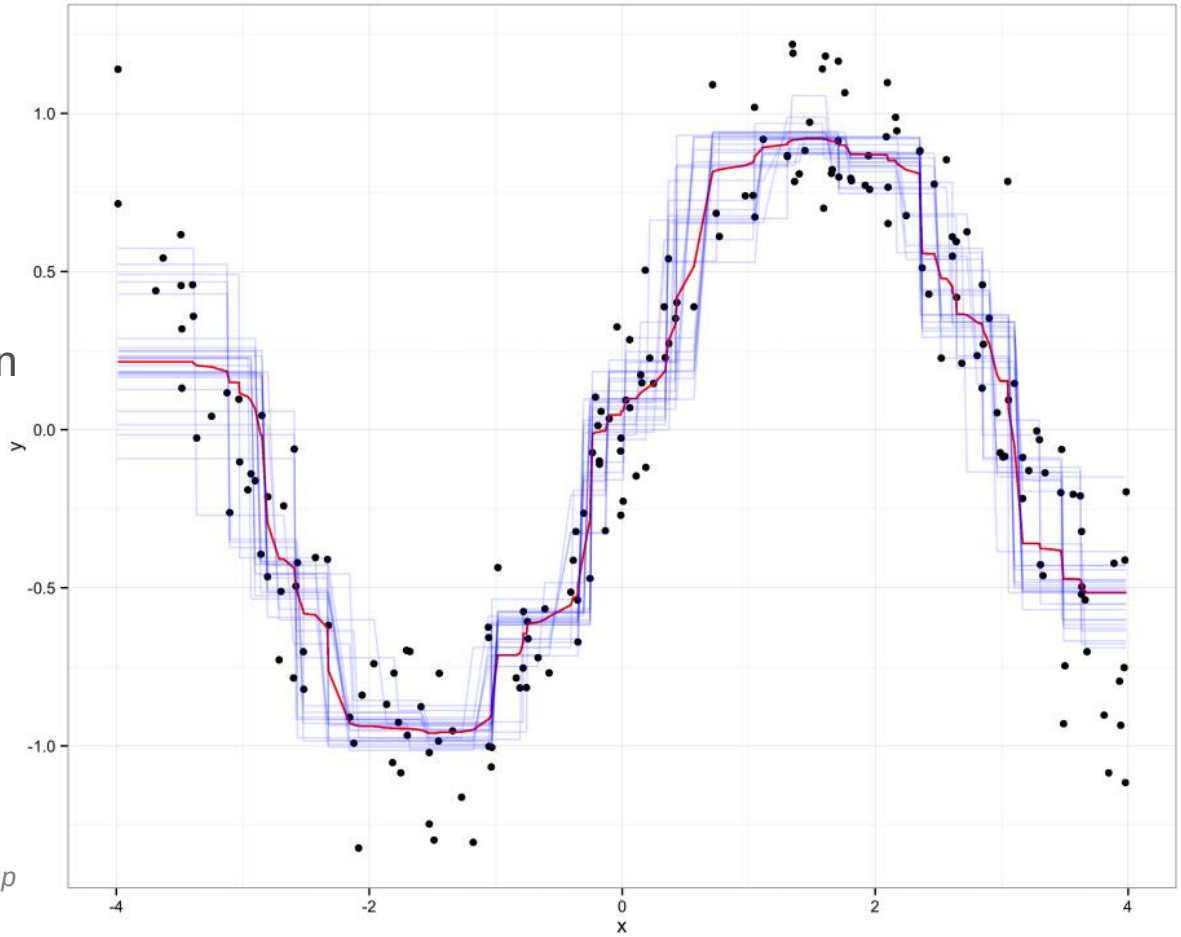
- High resolution municipal vector data was overlayed
- Impervious, high/low vegetation, water
- Soils manually assigned

- Fraction impervious cover derived for 10 m raster cells of Sentinel data
- Selection of 1400 training and 700 test pixels (stratified random sampling)



Regression approach

- Linear regression with NDVI as input
- Random Forest Regression with 9 spectral bands as input

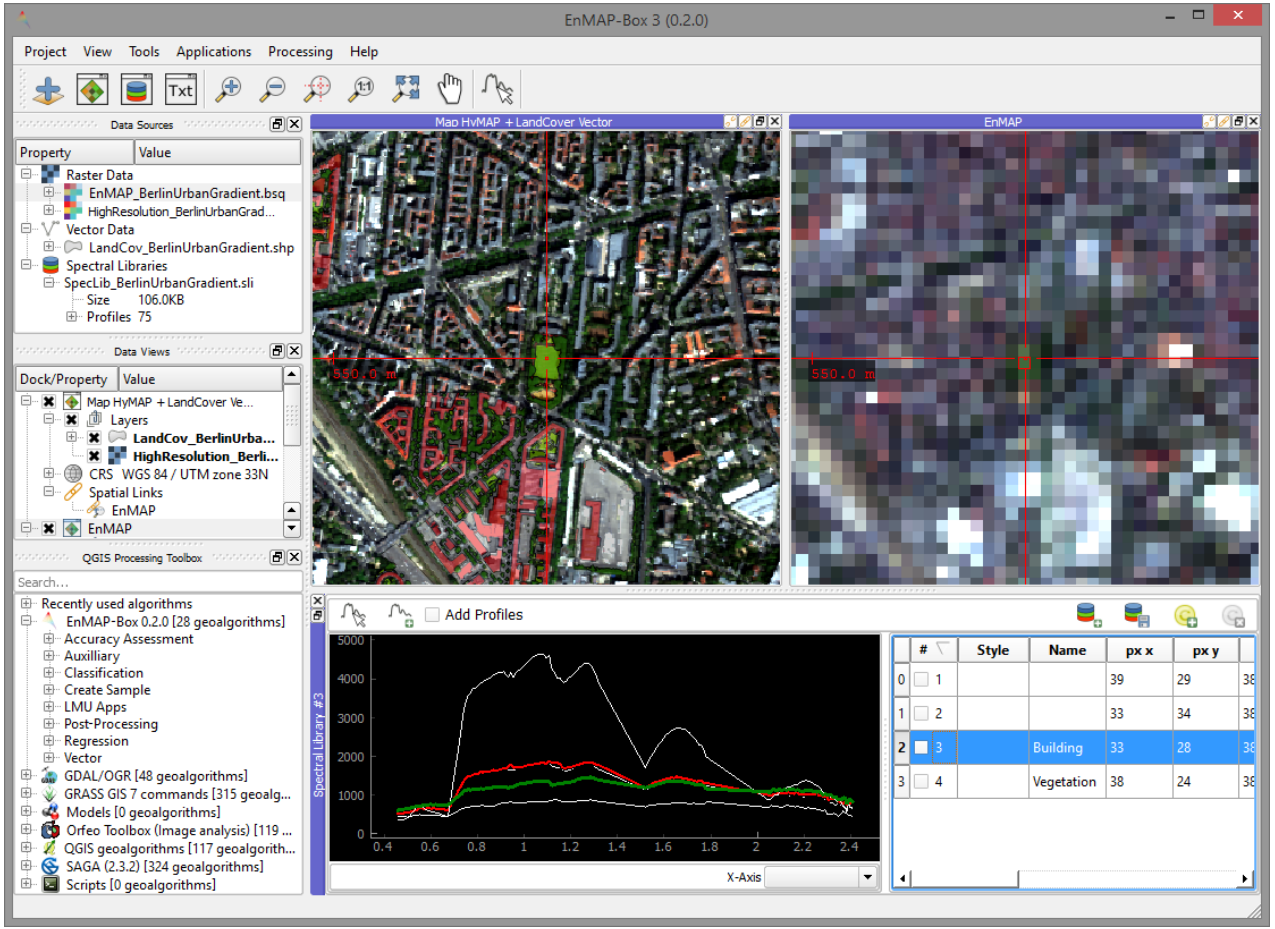


Source: Jones & Linder, 2015
http://zmjones.com/static/papers/rfss_manuscript.pdf

Software

- EnMAP-Box 3
- Free and open source software
- www.enmap.org

EnMAP
Hyperspectral Imager



Overview

1) Explore optical data from urban areas and urban surface materials

2) Evaluate inverse relationship between NDVI and impervious surface

3) Linear regression based on NDVI

4) Random Forest regression using 9 band Sentinel-2A spectrum

5) Quantitative accuracy assessment

6) Discussion on spatial resolution requirements (10 m vs. 20 m)