

# Martin Fleischmann

<sup>1</sup>Urban and Regional Laboratory, Charles University, CZ

<sup>2</sup>Geographic Data Science Lab, University of Liverpool, UK

[martin@martinfleischmann.net](mailto:martin@martinfleischmann.net)

+420 774 627 733

[martinfleischmann.net](http://martinfleischmann.net)

@martinleis

0000-0003-3319-3366

## EDUCATION

- Ph.D.     Architecture, University of Strathclyde, Glasgow, 2021  
*The Urban Atlas: Methodological Foundation of a Morphometric Taxonomy of Urban Form*
- MSc.     Urban Design, University of Strathclyde, Glasgow, 2017  
*Measuring Urban Form: A Systematisation of Attributes for Quantitative Urban Morphology*
- BSc.     Architecture and Urbanism, Czech Technical University, Prague, 2015

## ACADEMIC APPOINTMENTS

- 2024–     Charles University in Prague  
Research Associate, Department of Social Geography and Regional Development  
Urban and Regional Laboratory  
Research Team on Urban Structure
- 2023-24   The Alan Turing Institute  
Postdoctoral Research Associate  
Urban Analytics programme
- 2022-23   Charles University in Prague  
Postdoctoral Researcher, Department of Social Geography and Regional Development  
Urban and Regional Laboratory
- 2020–22   University of Liverpool  
Research Associate, Department of Geography and Planning  
*"Learning an urban grammar from satellite data through AI."*  
Economic and Social Research Council & Alan Turing Institute

## HONORARY APPOINTMENTS

- 2022–     University of Liverpool  
Fellow, Department of Geography and Planning

## PROFESSIONAL APPOINTMENTS

- 2022–23   UrbanDataLab AG  
Head of Data and Analytics

## PUBLICATIONS

### Journal Articles

- 2024 Fleischmann, M. and Arribas-Bel, D., 'Decoding (urban) form and function using spatially explicit deep learning' *Computers, Environment and Urban Systems* 112, 102147 doi:10.1016/j.compenvurbsys.2024.102147
- 2024 Fleischmann, M., and Vybornova, A., 'A shape-based heuristic for the detection of urban block artifacts in street networks' *Journal of Spatial Information Science* 28. doi:10.5311/JOSIS.2024.28.319
- 2023 Calafiore, A., Samardzhiev, K., Rowe, F., Fleischmann, M., and Arribas-Bel, D., 'Inequalities in experiencing urban functions. An exploration of human digital (geo-)footprints' *Environment and Planning B: Urban Analytics and City Science* 0 (0). doi:10.1177/23998083231208507
- 2023 Fleischmann, M. 'Clustergram: Visualization and diagnostics for cluster analysis'. *Journal of Open Source Software* 8 (89), 5240. doi:10.21105/joss.05240
- 2023 Wang, J., Fleischmann, M., Venerandi, A., Romice, O., Kuffer, M., and Porta, S. 'EO + Morphometrics: Understanding cities through urban morphology at large scale' *Landscape and Urban Planning*, 233. doi:10.1016/j.landurbplan.2023.104691
- 2022 Rowe, F., Calafiore, A., Arribas-Bel, D., Samardzhiev, K., and Fleischmann, M. 'Urban exodus? Understanding human mobility in Britain during the COVID-19 pandemic using Meta-Facebook data' *Population, Space and Place*, e2637. doi:10.1002/psp.2637
- 2022 Arribas-Bel, D. and Fleischmann, M. 'Spatial Signatures: Understanding (urban) spaces through form and function' *Habitat International*, 128, (102641). doi:10.1016/j.habitatint.2022.102641
- 2022 Fleischmann, M. and Arribas-Bel, D. 'Geographical characterisation of British urban form and function using the spatial signatures framework' *Scientific Data*, 9, (546). doi:10.1038/s41597-022-01640-8
- 2022 Venerandi, A., Feliciotti, A., Fleischmann, M., Kourtit, K., Porta, S. 'Urban form character and Airbnb in Amsterdam *NL*: A morphometric approach' *Environment and Planning B: Urban Analytics and City Science* 50 (2), 386-400. doi:10.1177/23998083221115196
- 2022 Samardzhiev, K., Fleischmann, M., Arribas-Bel, D., Calafiore, A., Rowe, F. 'Functional Signatures in Great Britain: A dataset.' *Data in Brief*, 108335, doi:10.1016/j.dib.2022.108335
- 2022 Singleton, A., Arribas-Bel, D., Murray, J., and Fleischmann, M. 'Estimating generalized measures of local neighbourhood context from multispectral satellite images using a convolutional neural network.' *Computers, Environment and Urban Systems*, 95, 101802. doi:10.1016/j.compenvurbsys.2022.101802
- 2021 Fleischmann, M., Feliciotti, A., Romice, O. and Porta, S. 'Methodological Foundation of a Numerical Taxonomy of Urban Form.' *Environment and Planning B: Urban Analytics and City Science* 49 (4), 1283-1299. doi:10.1177/23998083211059835
- 2021 Fleischmann, M., Feliciotti, A. and Kerr, W. 'Evolution of urban patterns: urban morphology as an open reproducible data science.' *Geographical Analysis* 54 (3). doi:10.1111/gean.12302
- 2020 Dal Cin, F., Fleischmann, M., Romice, O. and Costa, J.P. 'Climate Adaptation Plans in the Context of Coastal Settlements: The Case of Portugal.' *Sustainability* 12 (20). doi:10.3390/su12208559

- 2020 Fleischmann, M., Romice, O. and Porta, S. 'Measuring urban form: overcoming terminological inconsistencies for a quantitative and comprehensive morphologic analysis of cities.' *Environment and Planning B: Urban Analytics and City Science* 48 (8), 2133-2150. doi:10.1177/2399808320910444
- 2020 Fleischmann, M., Feliciotti, A., Romice, O. and Porta, S. 'Morphological tessellation as a way of partitioning space: Improving consistency in urban morphology at the plot scale' *Computers, Environment and Urban Systems* 80, 101441. doi:10.1016/j.compenvurbsys.2019.101441
- 2019 Fleischmann, M. 'momepy: Urban Morphology Measuring Toolkit' *Journal of Open Source Software* 4 (43), 1807. doi:10.21105/joss.01807

### Conference Papers

- 2022 Fleischmann, M. and Arribas-Bel, D. 'Classifying urban form at national scale : the British morphosignatures', *Annual Conference Proceedings of the XXVIII International Seminar on Urban Form*. University of Strathclyde Publishing, Glasgow, pp. 895-905. ISBN 9781914241161. doi:10.17868/strath.00080527
- 2022 Wang, J., Fleischmann, M., Venerandi, A., Kuffer, M., Porta, S. 'Earth observation+ morphometrics: towards a systematic understanding of cities in challenging contexts', *Annual Conference Proceedings of the XXVIII International Seminar on Urban Form*. University of Strathclyde Publishing, Glasgow, pp. 363-370. ISBN 9781914241161. doi:10.17868/strath.00080467
- 2022 Fleischmann, M., Romice, O. and Porta, S. 'Applicability of morphological tessellation and its topological derivatives in the quantitative analysis of urban form' *Cities as Assemblages, Proceedings of XXVI International Seminar on Urban Form, volume 3*. Nicosia. doi:10.36158/978889295357413

### Commentaries

- 2024 Fleischmann, M. and Arribas-Bel, D. 'In praise of (spatial) bundles', *Environment and Planning B: Urban Analytics and City Science* 51 (1), 3-6 doi:10.1177/23998083231224151

### Reports and Other publications

- 2022 Feliciotti, A., Fleischmann, M., eds. 'ISUF Annual Conference Proceedings of the XXVII International Seminar on Urban Form: "Urban Form and the Sustainable and Prosperous City"'. University of Strathclyde Publishing, Glasgow, ISBN 9781914241161. doi:10.17868/80146
- 2022 Rowe, F., Arribas-Bel, D., Calafiore, A., MacDonald, J., Samardzhiev, K., Fleischmann, M., 'Mobility data in urban science. Workshop report'. The Alan Turing Institute. London, United Kingdom.
- 2021 Fleischmann, M. 'Policy Brief: Flexibilita prostorového uspořádání města' (Flexibility of the spatial configuration of the city) *Územně analytické podklady hl. m. Prahy*. Institute for Planning and Development, Prague, Czechia
- 2021 Darlington-Pollock, F., Arribas-Bel, D., Fleischman, M., Newsham, N., Rowe, F. 'Policy Brief: What do 'left behind' areas look like over time? Developing place-based typologies of left behind areas'. Local Trust, UK
- 2020 Places Platform, Smart Growth America, UDSU. 'Welcome to the Future of Grand Rapids: Assessing Place-Based Economic, Social Equity, and Public Health Performance'. Downtown Grand Rapids Inc., US

2018 Fleischmann, M. 'Measuring Urban Form' *URBAN DESIGN* 146 (Spring 2018), 6-7.

## RESEARCH SOFTWARE DEVELOPMENT

2023– geodatasets: spatial data examples. (author and maintainer)  
2022– Xvec: vector data cubes for Xarray. (author and maintainer)  
2021– xyzservices: source of XYZ tiles providers. (author and maintainer)  
2020– clustergram: visualization and diagnostics for cluster analysis (author and maintainer)  
2020– PySAL: Python Spatial Analysis Library (core developer)  
2019– GeoPandas: an open source project to make working with geospatial data in python easier (core developer)  
2018– momepy: Urban Morphology Measuring Toolkit (author and maintainer)

## EDITORIAL APPOINTMENTS

2021– Journal of Open Source Software  
Associate Editor

## RESEARCH INCOME

### Awards

2024 *European Space Agency* 'EuroFab: European Urban Fabric Classification Using Artificial Intelligence', €250,000  
2023 *Primus Research Programme, Charles University* 'Influence of Socioeconomic and Cultural Factors on Urban Structure in Central Europe', €325,000  
2023 *NumFOCUS* 'Create a more consistent geometry API through the feature parity between low-level (Shapely) and high-level (GeoPandas) packages', \$8,000  
2020 *NumFOCUS* 'Improvement and modernization of GeoPandas documentation', \$5,000  
2018 *University of Strathclyde* 'John Anderson Research Award', £60,000

## INVITED TALKS

2023 'The Emergent Structure of Urban Form and Function' Space Syntax Lab Seminars. UCL. Online. May 18.  
2023 'Urban morphology drawn and seen' NETwoRks, Data, and Society. IT University of Copenhagen. Online. April 26.  
2021 'Capturing the Structure of Cities with Data Science.' Spatial Data Science Conference 2021. Online. Oct 26.  
2021 'Spatial Signatures: Dynamic classification of the built environment.' Spatial Analytics and Data seminar series by University of Newcastle and University of Bristol. Online. Mar 30.

- 2020 'Reading cities as numbers. Where data science meets urbanism.' Academy of Urbanism (Scotland). Online. Dec 3.

## TEACHING

- 2023– Spatial Data Science for Social Geography  
*Charles University*

## PRIZES

- 2023 Michael Breheny Prize  
*Environment and Planning B: Urban Analytics and City Science*

## CONFERENCE ACTIVITY

### Conferences Organized

- 2021 'XXVIII International Seminar on Urban Form' Urban Form and the Sustainable Prosperous City. Glasgow (virtually), UK. Jun 29 – Jul 3.

### Conference Papers Presented

Presenting author *italicized* if other than first author.

- 2023 Arribas-Bel, D. and Fleischmann, M. 'Learning from Deep Learning: Lessons from using computer vision to identify (urban) form and function in open data satellite imagery.' AAG Annual Meeting. Denver, US Mar 23 – 26.
- 2023 Fleischmann, M. 'Vector data cubes as a bridge between raster and vector worlds.' GeoPython. Basel. Mar 6–8.
- 2022 Fleischmann, M. 'Learning from the "cool kids": how academic research can benefit from becoming more like open-source.' GeoPython. Basel. Jun 20–22.
- 2022 Fleischmann, M. and Arribas-Bel, D. 'Detecting urban typology from multispectral satellite imagery using neural networks.' ISUF Italy 2022, Bolgona/Virtual, IT. Jun 8 – 10.
- 2022 Fleischmann, M. and Arribas-Bel, D. 'Using deep learning to identify (urban) form and function in satellite imagery - the case of Great Britain.' GISRUUK 2022, Liverpool UK. Apr 6 – 8.
- 2021 Fleischmann, M. and Arribas-Bel, D. 'Classifying urban form at a national scale: The case of Great Britain' XXVIII International Seminar on Urban Form: Urban Form and the Sustainable Prosperous City. Glasgow/Virtual. Jun 29 – Jul 3.
- 2021 Venerandi, A., *Feliciotti, A.*, Fleischmann, M., Kourtit, K., Romice, O., Nijkamp, P., Porta, S. and Fusco, G. 'Urban form and Airbnb: a study of their spatial relation in Amsterdam (NL)' XXVIII International Seminar on Urban Form: Urban Form and the Sustainable Prosperous City. Glasgow/Virtual. Jun 29 – Jul 3.
- 2021 Porta, S., *Venerandi, A.*, *Feliciotti, A.*, Fleischmann, M. and Romice, O. 'A Numerical Taxonomy of Urban Form in London: an Urban Morphometric Approach' XXVIII International Seminar on Urban Form: Urban Form and the Sustainable Prosperous City. Glasgow/Virtual. Jun 29 – Jul 3.

- 2021 Wang, J., Fleischmann, M., Venerandi, A., Kuffer, M. and Porta, S. 'Earth Observation + Morphometrics: towards a systematic understanding of cities in challenging contexts' XXVIII International Seminar on Urban Form: Urban Form and the Sustainable Prosperous City. Glasgow/Virtual. Jun 29 – Jul 3.
- 2020 Fleischmann, M. 'On the morphological composition of cities and how to measure it.' GeoPython. Virtual. Sep 21–22.
- 2020 Fleischmann, M., Romice, O. and Porta, S. 'The Urban Atlas: Towards a Morphometric Taxonomy of Urban Form' XXVII International Seminar on Urban Form: Cities in the 21st Century. Salt Lake City/Virtual. Sep 1–4.
- 2020 Hořák, D., Fleischmann, M., Romice, O. and Porta, S. 'Just like a bird. A community ecology perspective on urban form evolution' XXVII International Seminar on Urban Form: Cities in the 21st Century. Salt Lake City/Virtual. Sep 1–4.
- 2020 Feliciotti, A., Fleischmann, M., Romice, O., Kerr, W. and Porta, S. 'Morphological Resilience Evaluation (MoRE): a new assessment framework for multi-level assessment of urban form resilience' XXVII International Seminar on Urban Form: Cities in the 21st Century. Salt Lake City/Virtual. Sep 1–4.
- 2020 Dal Cin, F., Fleischmann, M., Romice, O. and Costa, J.P. 'DECODING SEASHORE STREETS: urban morphometrics as a tool for adaptation measures' XXVII International Seminar on Urban Form: Cities in the 21st Century. Salt Lake City/Virtual. Sep 1–4.
- 2020 Fleischmann, M., Dal Cin, F., Romice, O. and Barreiros Proença, S. 'Understanding seashore streets: urban morphometrics as a tool for climate-induced risk assessment' ISUF Italy International Conference: Urban Substrata and City Regeneration. Rome Feb 19–22.
- 2019 Feliciotti, A., Fleischmann, M., Romice, O., and Porta, S. 'Morphological Resilience: from a theory of resilient urban forms to the tools for its implementation' 12th CITTA International Conference on Planning Research: Spatial Planning for Change. Porto. Sep 19–20.
- 2019 Fleischmann, M., Romice, O. and Porta, S. 'Applicability of morphological tessellation and its topological derivatives in the quantitative analysis of urban form' XXVI International Seminar on Urban Form: Cities as Assemblages. Nicosia. Jul 2–6.
- 2019 Fleischmann, M., Hořák, D., Porta, S. et al. 'Ecological and evolutionary perspectives in urban morphology' Ecology and Evolution of Urban Areas, CEE Symposium. London. Jun 13.

#### **Other conference activities**

- 2023 Fleischmann, M. and van den Bossche, J. 'Writing efficient code for GeoPandas and Shapely in 2023' GeoPython 2023, Basel, CH, Mar 6 – 8.
- 2022 Fleischmann, M. and Gaboardi, J. 'Understanding the structure of cities through the lens of data' Spatial Data Science Symposium 2022, Virtual, Sep 22 – 23.
- 2022 Fleischmann, M. and van den Bossche, J. 'Scaling up vector analysis with Dask-GeoPandas' GeoPython 2022, Basel, CH, Jun 20 – 22.
- 2022 Nieves, J., Fleischmann, M. and Calafiore, A. 'Dasymetric population modelling in R and Python workshop' GISRUUK 2022, Liverpool UK. Apr 6 – 8.
- 2021 Fleischmann, M. and Arribas-Bel, D. 'Spatial Signatures in Great Britain - lightning talk' Towards urban analytics 2.0, Alan Turing Institute (Urban Analytics) event, Leeds UK. Nov 30 – Dec 1.

## **SERVICE**

### **Academic Journal Peer Review**

*Cartography and Geographic Information Science*

*Environment and Planning B: Urban Analytics and City Science*

*Geographical Analysis*

*Habitat International*

*Journal of Geographical Systems*

*Journal of Open Research Software*

*Journal of Open Source Software*

*Journal of Statistical Software*

*Moravian Geographical Reports*

*Nature Communications*

*Nature Machine Intelligence*

*Plos ONE*

*Scientific Reports*

*Transactions in GIS*

*Urban Morphology*

### **Academic Press Peer Review**

*CRC Press*

### **Other Peer Review**

*Austrian Academy of Sciences*

*Czech Technical University*

*pyOpenSci*

*ZHAW Zurich University of Applied Sciences*

### **Other**

2022      Lecturer, OpenGeoHub Summer School Siegburg  
*Introduction to GeoPandas and its Python ecosystem*

2022      Mentor, Google Summer of Code.  
*PySAL - Street network simplification projects*  
Greg Maya, Gabriel Agostini

2021      Mentor, Google Summer of Code.  
*Geopandas - Dask bridge to scale geospatial analysis*  
Thomas Statham (University of Bristol)

2019, 2022      External reviewer, FA CTU Doctoral workshop

## **CONSULTING**

2024	4ct platform, Czechia
2022	UrbanDataLab AG, Switzerland
2021	All-Party Parliamentary Group for 'left behind' neighbourhoods, UK
2019–20	Institute for Planning and Development, Prague, Czechia
2020	Places Platform, US

## **MEMBERSHIPS**

2021–	Royal Geographical Society (Fellow)
2019–	International Seminar on Urban Form (Member)
2018–	Academy of Urbanism (Young Urbanist)

Updated July 2024