

# Martin Fleischmann

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## 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

- 2022-2023     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

### 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.’ GISRUK 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