

Urban Grammar

*Making it easy for Regional Scientists to consider (urban)
form & function*

SEA Lecture'22

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The
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Geographic
Data Science
Lab

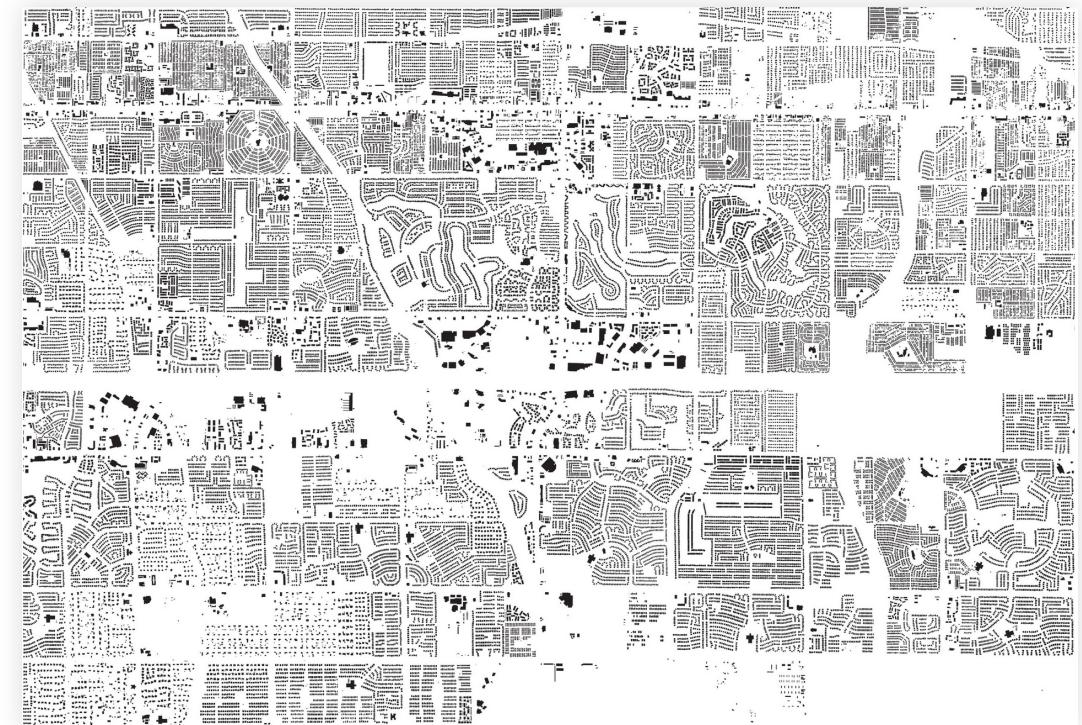


Today

- *Urban* Form & Function
- Urban Grammar
- A peek into the future

(Urban) Form & Function

How we arrange “stuff” in cities matters...



Source: *A map of every building in America* ([New York Times](#))

Form & Function

Form

What does it look like?

“Physical structure and appearance of cities”

Function

What is it used for?

“Activities that take place within an environment”

Why Form & Function?

Encodes the past

- Geography
- History
- Technology
- ...

Frames the future

- Productivity
- Sustainability
- Quality of Life
- ...

F&F in Regional Science

 **Regional Science and Urban Economics**
Volume 21, Issue 2, July 1991, Pages 163-182

Subcenters in the Los Angeles region ★
Genevieve Giuliano, Kenneth A. Small
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[https://doi.org/10.1016/0166-0462\(91\)90032-I](https://doi.org/10.1016/0166-0462(91)90032-I) [Get rights and content](#)

 **Journal of Urban Economics**
journal homepage: www.elsevier.com/locate/jue

The economic effects of density: A synthesis*
Gabriel M. Ahlfeldt^{a,1,*}, Elisabetta Pietrostefani^b
*London School of Economics and Political Sciences (LSE) and Centre for Economic Policy Research (CEPR), Houghton Street, London WC2A 2AE, United Kingdom
^bLondon School of Economics and Political Sciences (LSE), Houghton Street, London WC2A 2AE, United Kingdom

Cities in Bad Shape: Urban Geometry in India - American Economic Association — Mozilla Firefox

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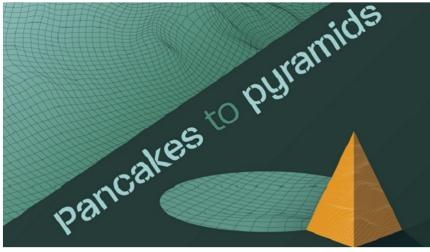
Home Journals American Economic Review August 2020
Cities in Bad Shape: Urban Geometry in India

Cities in Bad Shape: Urban Geometry in India

Mariaflavia Harari

AMERICAN ECONOMIC REVIEW
VOL. 110, NO. 8, AUGUST 2020
(pp. 2377-2421)

 **Pancakes to Pyramids: City Form to Promote Sustainable Growth**
PUBLICATION | JUNE 2, 2021



 **Rethinking Urban Sprawl**
MOVING TOWARDS SUSTAINABLE CITIES







F&F in Regional Science

Critical to understand:

- Agglomeration economies
- Amenities in cities
- Urban/rural
- ...

But often:

- Coarse
- Aggregate
- Ad-hoc
- ...

Detail matters...

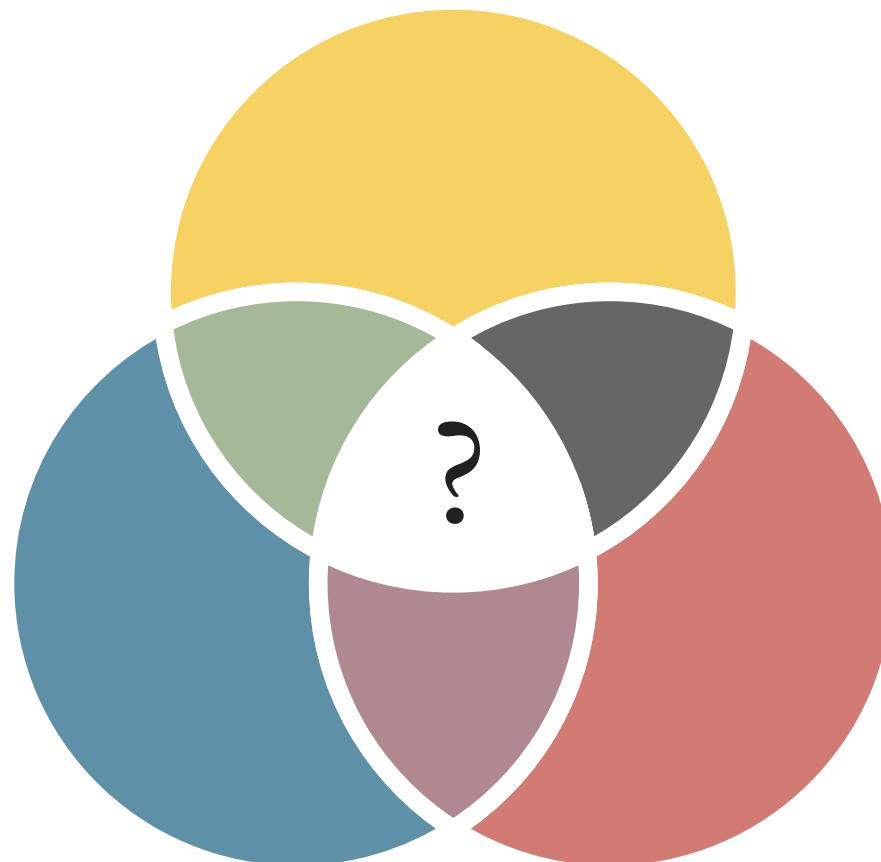


Source: *Six 15-minute walks capture the diversity, history of Houston neighborhoods* ([Urban Edge](#))

detailed

scalable

consistent



Urban Grammar



The Alan Turing Institute



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Urban Grammar

Learning an urban grammar from satellite data through AI

[Learn more ↓](#)

Project status
Ongoing

Related programmes
[Urban analytics](#)



*Characterisations of space based on form and function
designed to understand urban environments*

*Characterisations of space based on form and function
designed to understand urban environments*

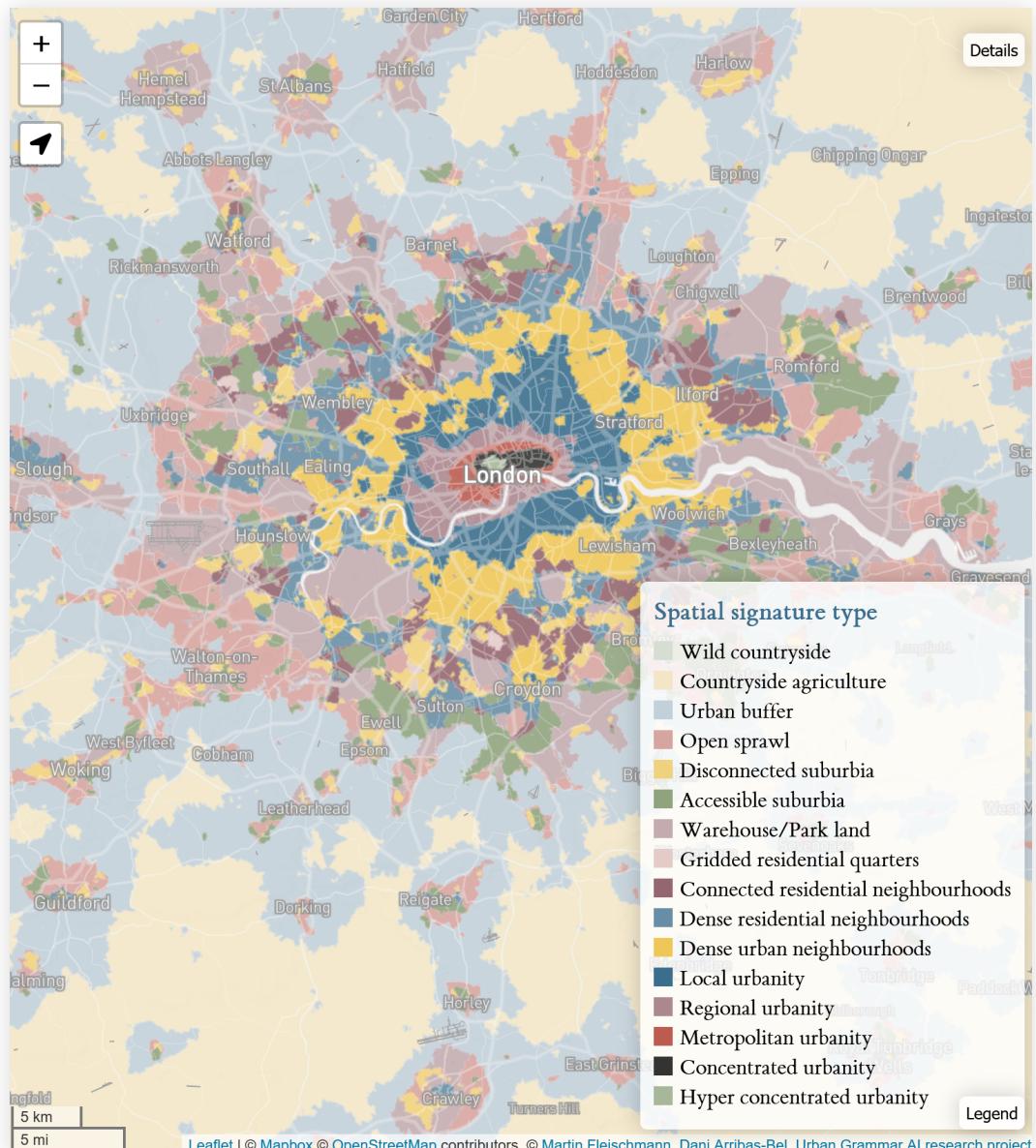
*Characterisations of space based on form and function
designed to understand urban environments*

*Characterisations of space based on form and function
designed to understand urban environments*

British Signatures



<https://urbangrammarai.xyz/story>



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Spatial Signatures of Great Britain

Population & Mobility Transport & Movement

Geographical Characterisation of British Urban Form and Function using the Spatial Signatures Framework

Spatial signatures characterise space based on form and function in a way designed to understand urban environments. This data product, part of the Urban Grammar project, contains a typology of spatial signatures in Great Britain. Each type has a distinct character capturing what the place looks like (form) and how it is used (function).

The data product contains bespoke Signature geometry with signature type, summary of input variables per each geometry and per each type, interpolation of signature types to OA and LSOA geometry and short pen portraits for the typology, shorthand descriptions of the characteristics of each signature type.

The interactive map showing the typology is available at <https://urbangrammarai.xyz/great-britain/>. More details about the project can be found at the project website <https://urbangrammarai.xyz>.

Data Extent

Leaflet | Map data © OpenStreetMap

License

UK Open Government Licence (OGL)



Sub-classifications

XXVIII International Seminar on Urban Form
ISUF2021: URBAN FORM AND THE SUSTAINABLE AND PROSPEROUS CITIES
29th June – 3rd July 2021, Glasgow

Classifying urban form at national scale: The British morphosignatures

Dr Martin Fleischmann¹, Dr Daniel Arribas-Bel¹

¹ Geographic Data Science Lab, Department of Geography and Planning, University of Liverpool, UK



 ELSEVIER

Data in Brief
Volume 43, August 2022, 108335


Data Article

Functional signatures in Great Britain: A dataset

Krasen Samardzhiev ^a  , Martin Fleischmann ^a , Daniel Arribas-Bel ^{a, b} , Alessia Calafiore ^a , Francisco Rowe ^a 

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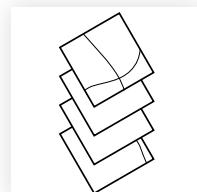
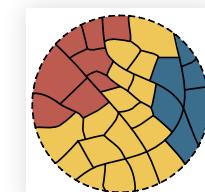
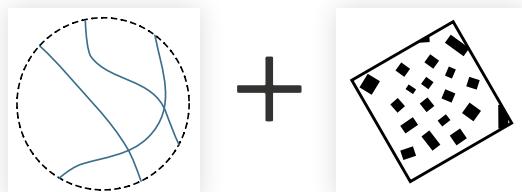
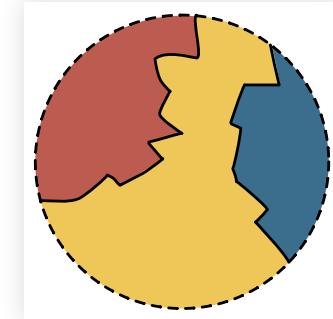
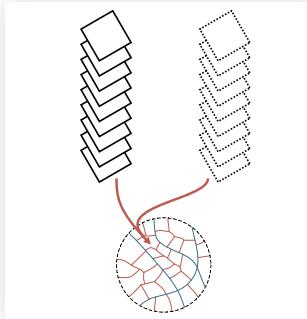
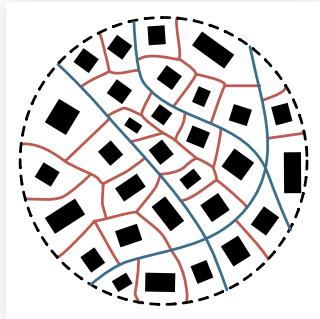
Building Spatial Signatures

[STAGE] Delimiters Enclosure Anchors Encl. Tess. Characters Clusters Signatures

Enclosed
Tessellation

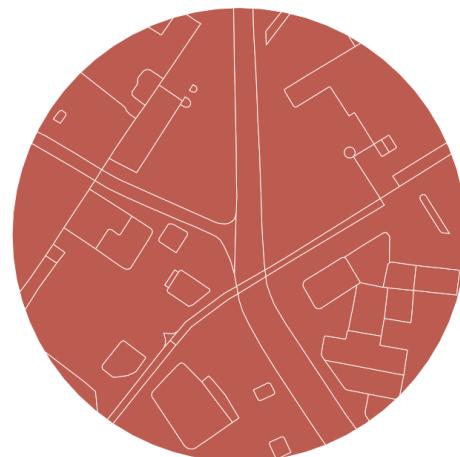
Embedding
form & function

Spatial
Signatures

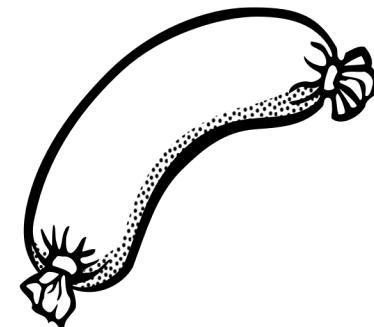


Meaningful spatial units

Enclosed tessellation



“Open by default”



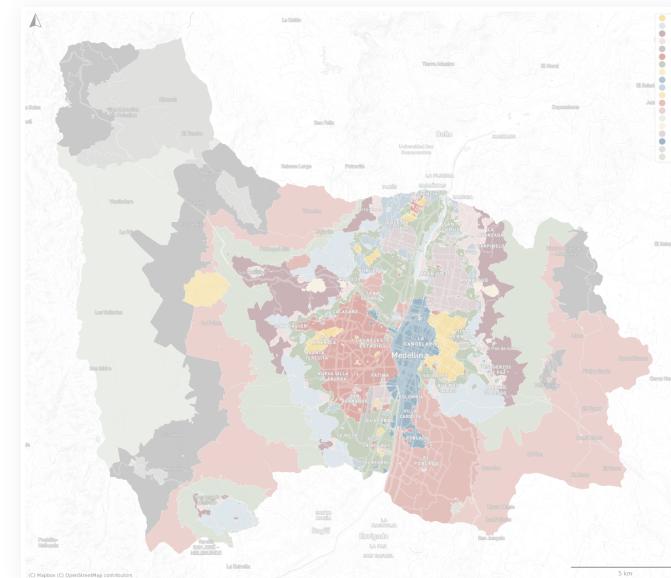
- Data, data, data
- Methods, code
- Infrastructure
- Dissemination
- Open Data Products
- Journaling/reporting

<https://urbangrammarai.xyz>

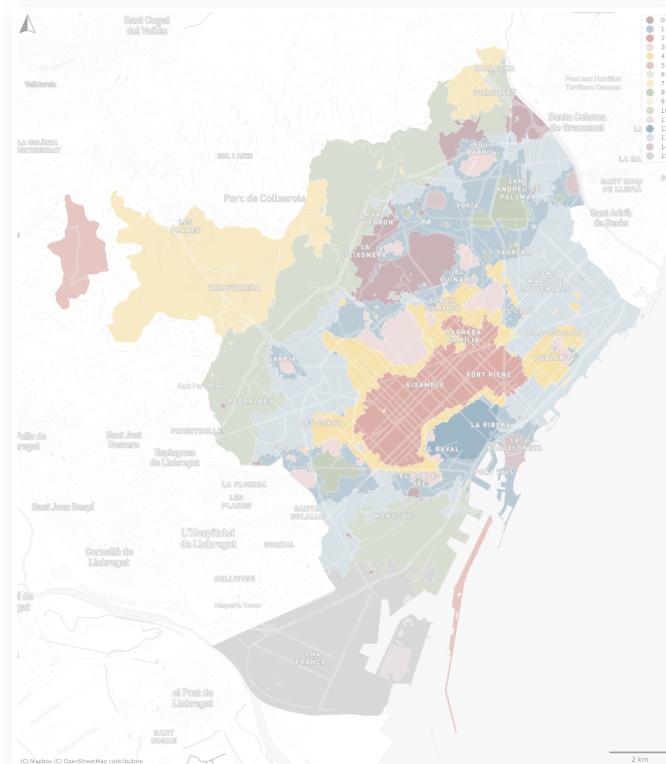
Lessons

Encoding

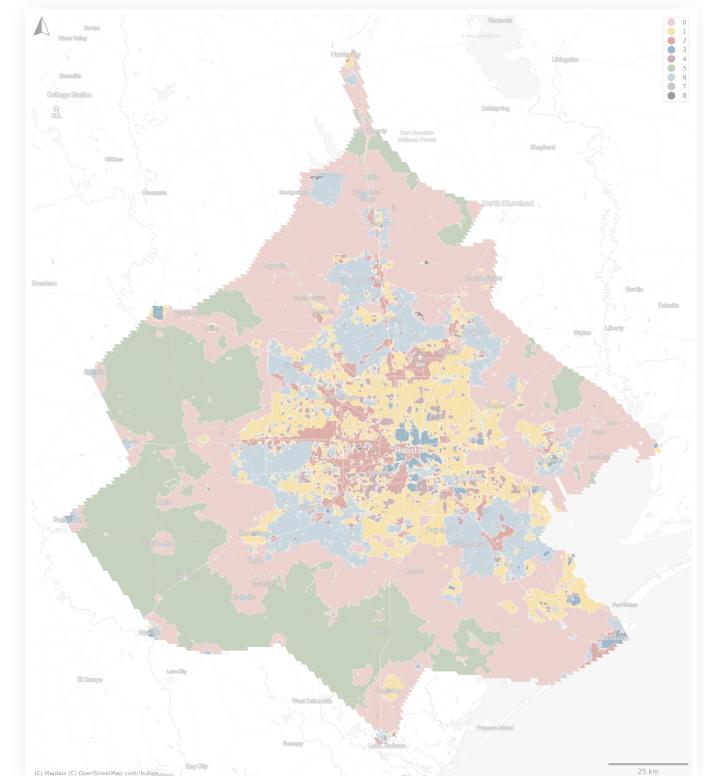
Geography



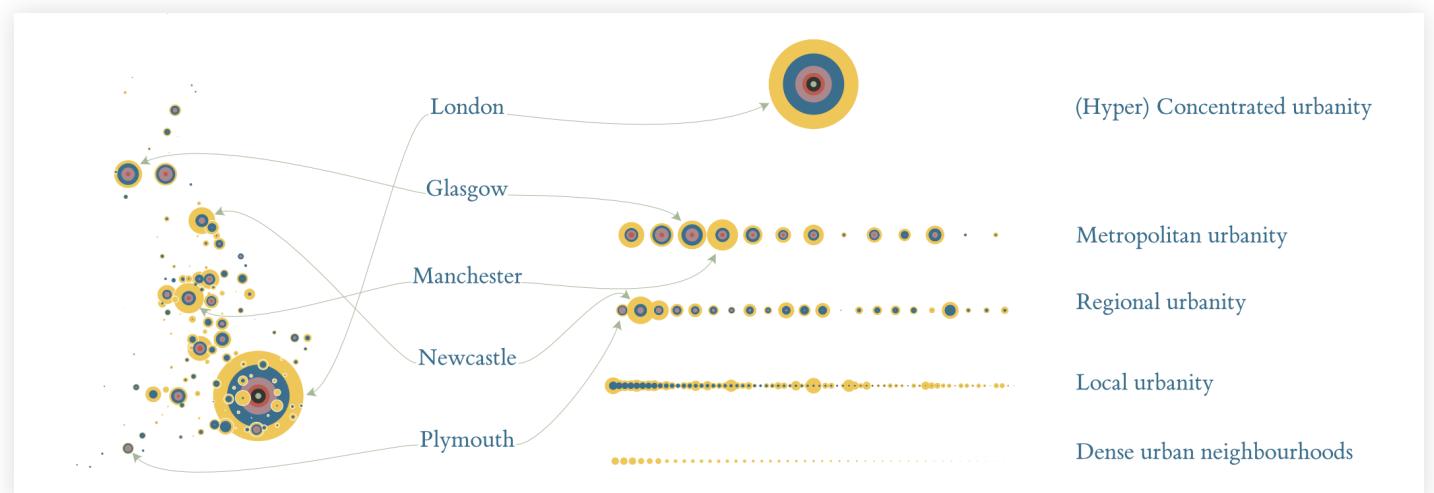
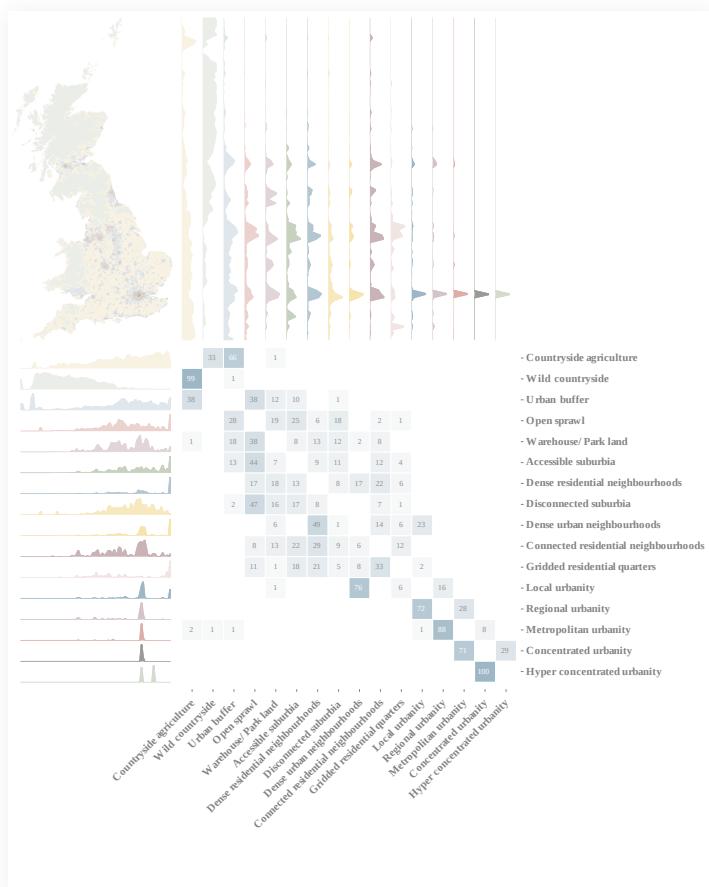
History



Technology



Hierarchy

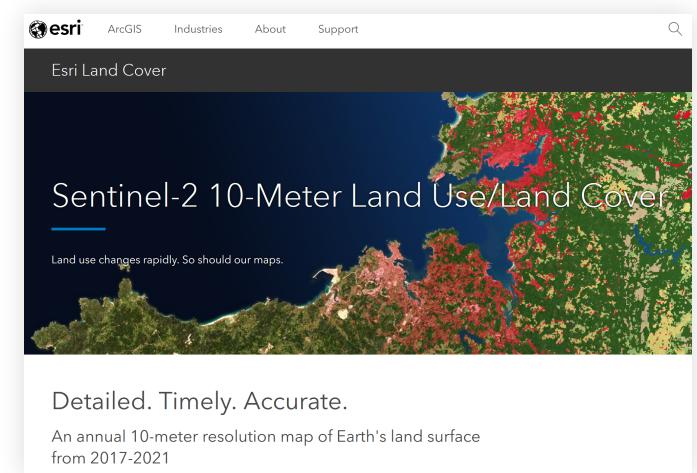
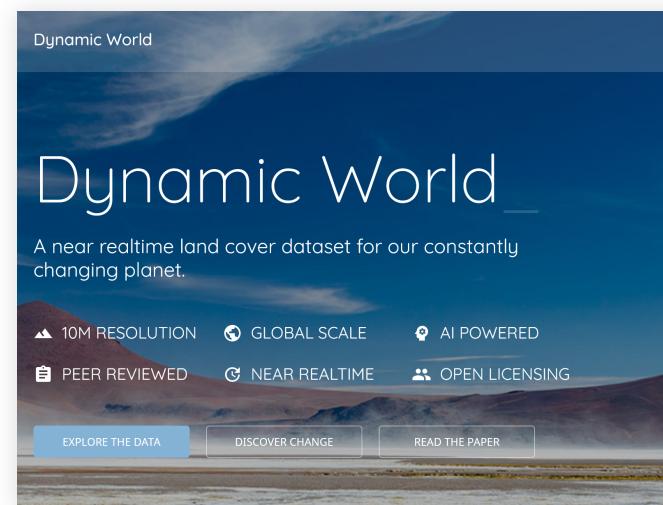
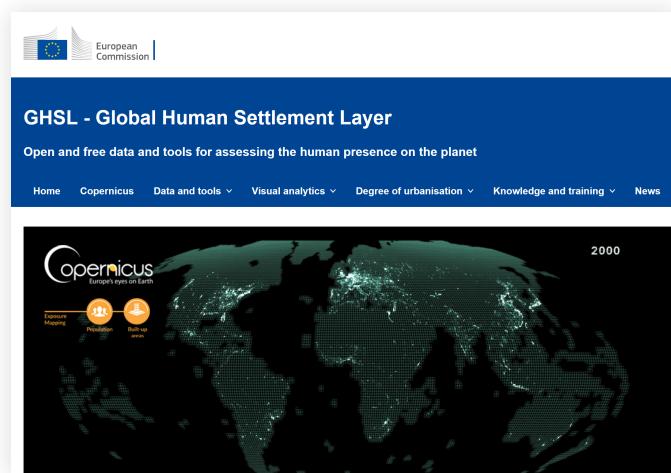
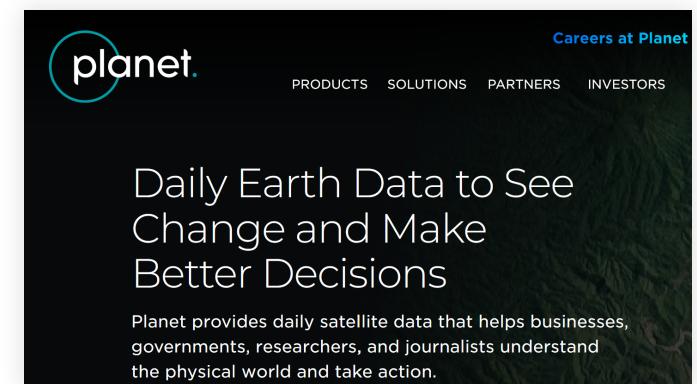
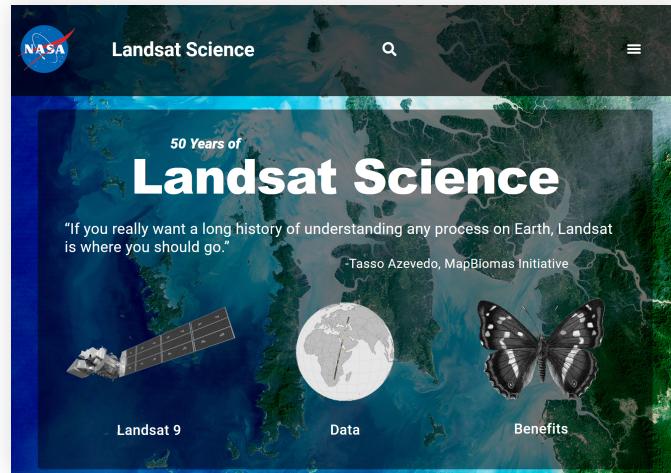


Framing?

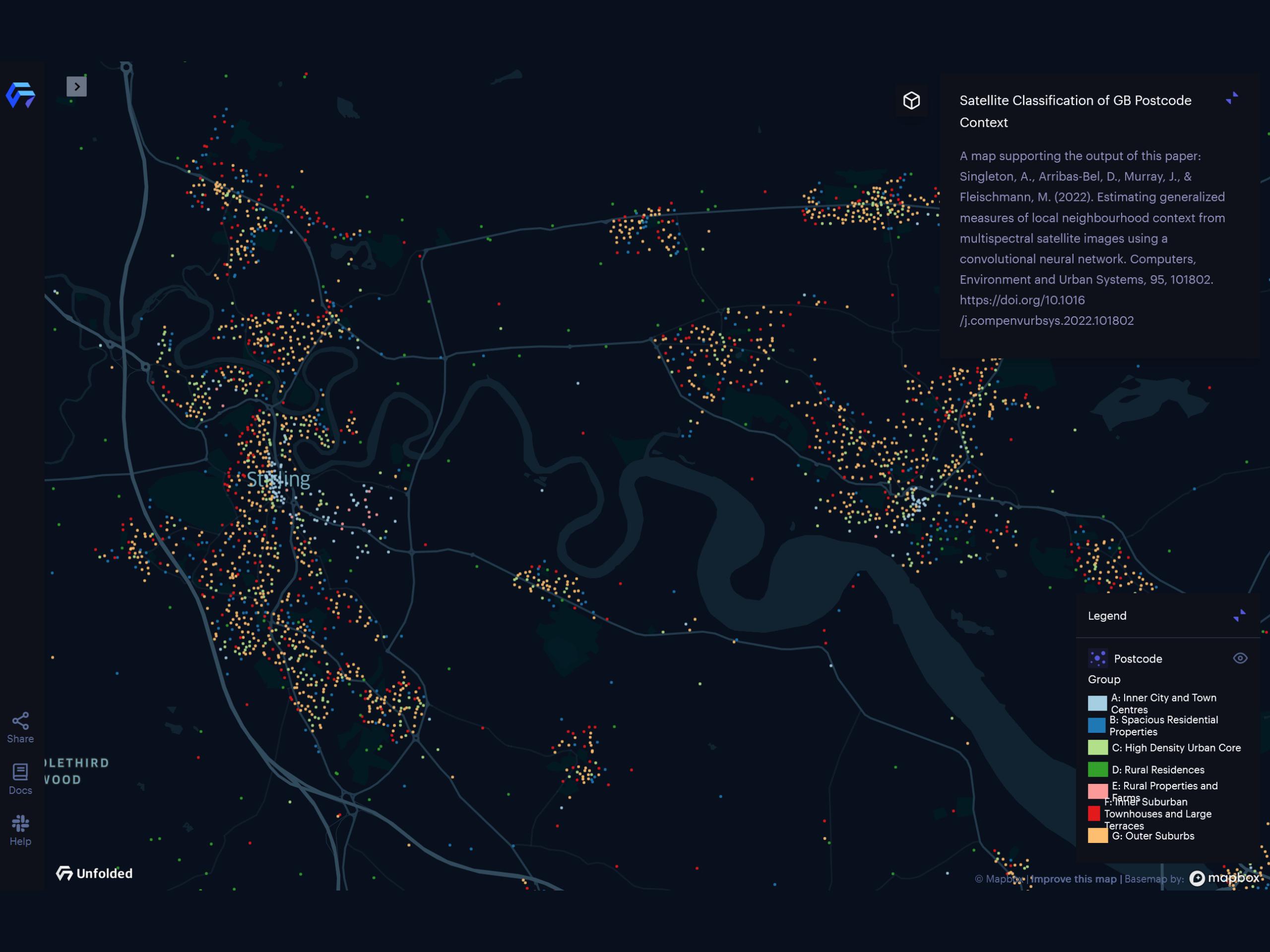
A peek into the future

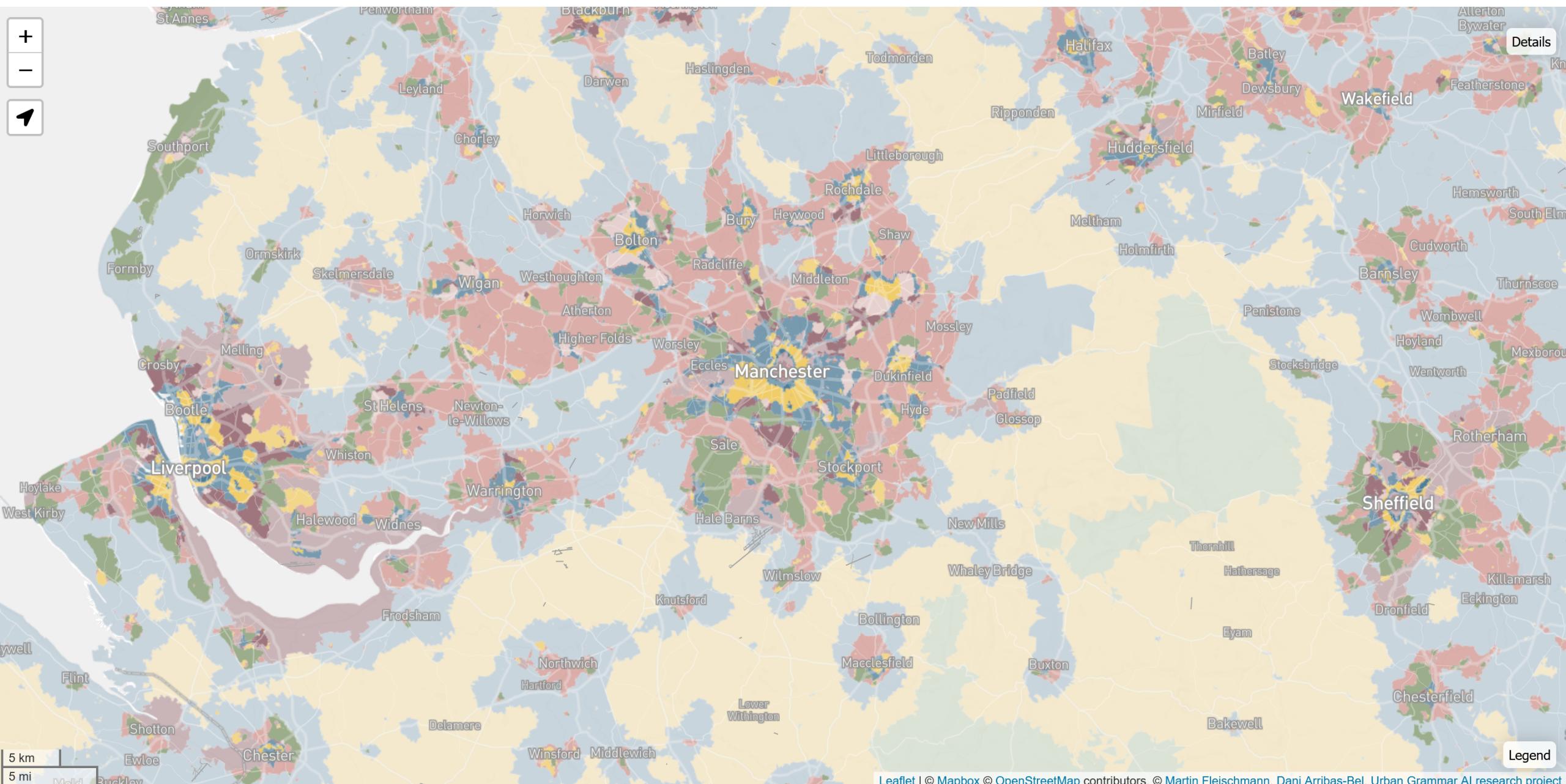
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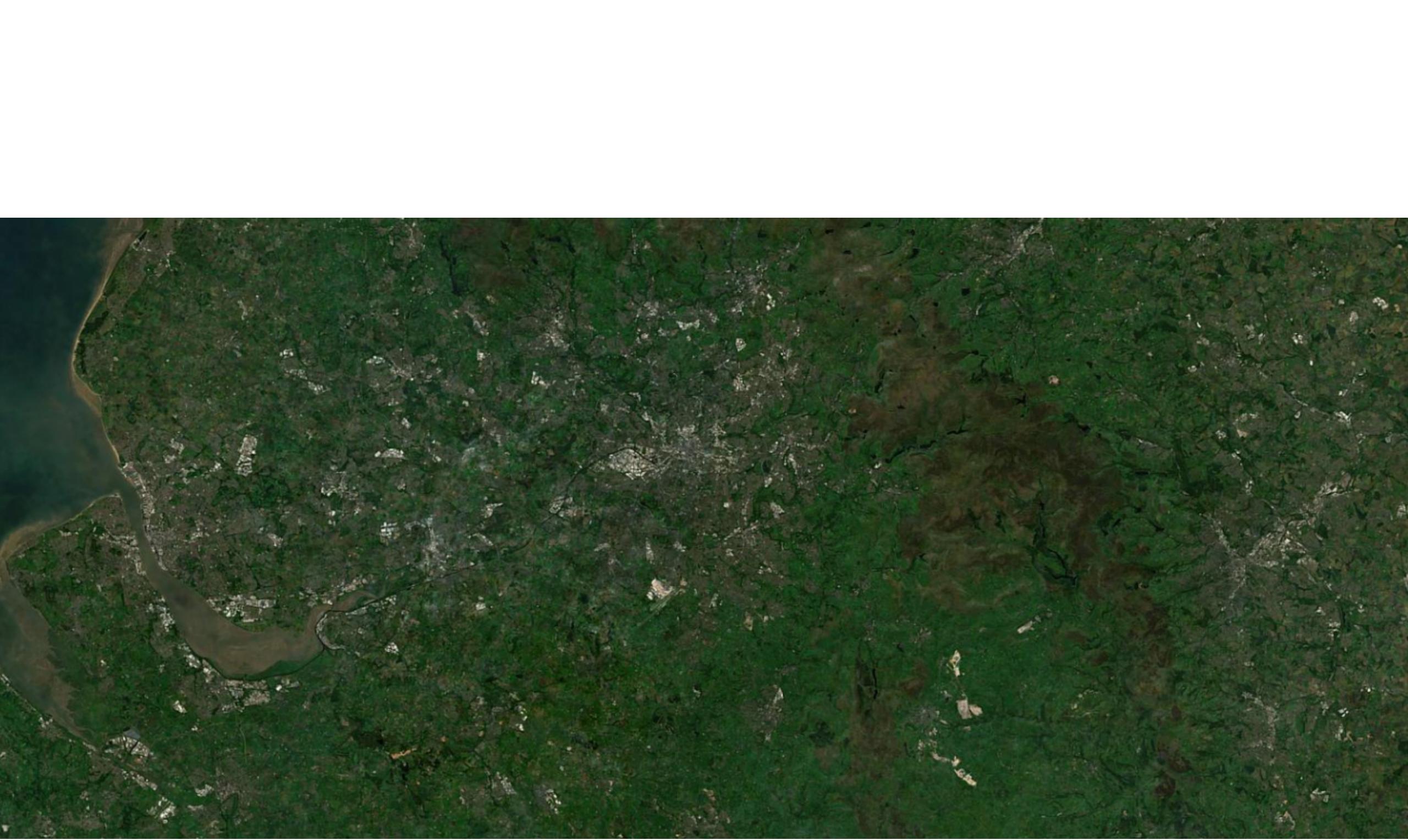
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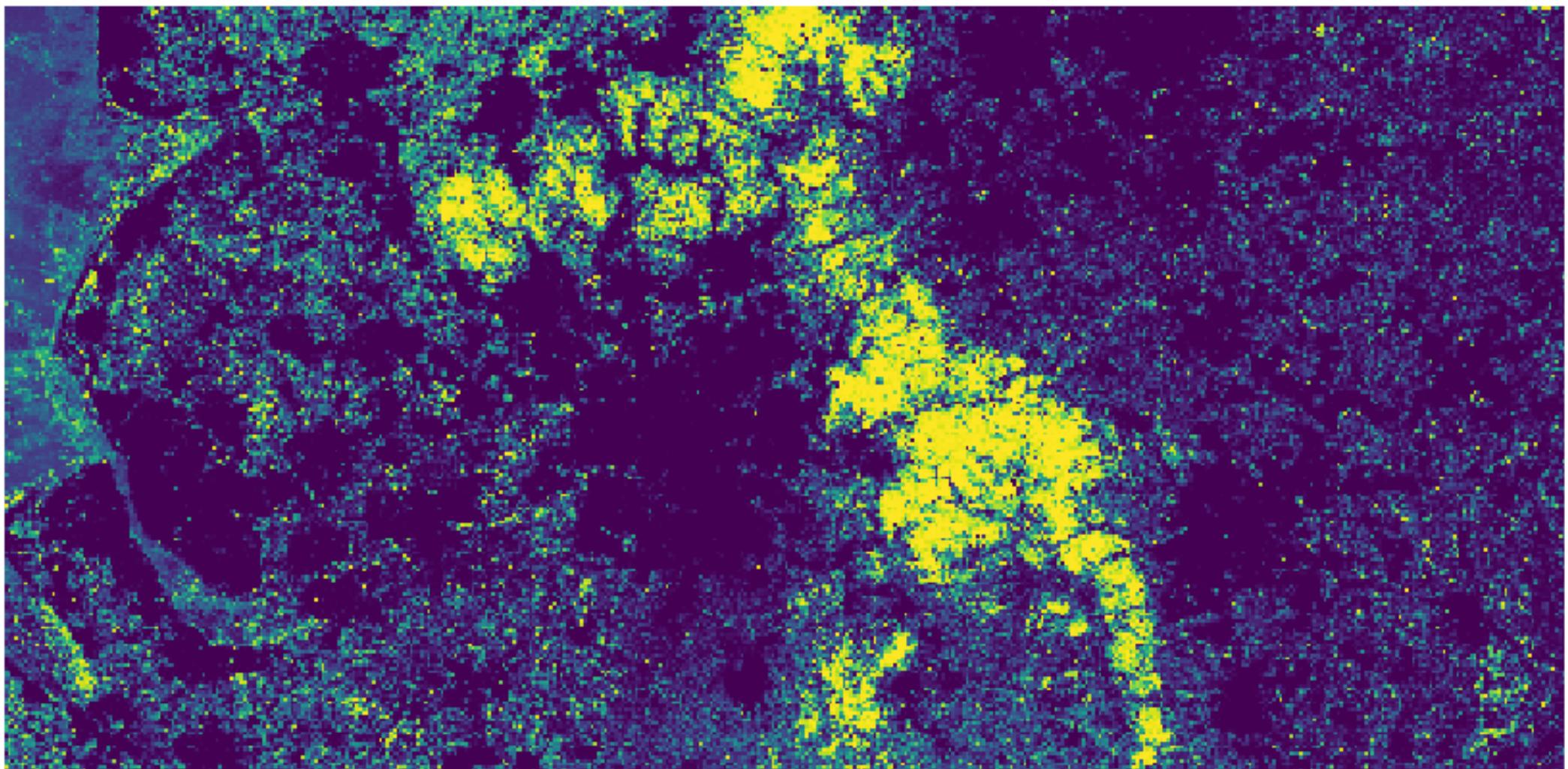
Two examples on Form & Function...



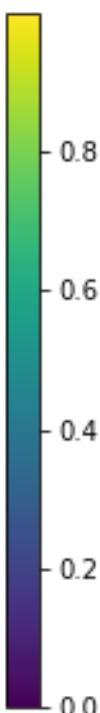


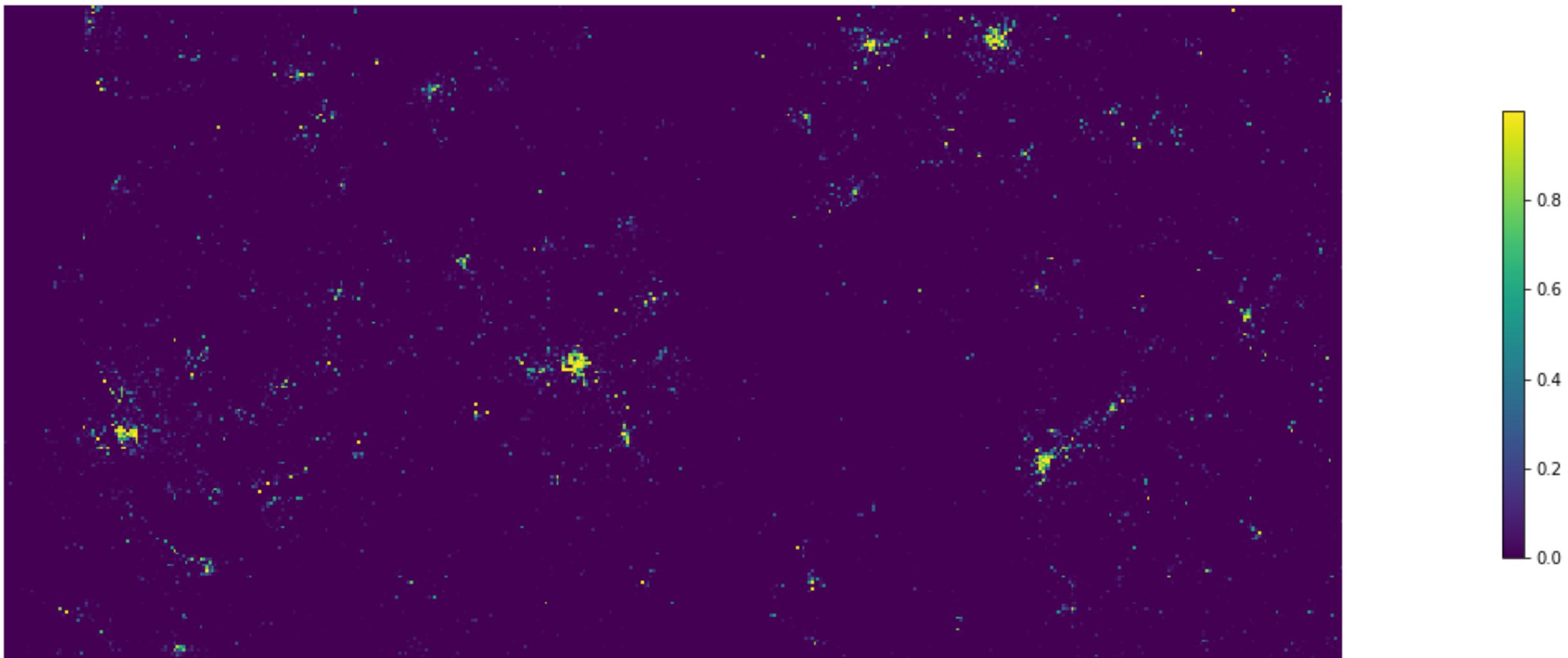


Source: Sentinel-2 cloudless

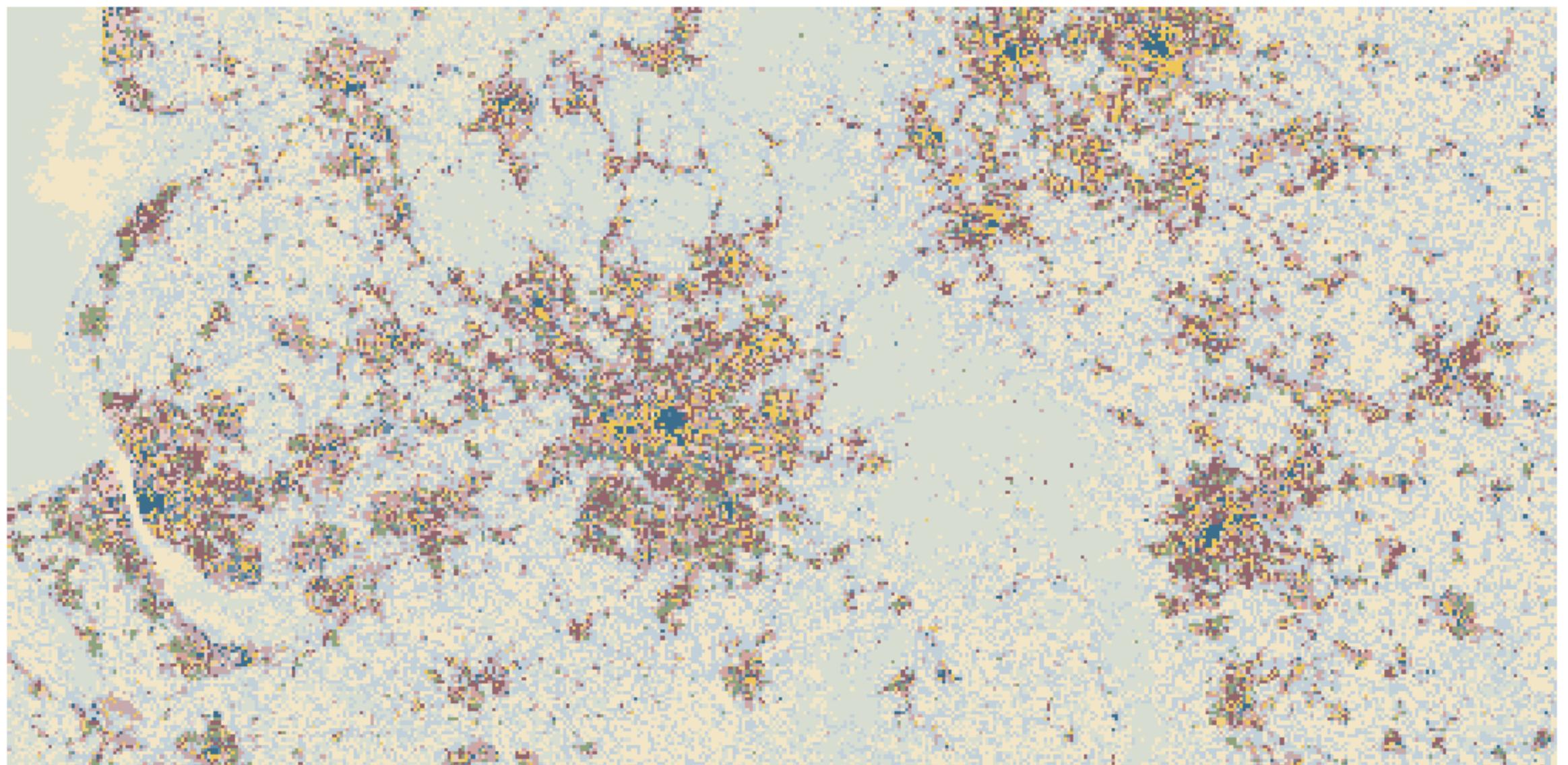


Wild countryside (320x320m)





Urbanity (320x320m)



Predicted class (320x320m)

- *Are we there yet?* Certainly not
- *Can we even get there?* Maybe
- *Worth trying?* Absolutely!

Wrap up

(Urban) form & function...

- underpin much of Regional Science
- are becoming easier to measure better
- You should use them more in your work!

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