Urban Grammar

Developing detailed, consistent and scalable characterisations of urban form & function

Masters Gathering AI and Smart City

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@darribas

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@martinfleis

UNIVERSITY OF LIVERPOOL

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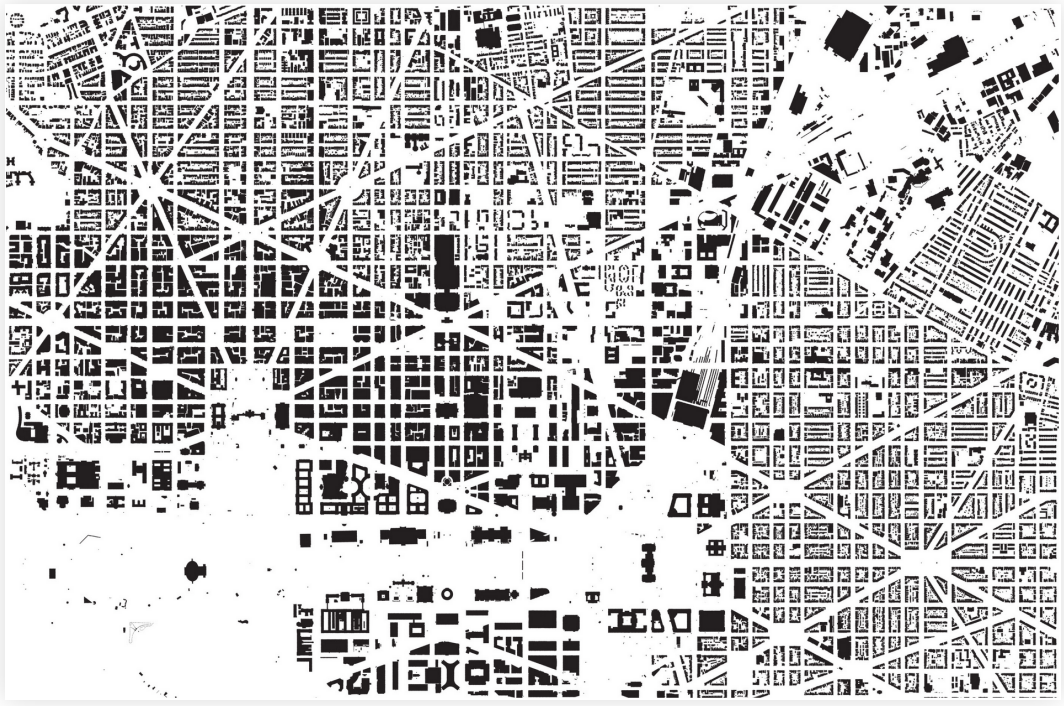
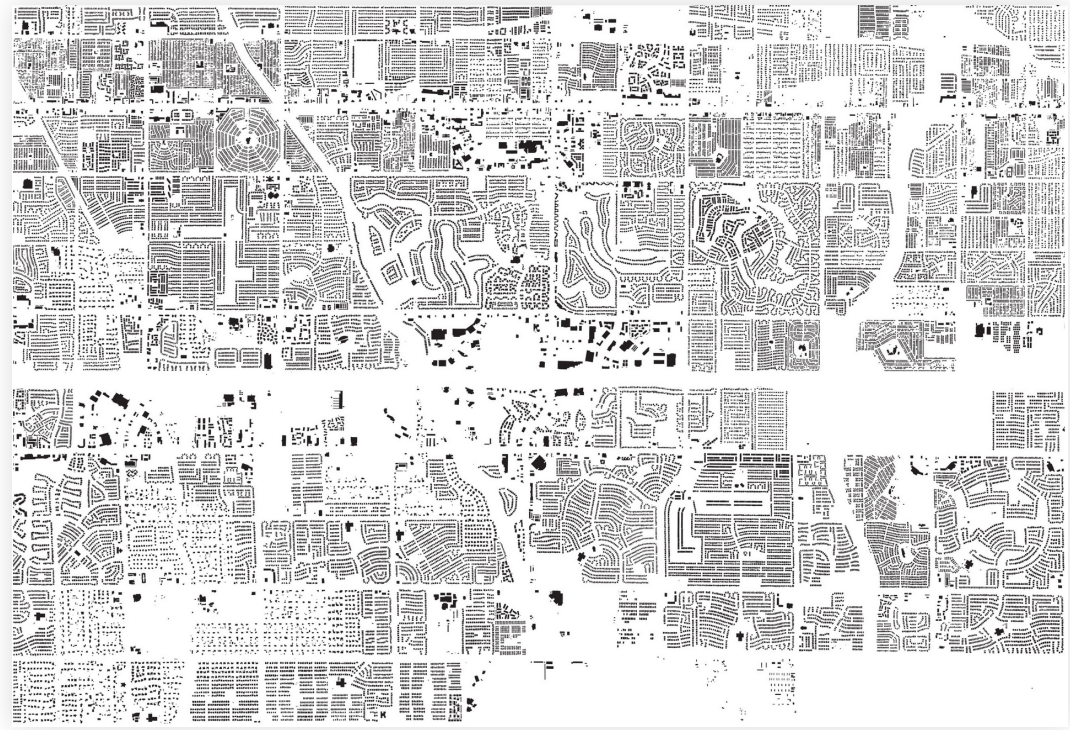
Today

- *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?

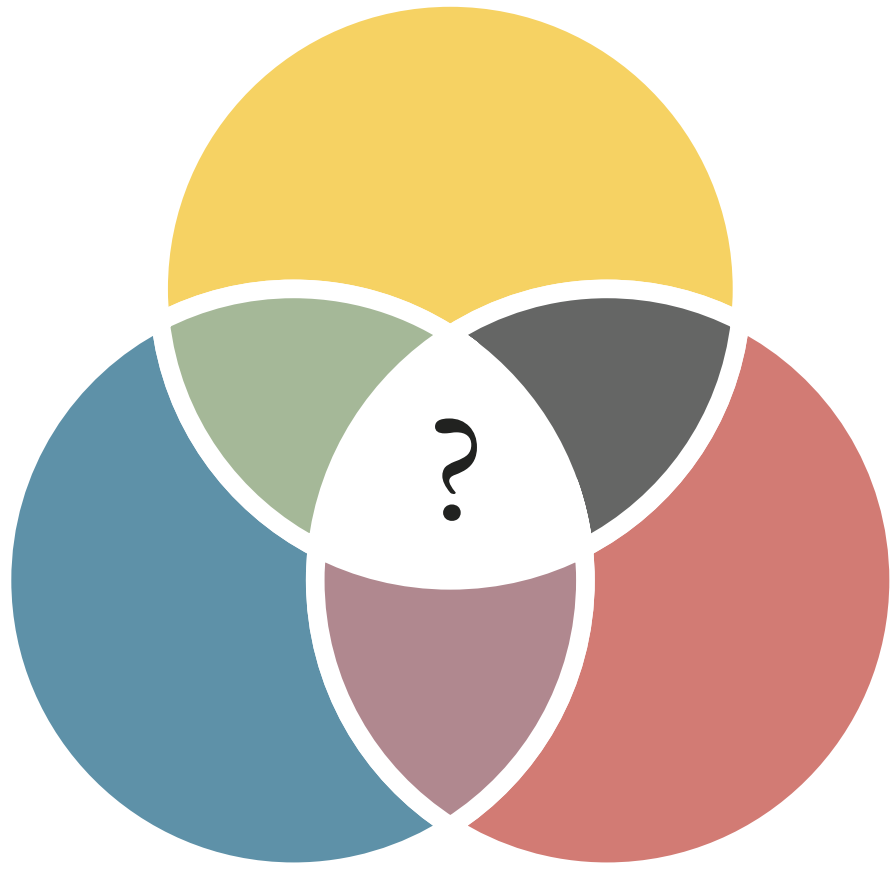
"Physical structure and appearance of cities"

`Function`

What is it used for?

"Activities that take place within an environment"

detailed



scalable

consistent

Urban Grammar

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

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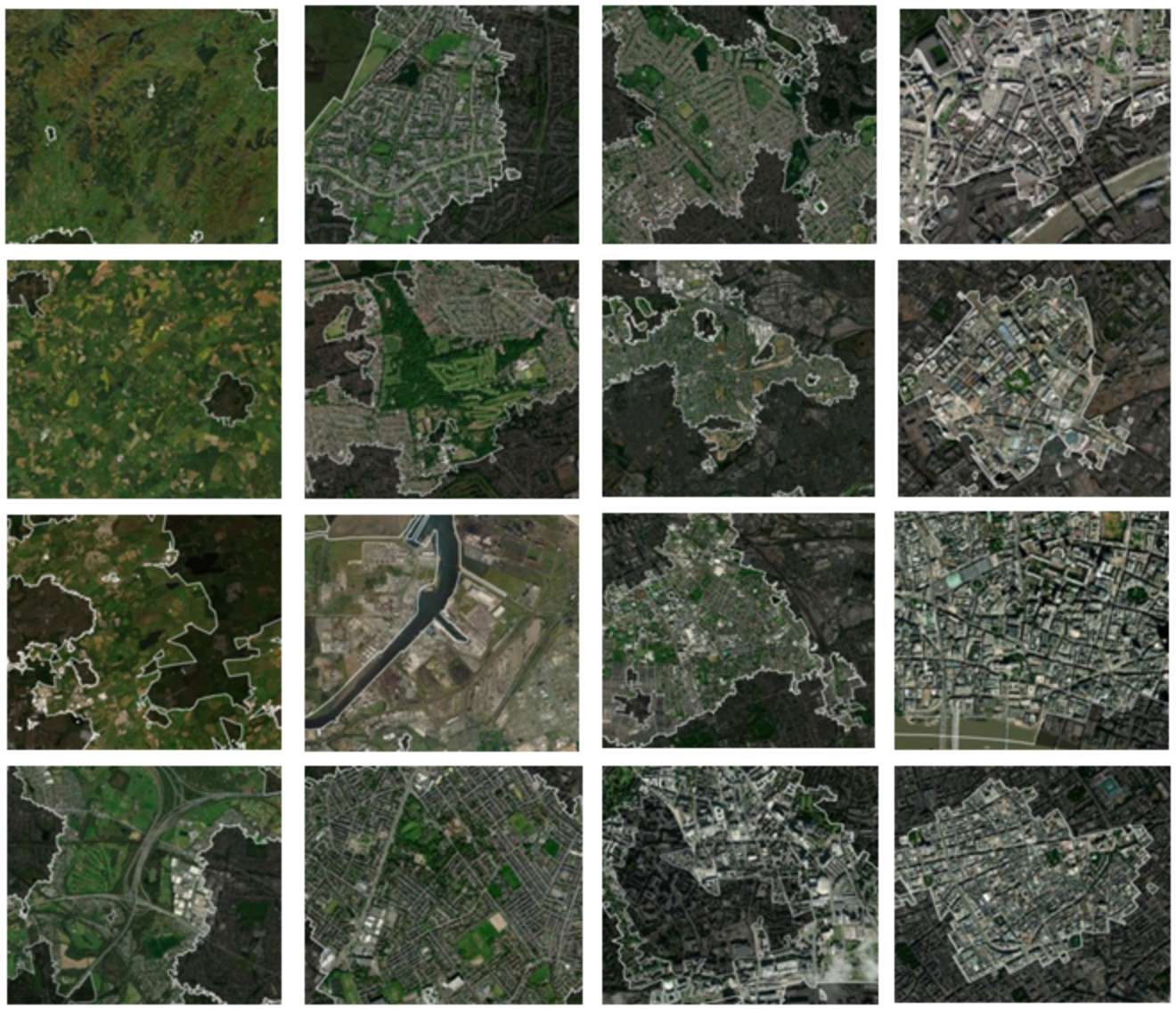
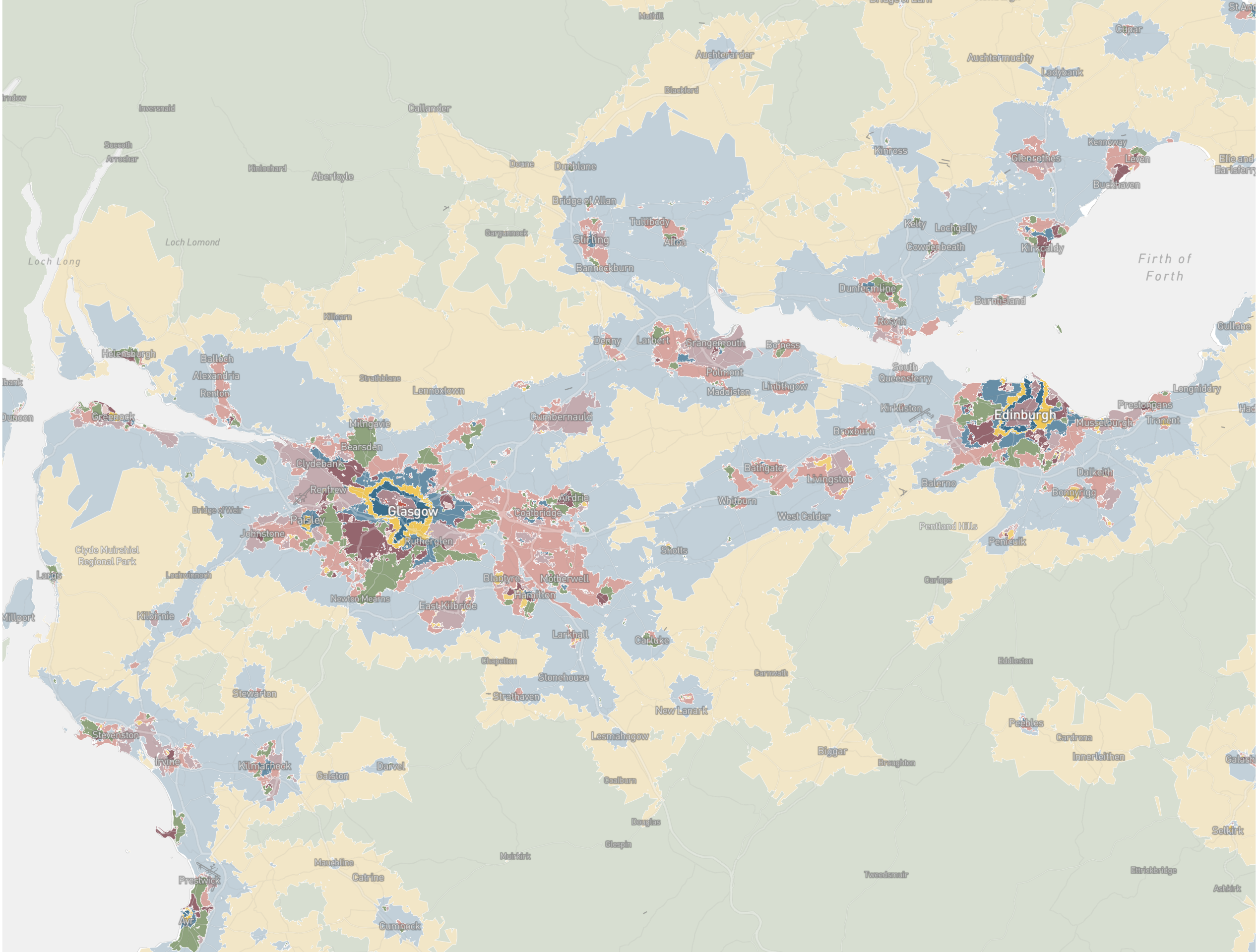
British Signatures



https://urbangrammarai.xyz/story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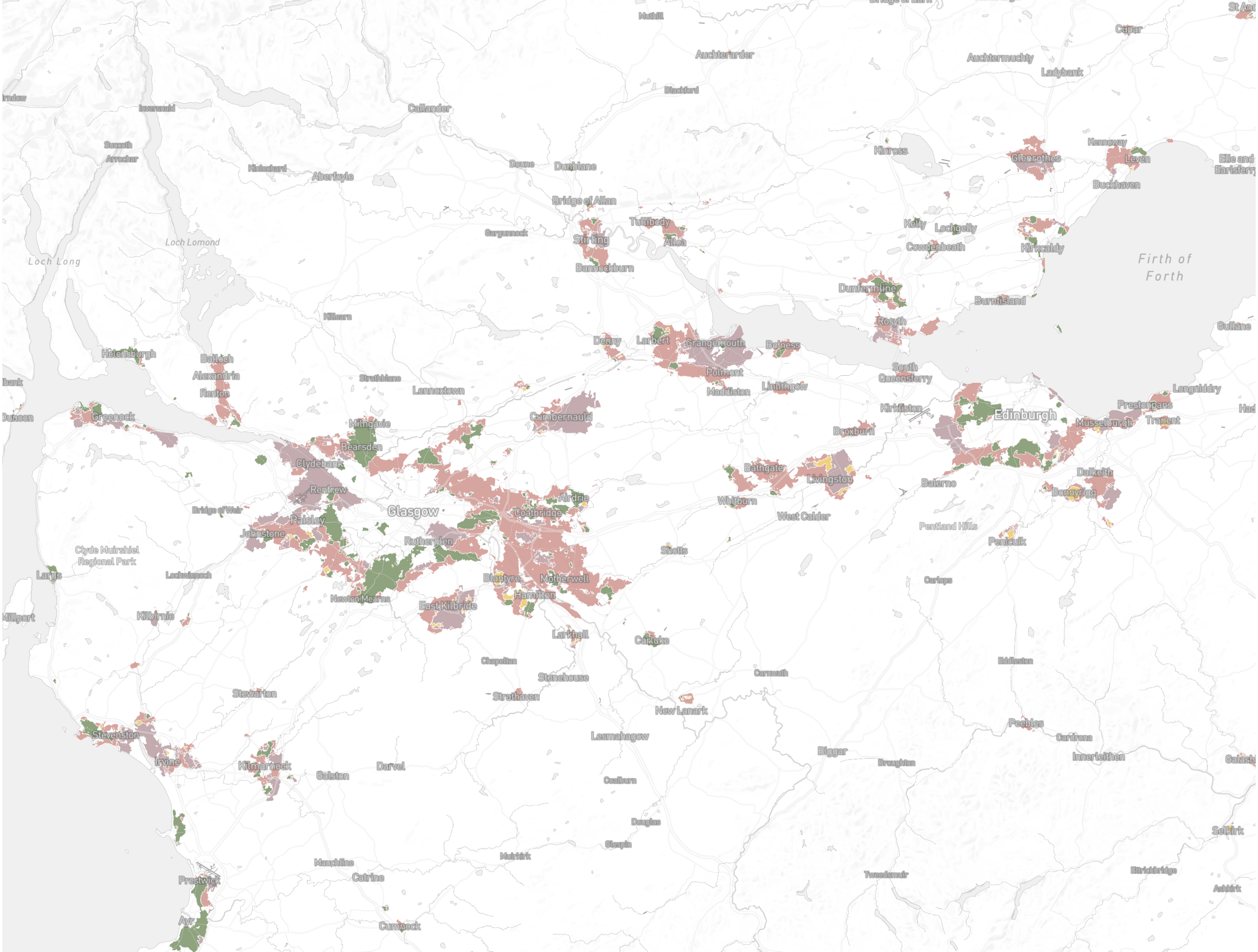
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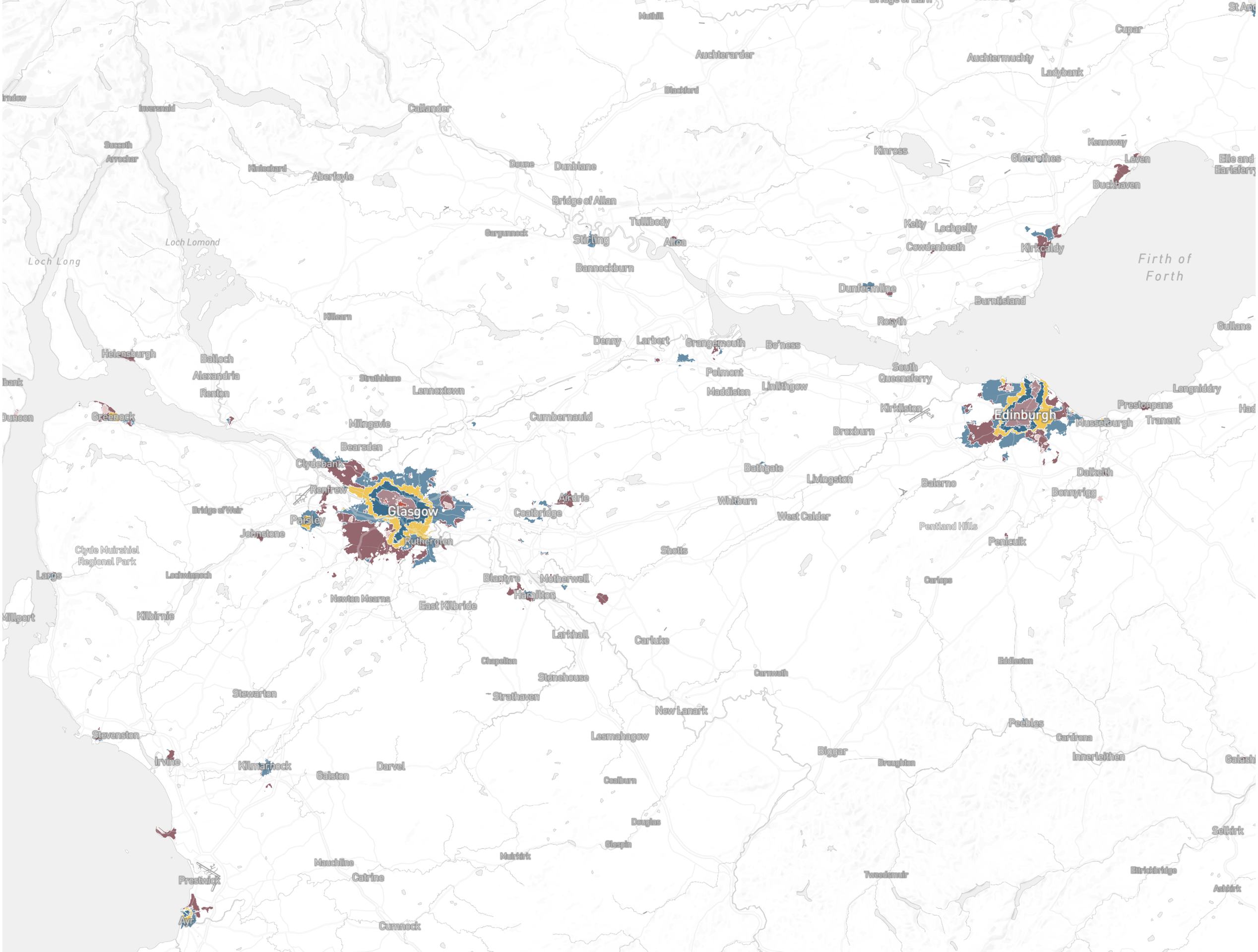
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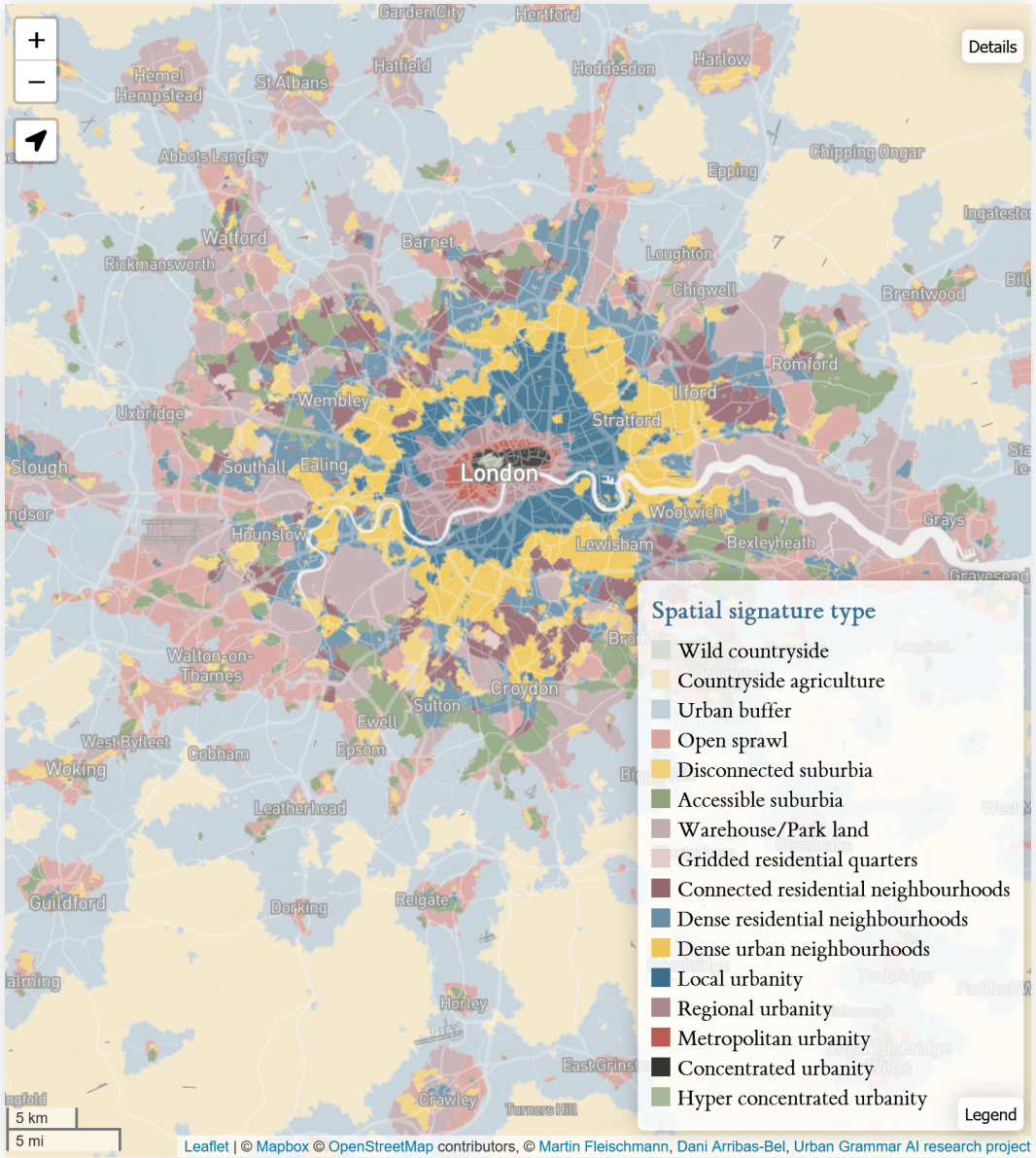

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Spatial Signatures of Great Britain

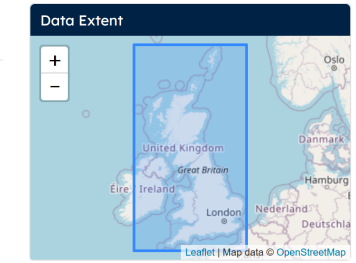
Population & Mobility Transport & Movement

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.



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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 Fleischmann[1], Dr Daniel Arribas-Bel[1]

[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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https://doi.org/10.1016/j.dib.2022.108335

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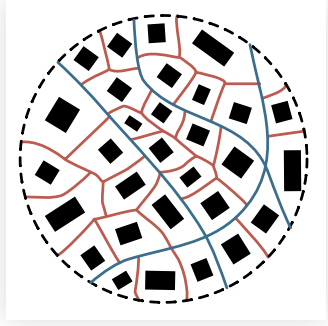
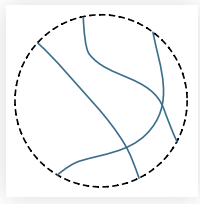
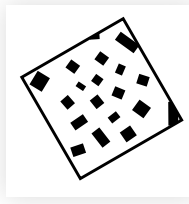
Building *Spatial Signatures*

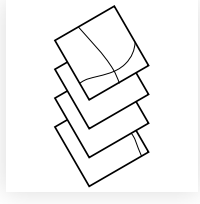
[STAGE] Delimiters Enclosure Anchors Encl. Tess. Characters Clusters Signatures

Enclosed Tessellation

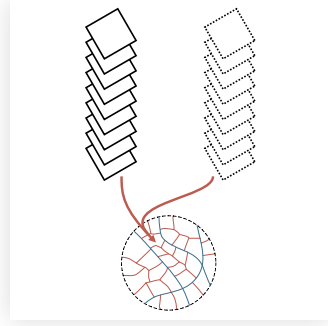




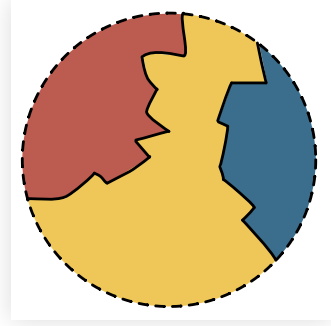


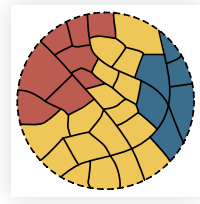


Embedding *form & function*

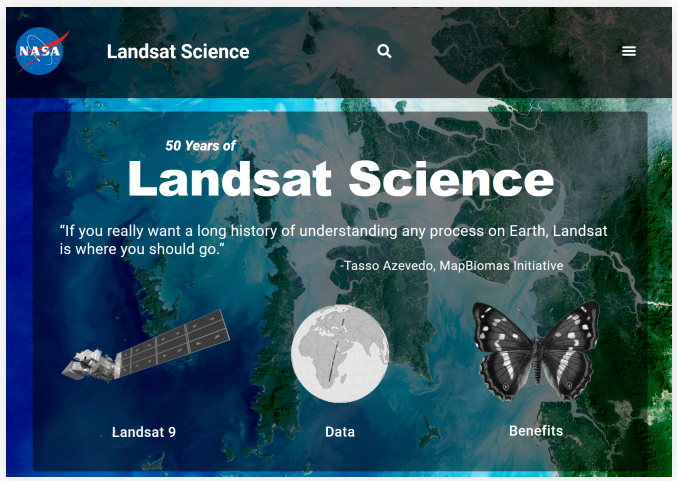


Spatial Signatures





A peek into the future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-Tasso Azevedo, MapBiomas Initiative
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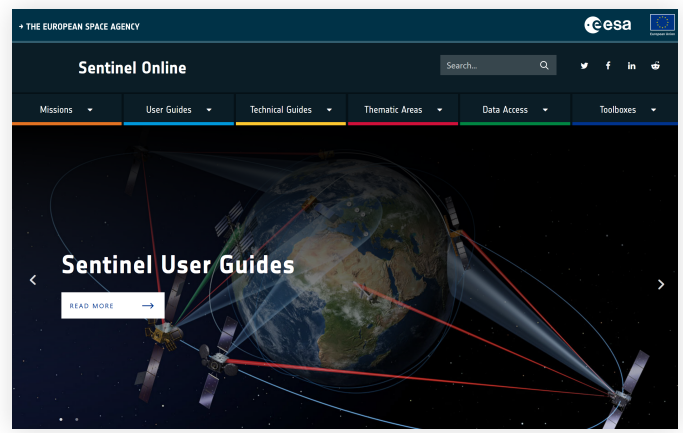
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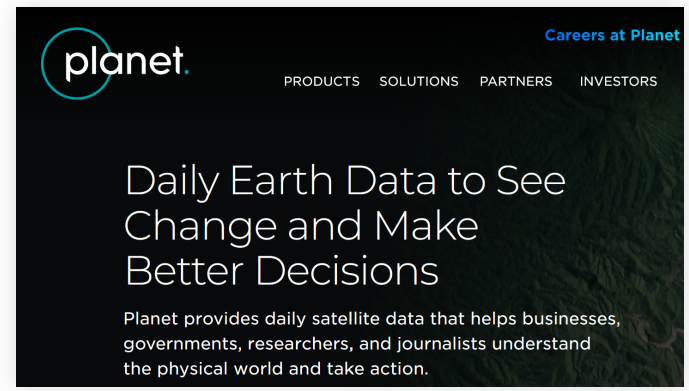
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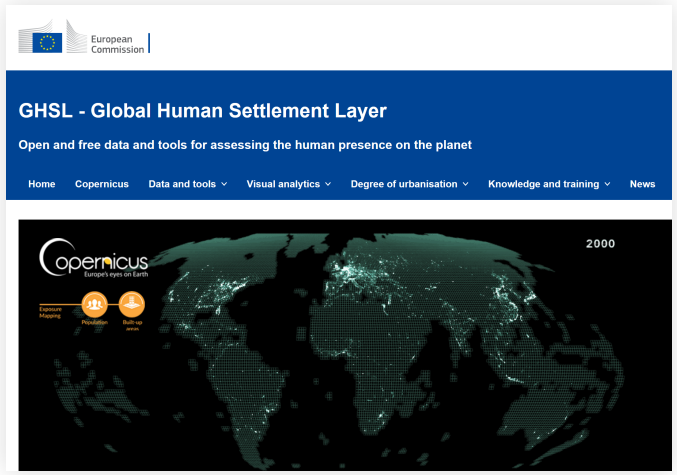
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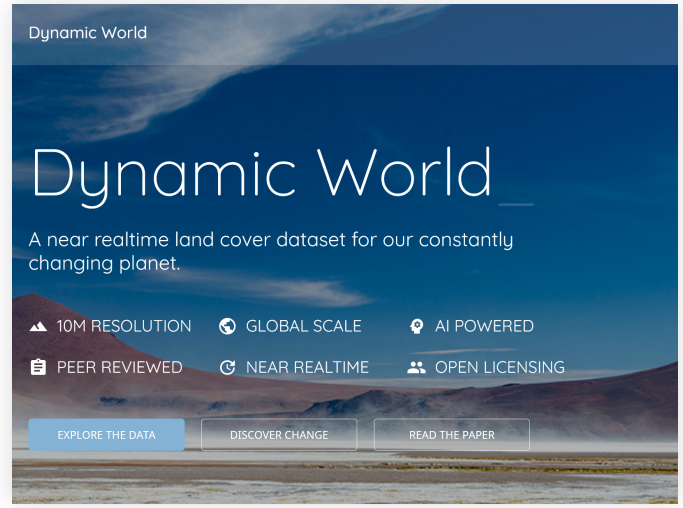
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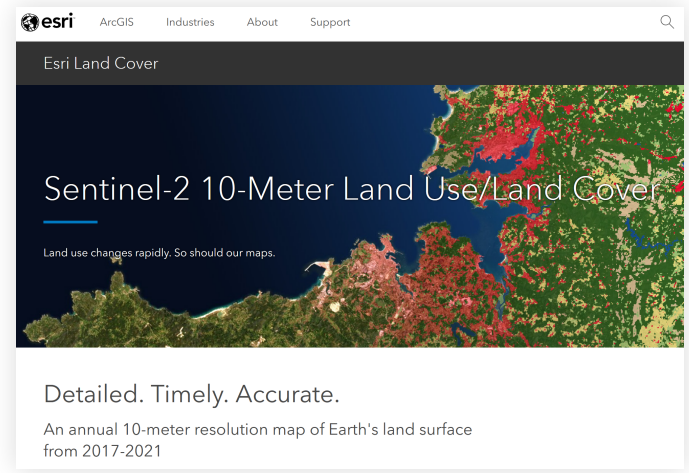
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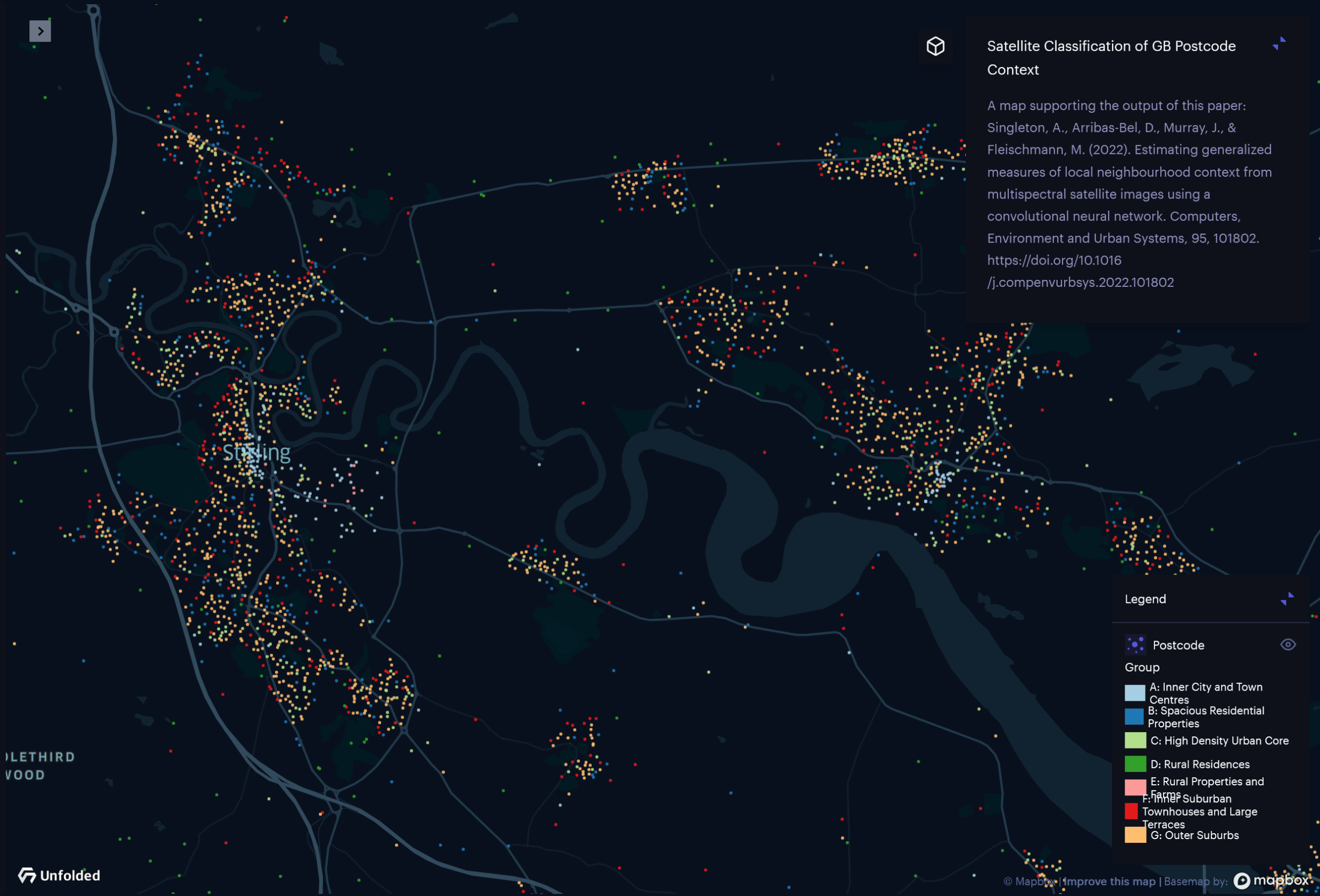
Two examples on Form & Function…


Satellite Classification of GB Postcode Context
A map supporting the output of this paper: Singleton, A., Arribas-Bel, D., Murray, J., & Fleischmann, M. (2022). Estimating generalized measures of local neighbourhood context from multispectral satellite images using a convolutional neural network. Computers, Environment and Urban Systems, 95, 101802. https://doi.org/10.1016/j.compenvurbsys.2022.101802
Legend
Postcode
Group
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C: High Density Urban Core
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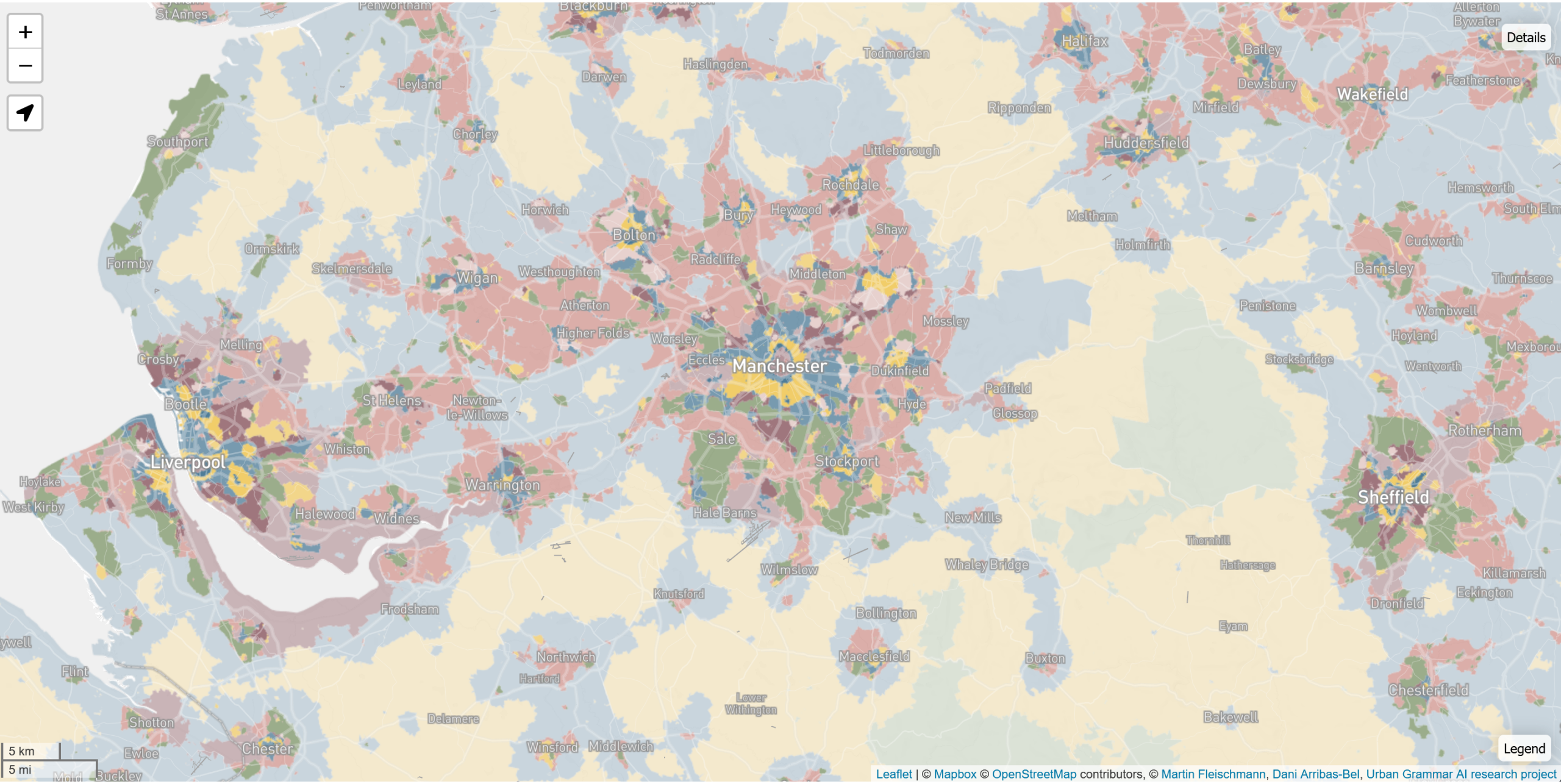
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Legend
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5 mi
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Batley
Dewsbury
Wakefield
Featherstone
Todmorden
Haslingden
Darwen
Leyland
Ripponden
Mirfield
Chorley
Southport
Huddersfield
Littleborough
Rochdale
Hemsworth
Horwich
Bury
Heywood
Meltham
Bolton
Shaw
Holmfirth
Cudworth
Ormskirk
Formby
Skelmersdale
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Barnsley
Wigan
Westhoughton
Middleton
Thurnscoe
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Hoyland
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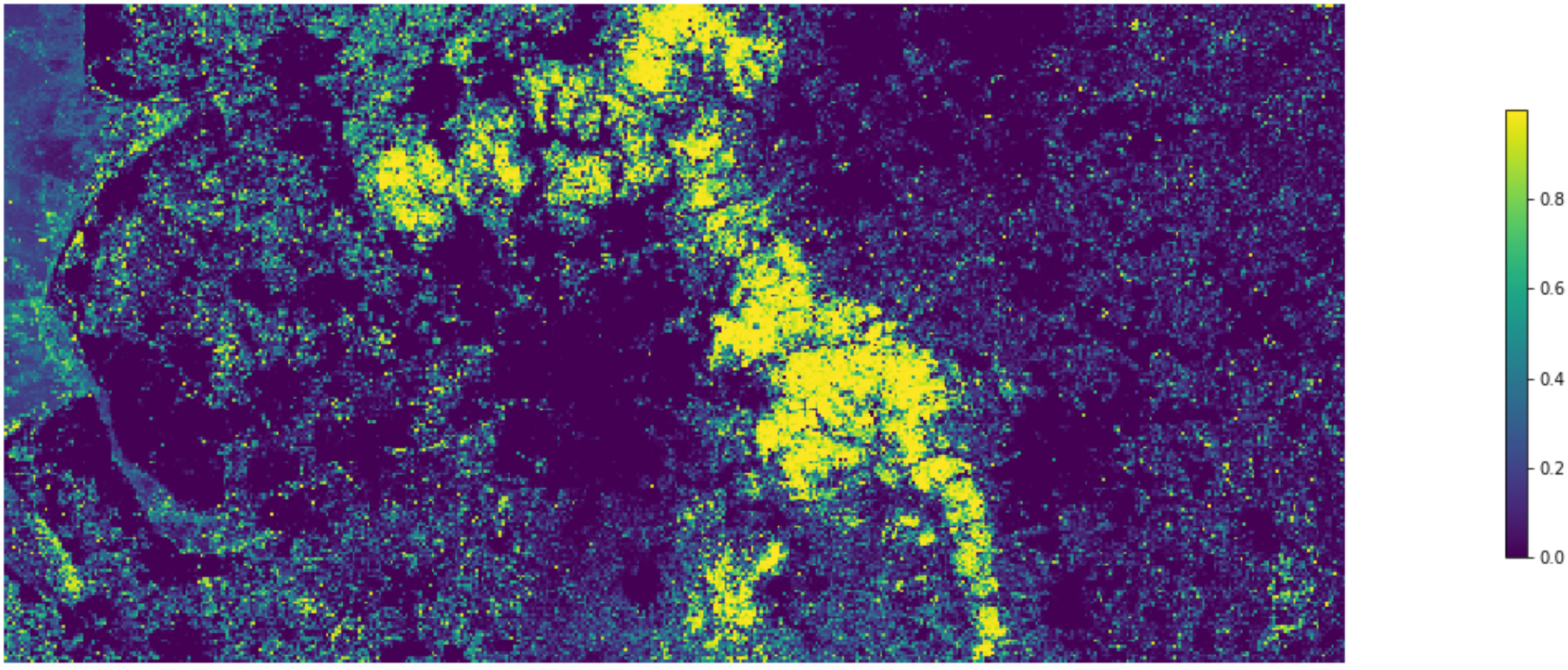
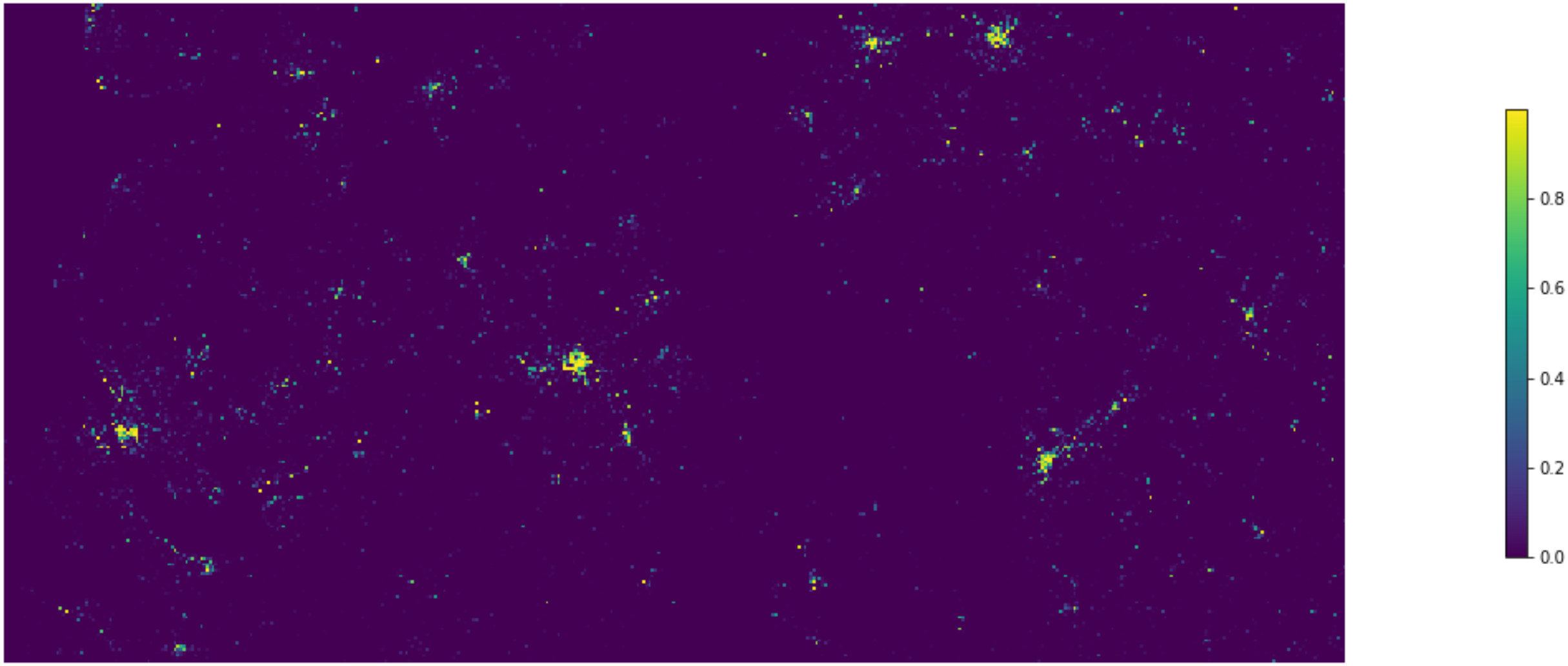
Buckley

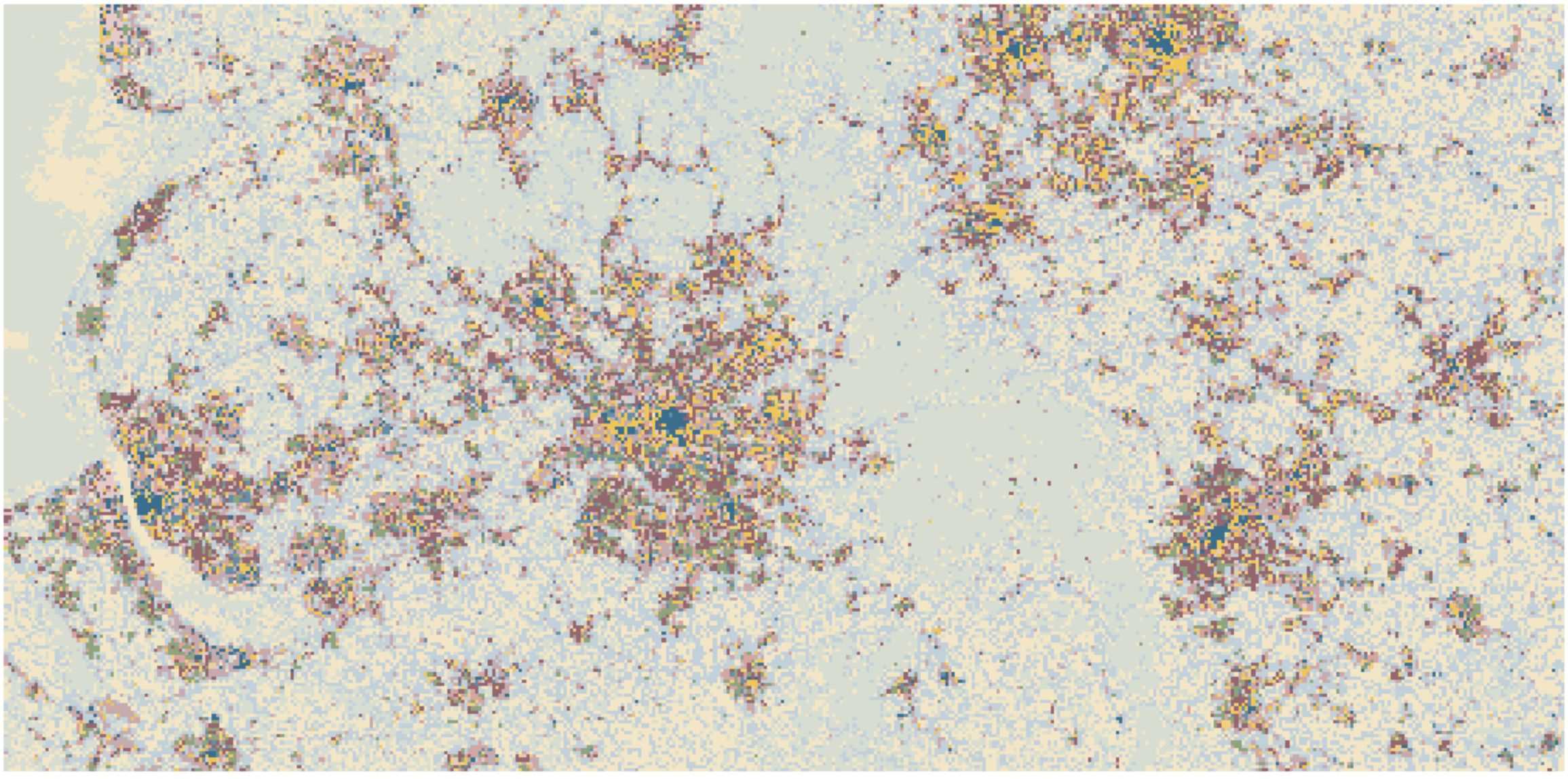
Source: Sentinel-2 cloudless



Wild countryside (320x320m)



Urbanity (320x320m)



Predicted class (320x320m)

Urban Grammar

Developing detailed, consistent and scalable characterisations of urban form & function

Masters Gathering AI and Smart City

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The Alan Turing Institute

Geographic Data Science Lab