Online workshop: Geographical Data Visualisation of UK Census Data.

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Wednesday 18th November 2020

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The UK Decennial Census of population

1971
1981
1991
2001
2011
2021 (2022)

Questions for whole Household


Household Questionnaire
England
Office for National Statistics
Census 2011

Complete online
www.census.gov.uk
Your personal internet access code is:
OR fill in this paper questionnaire and post it back using the pre-paid envelope supplied.

Return to:
FREEPOST 2011 Census,
Processing Centre, UK

If your address is incorrect or missing, enter your correct address here:

A message to everyone - act now

Everyone should be included in the census - all people, households and overnight visitors.

It is used to help plan and fund services for your community - services like transport, education and health.

Please complete your census questionnaire on 27 March 2011, or as soon as possible afterwards. You can fill it in online or on paper.

Taking part in the census is very important and it's also compulsory. You could face a fine if you don't participate or if you supply false information.

Your personal information is protected by law. Census information is kept confidential for 100 years.

So help tomorrow take shape and be part of the 2011 Census.

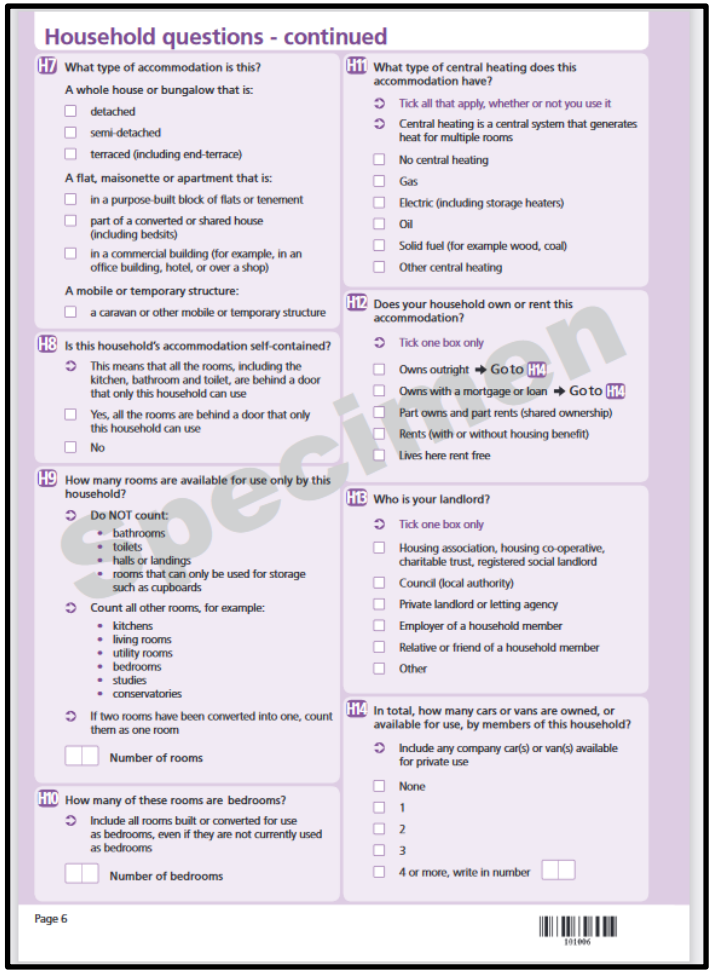
J. N. Mathison
Jil Matheson
National Statistician

Declaration
This questionnaire has been completed to the best of my knowledge and belief.
Signature
Date
Telephone number
We may contact you if we need to collect missing information.
If you have lost your envelope, please return to: FREEPOST 2011 Census, Processing Centre, UK

Where can you get help?
www.census.gov.uk
Census helpline 0300 0201 101
Text Relay 18001 0300 0201 160

Help is available in large print and Braille

H1


Household questions - continued

H7 What type of accommodation is this?

A whole house or bungalow that is:
- detached
- semi-detached
- terraced (including end-terrace)

A flat, maisonette or apartment that is:
- in a purpose-built block of flats or tenement
- part of a converted or shared house (including bedsits)
- in a commercial building (for example, in an office building, hotel, or over a shop)

A mobile or temporary structure:
- a caravan or other mobile or temporary structure

H8 Is this household's accommodation self-contained?
- This means that all the rooms, including the kitchen, bathroom and toilet, are behind a door that only this household can use
- Yes, all the rooms are behind a door that only this household can use
- No

H9 How many rooms are available for use only by this household?
- Do NOT count:
  - bathrooms
  - toilets
  - halls or landings
  - rooms that can only be used for storage such as cupboards
- Count all other rooms, for example:
  - kitchens
  - living rooms
  - utility rooms
  - bedrooms
  - studies
  - conservatories
- If two rooms have been converted into one, count them as one room

Number of rooms

H10 How many of these rooms are bedrooms?
- Include all rooms built or converted for use as bedrooms, even if they are not currently used as bedrooms

Number of bedrooms

H11 What type of central heating does this accommodation have?
- Tick all that apply, whether or not you use it
- Central heating is a central system that generates heat for multiple rooms

- No central heating
- Gas
- Electric (including storage heaters)
- Oil
- Solid fuel (for example wood, coal)
- Other central heating

H12 Does your household own or rent this accommodation?
- Tick one box only

- Owns outright → Go to H14
- Owns with a mortgage or loan → Go to H14
- Part owns and part rents (shared ownership)
- Rents (with or without housing benefit)
- Lives here rent free

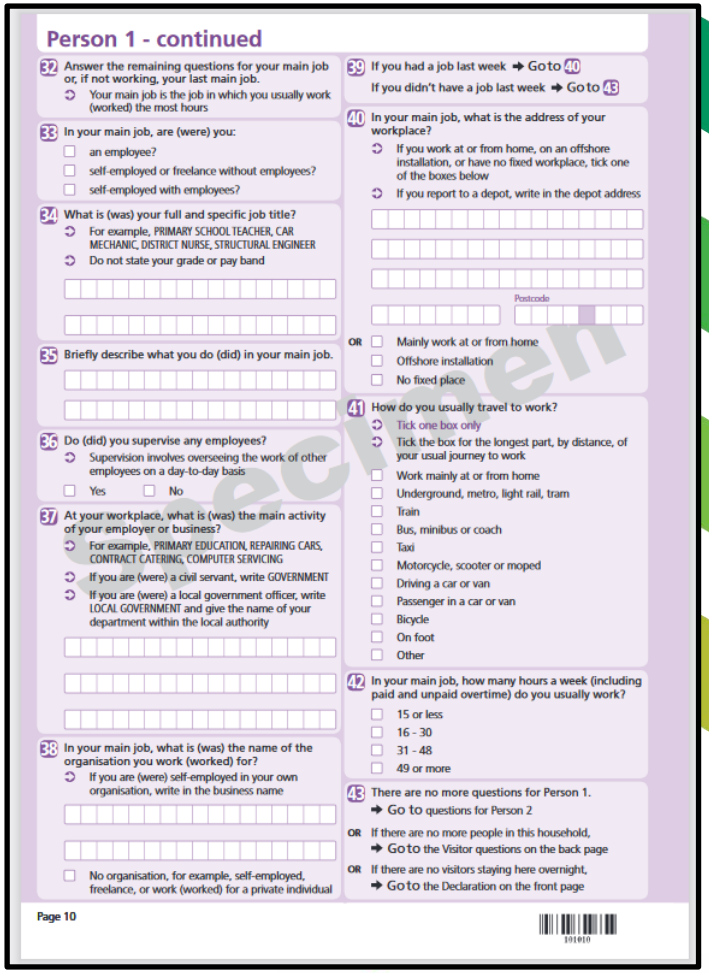
H13 Who is your landlord?
- Tick one box only

- Housing association, housing co-operative, charitable trust, registered social landlord
- Council (local authority)
- Private landlord or letting agency
- Employer of a household member
- Relative or friend of a household member
- Other

H14 In total, how many cars or vans are owned, or available for use, by members of this household?
- Include any company car(s) or van(s) available for private use

- None
- 1
- 2
- 3
- 4 or more, write in number

Page 6


Person 1 - continued

32 Answer the remaining questions for your main job or, if not working, your last main job.
- Your main job is the job in which you usually work (worked) the most hours

33 In your main job, are (were) you:
- an employee?
- self-employed or freelance without employees?
- self-employed with employees?

34 What is (was) your full and specific job title?
- For example, PRIMARY SCHOOL TEACHER, CAR MECHANIC, DISTRICT NURSE, STRUCTURAL ENGINEER
- Do not state your grade or pay band

35 Briefly describe what you do (did) in your main job.

36 Do (did) you supervise any employees?
- Supervision involves overseeing the work of other employees on a day-to-day basis

Yes No

37 At your workplace, what is (was) the main activity of your employer or business?
- For example, PRIMARY EDUCATION, REPAIRING CARS, CONTRACT CATERING, COMPUTER SERVICING
- If you are (were) a civil servant, write GOVERNMENT
- If you are (were) a local government officer, write LOCAL GOVERNMENT and give the name of your department within the local authority

38 In your main job, what is (was) the name of the organisation you work (worked) for?
- If you are (were) self-employed in your own organisation, write in the business name

No organisation, for example, self-employed, freelance, or work (worked) for a private individual

39 If you had a job last week → Go to 40
If you didn't have a job last week → Go to 43

40 In your main job, what is the address of your workplace?
- If you work at or from home, on an offshore installation, or have no fixed workplace, tick one of the boxes below
- If you report to a depot, write in the depot address

Postcode

OR Mainly work at or from home
Offshore installation
No fixed place

41 How do you usually travel to work?
- Tick one box only
- Tick the box for the longest part, by distance, of your usual journey to work

- Work mainly at or from home
- Underground, metro, light rail, tram
- Train
- Bus, minibus or coach
- Taxi
- Motorcycle, scooter or moped
- Driving a car or van
- Passenger in a car or van
- Bicycle
- On foot
- Other

42 In your main job, how many hours a week (including paid and unpaid overtime) do you usually work?
- 15 or less
- 16 - 30
- 31 - 48
- 49 or more

43 There are no more questions for Person 1.
→ Go to questions for Person 2

OR If there are no more people in this household, → Go to the Visitor questions on the back page

OR If there are no visitors staying here overnight, → Go to the Declaration on the front page

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Questions for indv persons in Hh

Office for National Statistics
National Records of Scotland
NISRA Northern Ireland Statistics and Research Agency Gníomhaireacht Thuaisceart Éireann um Staitisticí agus Taighde
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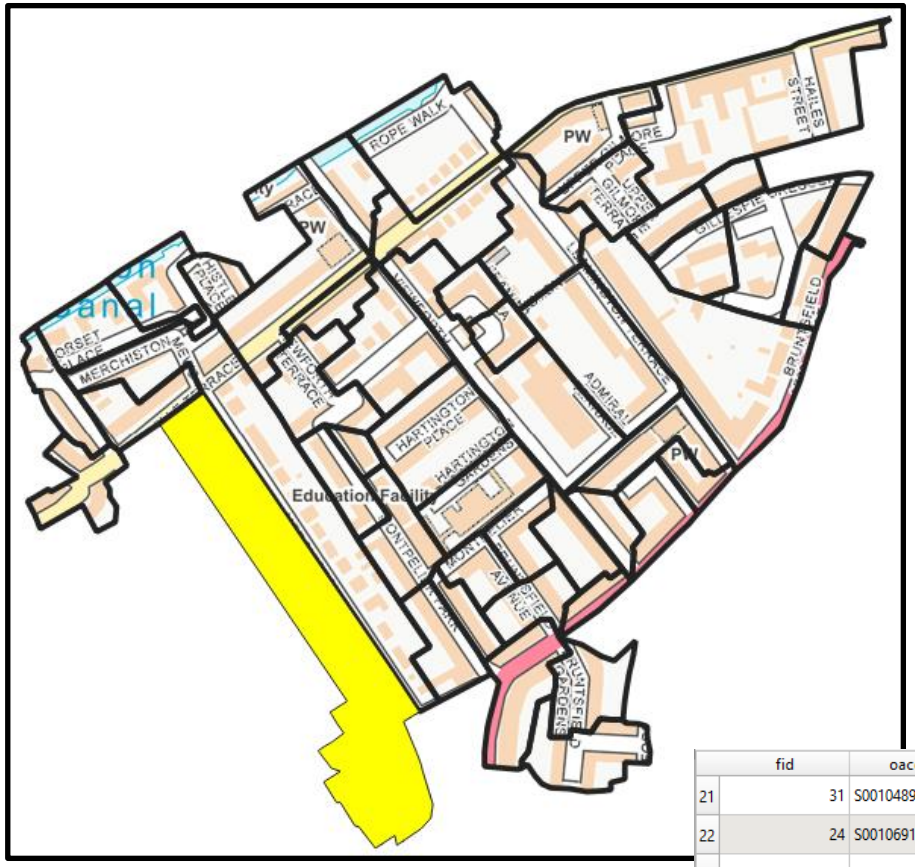
Processed Output Census Data



- Information submitted by census form on census night is processed into aggregate output tables
- Univariate and Multivariate tables
- Data output as counts of people or households
- Data output at different levels of geography grouping together larger groups of population
- Smallest level of geography is the Census Output Area (as here)
- Output Areas are a synthetic geography especially created for the publication of census data

	fid	oacode	totpop	hhdspace	male	female	detached	flatpur
21	31	S00104890	138	66	63	75	0	64
22	24	S00106918	110	69	60	50	0	67
23	25	S00104904	73	54	29	44	0	53
24	26	S00104922	113	41	53	60	9	6
25	27	S00104908	153	53	75	78	3	39
26	4	S00104910	87	57	38	49	0	56

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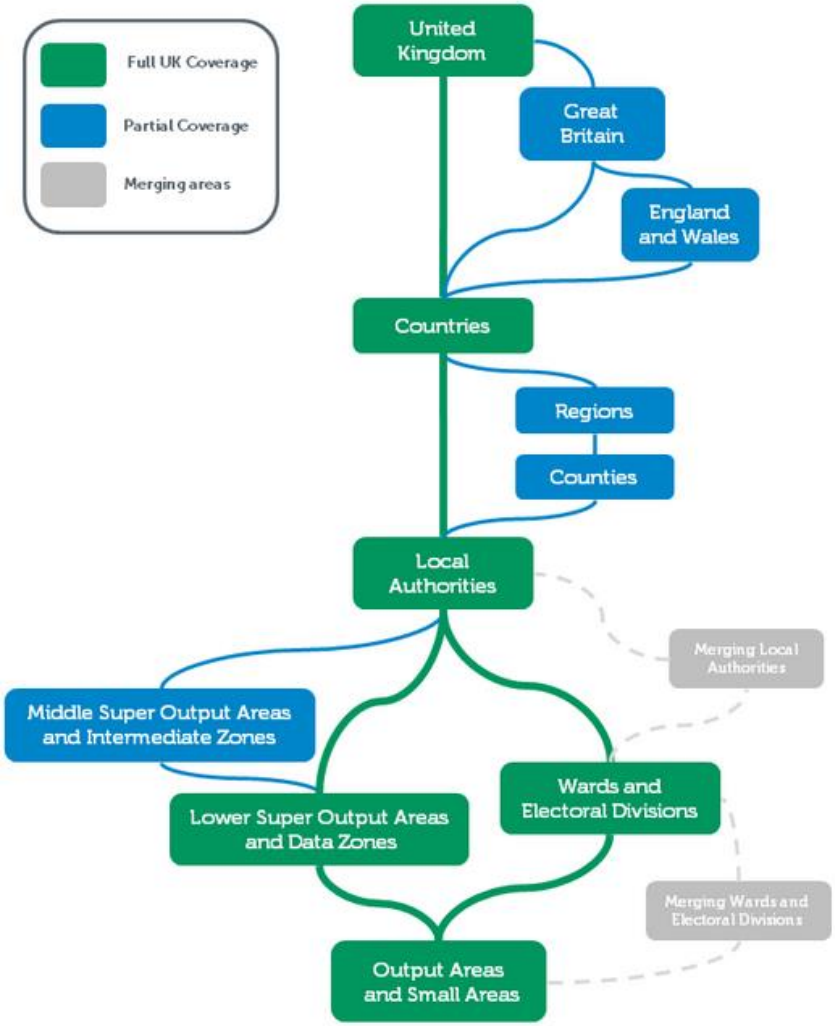
Census Output Geography Hierarchy



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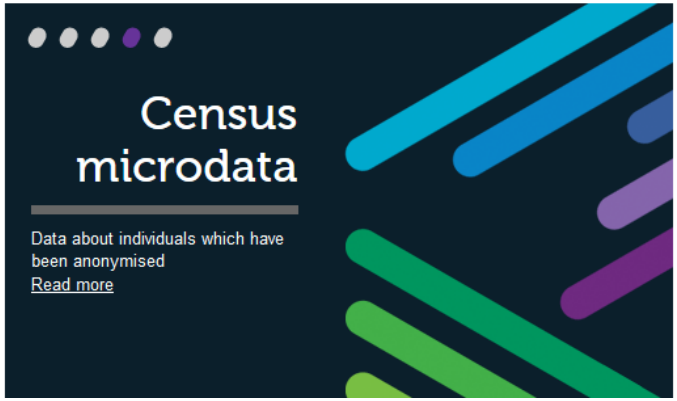
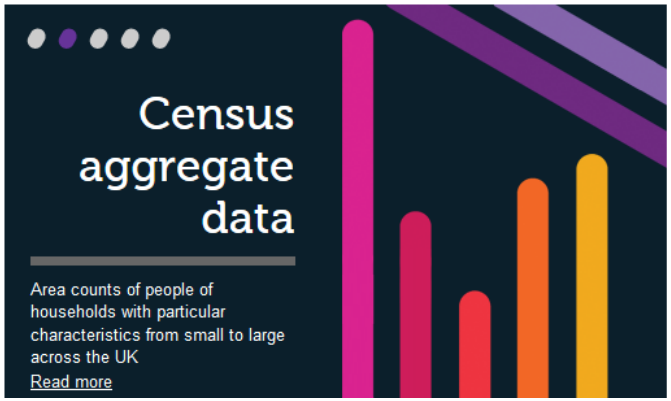
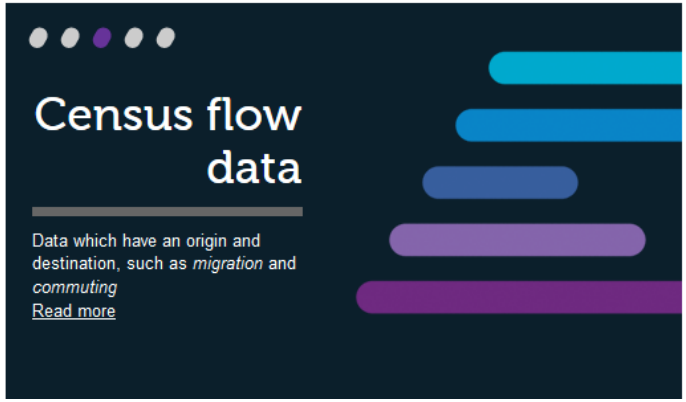
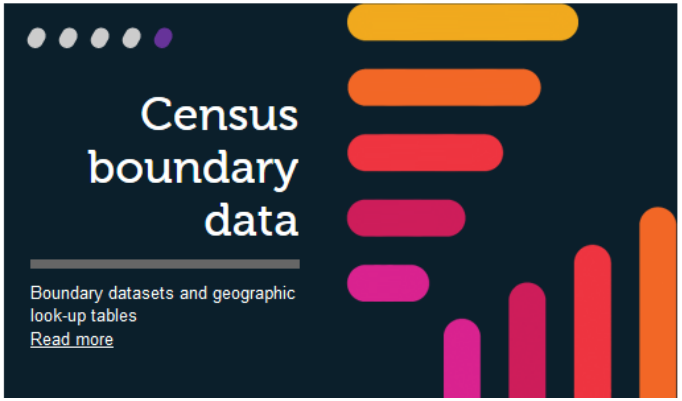
Census data available through the UK Data Service









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Visualising Census Data: Choropleth Maps

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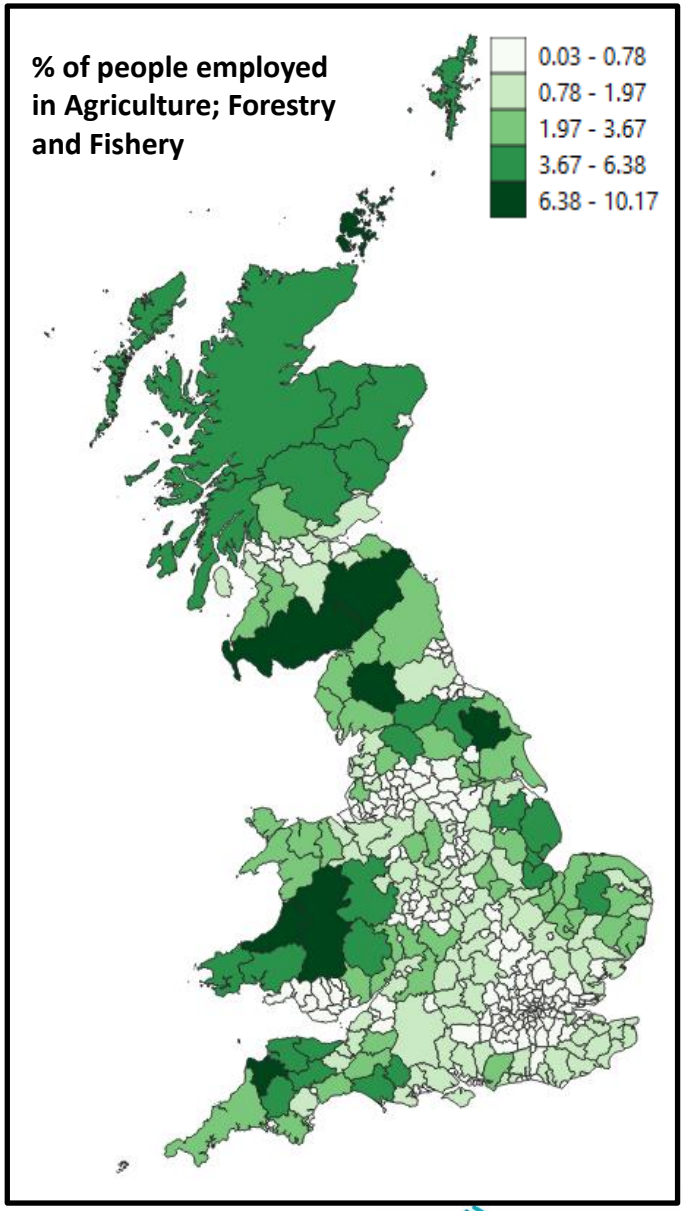
Choropleth maps

- Polygons are shaded in proportion to the measurement of the statistical variable being displayed on the map.
- Choropleth maps provide an easy way to visualize how a measurement varies across a geographic area or to show the level of variability within a region.



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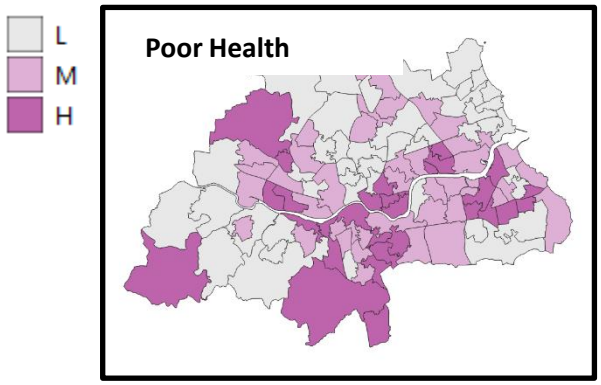
Bivariate Choropleth Maps

- Most Choropleth maps display a single variable and are known as univariate Chropleth maps.
- Bivariate Choropleth maps combine data from 2 variables
- For Newcastle and Tyneside combine into a single map variables from the census on poor health and unemployment.



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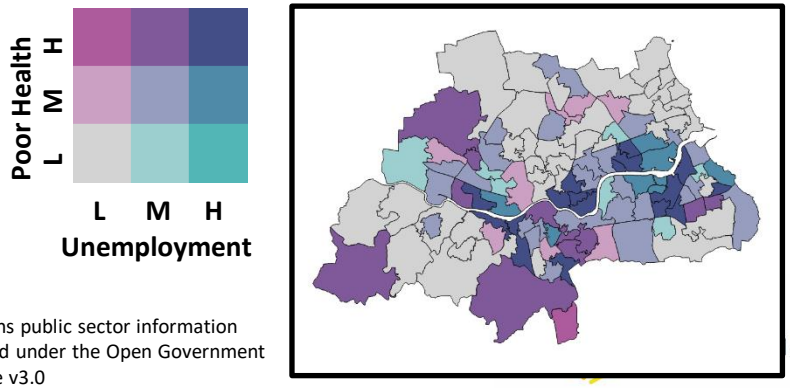

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Limitations of Choropleth Maps

- Choropleth maps imply that the population is distributed uniformly across the extent of the polygon (census zone).
- In reality this is not the case

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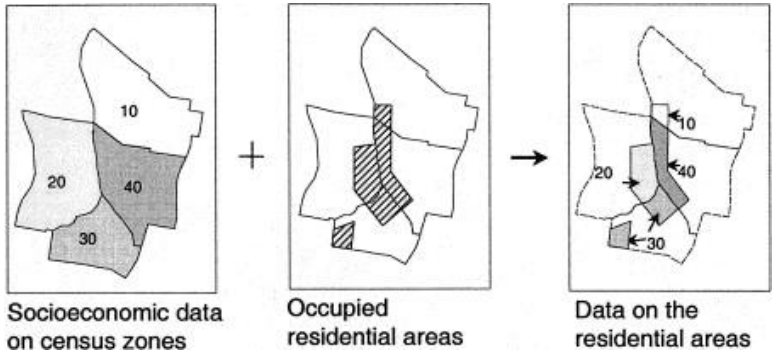
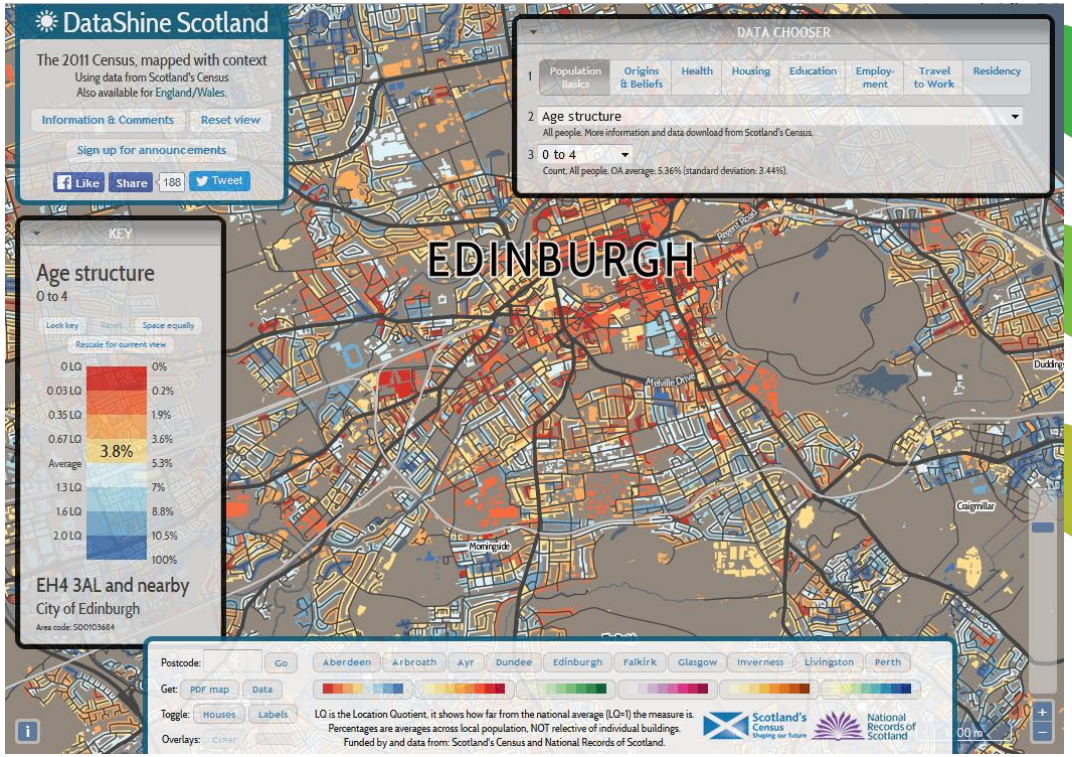
Masked Choropleth Maps



- Dasymetric Maps modify traditional Choropleth maps using additional land use datasets to present a more realistic distribution of the variable.
- DataShine is a form of dasymetric mapping where a layer of Ordnance Survey buildings is used to mask the census areas
- This helps with the problem of the choropleth implying that population is uniformly distributed across polygons



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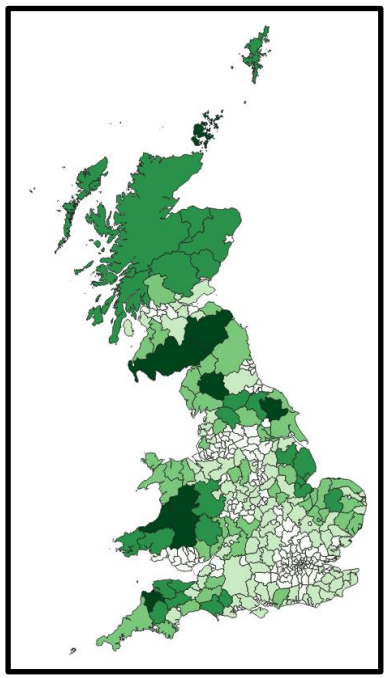
Guidance on constructing choropleth maps from UK census data

- Choose Output Census Geography
- Standardise Census Variables
- Choose Classification Method
- Choose Colour Ramp



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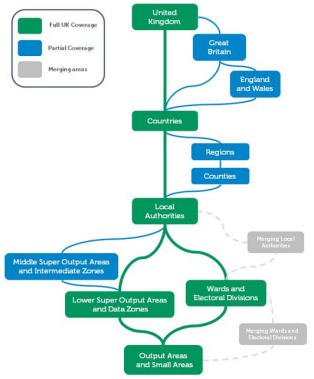
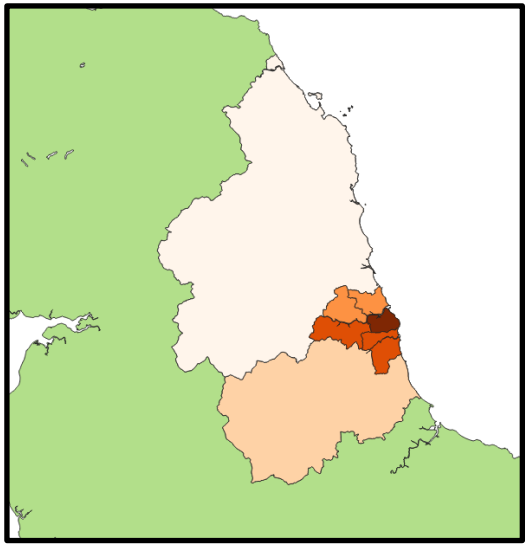
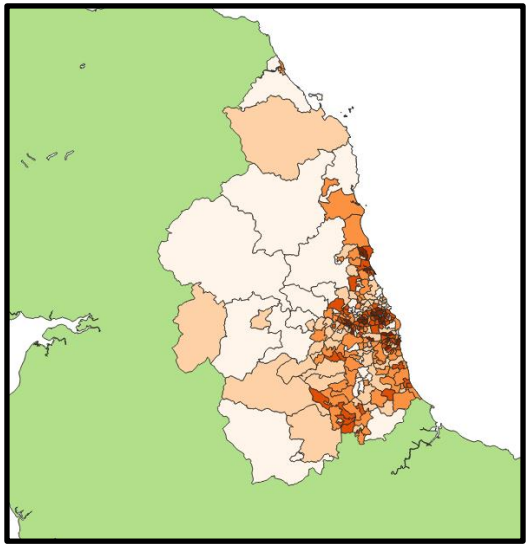
Choose Output Census Geography

- UK Census Data is available at different levels of output geography.
- Disclosure control means that not all census variables are available at all levels
- Mapping / analysing data at different levels of output geography may lead to different insights

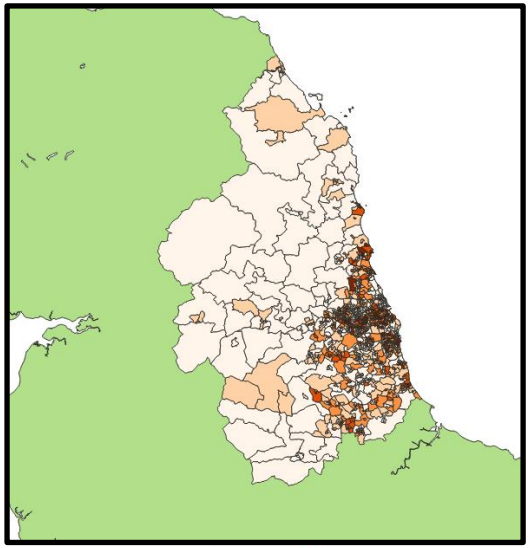




Local Authority



MSOA



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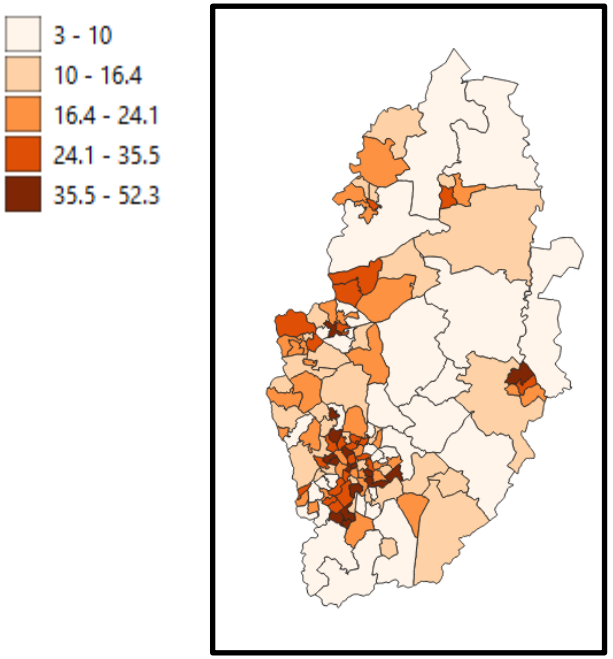
Standardise Census Variables

- Displaying raw counts of census variables (people or households) as a choropleth map should be avoided
- High counts are just where people are
- Instead the counts should be standardised (normalised) to allow values in one area to be compared with another.
- Option 1 – Standardise the census variable being mapped by **dividing it by the total geographic area**. This expresses the variable as a density.
- Option 2 – Standardise the census variable being mapped **by dividing it by the total population size** (people or households) in that area.

Households living in terraced housing as % of all households



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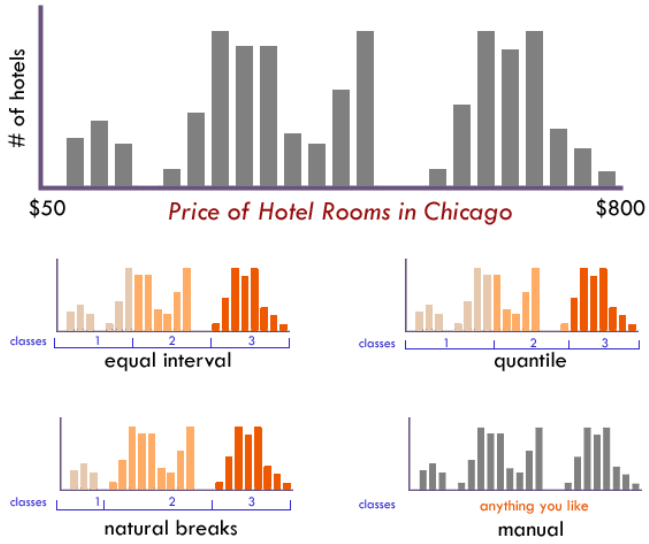
Choose Data Classification Method.

- When we construct a choropleth map we perform a classification
- Classification takes a large number of observations and groups them into a smaller number of data ranges or classes.
- A form of generalisation
- This makes it easier to spot patterns and understand the data compared with looking at all the variance of the data at once.
- Different classification methods are available. Some methods include:
  - Quantile
  - Equal Interval
  - Natural Breaks
  - Manual



https://www.axismaps.com/guide/data-classification

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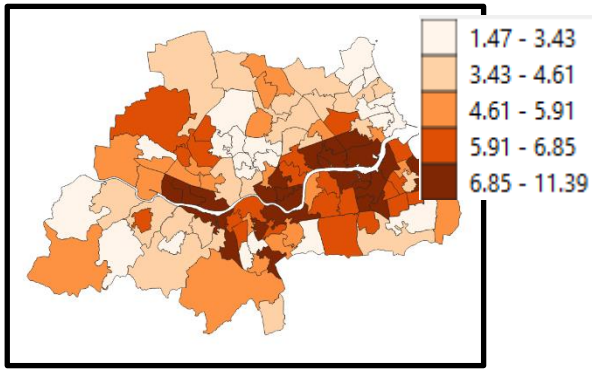
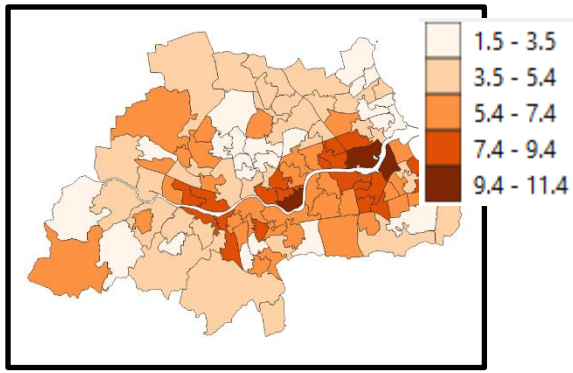
Applying to the same data, different classification methods or selecting a different number of classes leads to different choropleth maps.

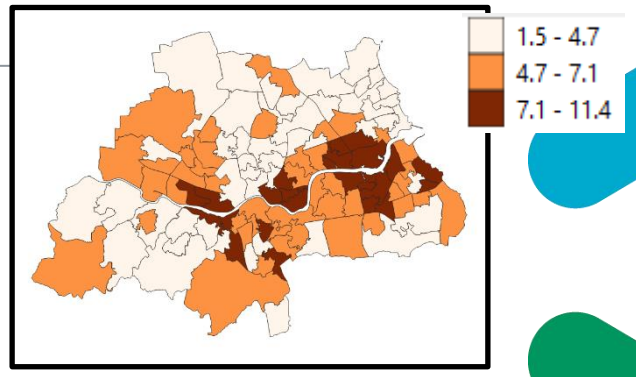
% Unemployment recorded in 2011 census by MSOA for Newcastle; Gateshead; North and South Shields



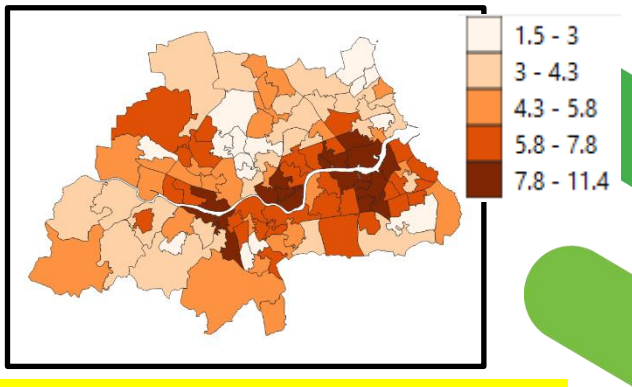
5 Classes - Quintiles



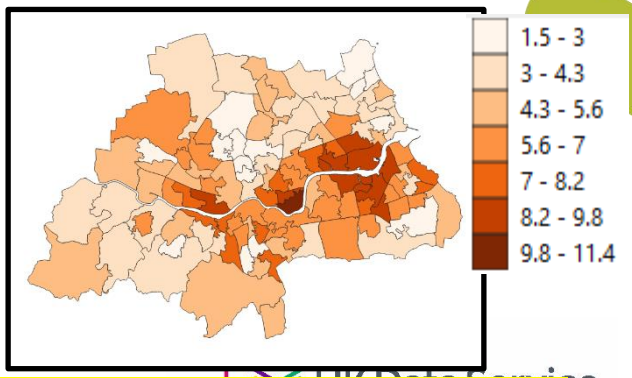
5 Classes – Equal Interval



3 Classes – Natural Breaks



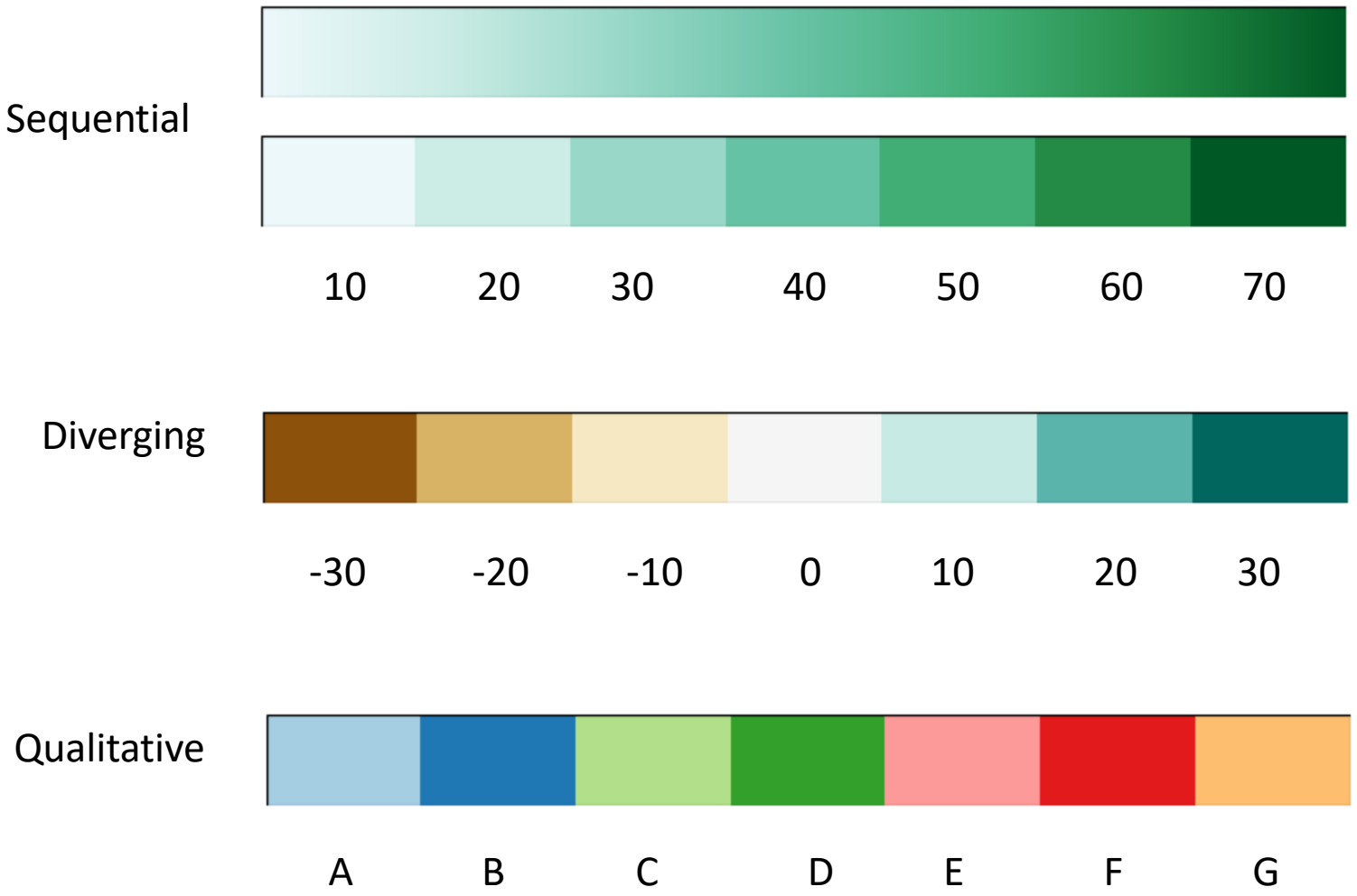
5 Classes – Natural Breaks



7 Classes – Natural Breaks

No classification method is right or wrong. Choice of classification method should be based on the characteristics of the data and an aim to avoid constructing misleading maps.

Choose Colour Ramp



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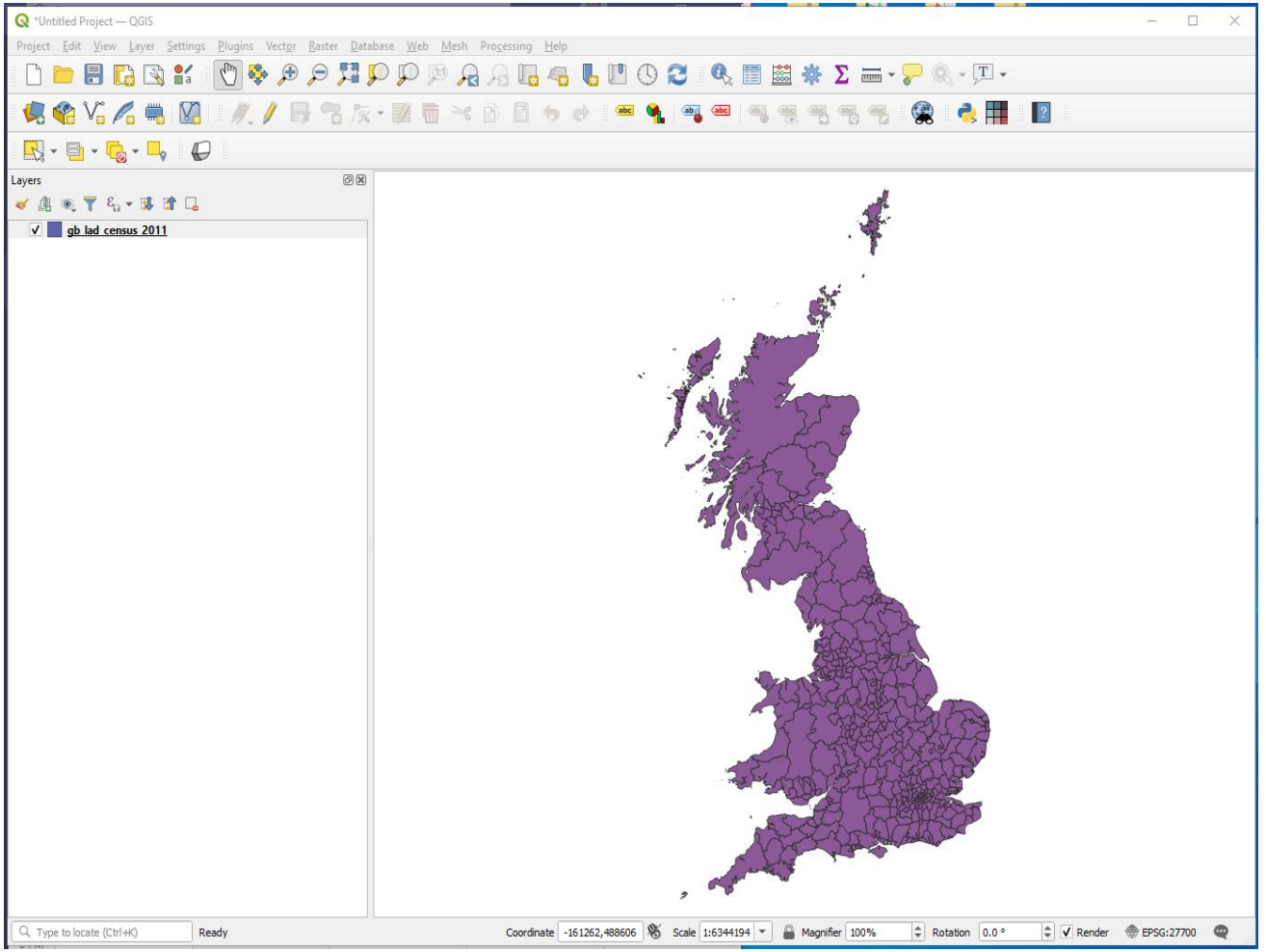
QGIS Desktop GIS Application



https://qgis.org/en/site/forusers/download.html

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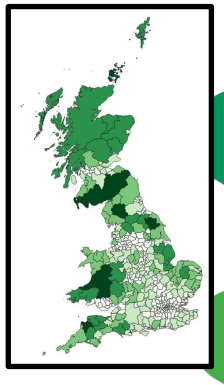
QGIS Hands-on Session 1 - Choropleth



If you have not done so already go to:

https://bit.ly/3luopw2

and download the Census_DataViz_Training_Pack.zip file to your working folder.

Unzip the contents of the Census_DataViz_Training_Pack.zip file

This contains training data and PDFs of all of the workbooks we will be using for the hands-on sessions.

qgis-choropleth-workbook.pdf is the first workbook we will use.

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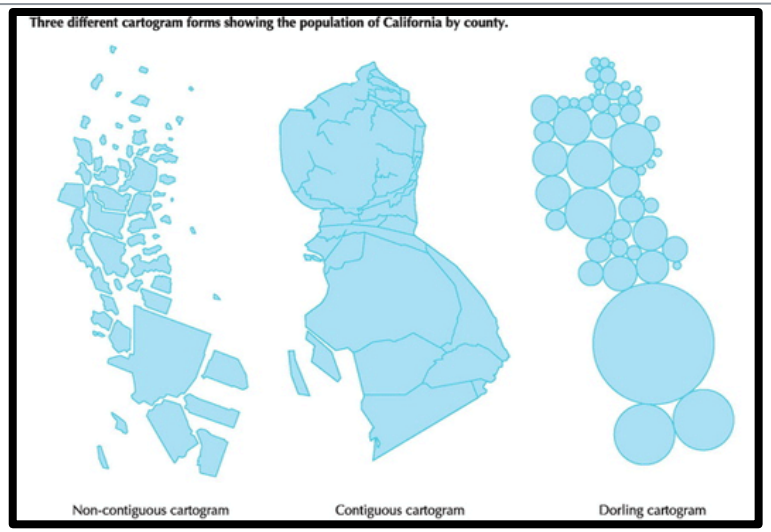
Visualising Census Data: Cartograms

Cartograms

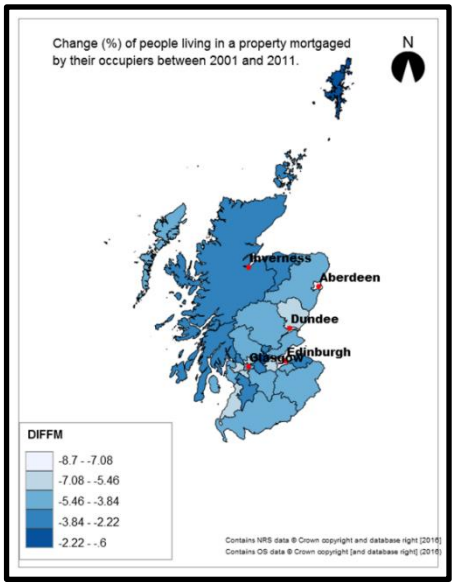
- A cartogram is a special form of map projection where polygon areas are drawn in proportion to the variable being mapped rather than the land area of the polygon

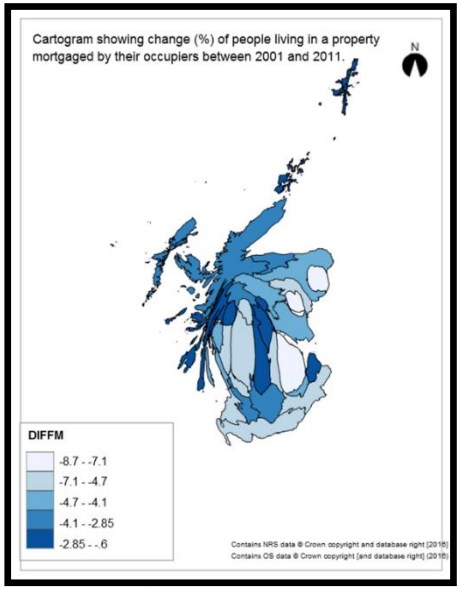
- Different types of Cartogram:
  - Non-contiguous Cartograms
  - Contiguous Cartograms
  - Dorling Cartograms

- Cartograms help avoid the problems of census areas with large populations but covering a small area being hidden by census areas with small populations but covering much larger areas



http://googlemapsmania.blogspot.com/2018/04/californias-century-of-growth.html





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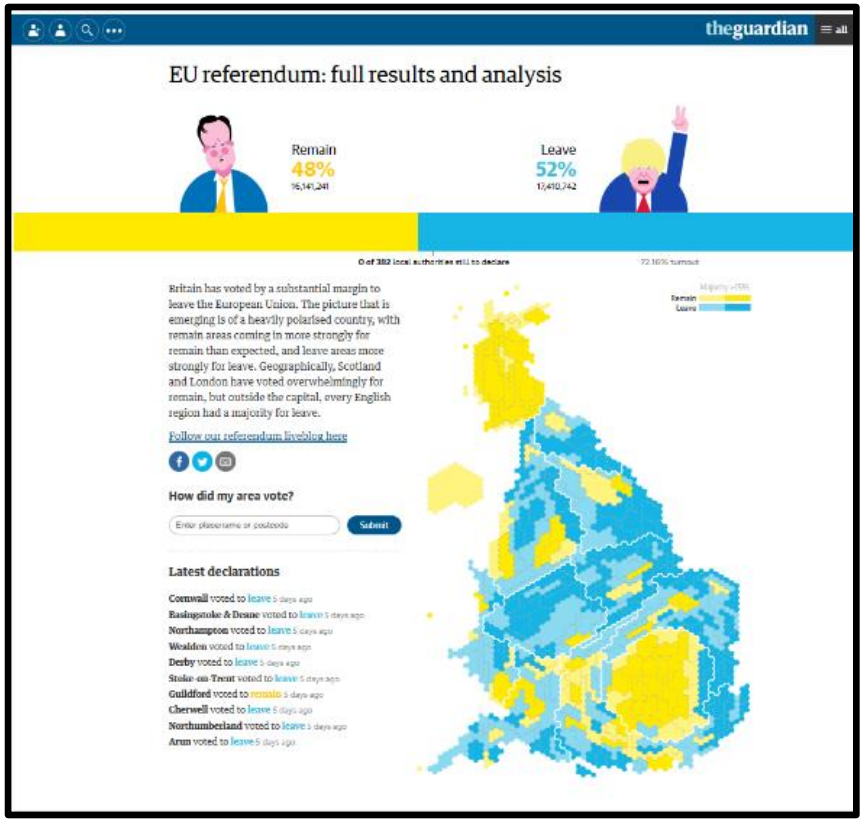
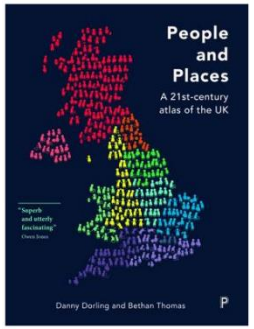
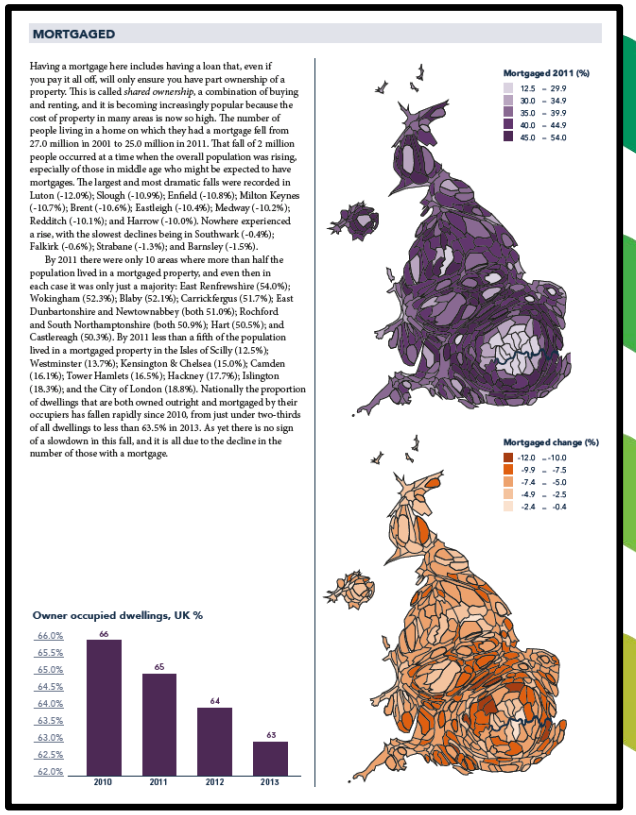
Cartograms in the wild

Brexit Cartograms



Census Cartograms





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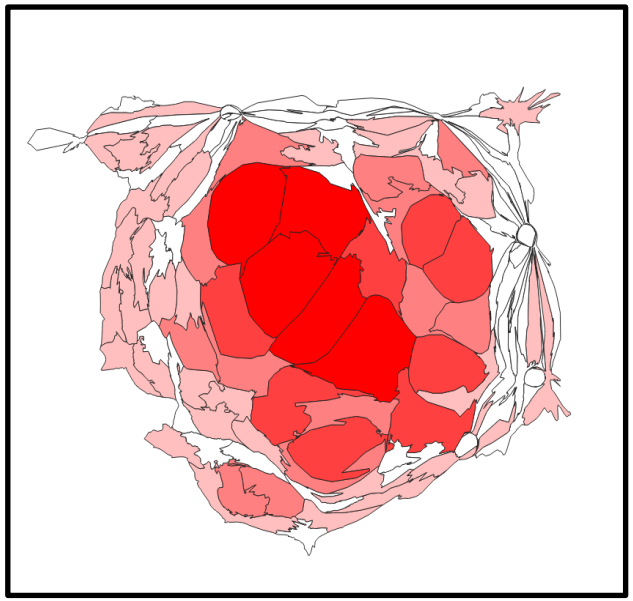
QGIS Hands-on Session 2 - Cartogram

- **qgis-cartogram-workbook.pdf** is the workbook we are using for this exercise
- This session uses data provided in the **Census_Training_Data\Cartogram** folder



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Visualising Census Data: Flow Maps

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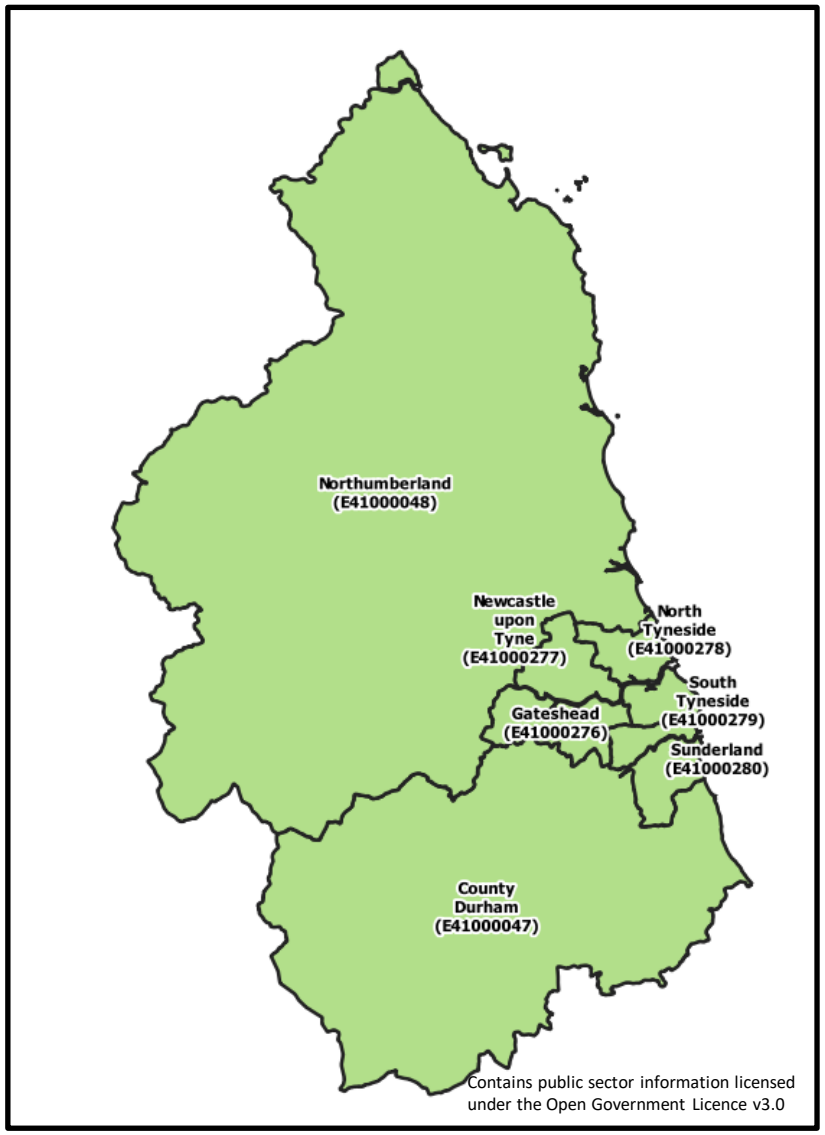
Census Flow Data



- Question on census form asks people for address of their place of work
- One Census output is counts of people that travel between places of residence and places of work
- Origin-Destination Matrices. These can be very big at most detailed levels.
- Understand Travel to Work patterns
- Transport Planning
- Data available through UKDS WICID

	E41000047	E41000048	E41000277	E41000276	E41000278	E41000279	E41000280
E41000047	127585	2279	8682	10267	1686	1888	15709
E41000048	1676	74442	19289	4691	10506	848	1677
E41000277	2311	6275	63863	9944	10848	1551	3220
E41000276	4317	3592	19941	37486	3596	2456	5883
E41000278	1141	6256	24932	4104	39149	1785	2207
E41000279	1739	832	6484	4960	2170	27902	8749
E41000280	9409	1027	6161	7140	1676	4979	70399

Origin-Destination Travel to Work Matrix for 7 Local Authorities in the North East as recorded in 2011 Census

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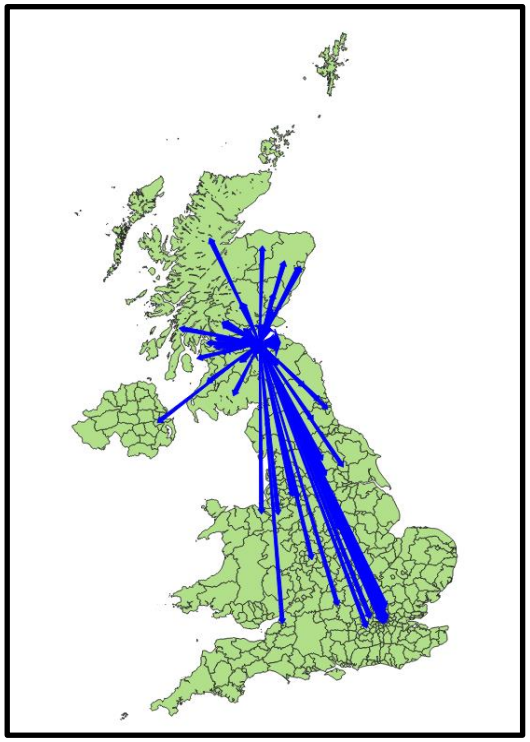
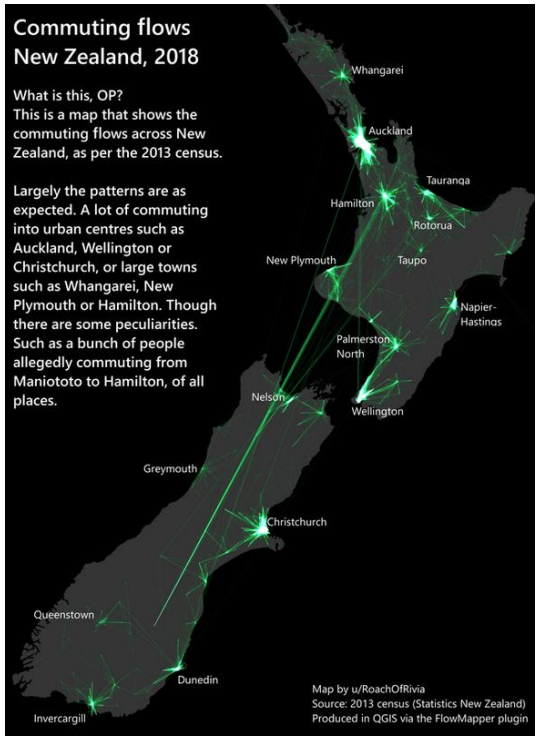
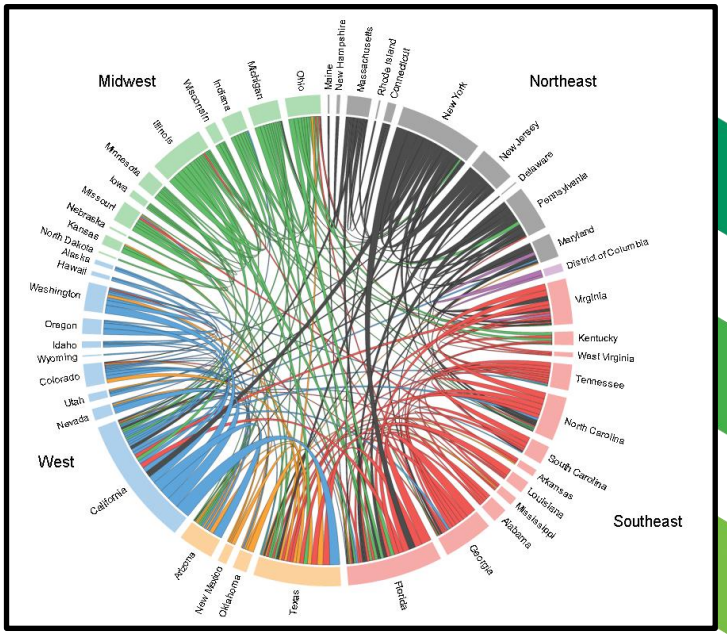
Visualising Census Flow Data







- Flow Map – flows between zones shown as weighted arrows. Direction of arrow = direction of flow. Thicker the arrow = more volume of flow.
- Advanced Flow Map – visualise flow for an entire country using advanced graphic techniques. Brighter areas = more flow.
- Chord Diagram – alternative to flow maps. Criticism of flow maps is that using geography leads to cluttering.

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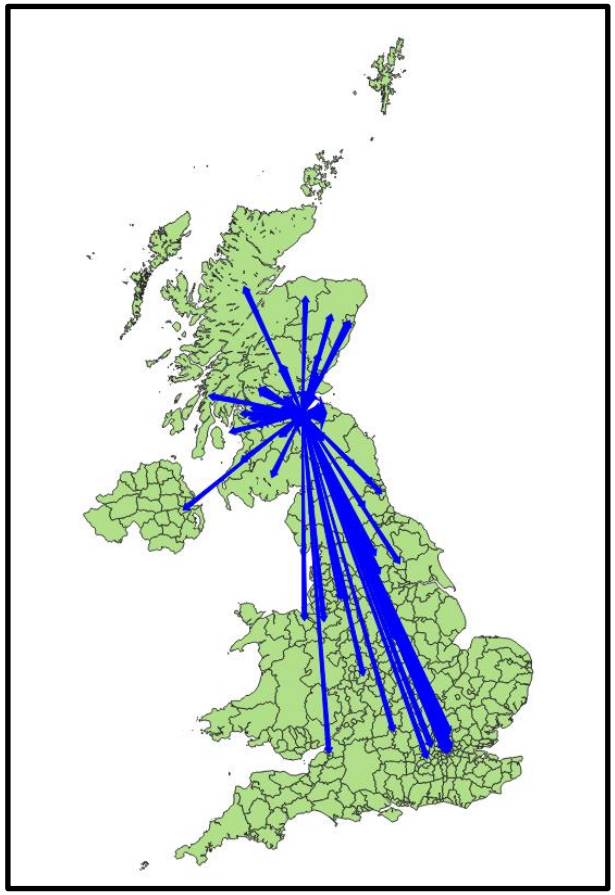
QGIS Hands-on Session 3 – Creating Flow Map from census flow data using QGIS

- **qgis-flow-map-workbook.pdf** is the third workbook we are using
- This session uses data provided in the **Census_Training_Data\FlowMap** folder
- Follow the first 4 sections of the workbook. Don`t do the Extra bits in Appendix 1 and 2 at the end.



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5 minute Break

Exploring Tableau Public to create maps, other visualisations, and a dashboard

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Tableau Hands-on Session

tableauintro2019.pdf is the Tableau Workbook.

First half of the workbook uses international data to introduce use of Tableau. Second half of the workbook uses census data.

Tableau has changed since the **tableauintro2019.pdf** workbook was written. When you get to section 2.4 of the **tableauintro2019.pdf** workbook refer to the **tableauintro2019_ammendment.pdf** (after this amended section continue to follow **tableauintro2019.pdf** for the rest of the exercise)

Demos

Q & A.

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