Megaregions

The United States of America, or just a bunch of 'megaregions'? An alternative view of the economic geography of the United States

A research story, by Alasdair Rae
@undertheraedar
General Election 2015: the view from second place

In my last blog post I shared a shapefile with the current UK constituency boundaries, which included a lot of other data. One of the variables included was who came second in the 2015 UK General Election. I thought it would be interesting to map this and also include a couple of widgets using the new Builder tools in CARTO (formerly CartoDB). I wanted to do this because I knew UKIP came second in 120 constituencies and I wanted to see where. I also wanted to post an interactive version of the data from my shapefile so people could explore it themselves. The first map below shows who came second in each constituency in 2015 and if you click an area you’ll get more information – winner, MP, and so on. Using the widgets below you can then select by winning party and margin of victory, should you want to quickly identify marginal seats, for example.

Who am I?
In the next 40 minutes or so

1. A bit of background to the study
2. A few words on open access, and why it made a difference here
3. The power of maps
4. **US megaregions project**
5. Tropicana Field and the bobblehead
Background
Novo ordo seclorum?
New order of the ages?
The Treasure of the Blue Banana
(yes, really)
Megaregions are a group of geographic locations and/or areas that are combined because of similar characteristics and mutual interest. Since our roadway system crosses many jurisdictional boundaries, transportation is inherently Megaregional. Things like air pollution, freight movements, and road safety don’t stop at political boundaries but planning often does. Therefore, planning at the Megaregional scale provides an approach to address new emerging challenges, and take advantages of the opportunities that arise around large metropolitan centers and their surrounding areas, connected by existing environmental, economic, cultural, and infrastructure relationships.

Megaregions present a new perspective that captures the economic, political and spatial level at which planning can be conducted in order to respond to the challenges of agglomerations of economic activity and population. It also recognizes the new context in which large-scale regions exist—one of global economic and environmental issues taking place on a larger scale.

Megaregions offer flexible frameworks to harmonize transportation with quality of life, economic opportunity, and environmental sustainability. Megaregions are the infrastructure and economic footprint in the global economy. Megaregions provide a sustainable future through multi-scalar, cross-boundary solutions. Megaregions allow us to think globally, coordinate regionally and act locally. (Ross, 2009)
Megaregions

What are Megaregions?

Megaregions are characterized as a network of urban clusters and their surrounding areas, and infrastructure relationships. This section introduces the megaregion concept and identifies United States

- Ross et al., 2011. Megaregions: Literature Review of Organizational Structures and Fin; the Implications for Megaregion Transportation Planning in the U.S.
- Lang, 2009. The Cascadia Corridor
- Ross et al., 2009. Delineating Existing and Emerging Megaregions (not online, hard c
- Ross et al., 2008. Megaregions: Literature Review of the Implications for U.S. (Ross ’08)
- Infrastructure Investment and Transportation Planning (Ross ’08)
- Ross et al., 2008. Proceedings of the Megaregions and Transportation Symposium
- RPA, 2007. The Healdsburg Research Seminar on Megaregions
- Lang and Dhavale, 2005. Beyond Megalopolis
Based on what?

“To be more charitable than Morozov, I would say there is a thin and interesting essay nestled inside the enormous pile of fluff that is “Connectography.”
Everyone talks about the ‘economic geography’ of places, and also of ‘megaregions’ but how can we systematically define them? Can we?
Why you should embrace open access

- People will find your work
- People can read your work
- It’s a nice thing to do
- It’s a good thing to do
- It’s the right thing to do
- It’ll look bad if you don’t
- People will share back
- You will find it helpful
- Others will find it helpful
- **But be careful, people might read it**

Is our work really like this?
No, mostly not. But it shouldn’t all be locked away either.
Hmm. Let me think about it.
EVERYONE ‘facing shifting landscape on publishing’

Latest EUA doctoral council chair says open science very much on his agenda for the role

December 7, 2016

By Holly Else
Twitter: @HollyElse
The impact of sharing supplementary datasets and speaking outside the echo chamber

Alasdair Rae, The University of Sheffield

Key Points

• Go the extra mile
  Any additional information you can share is valuable.

• Break the echo chamber
  Sharing your data encourages conversations outside the echo chamber.

• Sharing data now can save time
  People don’t have to request to see the data.

Pre-publication

I work in the Department of Urban Studies and Planning at the University of Sheffield.

I’ve published a few things about flow-mapping. In 2015, I began a piece of analysis looking at census travel to work data in the U.S. I started to get stuck into an origin-destination dataset of commuting flows between about 74,000 census tracts in the U.S.

So, I published the data on Dropbox and I put the working paper on the White Rose Repository at The University of Sheffield. After that, Garrett So we did that about five times. On the fifth run, we got a result that made the most sense. We submitted a paper to PLOS ONE in July 2016 and it went online in November.

Post-publication

I’m also an editor of an Open Access journal, Regional Studies, Regional Science. I was familiar with the Open Access and sharing infrastructure, so I thought we should do it properly. I spoke to Jez, our Research Data Manager at The University of Sheffield, and said we should get it all on the data portal, ORDA, and repository, WRRO. We also
Why are we here?

1. Not really sure what to do with our lives?
2. Want to change the world?

The answers to these questions should have some bearing on how, where and when we publish
Reminder: Wales exists (so does New Zealand)

World Maps Without New Zealand
It’s not a very important country most of the time

The Trump Organization spans at least 20 countries
Many, like Turkey and the Philippines, are central to U.S. security interests.
“The President Likes Maps”

This is one thing most of us have in common with The President of the United States. Possibly the only thing.
Pic of my very heavy laptop
aka The MegaMonster
The American Commute
A functional economic geography of the United States

About the map
This map shows all commuting links of 100 miles or less, between census tracts in the contiguous United States.

The shortest journeys are shown in yellow and the longest journeys in red. The map mirrors the underlying population distribution but it also highlights the functional economic geography of the nation, including several ‘mega-regions’. There are just over four million lines in the dataset, and more than 130 million individual commutes.

Data Source: American Community Survey 2006-2010

Map created by Alasdair Rae
Working paper and data

This is an author produced version of Mapping the American Commute: from mega-regions to mega commutes.

White Rose Research Online URL for this paper: http://eprints.whiterose.ac.uk/89361/

Monograph:

released and this release included tract-to-tract flows. However, this is where data volume problems first arise (one of the three Vs of ‘big data’). There were 74,134 census tracts in the United States in 2010. These tracts produce a potential interaction matrix of 5,495,849,596 cells but, unsurprisingly, most cells contain zeros and the actual number of connected census tracts is 4,456,426. However, dealing with this volume of data is far from trivial so the Federal Highway Administration provides a very useful tutorial for users on how to explore and analyse the data using Microsoft Access (FHA, 2015). The dataset contains the following columns:

ACS tract-to-tract commuting data
1. Residence state FIPS code
2. Residence county FIPS code
3. Residence tract FIPS code
4. Workplace state FIPS code
5. Workplace county FIPS code
6. Workplace tract FIPS code
7. Estimated commuters
8. Margin of error

*This is a unique Federal Information Processing Standard code for each geographic unit in the United States and territories. These individual codes can then be used to create a unique identifier for each census tract.

For the ACS 2006-2010 tract-to-tract product released herein, there is no data on different modes of travel, though this could be a major advantage available from the United States Census Bureau and also contains population data from the 2010 Census for each tract. The workflow from original dataset to United States tract-to-tract commuter flow map is described below. There are almost endless number of potential workflows but this approach was simple and effective on a Dell Precision M6800 workstation with 32GB of RAM and i7 processor running 64-bit Windows 7.

Flow map workflow from original database to shapefile

1. Open the original tract-to-tract database file in Microsoft Access and then export to Dbase format.
2. Import the Dbase file into QGIS 2.8 (open source geographic information system software). Concatenate the state, county and tract FIPS code to create a unique state-county-tract FIPS code for each origin and destination.
3. Import data file containing the latitude and longitude of census tract centers of population. Concatenate the state, county and tract FIPS code to create a new state-county-tract FIPS code for each point.
4. Perform two joins, each based on the unique FIPS code for each census tract. These joins produce a dataset...
Mapping the American Commute

Update, 20 September 2015: scroll to the bottom of the post if you want to download the data.

One of my summer projects this year has been attempting to map the American commute, following earlier work on a similar subject. Put simply, I’ve attempted to put together a map which shows commuting connections between locations in the contiguous United States, using the most fine-grained data I could find. Some of the results of this went into a recent piece in WIRED, and also City Metric, and the larger piece of work it’s based on is part of ongoing research into the best ways of mapping commuting flows. The main images are below, followed by some more technical information. For now, all you need to know is that these images show commuting connections of 100 miles or less between Census tracts in the lower 48 states. You’ll have to forgive me if your city isn’t labelled!

Dr Alasdair Rae is a senior lecturer in the geography department of the University of Sheffield.

I’ve recently been writing and thinking about polycentric urban regions: partly because I’m interested in how places connect (or not) for one of my research projects, and partly because I’ve been experimenting with ways to map the connections between places in polycentric urban regions.
ANIMATED MAPS ILLUSTRATE THE HELL OF BAY AREA COMMUTING
Mark Evans piece - amazing work

This really is amazing:
Keeping it together

Today is my birthday, so I decided to take a day off from my usual work—writing a dissertation about the production of a project that tries to examine the same basic question from a very different perspective. In the dissertation, I primarily focus on people’s use of space, and I try to emphasize how the recognition of a “single” place is often defined by a substantive web of relations. I am highly skeptical that you can ever make the case for unit areas in empirical and geographic terms with much precision. But the suggestions about how human communities are materially interrelated in space.

Last month, the geographer Alasdair Rae published a wonderful working paper on American “mega-regions” based on a project he’s working on that’s based on the observation that commuting patterns sketch out “how the places where people live and work are connected.” As part of the project, Rae made the massive data set available online.

Rae’s project offers a striking visual representation of how “mega-regions” are visible across some of the U.S.’s largest metropolitan areas and subjected it to an algorithmic detection of community borders, rather than merely relying on the human eye to pick them out. The work was done in collaboration with Stanislav Sobolevsky, Ricardo Campari, Alexander Bein, and Carlo Ratti at the MIT Senseable City Lab.

It took a fair amount of data wrangling in Python, SQLite, and QGIS to get all of the different software working together. I’ll limit the analysis to the 104,272 commute entries from Rae’s database which had both their origin and destination point included. I also wanted to see whether community-detection patterns would emerge at a much smaller scale than the national level. When I finally managed to get the data, I split Massachusetts up into nine communities, with an optimality score of 0.96E08. Here’s what that looks like when plotted back onto a map:
Combo (Sobolevsky et al., MIT)

Community detection is key to understanding the structure of complex networks, and ultimately extracting useful information from them. Applications are diverse: from healthcare to regional geography, from human interactions and mobility to economics. In this paper we present a novel search strategy for the optimization of various objective functions for community detection purposes [S. Sobolevsky, R. Campari, A. Belyi, and C. Ratti “General optimization technique for high-quality community detection in complex networks” Phys. Rev. E 90, 012811 2014]. Existing search strategies take one of the following steps to evolve starting partitions: merging two communities, splitting a community into two, or moving nodes between two distinct communities. The proposed algorithm compounds all three actions. After selecting an initial partition made of a single community, the following steps are iterated as long as the iteration results in an...
Garrett G. D. Nelson

Postdoctoral Fellow, Society of Fellows

I am a historical geographer who is interested in the ways that social change and landscape change are intertwined. My work focuses on how human communities make choices about transforming and managing the shared places in which they live, and, in turn, how those same places structure the formation of communities, states, and social groups. In particular, I am interested in the many themes which come together in the field of planning—concerns about justice, equality, aesthetics, ecology, and administration—and how these are related to the spatial pattern of human life on the earth's surface. In addition to explaining the historical formation of landscapes and societies, these lines of inquiry also help to frame contemporary questions about how to make decisions about people and places.

[show more]
The Paper

- Written collaboratively in Google Docs, files on Dropbox
- Cloud computing in AWS (about $20 per run)
- Several iterations (5 main ones)
- A good few maps
- Targeted big OA journal with quick turnaround
- Several Skype chats
- Submitted summer 2016
- Published 30 Nov 2016 (OA often faster as well)
An Economic Geography of the United States: From Commutes to Megaregions

Garrett Dash Nelson  Alasdair Rae

Published: November 30, 2016  https://doi.org/10.1371/journal.pone.0166083

Abstract

The emergence in the United States of large-scale "megaregions" centered on major metropolitan areas is a phenomenon often taken for granted in both scholarly studies and popular accounts of contemporary economic geography. This paper uses a data set of more than 4,000,000 commuter flows as the basis for an empirical approach to the identification of such megaregions. We compare a method which uses a visual heuristic for understanding areal aggregation to a method which uses a computational partitioning algorithm, and we reflect upon the strengths and limitations of both. We discuss how choices about input parameters and scale of analysis can lead to different results, and stress the importance of comparing computational results with "common sense" interpretations of geographic coherence. The results provide a new perspective on the functional economic geography of the United States from a megaregion perspective, and shed light on the old geographic problem of the division of space into areal units.
Data Availability: The data are available at the following Figshare link: https://doi.org/10.15131/shef.data.4110156. Link to all Figs in high resolution: https://www.dropbox.com/sh/tnmqy68m80gjblz/AAAZBeEJxyYWvZntBzRnibWMLa?dl=0.
An Economic Geography of the United States: From Commutes to Megaregions

Overview of attention for article published in PLoS ONE, November 2010

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Title: An Economic Geography of the United States: From Commutes to Megaregions
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Authors: Garrett Dush Nelson, Alasdair Rae, Garrett Dush Nelson, Alasdair Rae, Nelson, G.D., Garrett Dush...
Abstract: The emergence in the United States of large-scale "megaregions" centered on major metropolitan...

This research output has an Altmetric Attention Score of 850. This is our high-level measure of the quality and quantity of online attention that it has received. This Attention Score, as well as the ranking and number of research outputs shown below, was calculated when the research output was last mentioned on 15 April 2017.

Altmetric has tracked 7,584,657 research outputs across all sources so far. Compared to these this one has done particularly well and is in the 99th percentile: it's in the top 5% of all research outputs ever tracked by Altmetric.
In a nutshell

We moved from this

To this
The geography-blindness of the algorithm therefore also allows us to provide a test case for Tobler’s “First Law” of geography: the premise that ‘near things are more related than distant things’ [34]. Census tracts near to each other should, according to this logic, have stronger commuter connections to one another than census tracts far apart. Consequently, even though the partitioning algorithm is not considering nodes’ locations in space, it should produce communities which are spatially clustered, if the structure of commuter patterns obeys the expected rule of more connections between spatially-proximate nodes, and fewer connections between spatially-distant nodes.
Commuting in Santa Barbara
A visual heuristic approach to regional delineation

When attempting to make sense of large and complex spatial datasets, it is possible to take a number of different methodological approaches. Here we examine two of the most common: a visual heuristic approach and an algorithmic approach. According to Smelcer and Carmel [23], the cognitive work we do with maps is simplified using visual heuristics, and this is certainly the case when we compare a large commuter data table with millions of cells to the kind of cartographic representation shown in Fig 1. However, we do not concur with Smelcer and Carmel when they state that "visual heuristics differ from algorithms, which are guaranteed to provide a correct solution" (emphasis added; cf. Anderson, [24]). As we shall see below, the extent to which a "correct solution" can be derived depends upon user-defined parameters, the nature of the algorithm used and the underlying epistemological position of the researcher. Nonetheless, we do believe that the algorithmic approach we develop confers many advantages above and beyond the visual heuristic and has significant potential in adding value to the visual approach, particularly with respect to discriminating the dividing lines or overlaps between closely-integrated regions.
A value of 0 indicates a partitioning of nodes into communities which is “no better than random,” while a value of 1 indicates “networks with strong community structure.”
Four Million Commutes Reveal New U.S. 'Megaregions'

As economic centers grow in size and importance, determining their boundaries has become more crucial. Where do you fall on the map?

People quite like regions

Google Trends
How 4 Million Commutes Shape America's 'Megaregions'

New maps use math to define the amorphous term.

LAURA BLISS | @mslaurabliss | Dec 7, 2016 | 4 Comments
What the U.S. map should really look like

State boundaries matter for all sorts of reasons. The state you live in determined how much your vote
World Economic Forum

The international organization for public private cooperation. Follow us for research, insight and analysis on global issues. Annual Meeting hashtag: #wef

Geneva, Switzerland
wef.ch/agenda
Joined April 2007

World Economic Forum @wef - 6m
Three ways to attract - and keep - millennials wef.ch/2hvUV01

World Economic Forum @wef - 1h
This is how the US could look, based on economics wef.ch/2h0MPMz
Hi Reddit,

My name is Alasdair Rae and I am Senior Lecturer in Urban Studies and Planning at the University of Sheffield, in England. My research focuses on geographic analysis, and particularly on how places connect, or not. One of the main things I'm interested in is the difference between political boundaries, such as counties and states, and how this compares with patterns of human connection on the ground, such as commuting and migration.

And I'm Garrett Dash Nelson; I'm a postdoctoral fellow in the Society of Fellows and the Department of Geography at Dartmouth College in New Hampshire. I work on the history of geographic problems in planning, and I'm interested in how the human landscape and social action structure one another.

Last month, we published a paper titled "An Economic Geography of the United States: From Commutes to Megaregions" in the journal PLOS ONE. We were curious what would happen if we tried to divide the geography of the United States up by using data about millions of Americans' commuting habits, instead of relying on old borders like state and city lines. We tried two ways of interpreting the data. First, we made "flow maps," which allowed us to visually interpret where clusters of commuters are congregating. Second, we used an algorithm to do what's called "community detection"—finding groups of closely related points within a network of complex interrelations. We ended up with a new map of the United States that offers a new way of thinking about what kind of areas match the geographic patterns of our real lives.

We'll be answering your questions at 1pm ET — Ask Us Anything!

Follow Alasdair on Twitter @undertheraedar and Garrett on Twitter at @en_dash
Yup, DC/Baltimore is spot on as well.
I leave Maryland all the time, but I rarely go beyond the areas of VA, WV, and PA that they included.

Arlington, VA resident here: I agree as well. Baltimore feels much more like a part of my home region than Richmond does. I always have to correct people who hear I’m from Virginia and think I’m a Southerner.

As someone who lives in the Roanoke area, I’m always surprised how different NoVA is from the rest of the state, even Richmond. Driving past Front Royal even feels like driving into another state.

don't NOVA my rva.
Really useful public feedback on this project helped us move things on a bit more. Let’s take a look if there’s time.
Why did a new Rays stadium search take so long?

Some political thoughts on this Florida primary day.

by Daniel Russell | @d_russ | Mar 15, 2016, 10:30am EDT

Trending

Tampa Bay Rays close to signing Nathan Eovaldi
Summing up

1. It’s not procrastination if you produce something useful
2. 1 isn’t strictly true, but it gets you off the hook
3. This conception of megaregions really struck a chord
4. The power of maps should never be underestimated
5. Publishing open access opens doors and starts new conversations with interesting people
6. Even Redditors agreed that the results make sense