



# NARSC NEWS



## Welcome from the Editors



This newsletter celebrates the one-year anniversary of the NARSC newsletter. We would like to extend a heartfelt thank you to those who have contributed and provided reflections on the newsletter as we work to provide interesting content

for the association membership.

The June 2014 edition of the newsletter features thought pieces on Open Regional Science. The centerpiece of these pieces is a condensed version of Sergio Rey's Western Regional Science Association (WRSA) presidential address, which was well received and stimulated thoughtful debate. Erik Heikkila, Dani Arribas-Bel, and Roger Bivand were kind enough to contribute reflection pieces on the presidential address.

In addition to these thought pieces, the newsletter features a piece from Douglas Wrenn on shale development and employment in the Northeast. We also include profiles of two junior faculty members from the Northeastern region - Douglas Wrenn (Penn St.) and Nathan Yang (Yale). Michael Carroll, the editor of Regional Science Policy and Practice, has provided a piece that profiles the journal.

The newsletter also features the funding accomplishments of our members. As always, all feedback, comments and suggestions you may have about this version or future editions of the newsletter are greatly appreciated. We hope to see you at the NARSC Meetings in November!

Elizabeth Mack and Ralph McLaughlin, Newsletter Co-Editors

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## Open Regional Science: Further Thoughts by Sergio Rey



It was an honor to give the presidential address at the WRSA meetings this past February in San Diego. The theme of my address was *Open Regional Science* that was framed as a call to action for regional scientists to engage with developments in open science. I was both pleased and disappointed by the response my talk received. One esteemed colleague called it provocative. While it is always pleasant to receive compliments, my disappointment stemmed from the confirmation of my fear that regional science is behind the curve when it comes to developments in open science. It appeared to me that much of what I discussed came as news to regional scientists.

Given space limitations, I will not revisit what open science is, but rather I would point the reader to the published version of my address. Here, I want to focus on a few aspects of my address that, I think, generated the most discussion. The first surrounds the tension between regional science and the exploratory turn that is coming to dominate much recent work in so called big data. While regional scientists have been using exploratory spatial data methods for some time, I argued that there was somewhat of a dismissive attitude towards these approaches in our community, and that the attitude reflected cultural norms in the discipline of economics where theory is prized over empirics.

I did not claim that we should abandon theory in favor of exploratory analysis. Indeed, I think regional science is positioned to engage with the rise of machine learning and related methods in an intellectually sound way. One piece of the recent rhetoric around big data is that it may render causality irrelevant since correlations and associations identified in massive data sets are all science needs. However, this data hubris can lead to mistaken views of reality. Just consider real-time data streams from MODIS sensors spotting the locations of fires and their convolution with road network sensors identifying that these locations are associated with the presence of fire trucks. Machine learning gone wild would identify the association between fire and fire truck, and a naïve (theory-less) intervention might be to eliminate the fire trucks. Theory and empirics are what we need, not one or the other.

A second issue revolves around the role of openness in the scientific process and science's role in the diffusion of knowledge. In *Capital in the Twenty-First Century*, Thomas Piketty argues that it has been the diffusion of knowledge, rather than capital flows that has been primarily responsible for any international convergence and economic development. In my address, I contrasted publication in captured science with publication in open science. One might draw an analogy where captured science is more akin to autarky, since it walls off interactions and knowledge diffusion, while open science is a world in which information and knowledge flow much more freely. If Piketty is correct and we as a community care about our research being relevant to the problems regions face today, then we should be pushing for open science models for regional science.

Link to original address: <http://link.springer.com/article/10.1007/s00168-014-0611-7>

## Reflections on Open Regional Science by Eric Heikkila



Professor Sergio Rey, in his WRSA Presidential Address, advocates for an "open" rather than a "captured" paradigm for scientific inquiry in the field of regional science. In this context, he calls for an *open* approach to data, modeling, software, collaboration and publication. In the spirit of his call, I sketch out here a single integrated scenario that responds to each of these. My suggestion hinges on a fundamental distinction between spatial *data* models and spatial *process* models.

Most examples of what are commonly described as "GIS models" are in fact spatial data models. For example, it is common now for municipalities and other local governmental entities to maintain spatial data models describing *what* can be found *where*. On the whole, these are very useful, worthwhile and informative. Much of the scholarly work we do in regional science entails spatial *process* or interaction models. These processes -- migration, climate change, and economic activities are some obvious examples -- act upon the entities described by spatial data models and prompt their evolution over time. *Spatial data models bring spatial process models down to earth, literally and figuratively, while spatial process models breathe life into spatial data models.*

Recognizing this distinction, how might the regional science community respond to Professor Rey's call for a more open regional science? One simple yet compelling idea is to host an internet-based venue or exchange for linking spatial process models to spatial data models. I call this the *Open Source Spatial Modeling Exchange*, or OSSM XΔ (pronounced "awesome exchange"). In the OSSM XΔ, spatial process models could be applied to qualifying spatial data models in a plug-and-play fashion. This would necessarily entail a set of protocols to determine which items in "column A" can operate on corresponding items in "column B".

To use a concrete example, consider the classic formulation of urban household and firm location behavior as described by Fujita and Ogawa (FO)<sup>1</sup>. My colleague Yiming Wang (University College London) and I re-adapted those behaviors within the context of an agent-based model<sup>1</sup> that replicates the FO results, using (as they did) a simple unitary linear representation of an urban space. But why stop there? Why not allow such FO "agents" to roam freely within the confines of a spatial data model of Los Angeles, or London, or Tokyo? In a similar fashion, the OSSM Forum could facilitate the linkage of spatial process models of flooding, immigration, or real estate development to corresponding spatial data models. It is likely that this kind of linkage would also foster richer interactions between scholars who develop spatial process models and the practitioners who are responsible for policy formulation and implementation in the real-world counterparts of those spatial data models.

The regional science community could take several steps to facilitate such a development. One is to provide the venue, presumably a website, where "open" spatial data and spatial process models would reside. Most importantly, regional science associations could also help shape the intellectual agenda underpinning such work. We could do so by setting aside one or more sessions at our annual conferences to explore related topics. Likewise, we could develop analogues to the Tiebout & Springer prizes to encourage outstanding scholarship in this area. Taken as a whole, these activities are indeed in the spirit of -- and can contribute tangibly to -- a more open regional science.

## Open Workflows for Open Regional Science by Dani Arribas-Bel



In his WRSA presidential address, Serge Rey makes a “call to arms for regional scientists to engage with open science and open source”. His premise is that regional science, as a discipline, has kept itself very much distant from recent developments in other fields in the way the scientific process is carried out. In particular, he considers the movement of open science, as contrasted with the notion of *captured* science. This involves a set of practices around the way academics write software (open source), manage data (open data), carry out modeling experiments (open modeling), collaborate (open collaboration) and distribute their results (open publishing). I could not agree more with both Rey’s principles and his view of the current state of affairs in regional science (and many other social sciences). In this piece, I would like to add to his plea to “go open” with a component of open science that, although not explicitly mentioned in the address, underlies most of its philosophy: open workflows.

The concept of a workflow is something regional scientists can all relate to, even though we might not realize straight away. After all, we all have a particular set of habits, techniques and tools we use to carry out the diverse activities that involve being a modern scholar. However, not much thought usually goes into the design and adoption of a *good* workflow, let alone of an *open* one. Rather, it is something seldom taught in school that the student (i.e. future researcher/scientist) is usually expected to “just know”, as if its acquisition and learning curve were non-existent or just surpassed by simply enrolling in a PhD program.

Thinking and designing a good open workflow is not (only) about tool choice. It is much more about shaping every aspect of how we carry out research, from the inception of the idea to its development (e.g. data collection and analysis) to its dissemination, in a way that can easily be captured, made transparent and, if need be, reproduced again in the future. Tools, of course, play a big role in enhancing (or dampening) this process. Some have been designed from the ground up with these principles in mind and thus embody them much better than others created under different premises. In any case, the umbrella of the workflow covers beyond the simple choice of one piece of software over another and focuses much more on documenting the endeavor itself.

Besides their better alignment with the scientific ethos, there are plenty of practical reasons for adopting open workflows. Purely self-interested minds will find they are more efficient in the long run, make collaboration easier and appear as an invaluable sanity keeper when it is required to revisit a research project after some time. However, the true advantages become clear when one considers the collective benefits of an open workflow culture. A structured and documented process facilitates the transition from private to public, lowering the barriers to publish and share with the wider community; transparency and reproducibility make it easier for scientists to fully grasp the methods and results of peers, even when they do not know each other; modularity and portability allow reuse of components between projects, avoiding “reinventing the wheel”.

A good open workflow is not something one “just knows”. As most things worth pursuing, it takes interest and some effort to master; however, its benefits clearly exceed its costs. Today, we know how Galileo made his discoveries because he kept detailed research diaries of his steps. We need to ensure the researchers of tomorrow will be able to look back and reconstruct how we reached the insights that have made regional science a meaningful discipline. The answer definitely lies in a more open regional science; but that can only happen with more open workflows.



## Open Regional Science: Comments by Roger Bivand



Sergio Rey's presidential address to the 2014 WRSA meetings: "Open Regional Science," is a timely call to action. It is timely for a number of reasons, including the increasing stress being placed on the reproducibility of scientific results, and the unfortunate consequences of perverse incentives in "captured science." It is a call to action in its framing of "open" as a verb, not just an adjective; action implies responsibility for encouraging the promotion of changes in the ways that regional science is conducted. It is challenging in its implicit suggestion that our academic comfort zone is deceptive, and our work less truly scientific than it could be if we addressed the incentive structures directly.

It does seem, however, that the criticism of publishing practices in this address could have been extended to consideration of other questionable sets of incentives. These relate to the principal-agent problem in higher education and research, in which grants and recruitment play a large role. Seeing graduate teaching and research as quasi-markets may be convenient for those solving procurement problems, but it has consequences for the kinds of research that are done, as well as for publication practices. This is expressed regretfully by Renfro (2009, p. 23): "To take an interest in programming and econometric software development would seem therefore to be the graveyard of any academic economist's professional ambitions, justifiable only as a minimally diverting hobby, spoken of only to trusted colleagues."

For example, there seem to be too strong incentives involved in attending only some sessions and streams in conferences, only scanning the contents of a narrow range of journals, because time should not be "wasted" with information that is not immediately relevant. Even exposure to the rudiments of scripting - a prerequisite for reproducible research - involves spending time for which there is no quick return. Opening regional science might also involve going to "other" sessions, and getting involved in sharing insights. This kind of disruptive action is well-represented in a collection that appeared at the time of the San Diego meeting (Stodden et al., 2014, also at [ImplementingRR.org](http://ImplementingRR.org) under a CC BY 3.0 US license). We can arguably, as Serge points out, learn from developments in other scientific disciplines, and even from lawyers (Stodden, 2009, 2014).

It is also worth noting that until some thirty years ago, much science was open, and tabular data and code listings were exchanged (or included in publications). Some of this background, and the outlook for economics, are discussed by Anderson et al. (2008). Where privacy concerns permit, the arguments for reproducible research are unassailable; fundamental standards of scientific methodology, and indeed the philosophy of science demand no less. It seems that reproducibility is fostered by the use and development of open source software, although this is not required if the use of proprietary software is fully documented. Koenker and Zeileis (2009) discuss alternatives, including the use of R, which I have found to be supportive as a programming environment, and stimulating as a community.

A final unanswered question is about the role of information asymmetries in open scientific communities, in which we should think about the consequences of power-seeking and gate-keeping, which may not be less prevalent than in captured science, although we can always hope. Designing incentive structures is hard, and it may be difficult, for example, to avoid self-censorship under open review processes. So while this call to action is justified, care in choosing which actions to pursue is still needed.

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## Shale Development and Employment in Pennsylvania by Doug Wrenn

The development of Marcellus and other shale plays have greatly impacted counties throughout the Northeastern U.S. The state of Pennsylvania has been particularly impacted. There are many anecdotes about new hiring and workers moving in and out of Marcellus counties. Over the past several years, numerous research studies have explored these and other impacts related to the Marcellus shale in Pennsylvania.

The impact on local employment has received specific attention. A number of studies have looked at the impact of Marcellus on employment and results are mixed in terms of the quantity and significance of the effect of Marcellus on employment. Employment changes reflect not only the direct impact of industry spending and hiring within a county, but also the additional indirect and induced employment generated in local businesses due to the industry, worker, and mineral rights spending. The extent that the economic benefit of gas drilling stays local is important to know because counties where drilling is occurring are most directly bearing the costs of that development. For residents living in those counties state-level impacts are less relevant than what occurs locally.

Shale gas development is a highly specialized production process with much of the drilling and extraction being conducted at the regional level with equipment and crews that shift sites frequently. The result is that as the amount of well activity increases in a county much of the increased employment is due to increases in temporary or transient employment. One of the challenges in quantifying the impact of shale development on county employment is getting data that actually reflects the impact of shale development on local, or county-level, labor markets.

Several federal agencies collect employment data (BLS labor data from the Department of Labor and BEA data from the Department of Commerce are the two main sources). However, most of these data are based on reports from employers and do not take account of the domicile of the employee. As a result, using these data to assess the impact of Marcellus on local employment can lead to an overestimation of the impact of drilling on local hiring as many of the jobs are being done by out-of-county workers. This potential for overestimation is likely to rise as the amount of drilling increases.

To remedy this deficiency, we use data from the Pennsylvania Department of Taxation to look at whether federal labor data sources may be overestimating the impact of Marcellus on local employment and how this interacts with well activity. Our tax data contains county-level information on the gross number of tax returns filed in each year from 2002 to 2011. Because an employee must be a resident of the county to file a return these data partially remedy the issue of not accounting for the employee's place of permanent residence. We combine these tax data with historical GIS data on well location and intensity at the county level in order to test whether federal data sources are over counting local employment and to what extent this overestimation increases with increased well activity.

Using a difference-in-difference-in-differences model with three levels of treatment based on well-drilling intensity, our results show that for low levels of well activity the BLS, BEA, and tax data are statistically equivalent in their estimates. However, as the amount of well activity increases, federal data sources do indeed overestimate the impact on local employment. Our model shows that estimates using federal sources can be up to twice as much as estimates using state-level tax data.

These results have significant implications both for Marcellus counties throughout the Northeast, but also for the way that researchers and policymakers use federal labor data sources to count local employment in places with a significant amount of transient labor.

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## Member Profile: Douglas Wrenn, Pennsylvania State University

Growing up in the Shenandoah Valley, in the shadow of the Blue Ridge Mountains, Dr. Douglas Wrenn developed a deep interest in the environment and the topic of sustainability. Over time, this interest became intertwined with a curiosity for understanding how changes to the environment are connected with human welfare, which he studied while pursuing his PhD at the Department of Agricultural, Environmental and Development Economics (AEDE) at Ohio State. While at AEDE, as both a student and a Postdoctoral Researcher, he conducted a significant amount of research on land and housing markets to understand how micro-scale interactions between policy and individual decisions impact aggregate outcomes. He is particularly interested in how land use outcomes impact the provision of public and ecosystem goods and services, and how policies can be implemented or improved to remedy these market failures.

One project that Wrenn has been heavily involved in is the Baltimore Ecosystem Study, a program with researchers from a wide variety of public, private and academic institutions, which conducts research on metropolitan Baltimore as an ecological system – Dr. Wrenn has worked for several years as a Research Assistant for the project. As part of this research team, Dr. Wrenn has helped to evaluate the impact of land use change in the region on the area’s water quality. In looking at land use patterns in the region, he has also developed spatial land use change models for use by policymakers to better predict land use changes in the region.

Dr. Wrenn is currently Assistant Professor at Penn State University, and was co-winner of the 2012 NARSC graduate-student-led paper competition.



## Member Profile: Nathan Yang, Yale University

Nathan Yang is currently a Postdoctoral Associate and Lecturer in Marketing at the Yale School of Management. He received his Ph.D in Economics from the University of Toronto, in which his doctoral studies were funded by the Social Sciences and Humanities Research Council of Canada (SSHRC). A majority of his research in quantitative marketing revolves around dynamic and spatial firm strategies. More specifically, his work has provided insights about cannibalization, preemptive motives, learning-by-doing, organizational forgetting, performance dynamics after mergers, learning-from-others, and demand externalities under the context of retail competition. As for customer dynamics, he is interested in studying inertial behavior and the role that structural state dependence plays in generating such persistence. From a methodological perspective, he is actively working on new structural estimation and quasi-experiment econometric methods to identify dynamic linkages under the presence of heterogeneity. Industry settings that he has studied or currently study include fast food location strategies in Canada/UK, convenience store expansion in Japan, car rental stores, usage patterns in a bike sharing network, crowdsourcing of plush toy designs, online sentiment dynamics, and social media adoption among politicians.

Dr. Yang was winner of the 2011 NARSC Graduate Student Paper Competition.

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## NARSC Members' Recent Grant Awards

### **David Shideler, Dawn Thilmany and Merritt Taylor win \$484,705 USDA-NIFA Grant**

**Title: "Evaluating the Role of Small and Mid-Sized Farms and their Impacts in Local and Regional Food Systems"**

Investigators: David Shideler, Oklahoma State University; Dawn Thilmany, Colorado State University; Merritt Taylor, Oklahoma State University.

Summary: The project aims to develop a typology of the local/regional food system landscape and aid small and medium-sized farmers in choosing among, planning for, and justifying investments in these new markets. Additionally, the marketing structure characterizations (i.e., the typology) will aid the economic development community to conceptualize and measure these activities. Outreach-oriented outputs include enterprise budgets of common organizational models of localized production and methodological guidelines about how economic contributions of different aspects of local foods systems should be estimated.

### **James Wicksted and Alicia Knoedler win \$20 million National Science Foundation Grant**

**Title: "Adapting Socio-ecological Systems to Increased Climate Variability"**

Investigators: James P. Wicksted, Oklahoma State University and Alicia J. Knoedler, University of Oklahoma

Summary: The grand vision of this grant is to significantly advance our understanding of how socio-ecological systems can adapt sustainably to increased climate variability caused by a changing climate. To this end, we propose an innovative research platform to center on a tightly coupled human and natural systems observatory, with integrated measurement, modeling and prediction capabilities and downstream decision-support systems.

### **Sandy Dall'erba et al. win \$1,414,123 NASA Grant**

**Title: "Atmospheric Rivers and Changing Flood Risk in the Pacific Coast Region of the Western United States"**

Investigators: Sandy Dall'erba, University of Arizona; Dennis Lettenmaier, University of Washington; Francina Dominguez, University of Arizona; Bart Nijssen, University of Washington; and Marty Ralph, NOAA

Summary: Floods are a pervasive natural hazard. Of the 114 billion dollar weather and climate-related natural disasters in the U.S. since 1980, 23 were floods. This project focuses on Washington, Oregon and Northern California. First, we analyze the atmospheric conditions and projected changes associated with future climate as projected by the AR5 scenarios. Second, we assess how the projected changes will lead to more frequent and more intense river flooding and, third, we provide an estimate of the economic impact over the region by input-output analysis.



**Mark Partidge et al. win \$499,976 USDA grant****Title: Maximizing the Gains of Old and New Energy Development for America's Rural Communities**

Investigators: Mark Partridge, Ohio State University; Alessandra Faggian, Ohio State University; Linda Lobao, Ohio State University; David Civittolo, Ohio State University;

Summary: Our overriding goal is to assess how energy development affects local job creation and general community economic well-being and, in turn, the manner by which communities can reap positive long-term sustainable benefits from energy development. This would be done in a national study, accounting for spatial heterogeneity across different US regions affected by shale developments. The goals of this study are: 1) to advance the current empirical methodology on how the boom-bust cycle of energy development affects socioeconomic development at the local level; 2) to apply the newly-refined methodology to our data to evaluate how energy development affects local job creation and incomes, as well as understand how communities can reap positive long-term sustainable effects from energy development and be more resilient to the boom-bust cycle; 3) to develop an empirical model to identify the 'winners' and 'losers' from energy development; 4) to empirically appraise economic differences in 'old' and 'new' energy developments on community outcomes; 5) to develop an extension/outreach program that better educates local government officials and key stakeholders of the short-term impacts of energy development; 6) to develop an extension/outreach program that educates community leaders and officials in making long-term plans to take full advantage of energy development on a sustainable basis.

**Information Bulletin: Regional Science Policy and Practice**

This journal is an official outlet of the Regional Science Association International (RSAI). It is intended for researchers and policymakers interested in a range of issues in applied regional science. Papers from a variety of disciplines are welcome including planning, public policy, geography, economics, environmental science and related fields. Submissions should address questions at the intersection of academic issues and policy debates. If you are interested in submitting a paper please see the journal website:

[http://www.regionalscience.org/index.php?option=com\\_k2&view=itemlist&task=category&id=92:regional-science-policy-practice&Itemid=616](http://www.regionalscience.org/index.php?option=com_k2&view=itemlist&task=category&id=92:regional-science-policy-practice&Itemid=616).

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