

# Internal versus international scholarly mobility and migration worldwide

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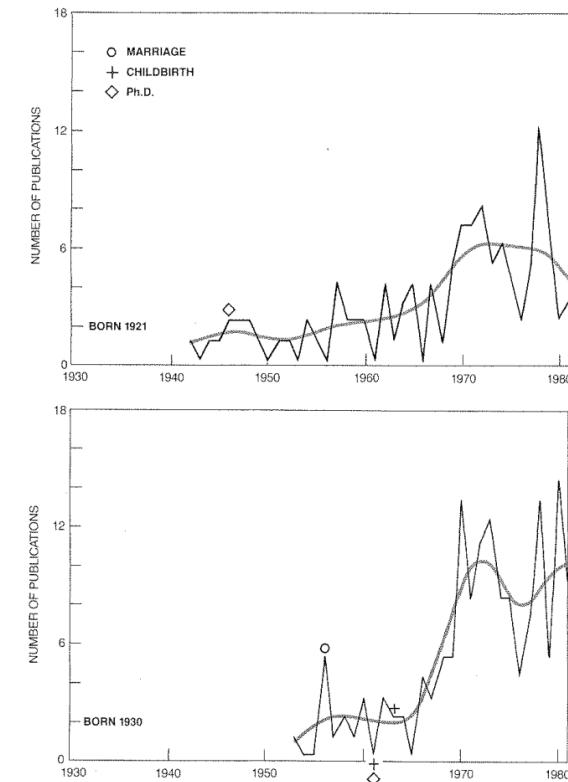
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# Outline

- Introduction
  - Theoretical and methodological inspirations of our work
- Methodological framework and prototype
- Global mobility based on Scopus and ORCID
  - International, country level
  - International, region level
  - Internal, region level

# Introduction

- Theoretical impressions
  - Internal versus international migration<sup>1</sup>
  - Research Trails<sup>2,3</sup>
- Methodological impressions
  - Using bibliometric data alongside demographic life events (see figure)<sup>4</sup>
  - Repurposing bibliometric data for migration research<sup>5,6,7</sup>
  - Repurposing bibliometric data for knowledge transfer<sup>8,9</sup>
- Our proposal: repurposing bibliometric data for:
  - Internal versus international mobility
  - Internationalized scholarly collaborations
  - Forming ties before (or during) mobility
  - *Integration in host country/institution's collaborations*



**LOWER RATES OF PUBLICATION** in the early part of a career are characteristic of both married men and single women. The publication profile of a distinguished woman biologist (*top*) who never married shows the same pattern of oscillations and an overall increase as the graphs of women who married and had children. The same pattern can be seen in the profile of an eminent male chemist (*bottom*). He published at a much slower pace when his children were young, although his domestic responsibilities were minimal.

- [1] Skeldon, R. (2006). Interlinkages between internal and international migration and development in the Asian region. *Population, Space and Place*, 12(1), 15–30. <https://doi.org/10.1002/psp.385>
- [2] Gläser, J., & Laudel, G. (2015). A Bibliometric Reconstruction of Research Trails for Qualitative Investigations of Scientific Innovations, *Historical Social Research*, Vol. 40, No. 3. <https://doi.org/10.12759/HSR.40.2015.3.299-330>
- [3] Laudel, G., & Gläser, J. (2017). Manual for Constructing Research Trails (Sciences). <http://www.laudel.info/downloads/research-trail-download/>
- [4] Cole, J. R., & Zuckerman, H. (1987). Marriage, Motherhood and Research Performance in Science. *Scientific American*, 256(2), 119–125. JSTOR.
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- [6] Vaccario, G., Verginer, L., & Schweitzer, F. (2020a). Reproducing scientists' mobility: A data-driven model. *ArXiv:1811.07229 [Physics]*. <http://arxiv.org/abs/1811.07229>
- [7] Vaccario, G., Verginer, L., & Schweitzer, F. (2020b). The mobility network of scientists: Analyzing temporal correlations in scientific careers. *Applied Network Science*, 5(1), 1–14. <https://doi.org/10.1007/s41109-020-00279-x>
- [8] Aman, V. (2018). A new bibliometric approach to measure knowledge transfer of internationally mobile scientists. *Scientometrics*, 117(1), 227–247. <https://doi.org/10.1007/s11192-018-2864-x>
- [9] Aman, V. (2020). Transfer of knowledge through international scientific mobility: Introduction of a network-based bibliometric approach to study different knowledge types. *Quantitative Science Studies*, 1–17. [https://doi.org/10.1162/qss\\_a\\_00028](https://doi.org/10.1162/qss_a_00028)

# Data (gathering & processing)

## For prototype

- Publications from Scopus web interface (APR 2021)
- Gold standard from publicly available CVs; or, ORCID record (education and experience sections)

## For Global mobility

- All organizations from Scopus RP 2020 (5.4m), then joined to only *article* and *review* publications (36 million)
- ORCID 2020 snapshot, 4.1m records for 2.3m ppl (**thanks to Stephan and Dimity**)

## Processing (on all sources)

- Processing time entries in CV which is not coherent
- Need to clean the bibliometric data even from web interface (example follows)
- Encoding country of affiliation from bibliometric record (not perfect, need proper disambiguation)
- Organization name disambiguation using **ROR API**, based on Akbaritabar (2021)
- Author name disambiguation based on Miranda Gonzalez et. Al (2020)
- Coverage of GeoNames codes for intra-country regions is dependent on previous step (example follows)
- Using specific coordinates in network visualization with stress minimization, Leiden algorithm for community detection

## Mobility based on public CV (top) and bibliometrics (bottom)

row_id	authorsid	name	highest_level_affiliation	country	city	start_date	end_or_max_date
1	23494432900	Emilio_Zagheni	Max Planck Institute for Demographic Research	DEU	rostock	2018-09-01	2021-03-30
2	23494432900	Emilio_Zagheni	University of Washington	USA	seattle	2014-09-01	2018-08-30
3	23494432900	Emilio_Zagheni	City University of New York	USA	new york	2012-08-01	2014-08-30
4	23494432900	Emilio_Zagheni	Max Planck Institute for Demographic Research	DEU	rostock	2010-08-01	2012-07-30
5	23494432900	Emilio_Zagheni	University of California	USA	berkeley	2005-08-01	2010-04-30
6	23494432900	Emilio_Zagheni	Bocconi University	ITA	milan	2000-09-01	2004-12-30
authorsid	authorswithaffiliations			year	country		
23494432900	Zagheni, E., Laboratory of Digital and Computational Demography, Max Planck Institute for Demographic Research, Rostock, Germany			2020	DEU		
23494432900	Zagheni, E., Laboratory of Digital and Computational Demography, Max Planck Institute for Demographic Research, Rostock, Germany			2020	DEU		
23494432900	Zagheni, E., Max Planck Institute for Demographic Research Rostock, Germany			2020	DEU		
23494432900	Zagheni, E., Max Planck Institute for Demographic Research, Germany			2020	DEU		
23494432900	Zagheni, E., Max Planck Institute for Demographic Research, Germany			2020	DEU		
23494432900	Zagheni, E., Max Planck Institute for Demographic Research, Rostock, Germany			2020	DEU		
23494432900	Zagheni, E., Max Planck Institute for Demographic Research, Rostock, Germany			2019	DEU		
23494432900	Zagheni, E., Max Planck Institute for Demographic Research, Konrad-Zuse-Straße 1, Rostock, 18057, Germany			2019	DEU		
23494432900	Zagheni, E.			2019			
23494432900	Zagheni, E., Department of Sociology, University of Washington, Seattle, United States, Max Planck Institute for Demographic Research, Rostock, Germany			2019	DEU		
23494432900	Zagheni, E., Max Planck Institute for Demographic Research, Germany			2019	DEU		
23494432900	Zagheni, E., Max Planck Institute for Demographic Research, Rostock, Germany			2019	DEU		
23494432900	Zagheni, E., Max Planck Institute for Demographic Research, Germany			2019	DEU		
23494432900	Zagheni, E., Max Planck Institute for Demographic Research, Konrad-Zuse-Str. 1, Rostock, 18057, Germany			2019	DEU		
23494432900	Zagheni, E., Qatar Computing Research Institute, Doha, Qatar			2019	QAT		
23494432900	Zagheni, E., Max Planck Institute for Demographic Research			2019			
23494432900	Zagheni, E., Max Planck Institute for Demographic Research, Rostock, Germany			2018	DEU		
23494432900	Zagheni, E., Max Planck Institute for Demographic Research, Rostock, Germany			2018	DEU		
23494432900	Zagheni, E., University of Washington, Max Planck Institute for Demographic Research, United States			2018	USA		
23494432900	Zagheni, E., University of Washington and Max Planck Institute for Demographic Research, United States			2018	USA		
23494432900	Zagheni, E.			2017			
23494432900	Zagheni, E., Department of Sociology, University of Washington, Seattle, 211 Savery Hall, Box 353340, Seattle, WA 98195-3340, United States			2017	USA		
23494432900	Zagheni, E., University of Washington, Seattle, United States			2017	USA		
23494432900	Zagheni, E., University of Washington, United States			2017	USA		
23494432900	Zagheni, E., University of Washington, Seattle, United States			2016	USA		
23494432900	Zagheni, E., Department of Sociology, University of Washington at Seattle, 211 Savery Hall Box 353340, Seattle, WA 98195-3340, United States			2016	USA		
23494432900	Zagheni, E., University of Washington, Seattle, WA, United States			2015	USA		
23494432900	Zagheni, E., Department of Sociology, University of Washington, United States			2015	USA		
23494432900	Zagheni, E., University of Washington, Seattle, United States			2015	USA		
23494432900	Zagheni, E., Department of Sociology, University of Washington, Seattle, United States			2015	USA		
23494432900	Zagheni, E., Department of Sociology, University of Washington, Seattle, WA, United States			2015	USA		

# Proposed prototype (1/3)

A

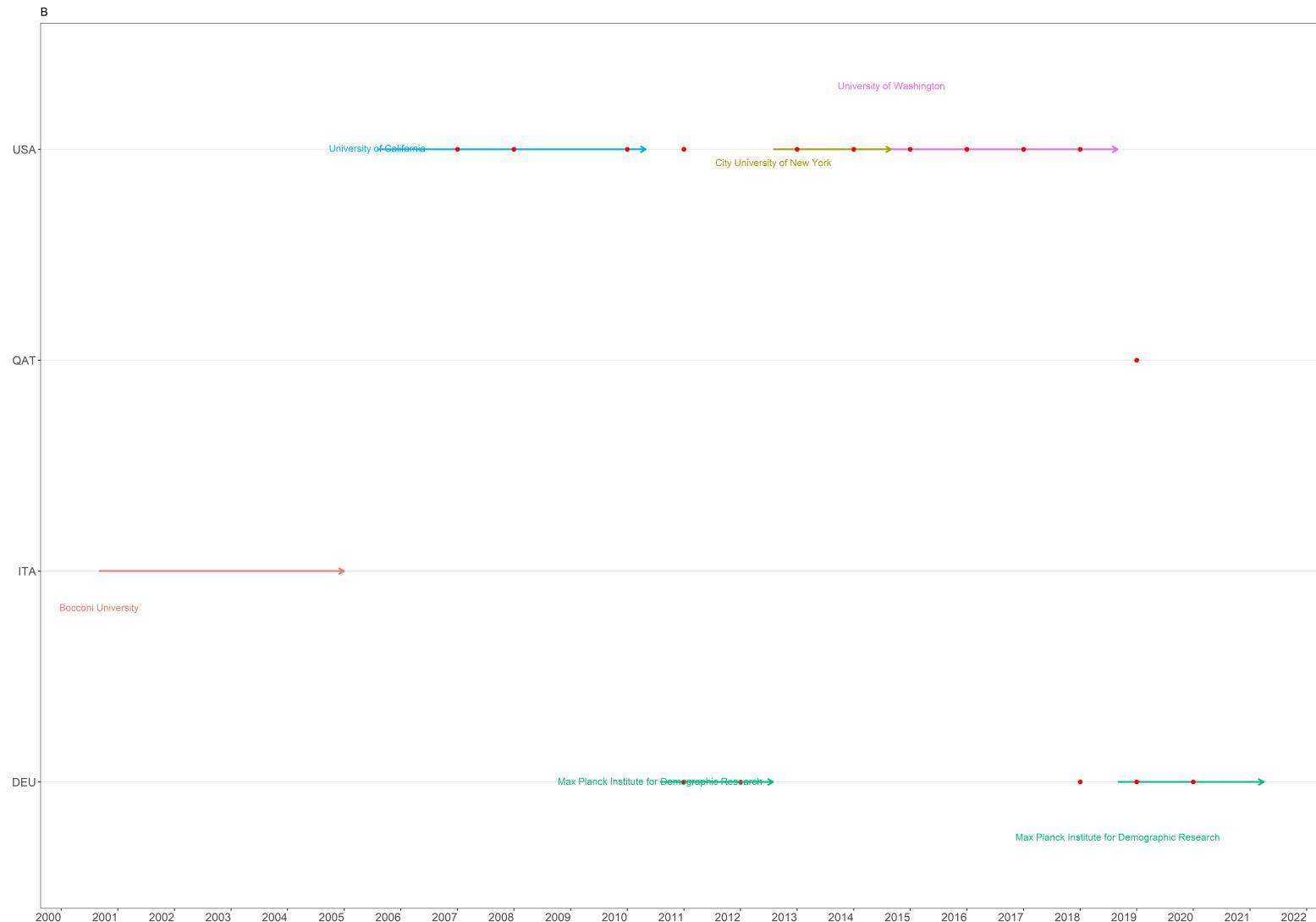
- Each dot: one publication; size: N. of distinct countries in publication's affiliations; color: community in Giant component
- Ties: shared authors excluding the ego



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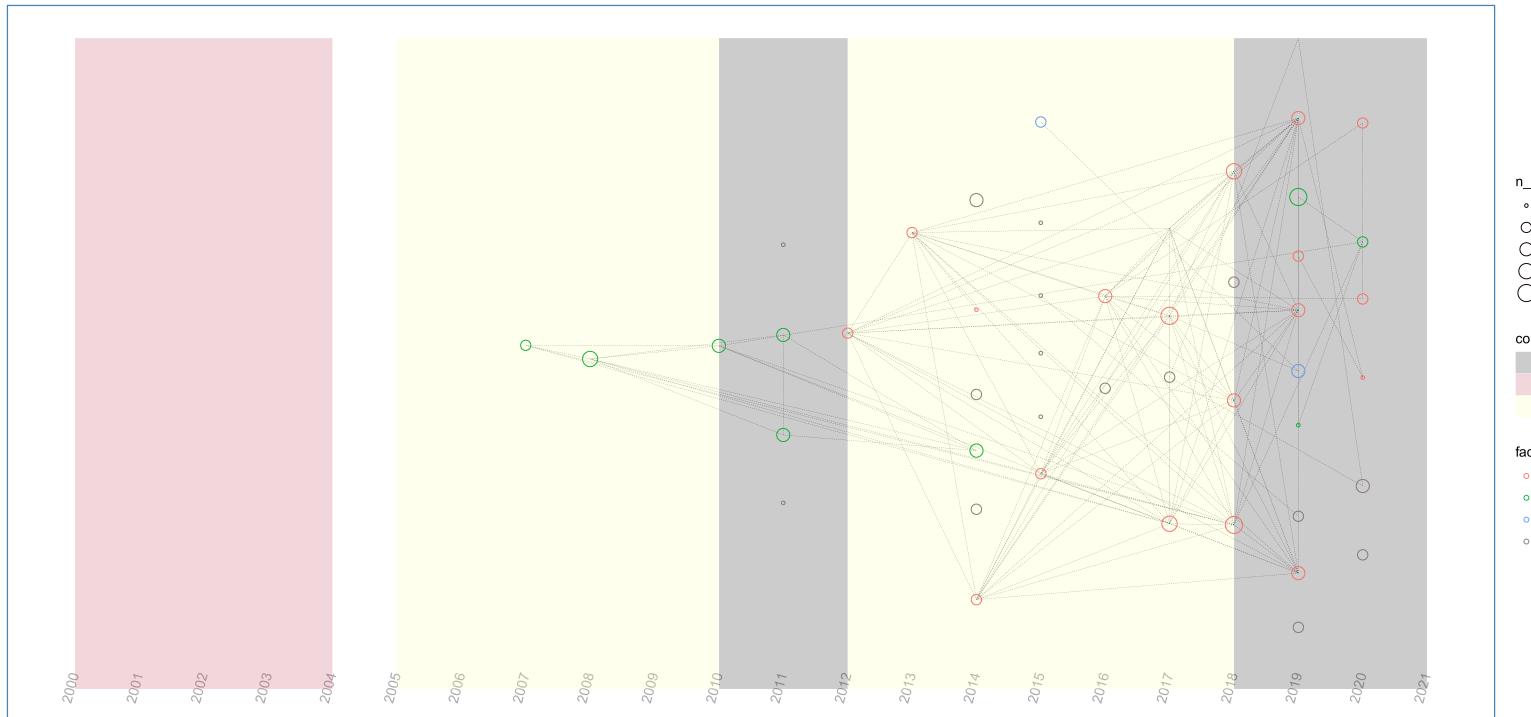


## Proposed prototype (2/3)



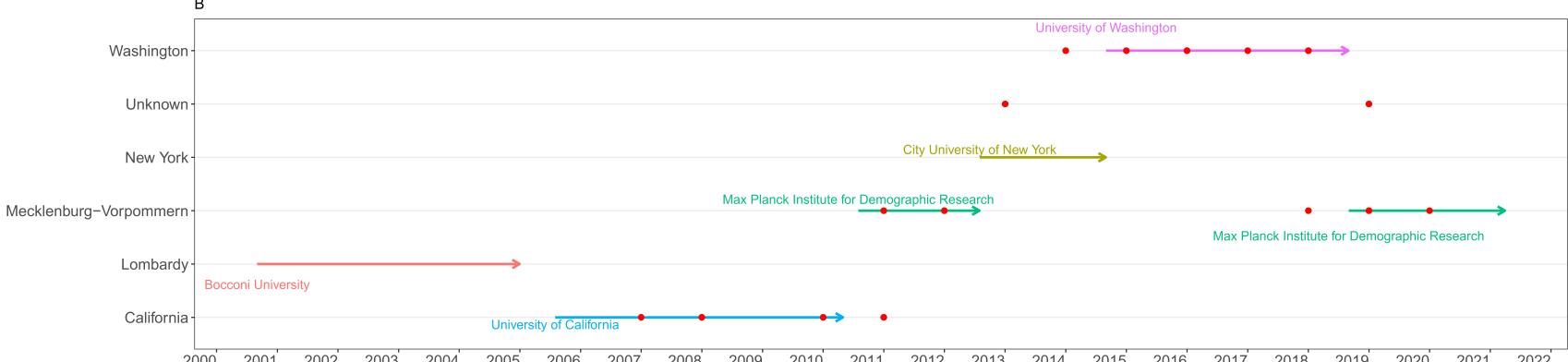
- Each red dot: one distinct country of affiliation (from publications)
- Horizontal lines: affiliation from public CV

## Proposed prototype (3/3)

**A**

**n\_country**  
 ● 1  
 ○ 2  
 □ 3  
 ▲ 4  
 △ 5

**country**  
 ■ DEU  
 ■ ITA  
 ■ USA

**factor(community)**  
 ○ 1  
 □ 2  
 ▲ 3  
 △ NA

**B**


An individual scholar's profile and mobility based on bibliometric and CV information (Scopus ID: 23494432900).

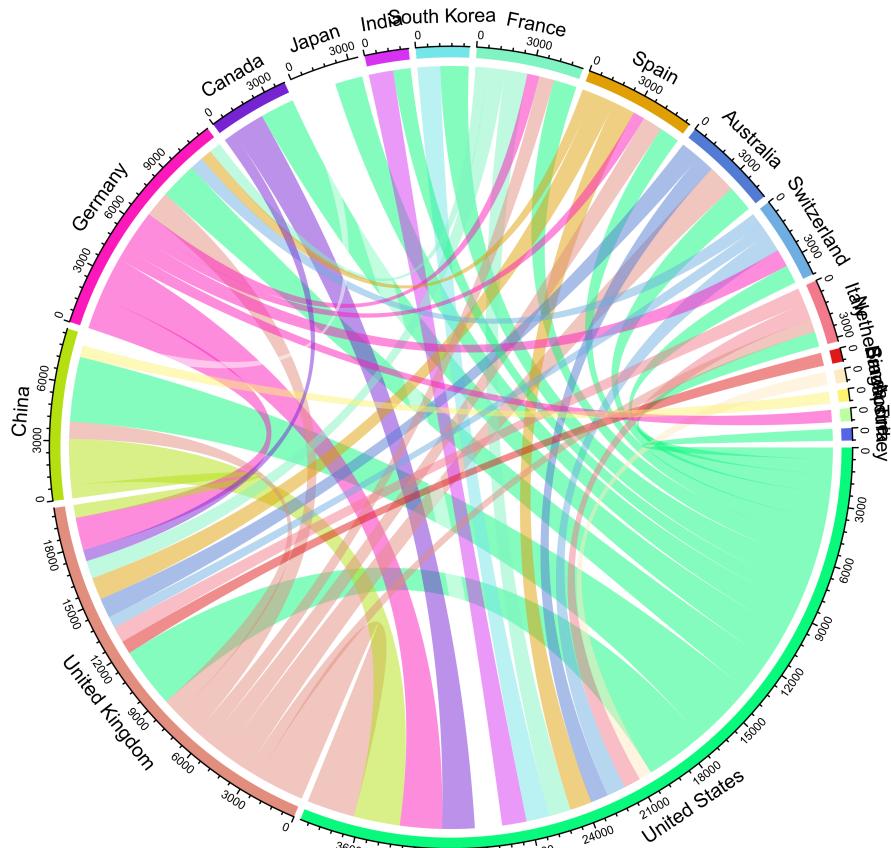
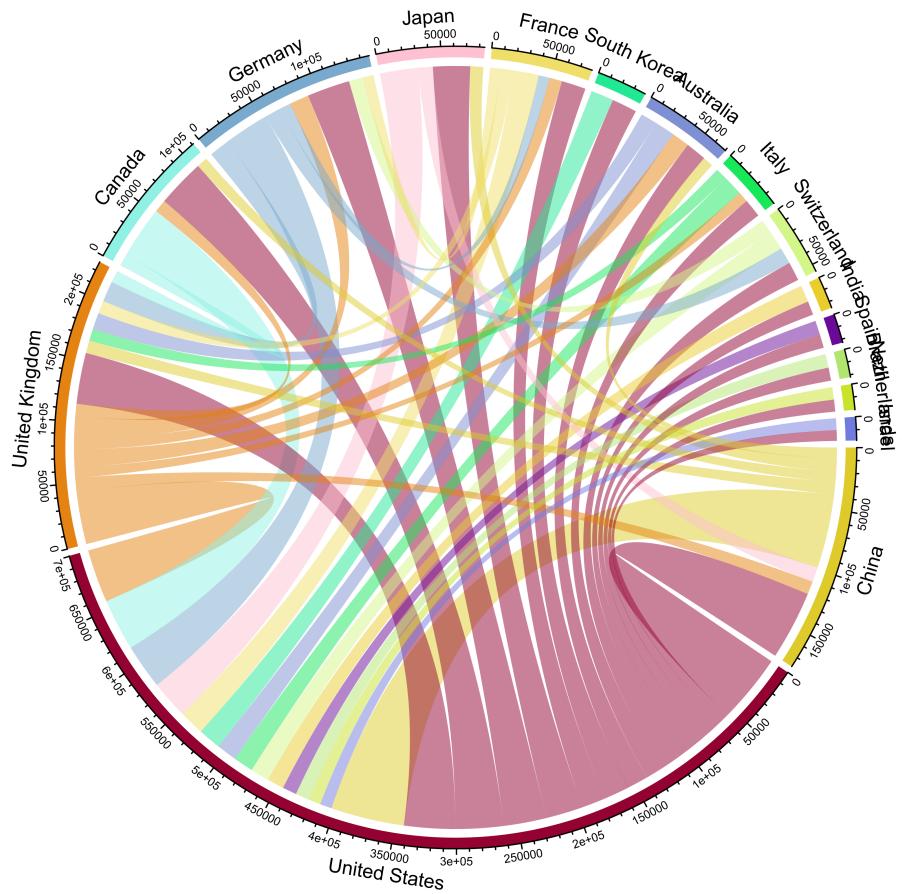
**A** : Coauthorship network of the scholar (Each node: one publication; Ties: shared authors excluding the ego; background color: country form CV, node size: N. of distinct counti node color: community membership in Giant component using Leiden algorithm)

**B** : Geo provinces and institutions of affiliation based on bibliometric data (red circles) and public CV (horizontal arrows). Unknown: Region not disambiguated.

# Global mobility based on Scopus and ORCID

## (Preliminary results)

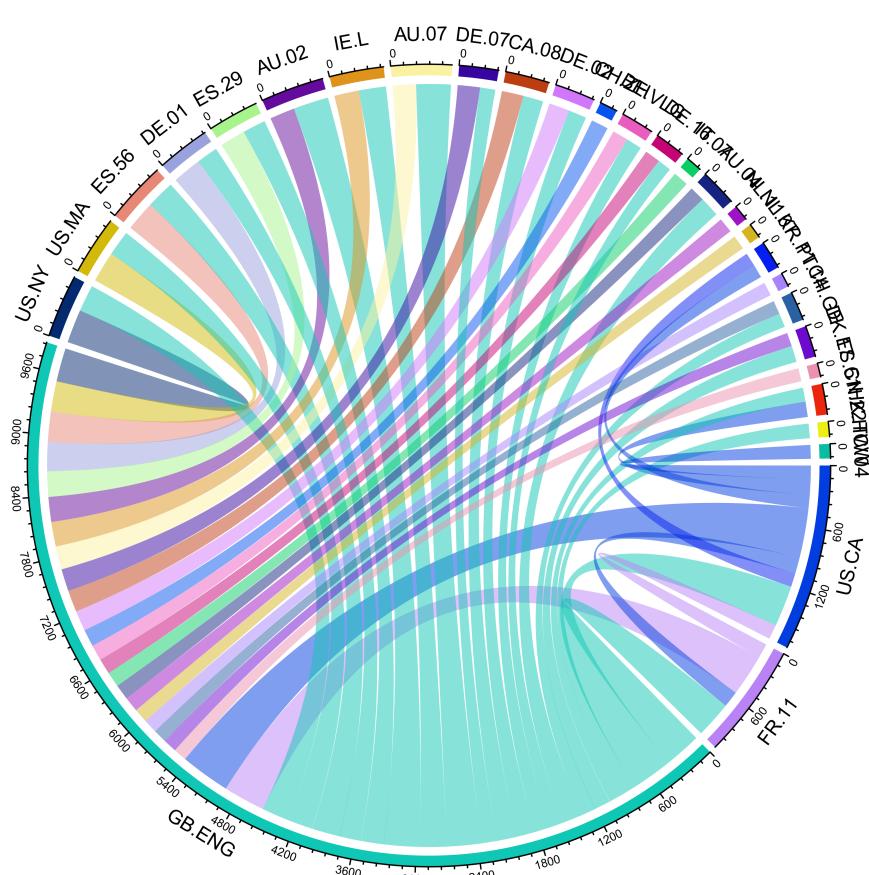
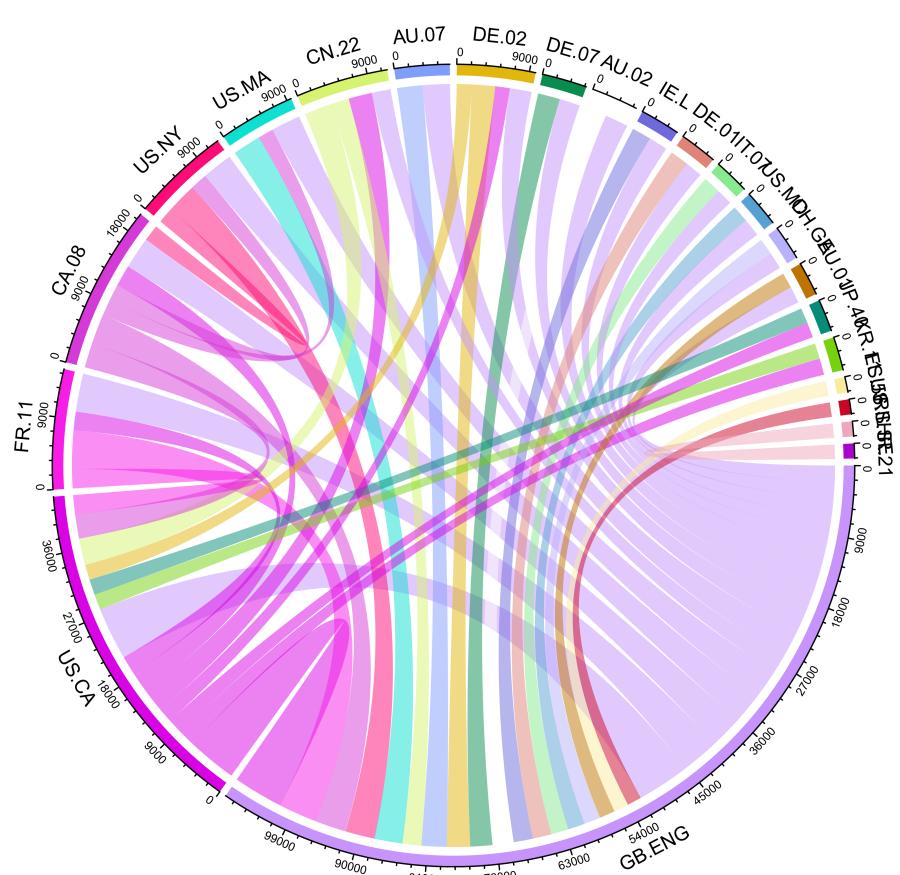
Top 50, Country level, international: Scopus (left), ORCID (right)



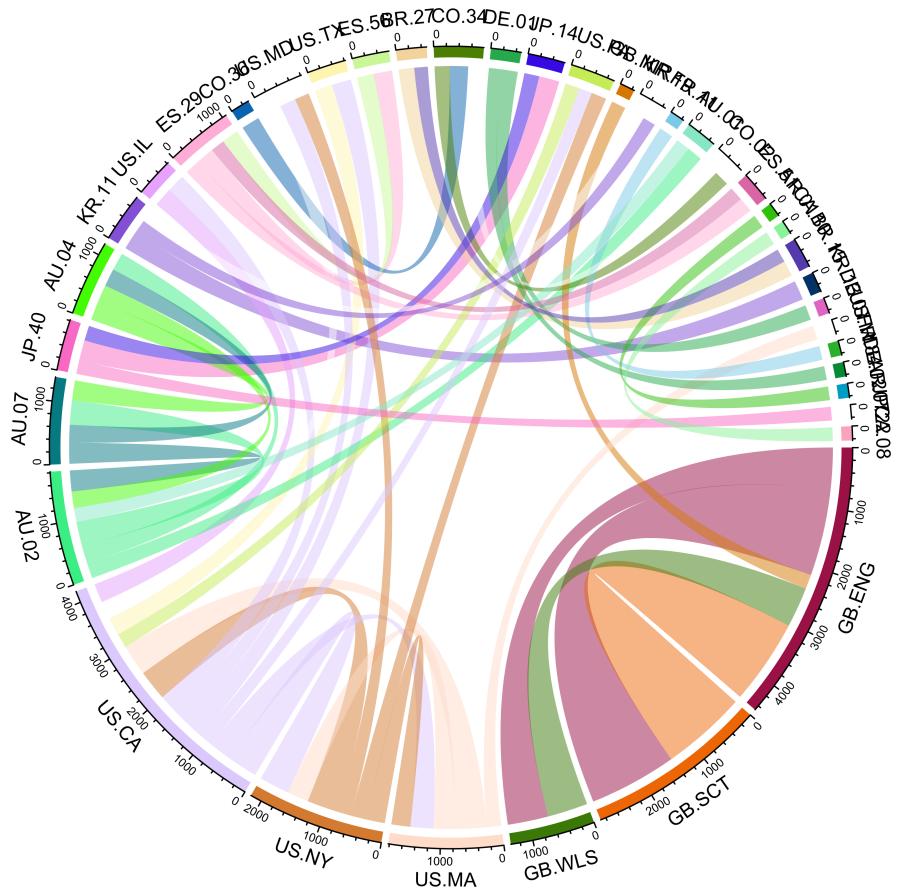
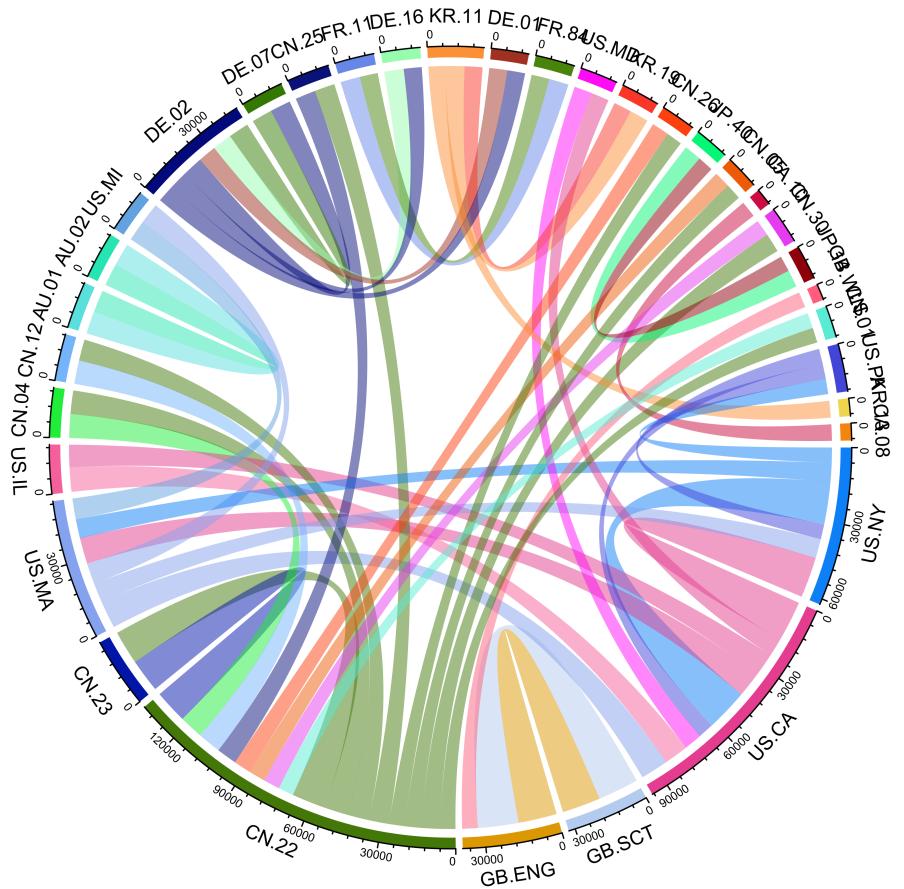
- Quite consistent trends between two sources
- China: much lower representation on ORCID vs. Scopus
- Need calculation of proportion based on population size

## Top 50, Region level, international: Scopus (left), ORCID (right)

- England region in the UK has the highest count of sending/receiving scholars
- Some regions (e.g., US.CA) more represented in publications vs. ORCID



Top 50, Region level, internal: Scopus (left), ORCID (right)



- ENG.WLS is much more prevalent in ORCID based mobility versus publications

# To summarize (and next steps):

- **Disambiguation** of authors and organization names (and addresses)
- **Collaboration** and **internationalization**
- **Disciplinary** differences
- A **macro** and **micro** global database of scholarly mobility
- **Internal** and/or/versus **international** scholarly mobility
- Individual level comparison of CV profiles using ORCID vs. Scopus
- More in-depth analysis and calculation of migration indicators
  - Crude Migration Intensity
  - Migration Effectiveness Index
  - Aggregate Net Migration Rate

# Thank you for your attention

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