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THE GEOGRAPHY OF
SCIENTIFIC COLLABORATION

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Agnieszka Olechnicka, Adam Płoszaj and
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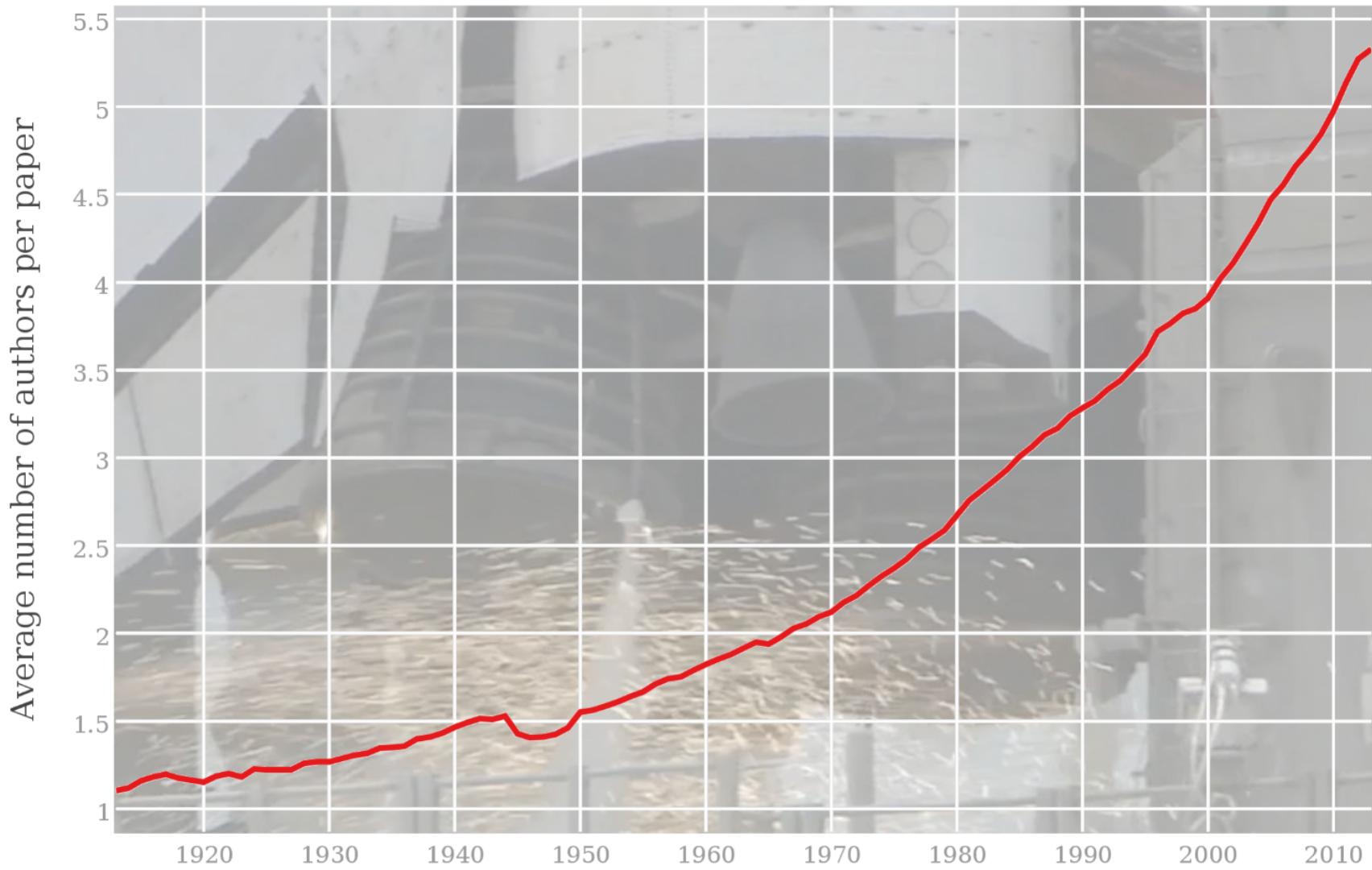
Agnieszka Olechnicka, Adam Płoszaj
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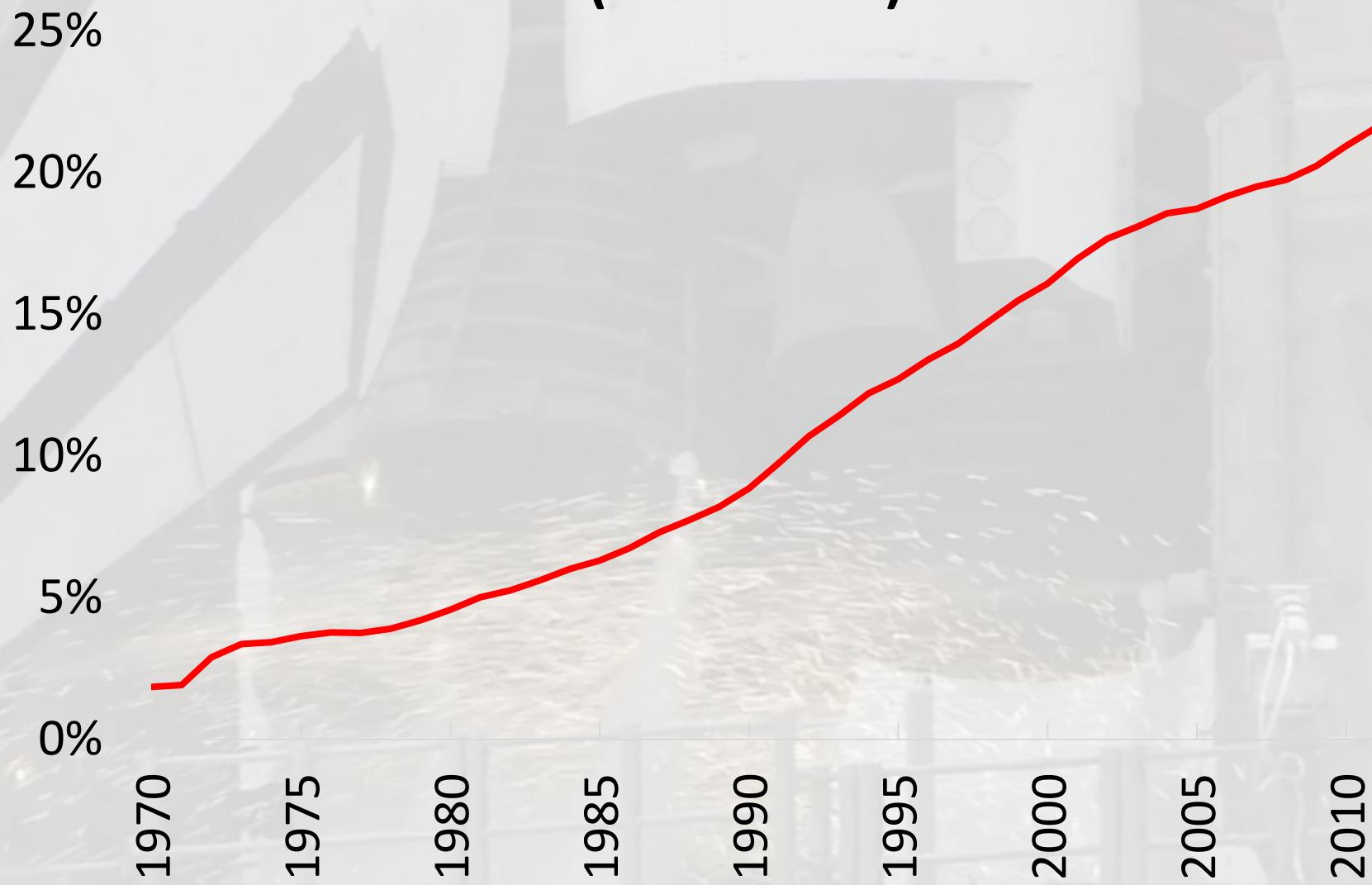
(Aboukhalil 2014)

Multi-authored papers 1900-2012

- natural and medical sciences: from 13% to 93%
- social sciences and humanities: from 3% to 62%

(Larivière, Gingras, Sugimoto & Tsou 2015)

Share of internationaly co-authored papers (1970-2013)



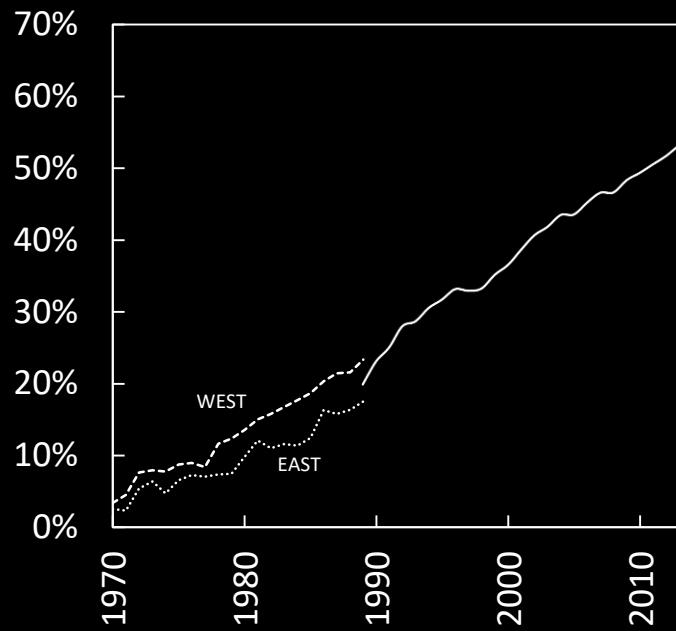
(Ploszaj, based on Web of Science data)

Between 1980 and 2009 the mean collaboration distance per publication raised from 334 to 1,553 kilometres

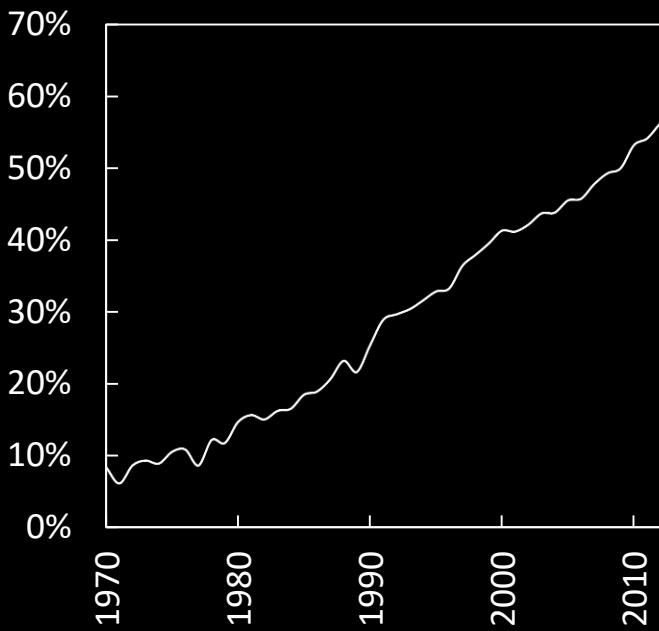
(Waltman et al. 2011)



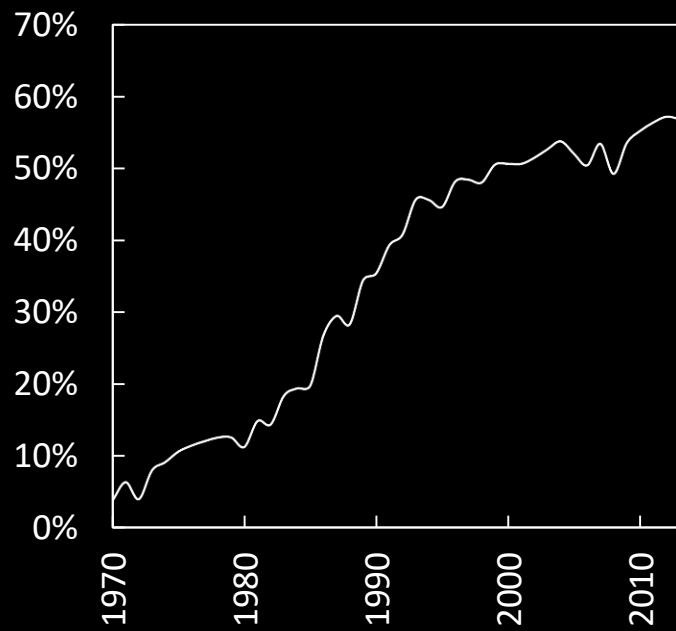
GERMANY



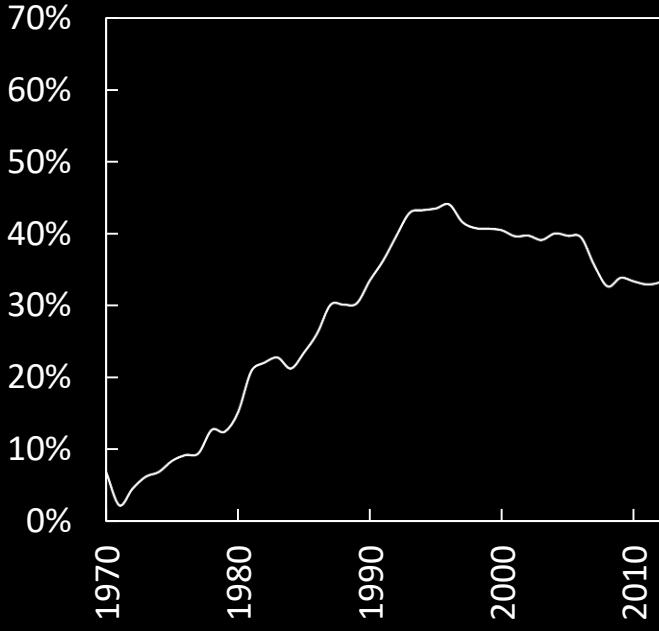
FINLAND



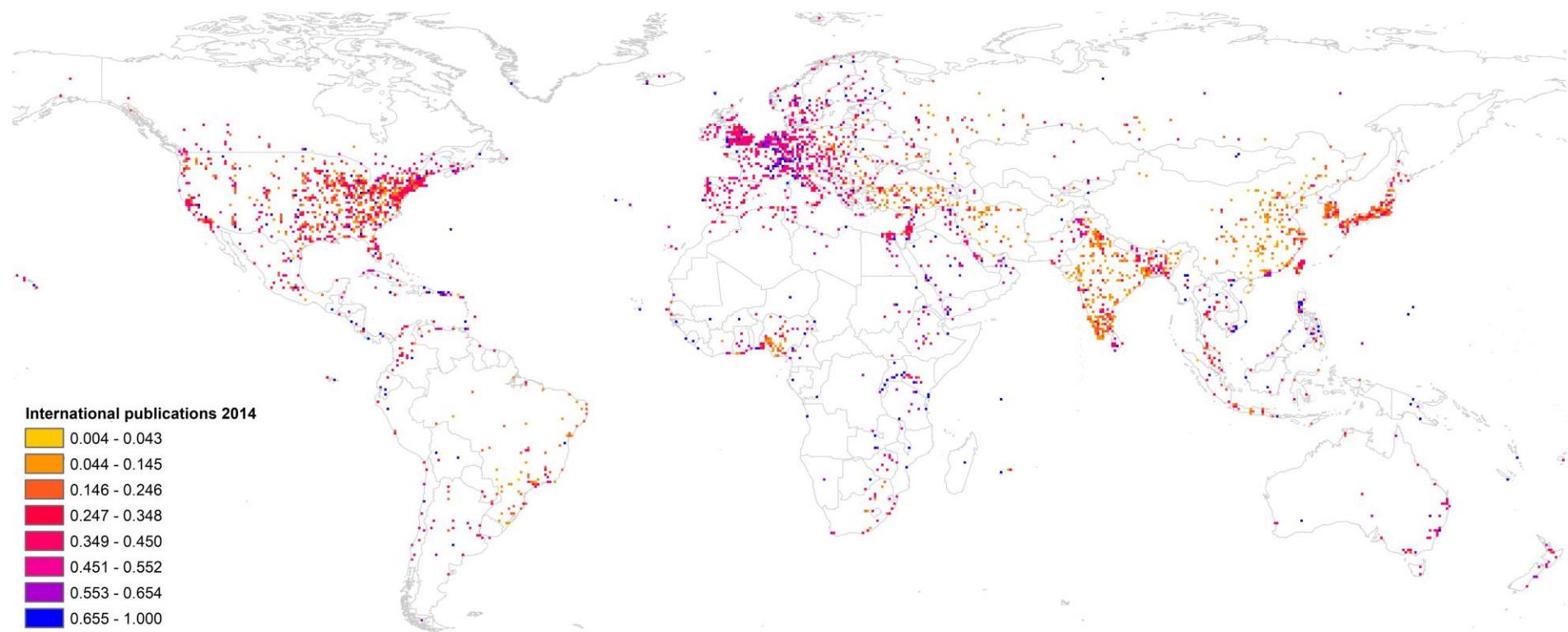
HUNGARY



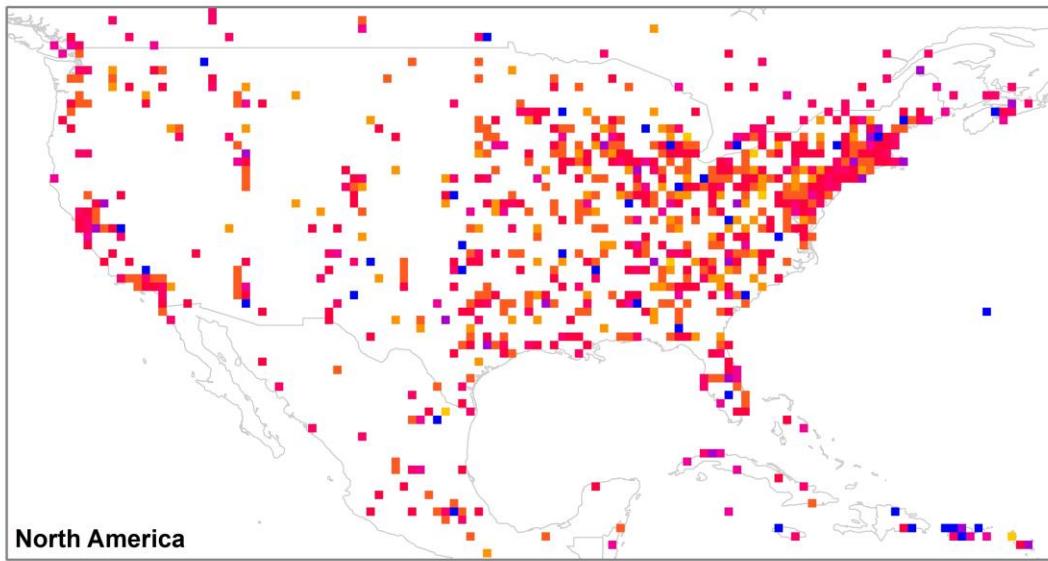
POLAND



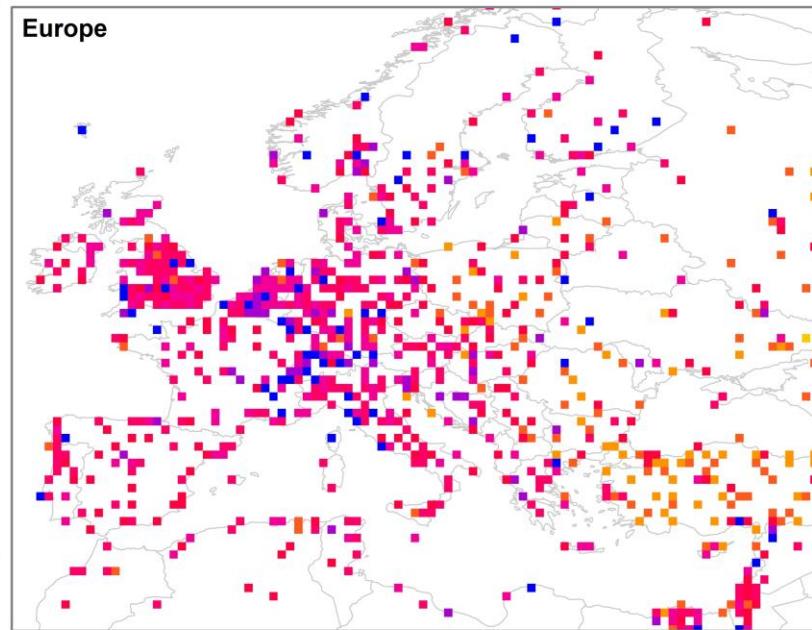
Internationally co-authored publications, 2014



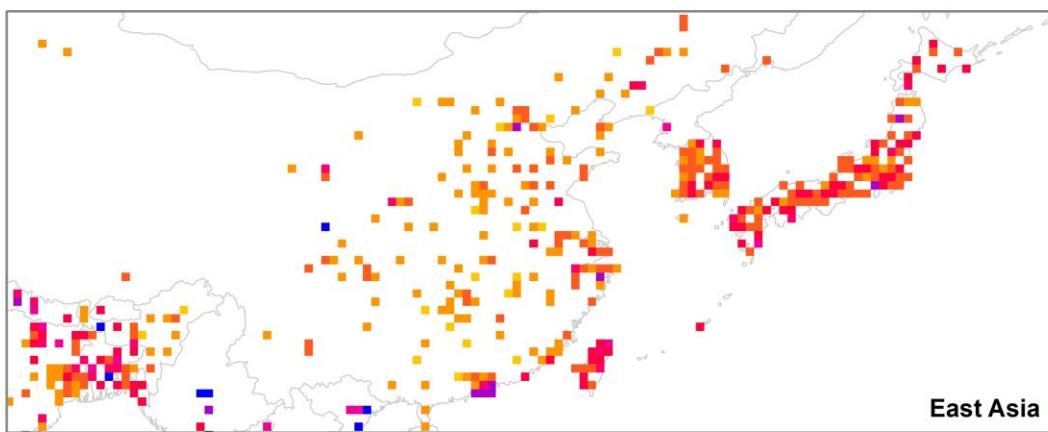
Internationally co-authored publications, 2014



North America

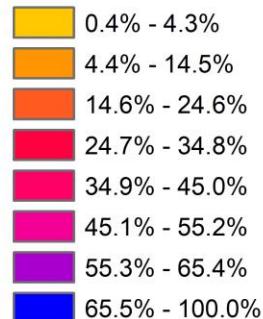


Europe

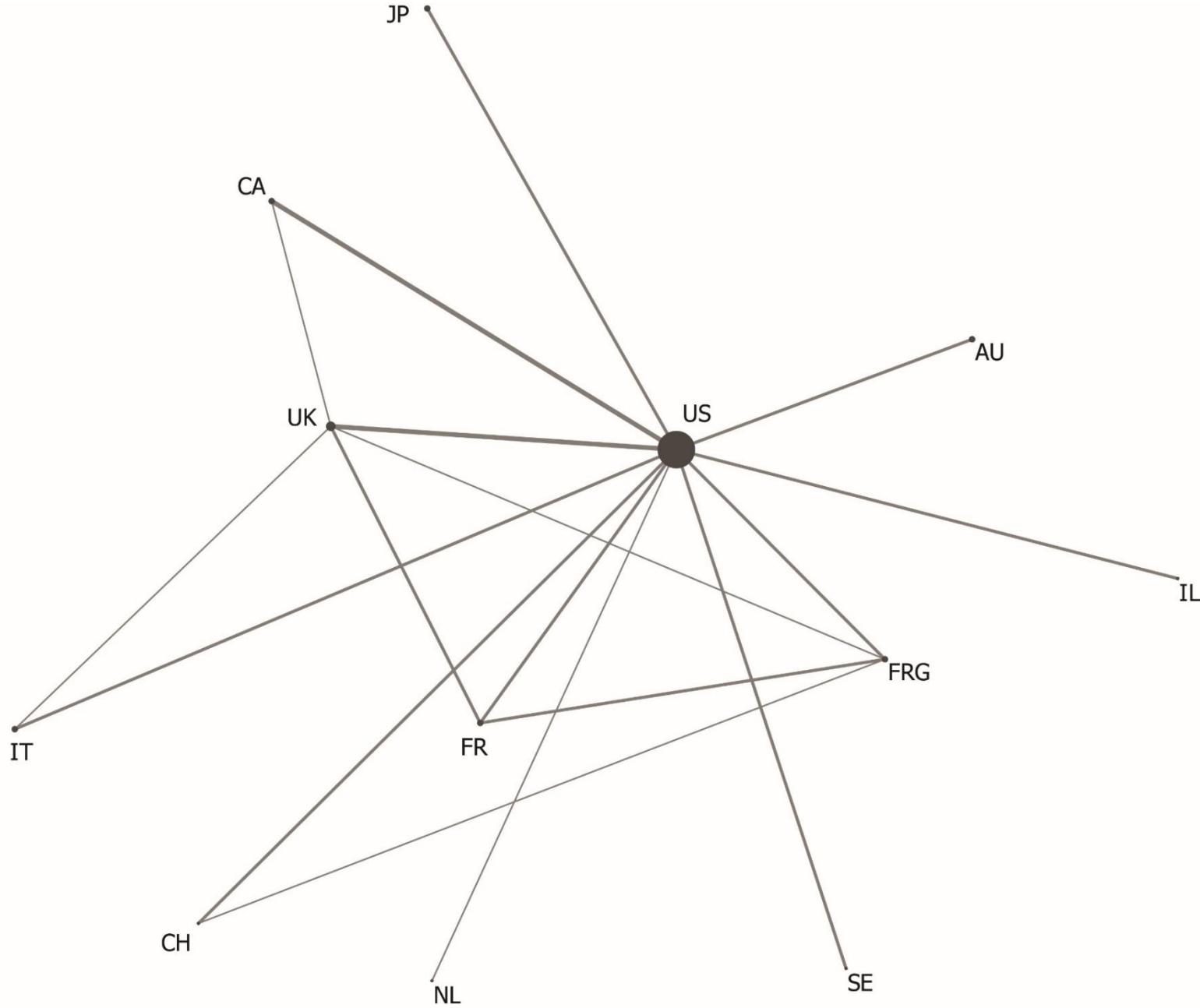


East Asia

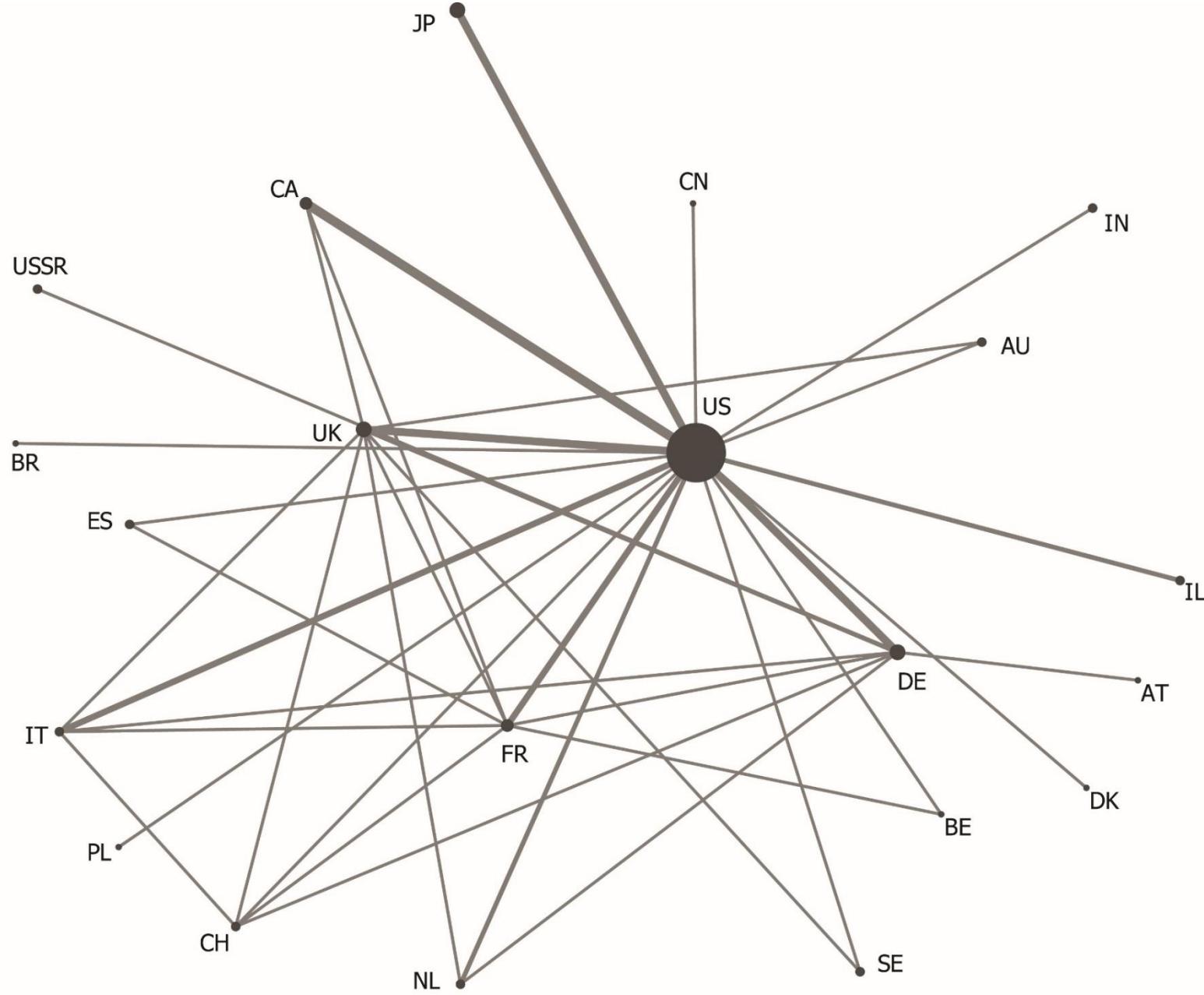
International publications 2014



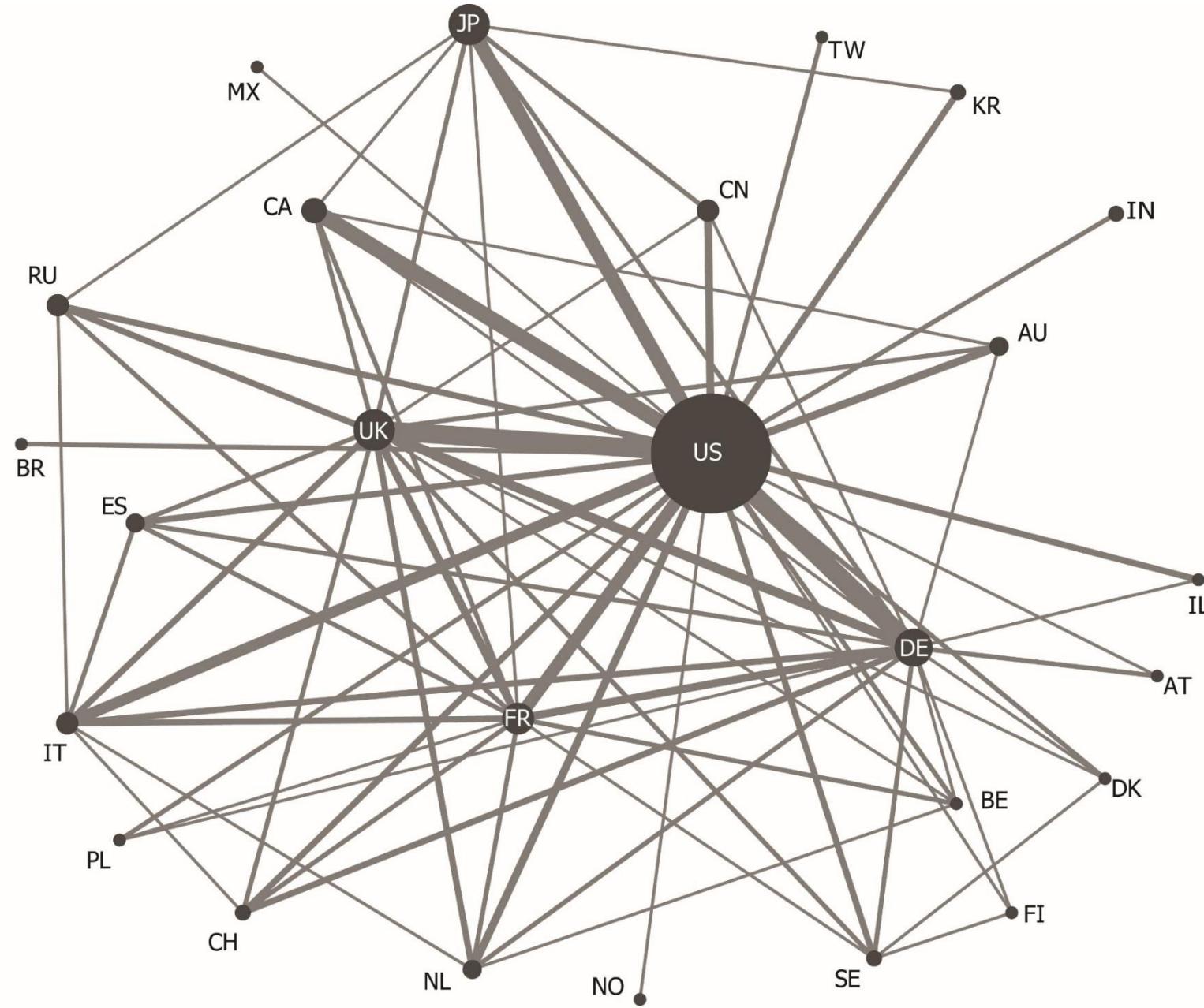
1980



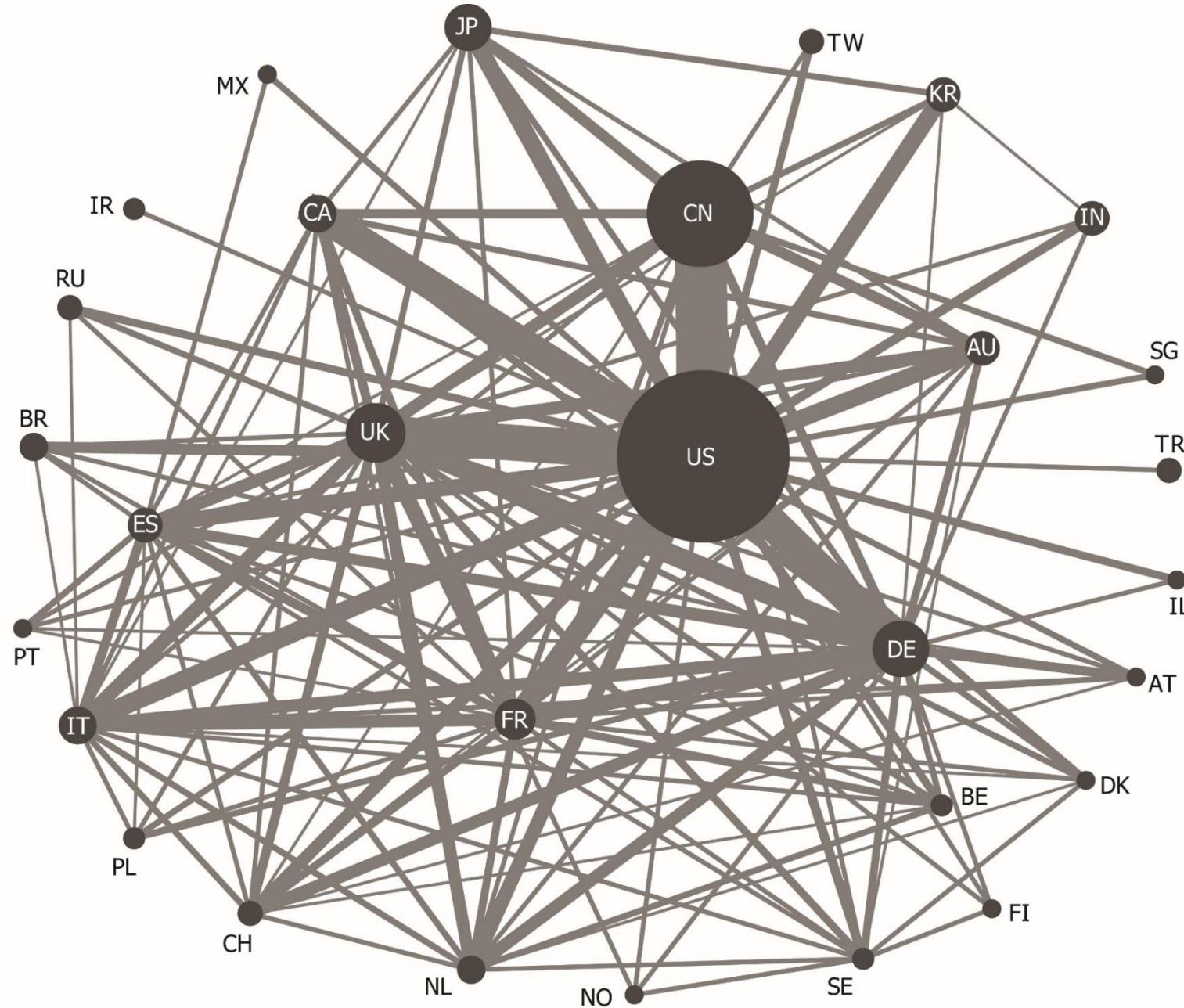
1990



2000

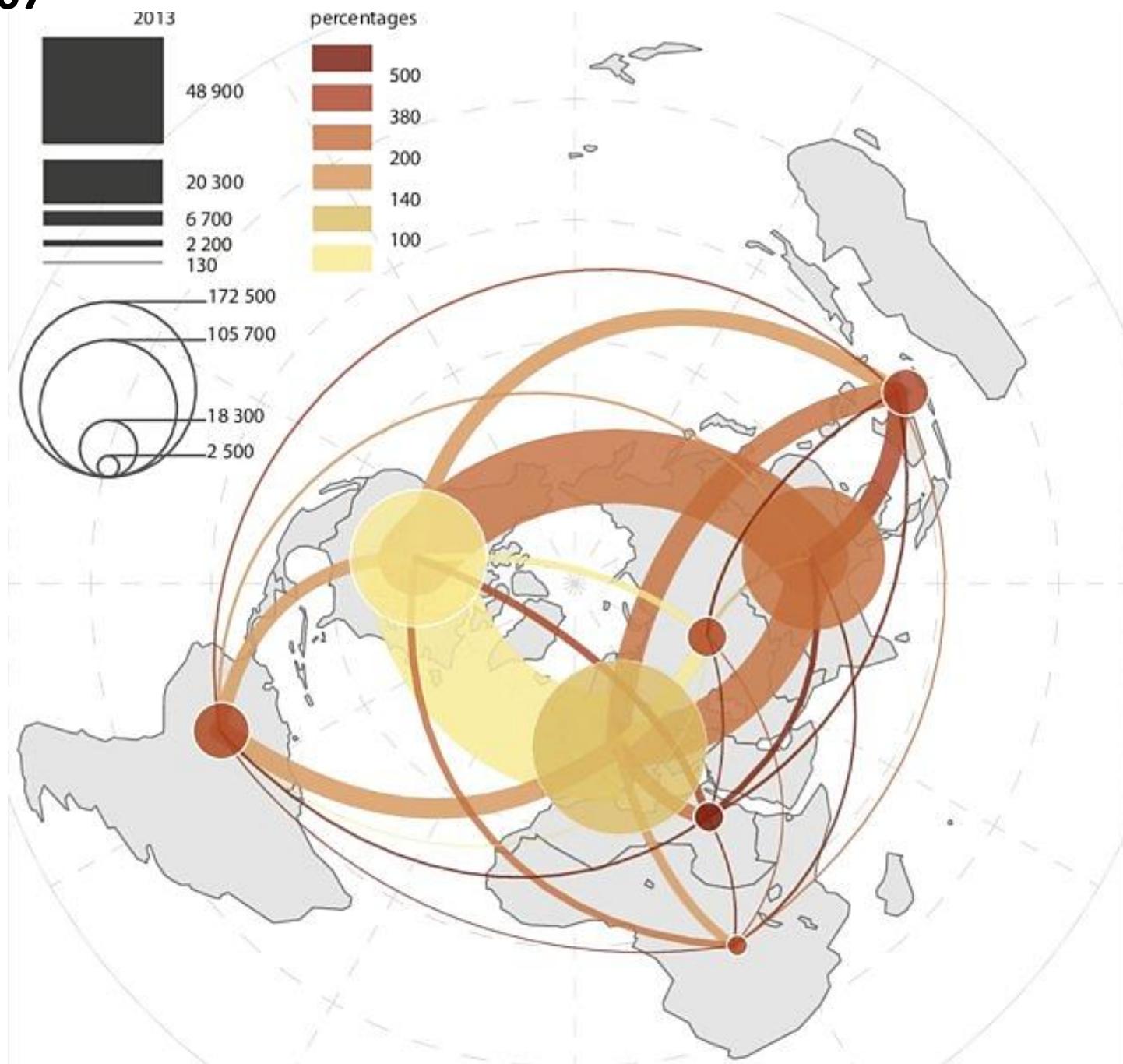


2013



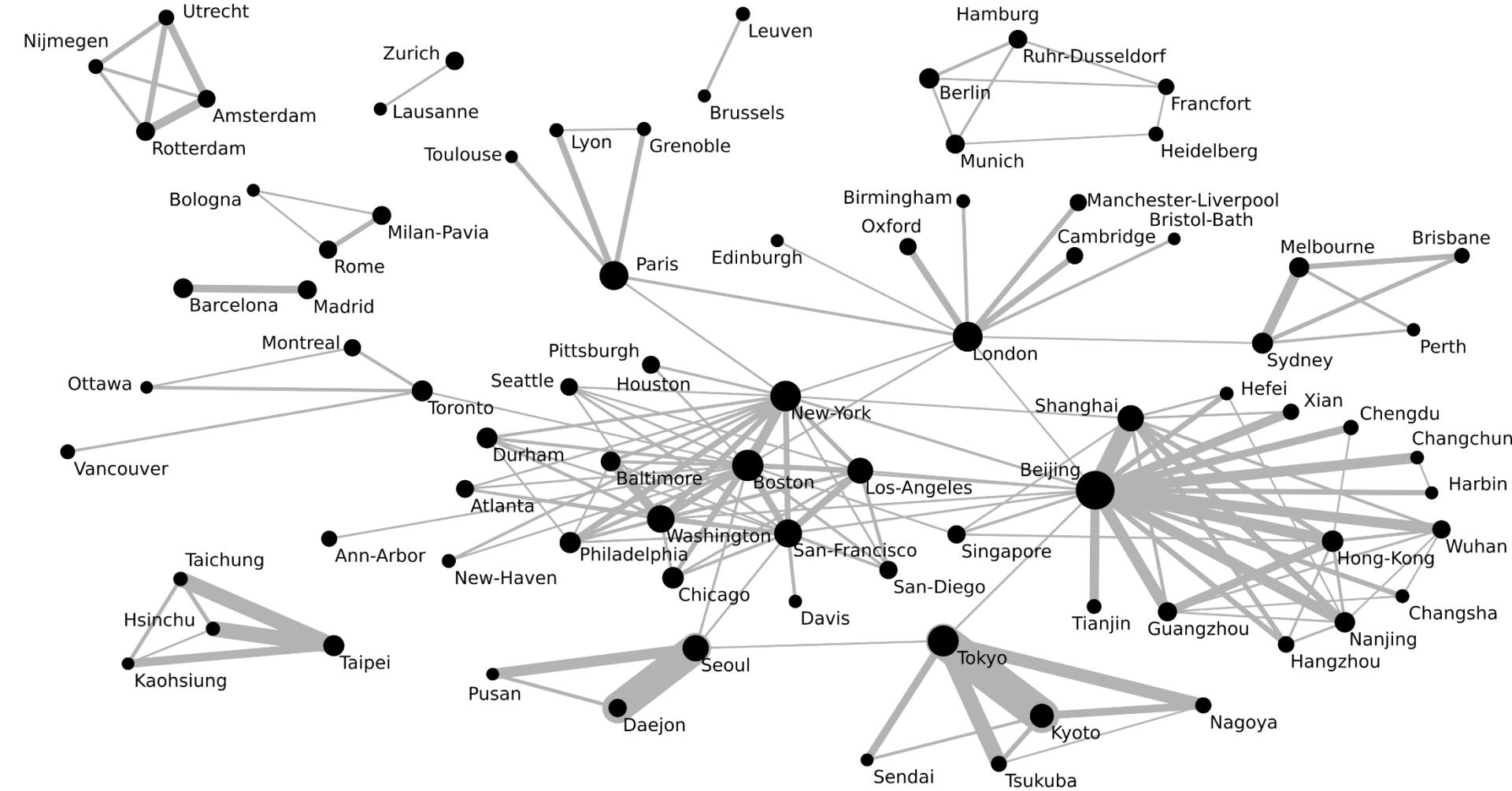
(Olechnicka, Płoszaj & Celińska-Janowicz 2019)

2000-2007



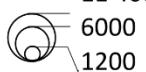
(Maisonobe, Grossetti, Milard, Eckert & Jégou 2016)

World network of interurban scientific collaborations in 2013*

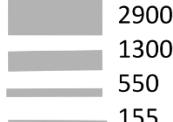


Co-authorship volume

Weighted degree*



Lines values*



Thresholds:

Scientific collaborations lines superior to 154 coauthorships in 2013*

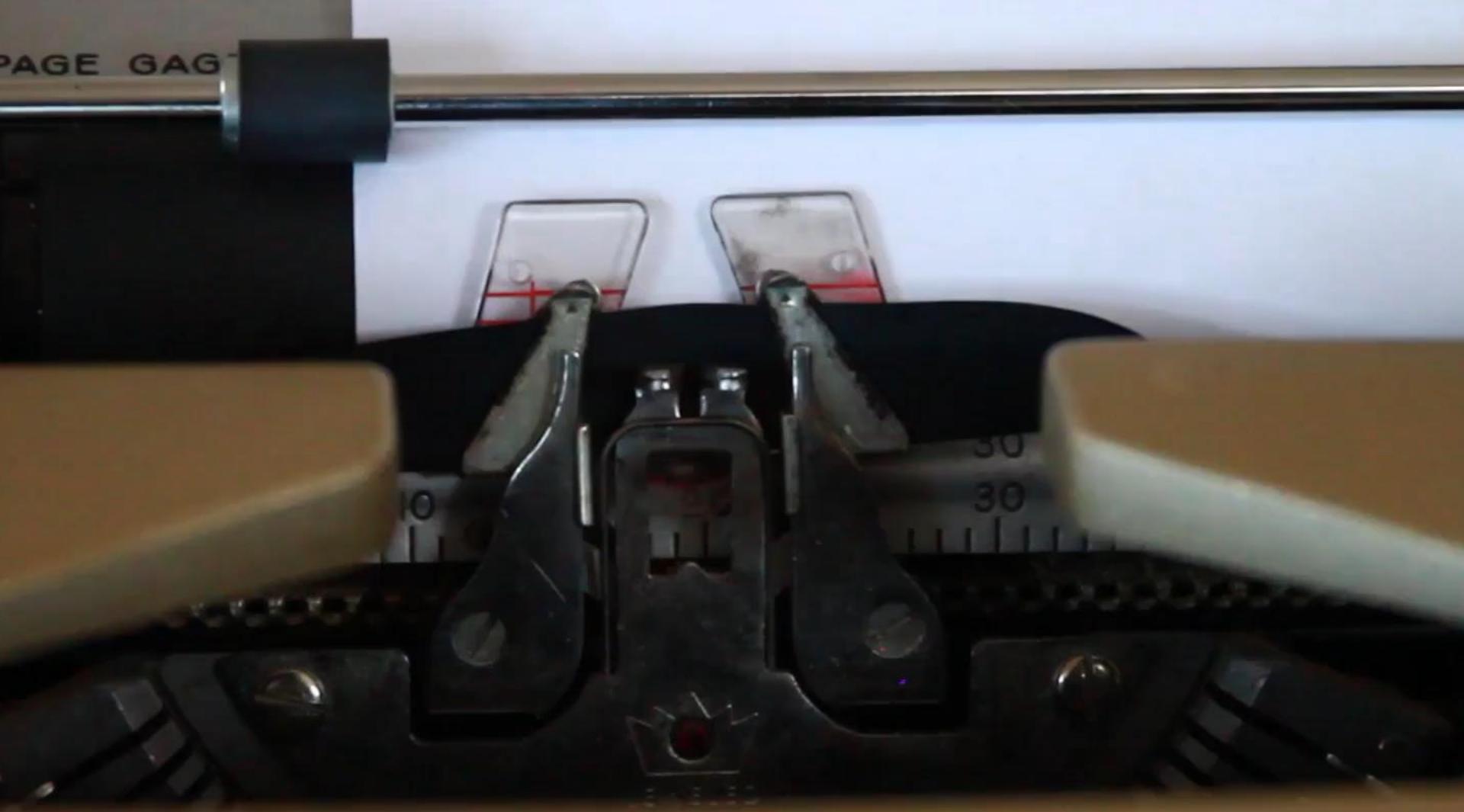
Scientific agglomerations with a weighted degree value upper than 1148 in 2013*

Layout algorithm: Kamada Kawai applied on the network structure in 2013*

Designed by: Marion Maisonneuve

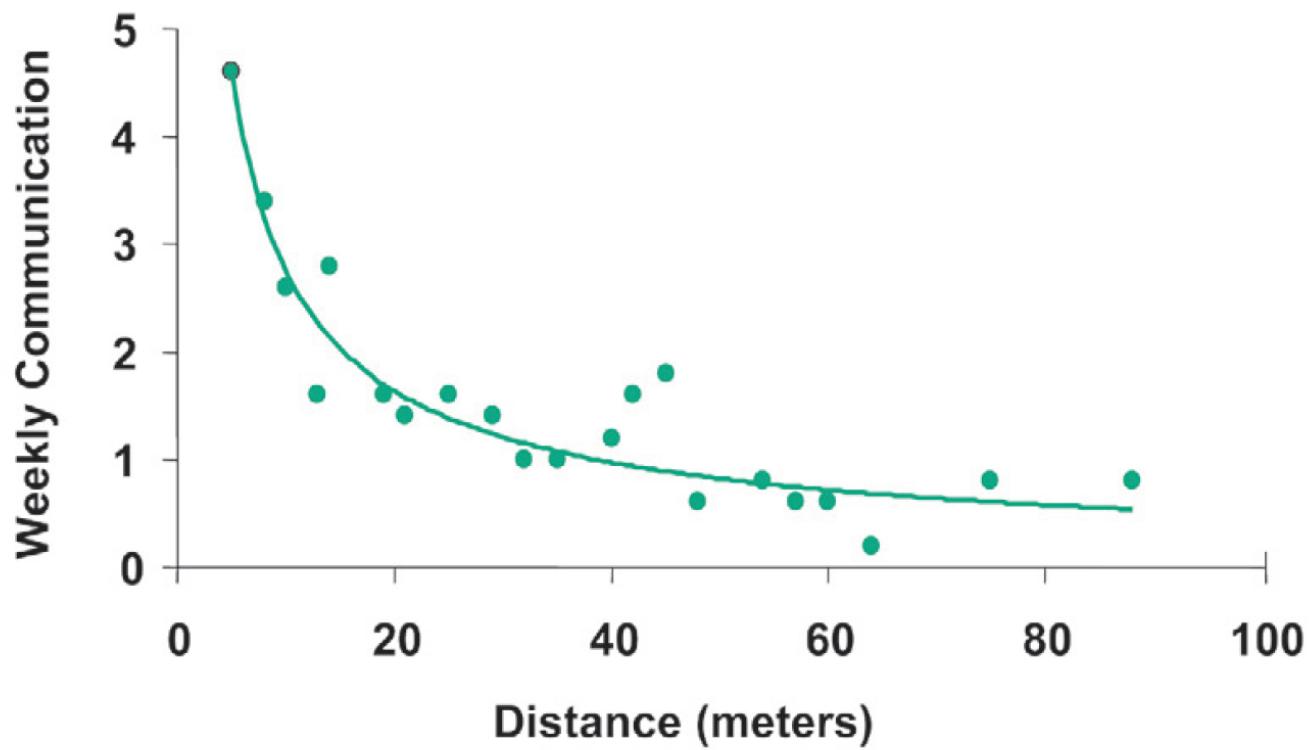
Source: SCIExp (articles, reviews, letters)

*Whole Normalized Counting, moving average (3 years)



How geography conditions
scientific collaboration?

Probability of Communication



(Allen 1977)

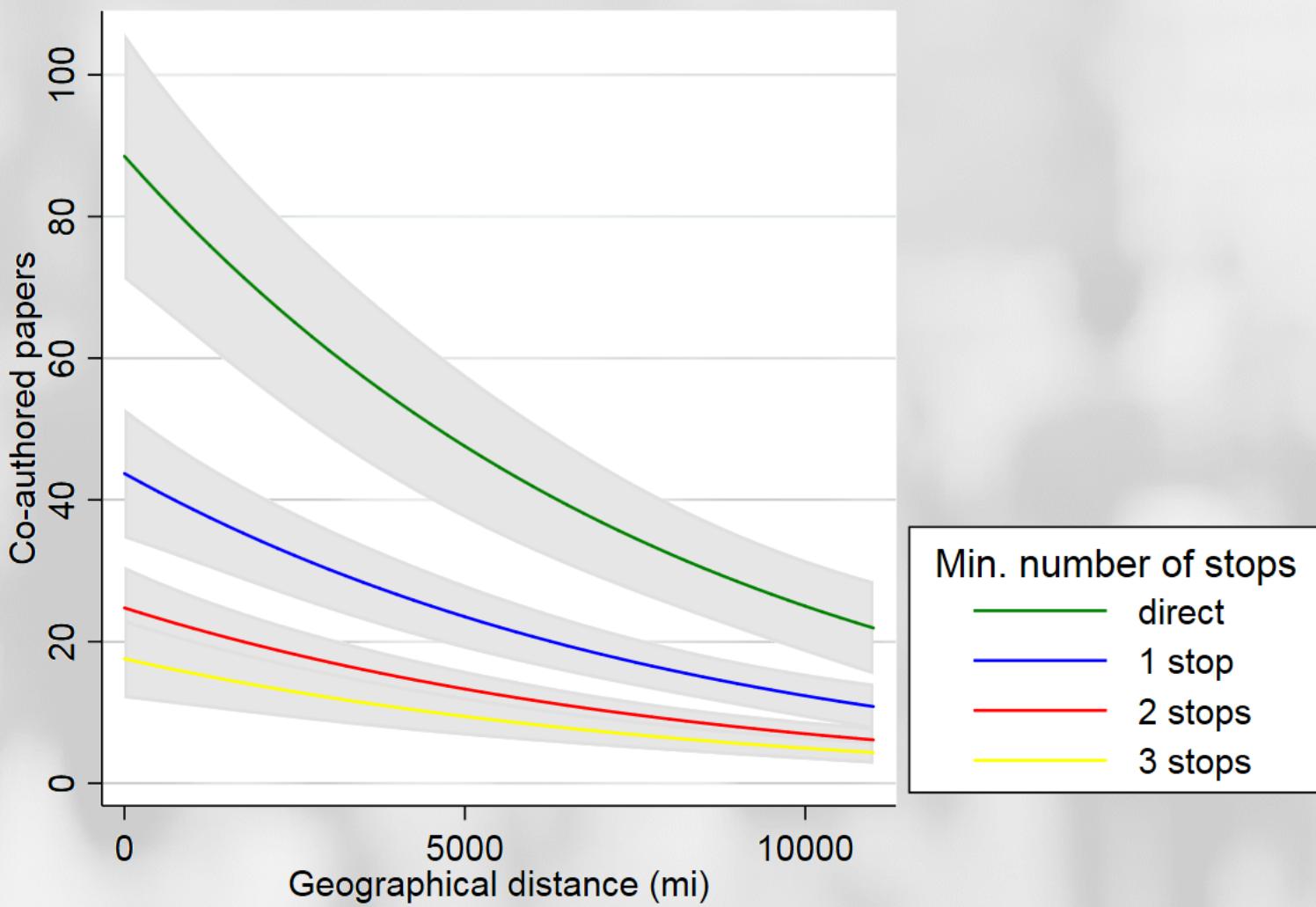
Gravity model

- Collaboration as a function of the mass of collaborating entities (e.g. number of publications) and the distance/proximity between them

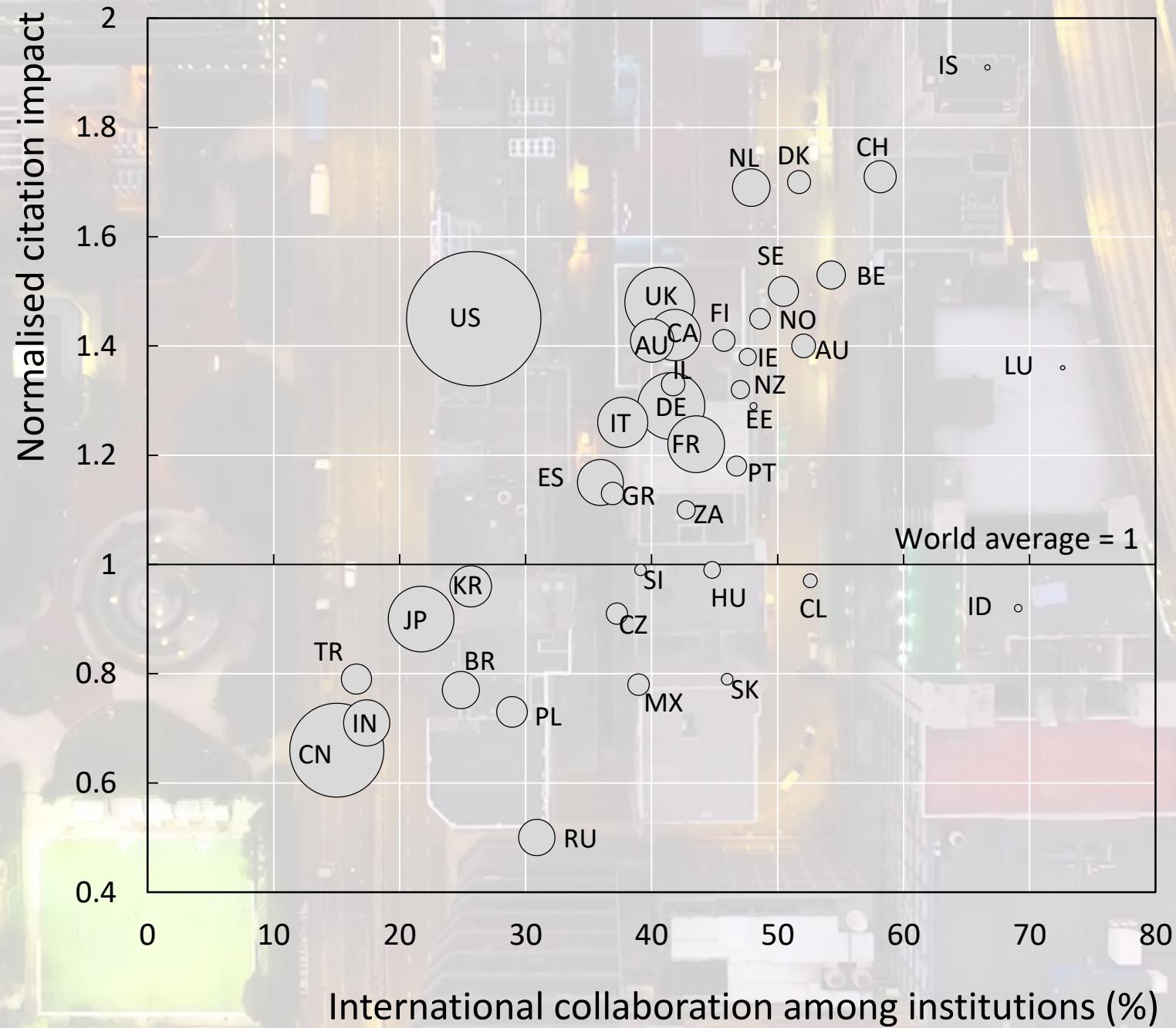
$$INTERACTION_{ij} = \alpha \frac{MASS_i^{\beta_1} MASS_j^{\beta_2}}{DISTANCE_{ij}^{\beta_3}}$$

- Distance/proximity – not only geographical, but also cognitive, institutional, organizational, social, and economic

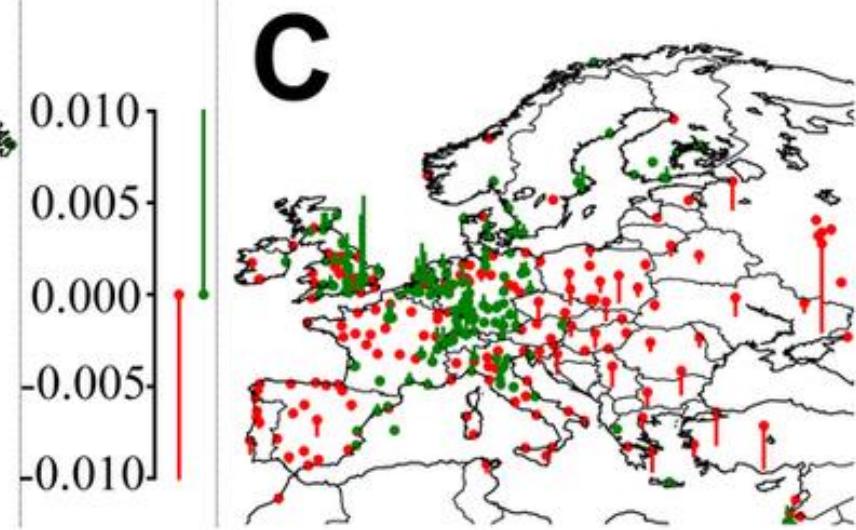
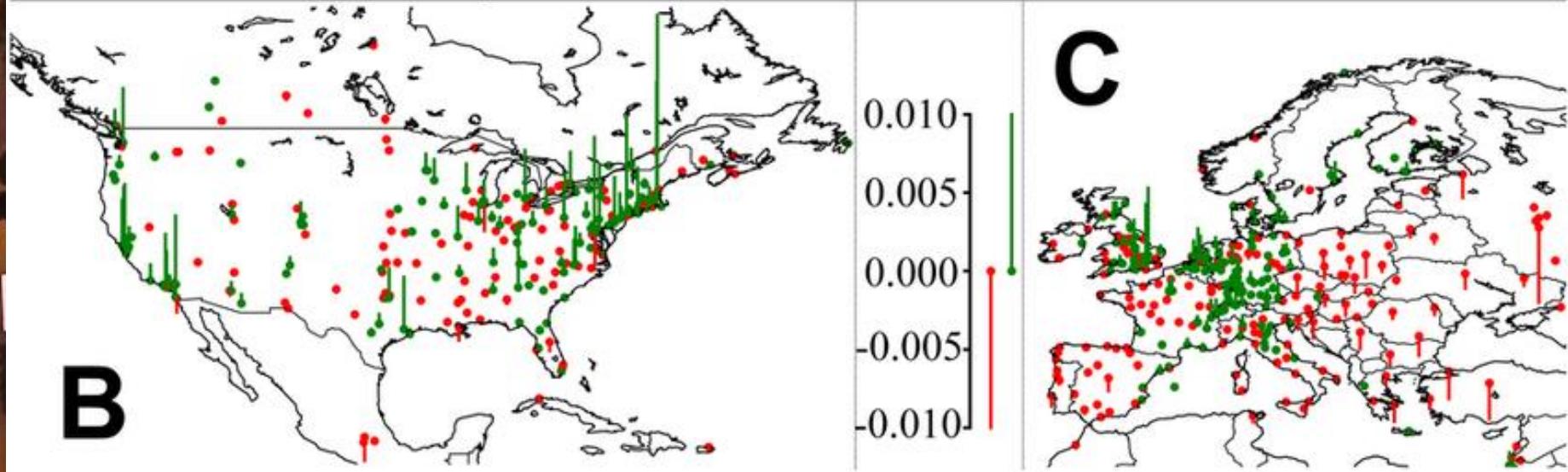
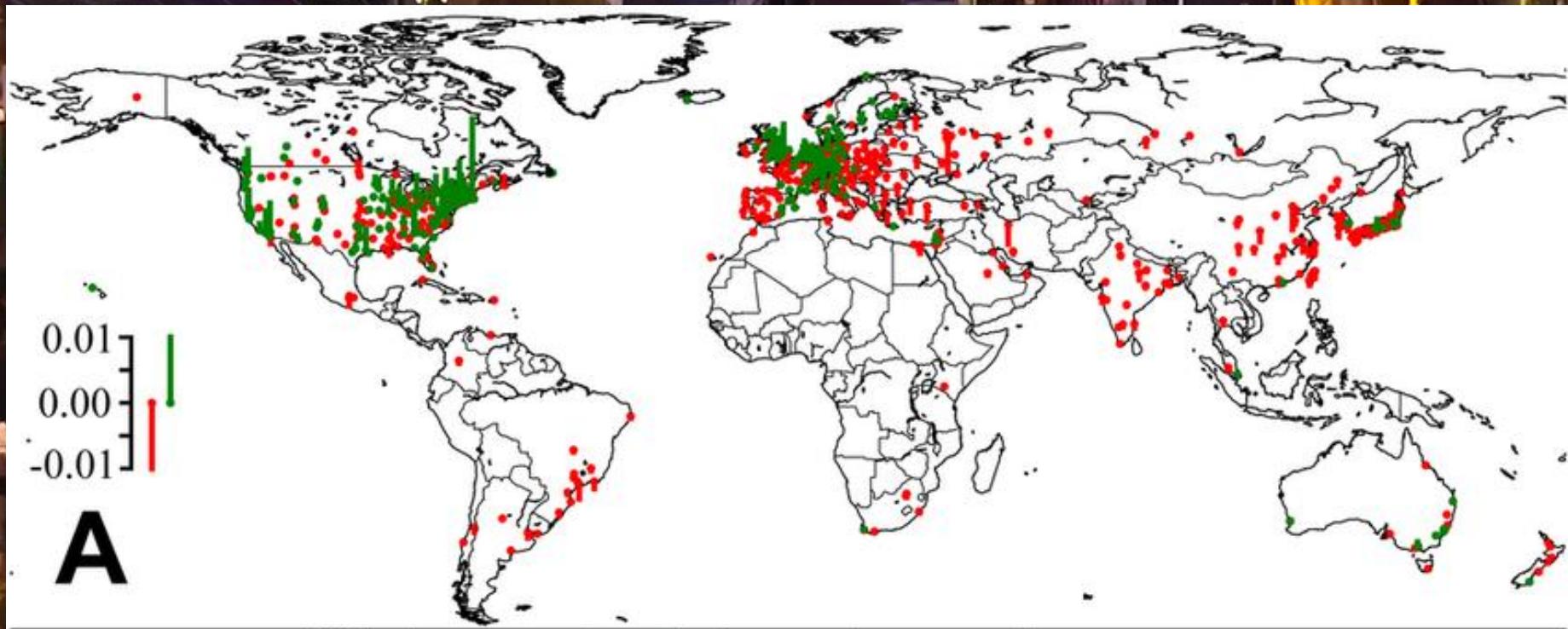
(Boshma 2005)



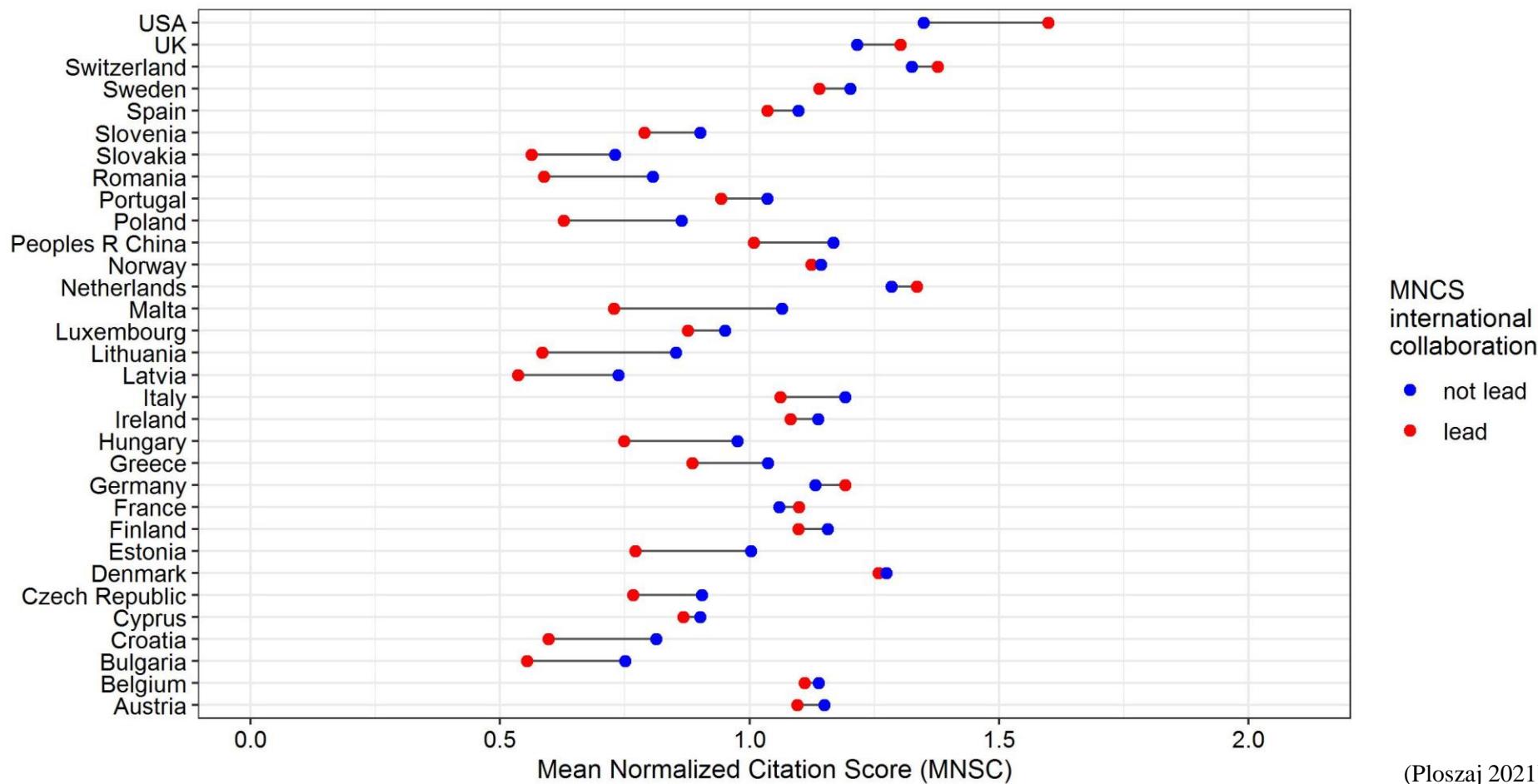
(Ploszaj, Yan & Börner 2020)



(Olechnicka, Ploszaj & Celinska-Janowicz 2019)

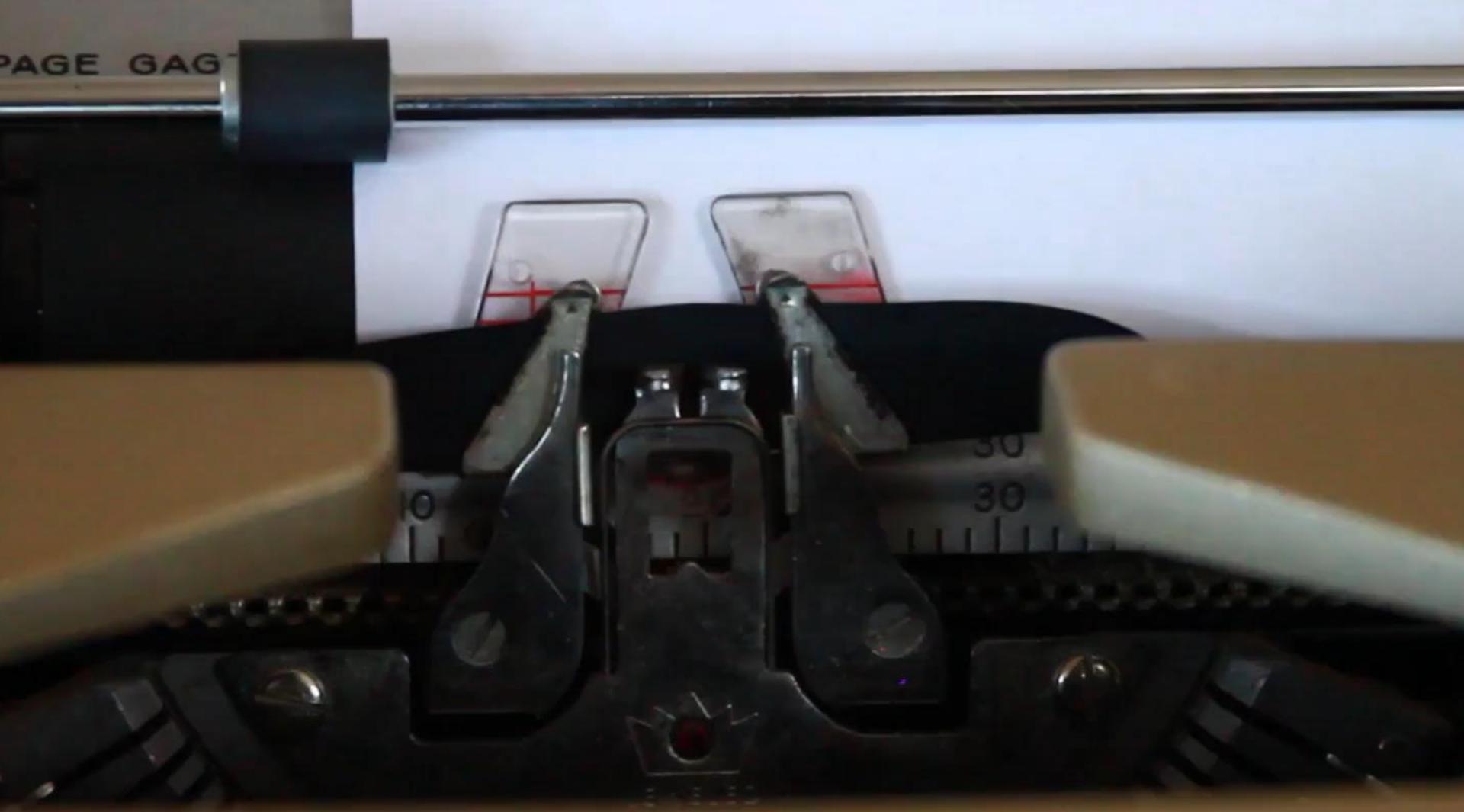


(Mazloumian, Helbing, Lozano, Light & Börner 2013)



(Ploszaj 2021)





How collaboration affects
the spatiality of science?

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Adam Płoszaj

Head of Science Studies Laboratory
Centre for European Regional and Local Studies EUROREG
University of Warsaw

a.ploszaj@uw.edu.pl | aploszaj@gmail.com | www.adamploszaj.com

www.euroreg.uw.edu.pl