

# NETSCITY TUTORIAL: UNVEILING WORLD SCALE SCIENTIFIC PRODUCTION AND COLLABORATIONS BETWEEN CITIES



17th INTERNATIONAL CONFERENCE  
ON SCIENTOMETRICS & INFORMETRICS

*September 2-5, 2019*

Sapienza University, ROME | Italy

# NETSCITY

A stylized orange globe icon with a stand, positioned between the 'S' and 'C' of the word 'NETSCITY'.

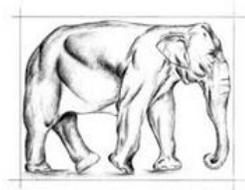
BY NETSCIENCE

**MARION MAISONOBE & GUILLAUME CABANAC**

A WEB APPLICATION MADE WITH LAURENT JÉGOU, NILS BOURGON & NIKITA YAKIMOVITCH

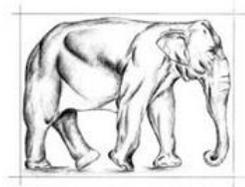
# A PLATFORM DEVELOPPED BY THE NETSCIENCE TEAM

- The NETSCIENCE team is a team of researchers in geography, sociology and computer science funded by the Labex « Structurations des Mondes Sociaux » grant (ANR-11-LABX-0066).
- It focusses on the contemporary geography of scientific activity
- Research outputs are available on the website: <http://geoscimo.univ-tlse2.fr>



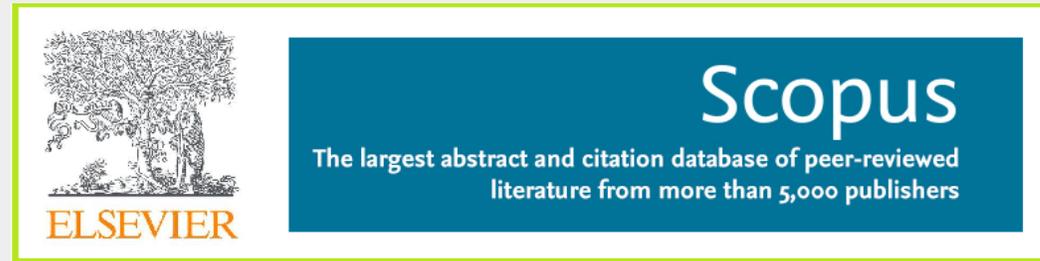
# FROM NETSCIENCE TO NETSCITY

- To map the word evolution of scientific activity, the NETSCIENCE team has developed a methodology which enables geolocating, clustering by urban areas, and fractionating bibliographic data extracted from the Web of Science, Scopus and other sources
- This methodology is implemented in NETSCITY and available to anyone needing to process the geographical information attached to bibliographic datasets



# THE WORLD SCIENTIFIC PRODUCTION

The whole production



Scientific publications

Nowadays more than **1 700 000** articles per year!

In peer-reviewed journals



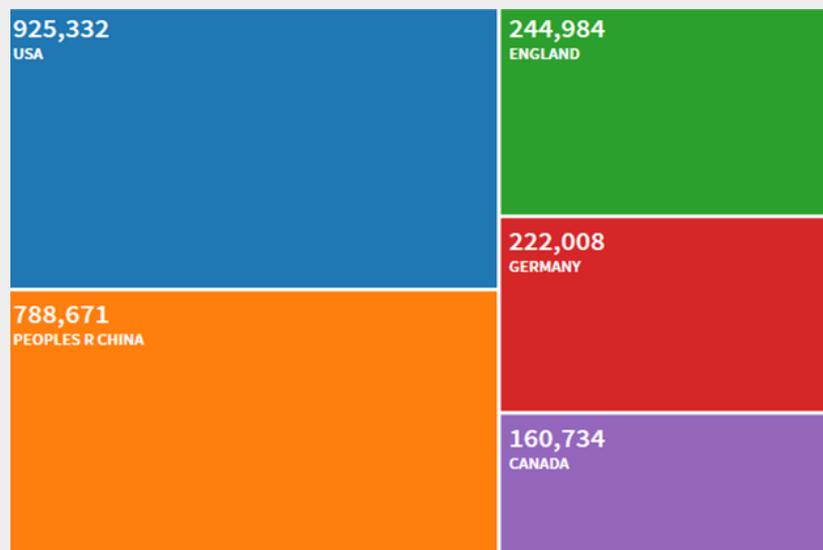
Nowadays more than **1 700 000** articles per year!

Indexed in bibliographic databases



A scientific article

# A LIMITED NUMBER OF TOOLS TO EXPLORE THE GEOGRAPHY OF SCIENTIFIC PRODUCTION



Tree map available on the Web of Science online database

**No geographical maps!**

## The **Netscience** project :

Socio-geographical research on scientific activity

- Spatial distribution
- World scale scientific collaboration

# EXISTING SOFTWARES FOR BIBLIOMETRIC MAPPING

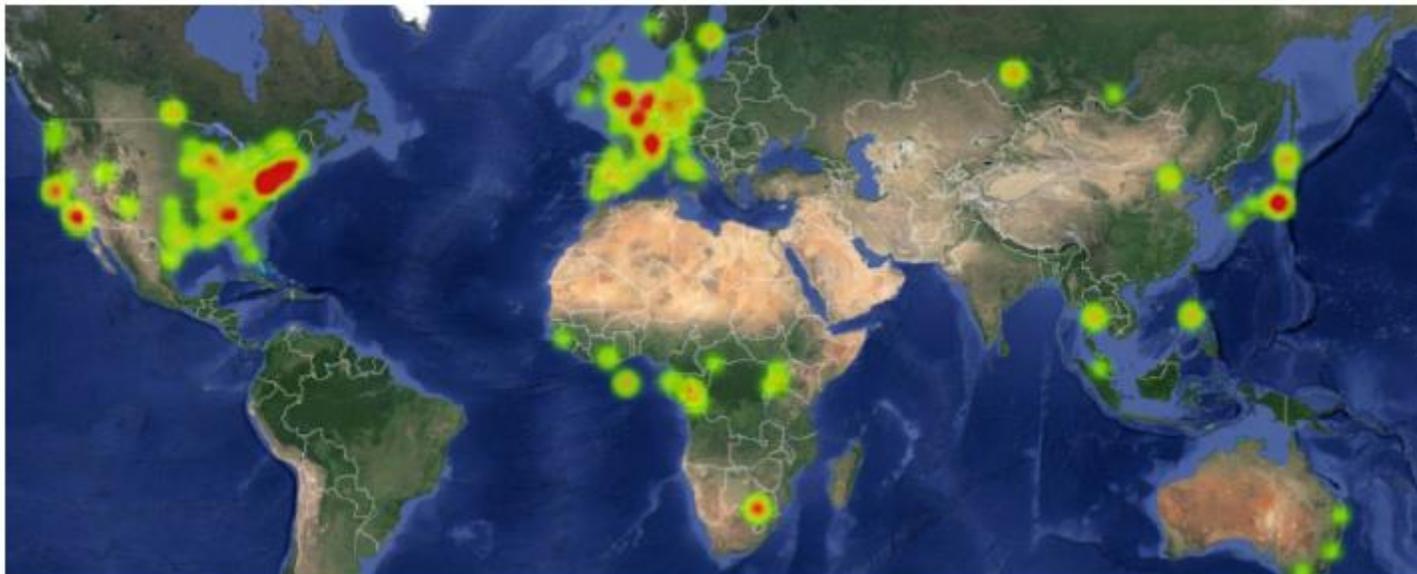
Software tool	Burst detection	Geospatial	Network	Temporal
Bibexcel			x	
CiteSpace	x	x	x	x
CoPalRed			x	x
IN-SPIRE	x		x	x
Leydesdorff's Software				
Network Workbench Tool	x		x	x
Science of Science Tool	x	x	x	x
VantagePoint	x	x	x	x
VOSViewer			x	

Cobo *et al.*, Science mapping software tools: Review, analysis, and cooperative study among tools, JASIST

# EXISTING SOFTWARES FOR BIBLIOMETRIC MAPPING

CiteSpace, Leydesdorff's programs and Sci2 Tool

- geocoding data at the street level and aggregating them at the country level
- mapping network data using Google Earth Maps and Yahoo! Maps using KML files



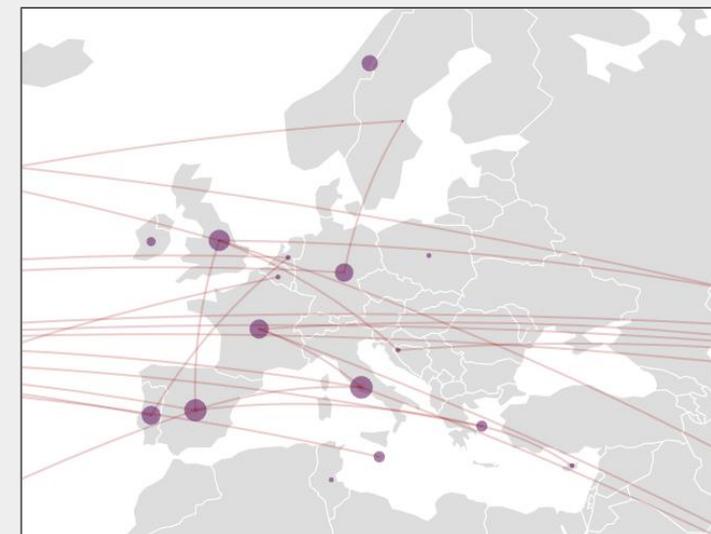
From Chen, 2016  
*A practical guide for mapping  
Scientific literature*

# WHAT NETSCITY OFFERS YOU

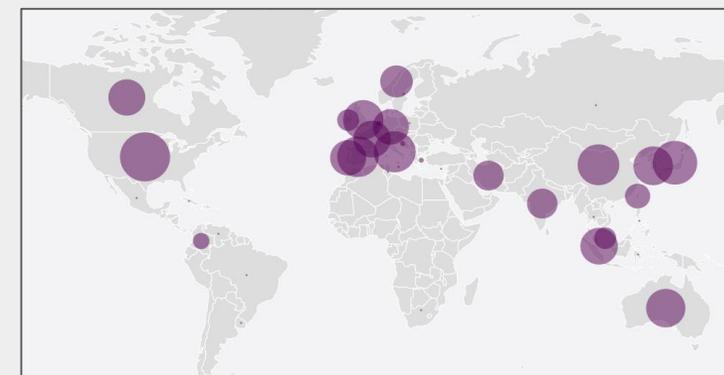
Analysing the geography of a bibliographic set  
At the urban & country level, with multiple counting methods,  
flow and stock maps



*A bibliographic dataset*



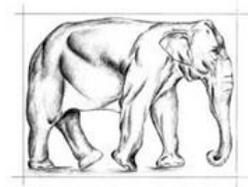
*A flow map*



*A stock map*

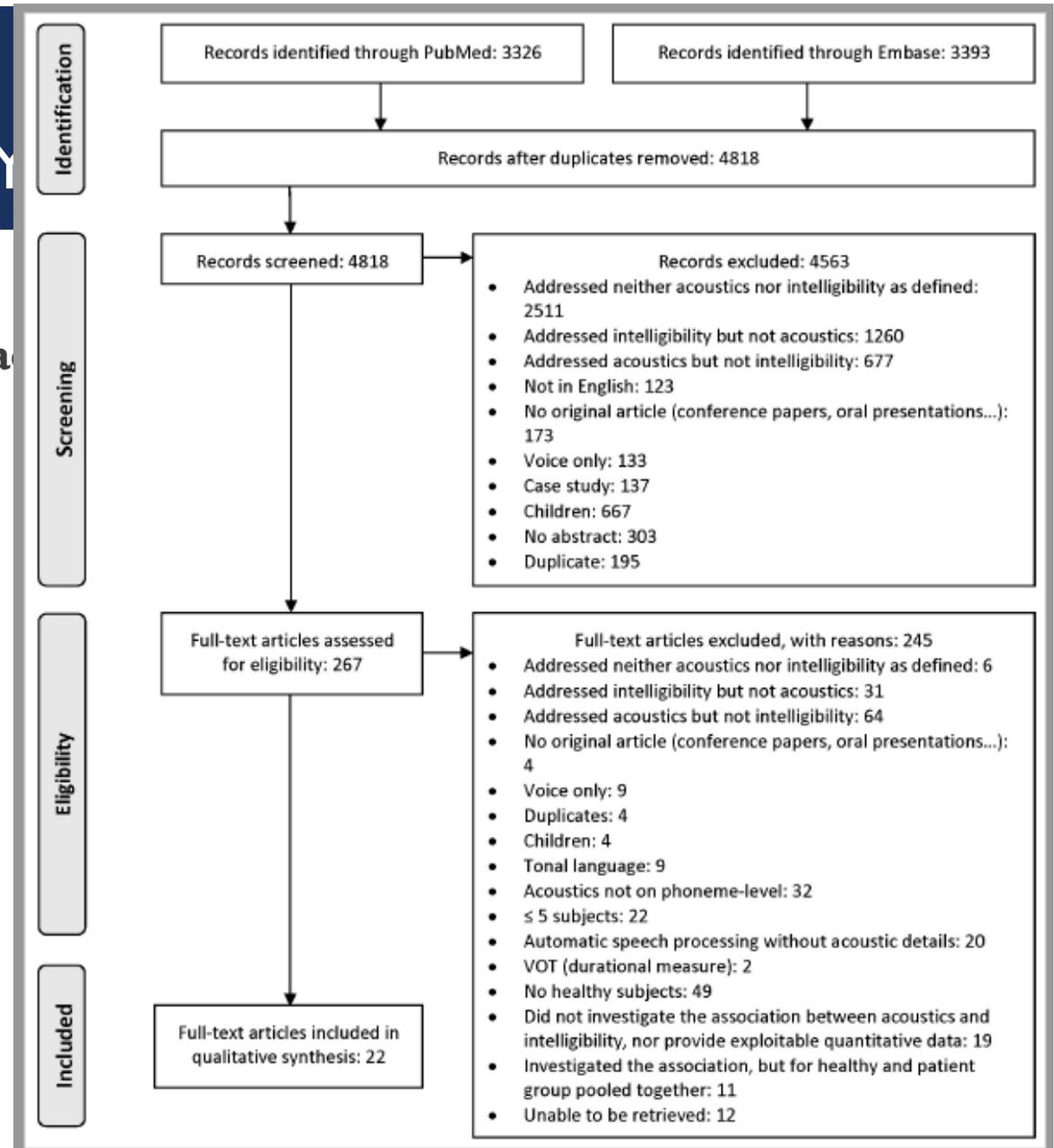
# FOR WHOM?

- Scientists wanting to get a global overview of their research field (example of a systematic survey)
- Information science specialists wanting to produce a report or an analysis
- Policy makers wanting to get a global overview of the research activity of their institution
- Geographers, sociologists and historians specialized in the social study of science (STS researchers)



# EXAMPLE OF A SYSTEMATIC SURVEY

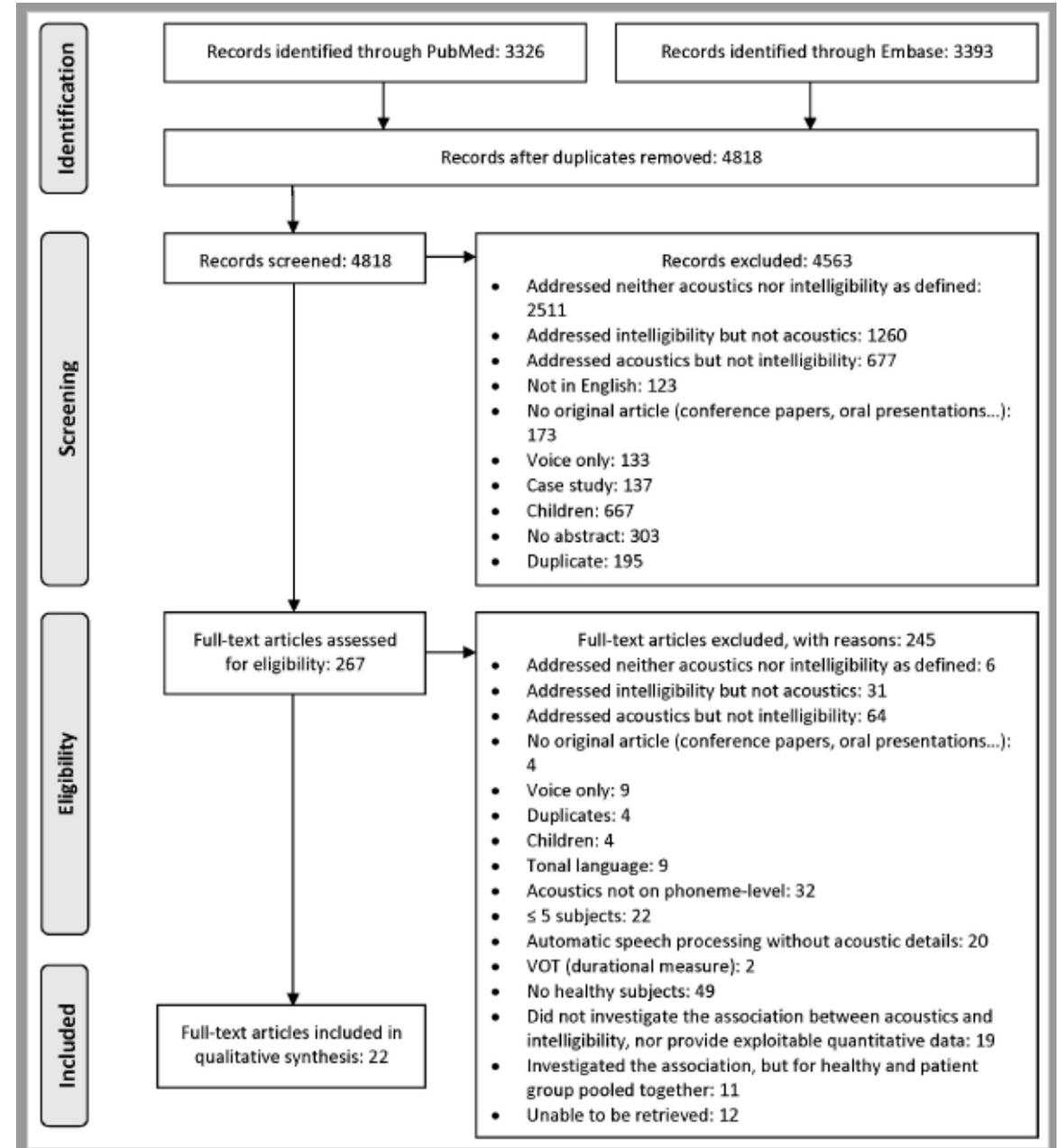
Pommé *et al.*, Relationship between phoneme-level and healthy speech: A systematic review



# Example of a systematic survey using NETSCITY

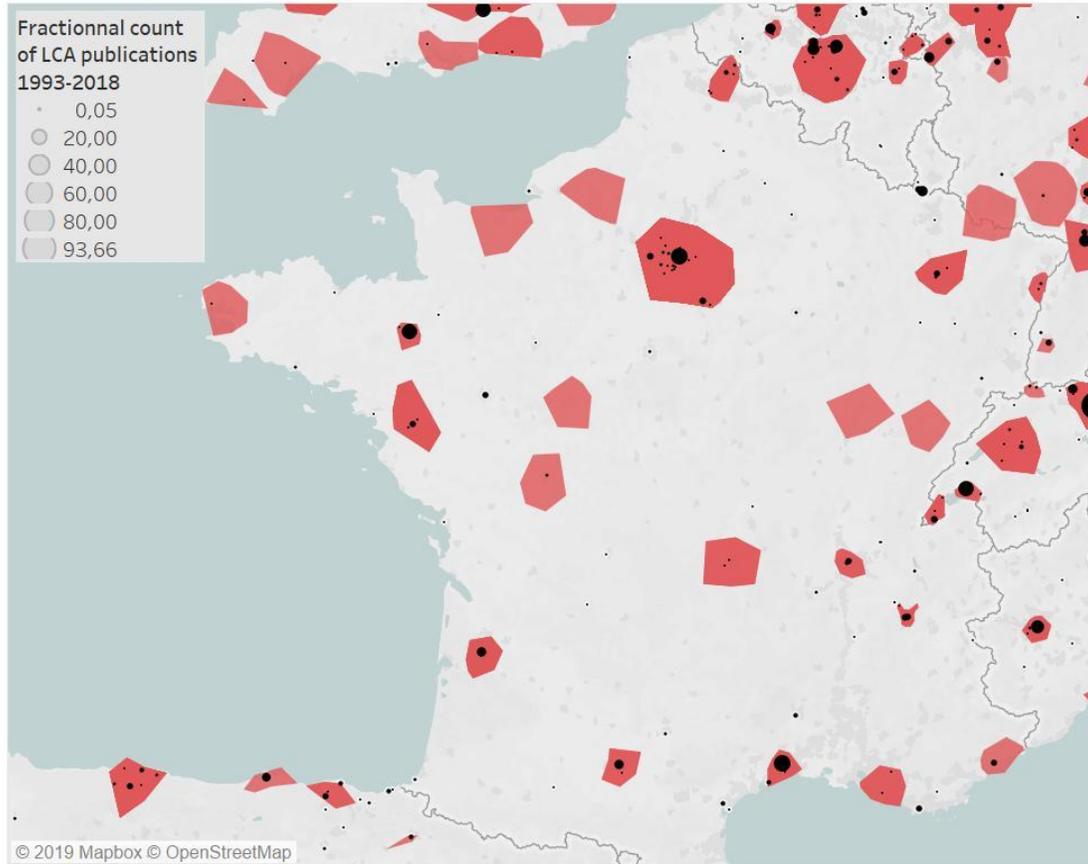
## Pommé *et al.*, Relationship between phoneme-level acoustic variables and speech intelligibility in healthy speech: A systematic review, 2019

*“It can be observed that most studies about the link between acoustics and intelligibility were carried out in North America and in Western Europe, with numerous collaborations with North American research teams.”*



# Mapping the LCA scientific field using NETSCITY urban agglomerations

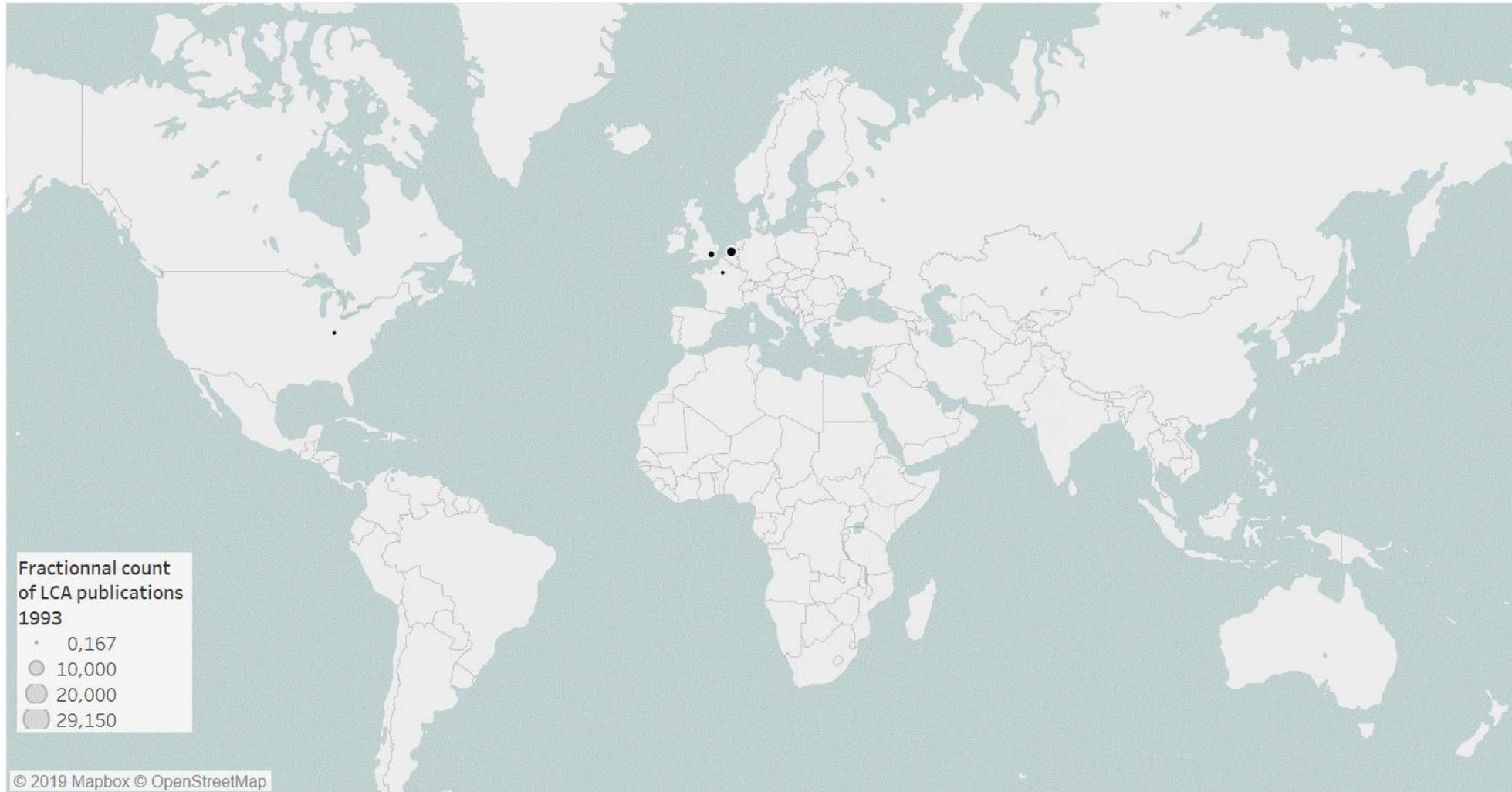
Saadé & Boistel, Geography of Environmental Life Cycle Assessment, ERSA conference, Lyon, 2019



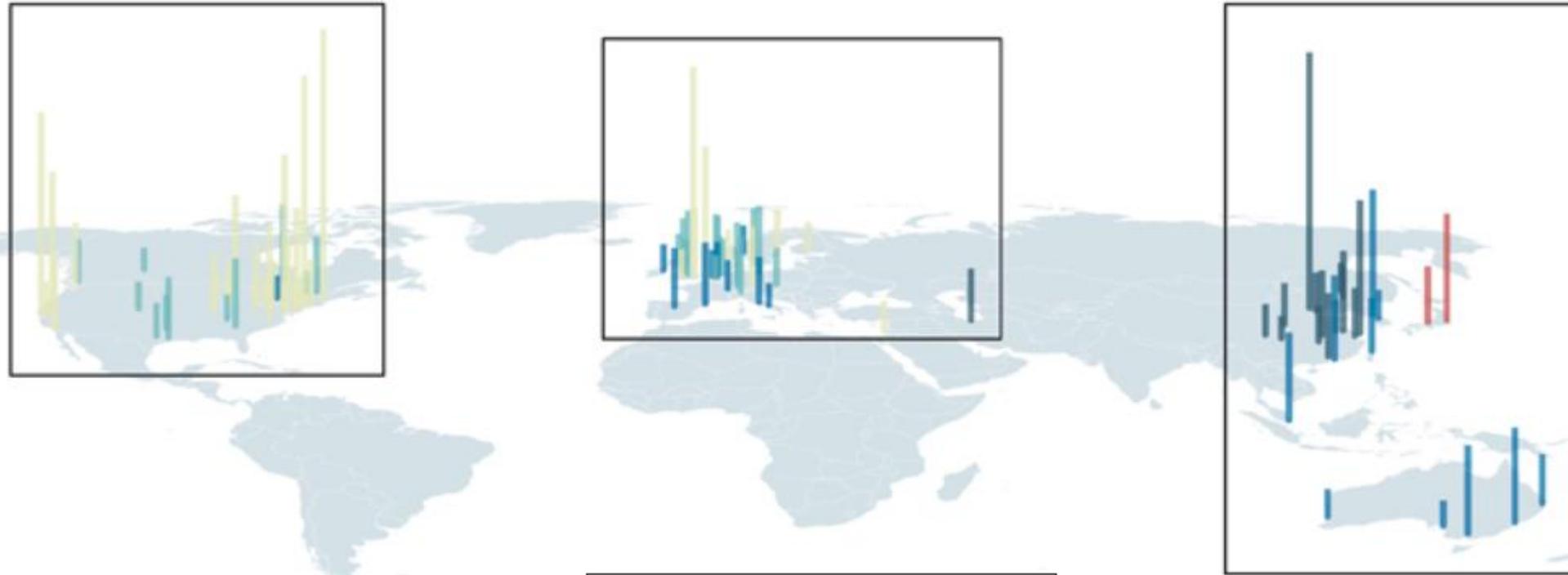
AGGLO or City	Country / World share			Rank		
	1997	2007	2017	1997	2007	2017
BEIJING		2,04%	5,63%	0	28	1
ZURICH	2,58%	6,88%	3,55%	55	2	2
COPENHAGEN	7,16%	4,77%	3,33%	6	7	3
GOTHENBURG	5,30%	7,49%	2,75%	12	1	4
ROTTERDAM-LEIDEN-DELFT-DEN HAAG	7,95%	4,99%	2,48%	5	6	5
BANGKOK		5,68%	2,42%	0	3	6
BARCELONA	2,53%	2,99%	2,39%	58	14	7
BERLIN	5,14%	1,42%	2,38%	13	71	8
MONTREAL	2,27%	3,29%	2,37%	64	12	9
Ispra			2,01%	0	0	10
HONG-KONG			1,88%	0	0	11
MILAN-PAVIA	4,55%	2,04%	1,87%	16	28	12
PARIS	4,44%	0,96%	1,84%	20	123	13
SHANGHAI		0,91%	1,83%	0	133	14
LONDON	9,86%	2,55%	1,81%	2	22	15
NIJMEGEN-WAGENINGEN		2,89%	1,68%	0	17	16
TRONDHEIM	2,70%	2,89%	1,68%	38	17	17
ROME			1,61%	0	0	18
SANTIAGO-DE-COMPOSTELA		1,32%	1,53%	0	76	19
AALBORG		5,45%	1,53%	0	4	20
JINAN			1,50%	0	0	21
STOCKHOLM	2,58%	3,29%	1,45%	55	12	22
TOKYO		4,72%	1,45%	0	8	23
SAN-FRANCISCO-BAY AREA	2,27%	2,99%	1,39%	64	14	24
TEHERAN			1,37%	0	0	25

# Mapping the LCA scientific field using NETSCITY urban agglomerations

Saadé & Boistel, Geography of Environmental Life Cycle Assessment, ERSA conference, Lyon, 2019



# Mapping the evolving geography of highly cited publications



Bars are sized by number of publications in the top 10% of highly-cited research in 2013

### CHANGE IN OUTPUT 2000–2013 (%)

- <0 change in highly-cited papers
- 0–50
- 51–100
- 101–500
- >500

Source: Maisonobe *et al.*/Web of Science

Maisonobe, Jégou & Cabanac, *Peripheral Forces*, *Nature* **563**, S18-S19 (2018)

<https://www.nature.com/articles/d41586-018-07210-6>

# BIBLIOGRAPHIC DATA – WHAT IS THE ROW MATERIAL WE NEED?

## Bioelectrochemical treatment of groundwater containing BTEX in a continuous-flow system: Substrate interactions, microbial community analysis, and impact of sulfate as a co-contaminant

By: Palma, E (Palma, Enza)<sup>[1,3]</sup>; Tofalos, AE (Tofalos, Anna Espinoza)<sup>[2]</sup>; Daghighio, M (Daghighio, Matteo)<sup>[2]</sup>; Franzetti, A (Franzetti, Andrea)<sup>[2]</sup>; Tsiota, P (Tsiota, Panagiota)<sup>[1,4]</sup>; Viggli, CC (Viggli, Carolina Cruz)<sup>[1]</sup>; Papini, MP (Papini, Marco Petrangeli)<sup>[3]</sup>; Aulenta, F (Aulenta, Federico)<sup>[1]</sup>

[View Web of Science ResearcherID and ORCID](#)

NEW BIOTECHNOLOGY

Volume: 53 Pages: 41-48

### Author Information

Reprint Address: Aulenta, F (reprint author)

+ CNR, Natl Res Council, Water Res Inst IRSA, I-00015 Monterotondo, RM, Italy.

Addresses:

### POSTAL ADDRESSES

+ [ 1 ] CNR, Natl Res Council, Water Res Inst IRSA, I-00015 Monterotondo, RM, Italy

+ [ 2 ] Univ Milano Bicocca, Dept Earth & Environm Sci, I-20126 Milan, Italy

+ [ 3 ] Sapienza Univ **Rome**, Dept Chem, I-00185 **Rome**, Italy

+ [ 4 ] Tech Univ Crete, Sch Environm Engn, Khandia 73100, Greece

E-mail Addresses: [aulenta@irsa.cnr.it](mailto:aulenta@irsa.cnr.it)

### Citation Network

In Web of Science Core Collection

0

Times Cited

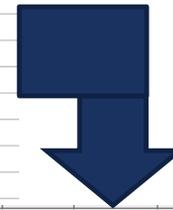
 [Create Citation Alert](#)

### « CITY, PROVINCE, COUNTRY »

city	province	country
Monterotondo	RM	Italy
Milan		Italy
Rome		Italy
Kania		Greece

# OTHER TYPE OF SOURCES: E.G. CONFERENCE ATTENDANCE

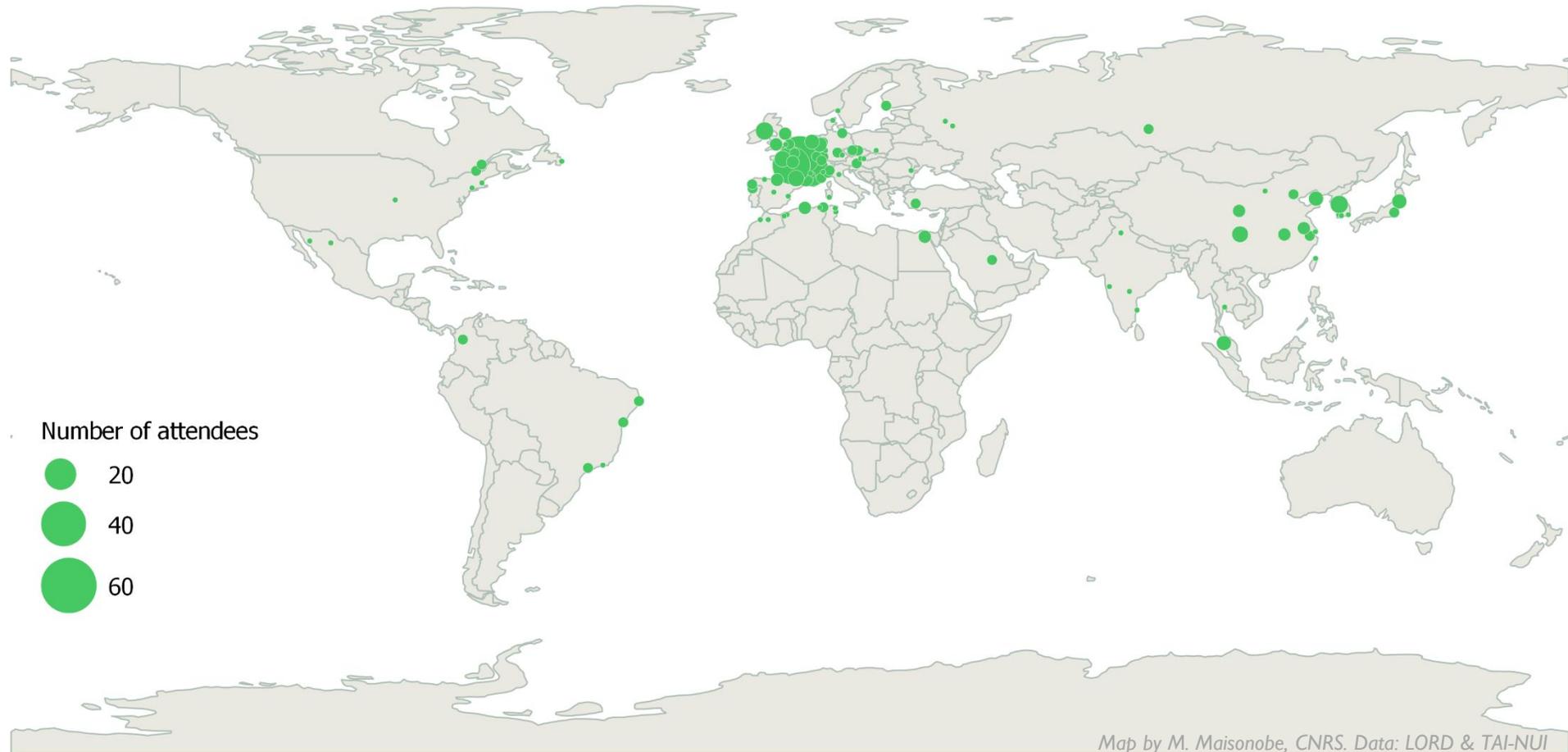
city	country	discipline	has_speaker_presenter	date_1	date_2	date_3	date_4	menu	cocktail	gala_dinner	province
Pune	India	student	0	1	1	1	1	1 vegetarian	1	0	
Belfast	United Kingdom	academia	0	1	1	1	1	1 standard	0	0	
Guangzhou	China	academia	0	1	1	1	1	1 standard	1	1	
Villeneuve d'Ascq	France	academia	0	1	1	1	1	1 standard	1	0	
NANTES	France	academia	0	1	1	1	1	1 standard	1	0	
REIMS Cedex 2	France	student	0	1	1	1	1	1 standard	1	0	
lille	France	academia	0	1	1	1	1	1	1	0	
Gothenburg	Sweden	academia	0	1	1	1	1	1 standard	1	0	
Lanzhou	China	academia	0	1	1	1	1	0 standard	1	0	
SAINT BEAUZIRE	France	industry	0	0	1	0	0	0 standard	1	1	



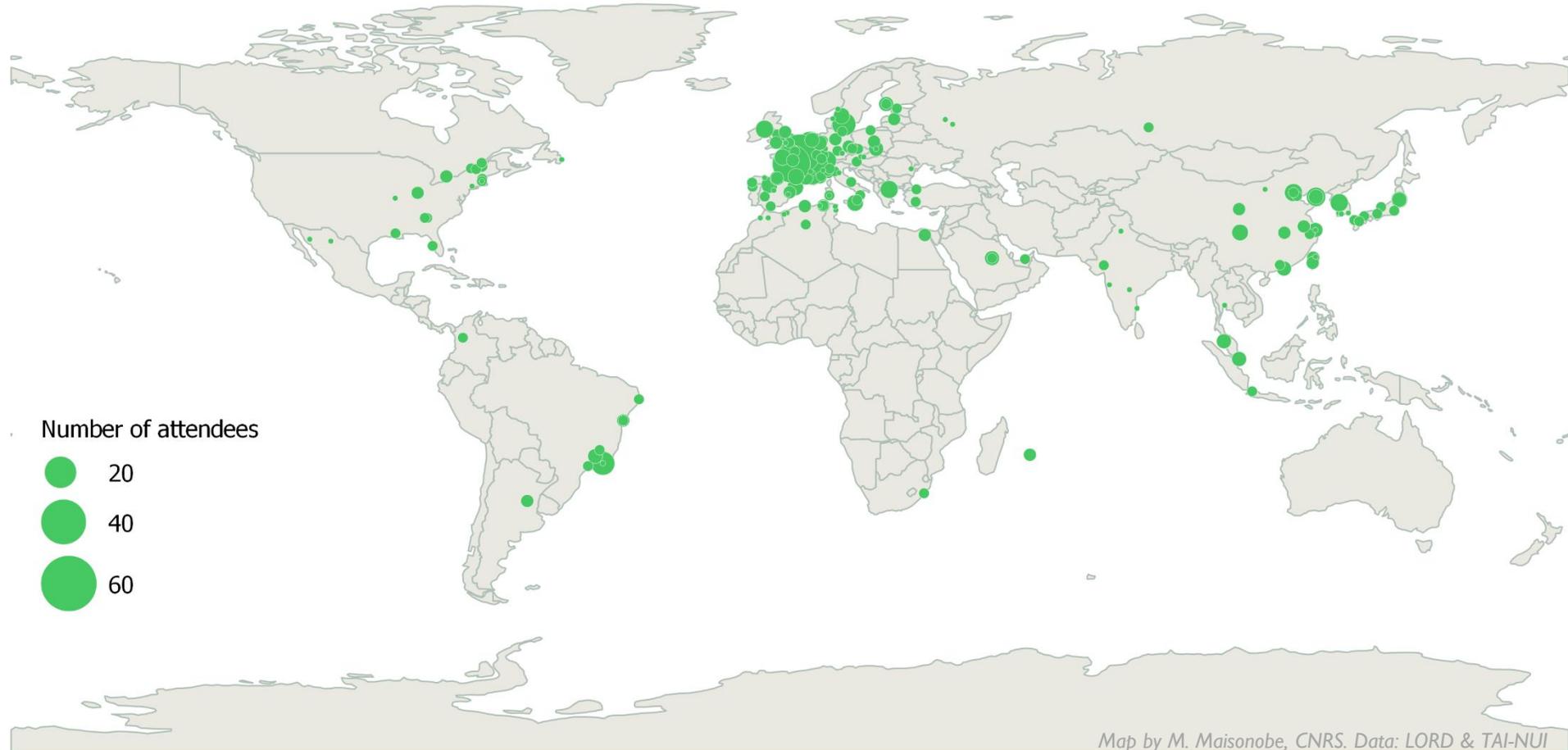
city	country	discipline	num	adresse	city_corr	province	country_corr	lng2	lat2	annee	niveau	id_agglomeration	agglomeration	province_agglomer	pays_agglomeration
Rio de Janeiro	Brazil	student	1	NATIONAL CHEMICAL LABORATORY	PUNE		INDIA	73.856	18.520	2015	SANS	AD11844	PUNE		INDIA
LA ROCHELLE	France	student	2	AGRI-FOOD AND BIOSCIENCE	BELFAST		UNITED-KINGDOM	-5.925	54.596	2015	INCERT	AD11428	BELFAST	NORTH-IRELAND	UNITED-KINGDOM
la rochelle	France	student	3	SOUTH CHINA UNIVERSITY OF	GUANGZHOU		CHINA	113.26	23.132	2015	SANS	AD2136	GUANGZHOU	GUANGDONG	CHINA
La Rochelle	France	student	5	INRA BIOPOLYMERS INTERAC	NANTES		FRANCE	-1.5553	47.217	2015	SANS	AD3567	NANTES		FRANCE
Tarragona	Spain	academia	7	FACULTE DE PHARMACIE D	LILLE		FRANCE	3.0639	50.632	2015	SANS	AD3460	LILLE		FRANCE
OXFORD	United Kingdom	other	8	CHALMERS UNIVERSITY OF	GOTHENBURG		SWEDEN	11.960	57.697	2015	SANS	AD10382	GOTHENBURG	VASTRA-GOTALA	SWEDEN
Daejeon	South Korea	government	9	LANZHOU INSTITUTE OF CHE	LANZHOU		CHINA	103.83	36.062	2015	SANS	AD2206	LANZHOU	GANSU	CHINA
Saint Fons Cedex	France	industry	10	GREENTECH, SAINT BEAUZIR	ST-BEAUZIRE		FRANCE	3.1813	45.849	2015	SANS	AD3213	CLERMONT-FERRAND		FRANCE
Regensburg	Germany	academia	11	FEDERAL UNIVERSITY OF RIO	RIO-DE-JANEIRO		BRAZIL	-43.209	-22.90	2015	SANS	AD1508	RIO-DE-JANEIRO	RJ	BRAZIL
AIN TURCK	Algeria	student	12	UMR-CNRS 7266 LIENSS, UNI	LA-ROCHELLE		FRANCE	-1.1526	46.158	2015	SANS	AAPOLY6777	LA-ROCHELLE		FRANCE
Antony	France	industry	13	UMR-CNRS 7266 LIENSS, UNI	LA-ROCHELLE		FRANCE	-1.1526	46.158	2015	SANS	AAPOLY6777	LA-ROCHELLE		FRANCE
PARIS	France	student	14	UNIVERSITY OF LA ROCHELLE	LA-ROCHELLE		FRANCE	-1.1526	46.158	2015	SANS	AAPOLY6777	LA-ROCHELLE		FRANCE
Illkirch-Graffenstaden	France	student	15	CTQC, TARRAGONA, SPAIN;	TARRAGONA		SPAIN	1.2445	41.118	2015	SANS	AAPOLY21574	TARRAGONA	CT	SPAIN
Illkirch-Graffenstaden	France	academia	16	LINACRECOLLEGE OXFORD	OXFORD		UNITED-KINGDOM	-1.2577	51.752	2015	SANS	AD12080	OXFORD-DIDCOT	ENGLAND	UNITED-KINGDOM
ORAN	Algeria	academia	17	KOREA RESEARCH INSTITUT	DAEJEON		SOUTH-KOREA	127.38	36.350	2015	SANS	AD9996	TAEJON		SOUTH-KOREA
			18	CINACHEM ADISSEO, SAINT	ST-FONS		FRANCE	4.8532	45.709	2015	SANS	AD3481	LYON		FRANCE
			19	INSTITUTE OF PHYSICAL CHE	REGENSBURG		GERMANY	12.093	49.019	2015	SANS	AD4800	REGENSBURG		GERMANY
			20	STUDENT, AIN TURCK, ALGE	ORAN		ALGERIA	-0.6337	35.697	2015	SANS	AAPOLY90	ORAN		ALGERIA
			21	ADISSEO, ANTONY, FRANCE;	ANTONY		FRANCE	2.2971	48.753	2015	SANS	AD3612	PARIS		FRANCE
			22	LORD, PARIS, FRANCE;	PARIS		FRANCE	2.3095	48.856	2015	SANS	AD3612	PARIS		FRANCE
			25	FACULTY OF MEDICINE, DEP	ORAN		ALGERIA	-0.6337	35.697	2015	SANS	AAPOLY90	ORAN		ALGERIA
			26	UNIVERSITY OF THE BASQUE	BASQUE		SPAIN	-2.9442	43.257	2015	SANS	AAPOLY21187	BILBAO	PV	SPAIN
			27	ALGIERS., ALGERIA	ALGIERS		ALGERIA	3.042	36.752	2015	SANS	AAPOLY31	ALGER		ALGERIA

**Netconf project  
With B. Bernela  
& F. Briatte**

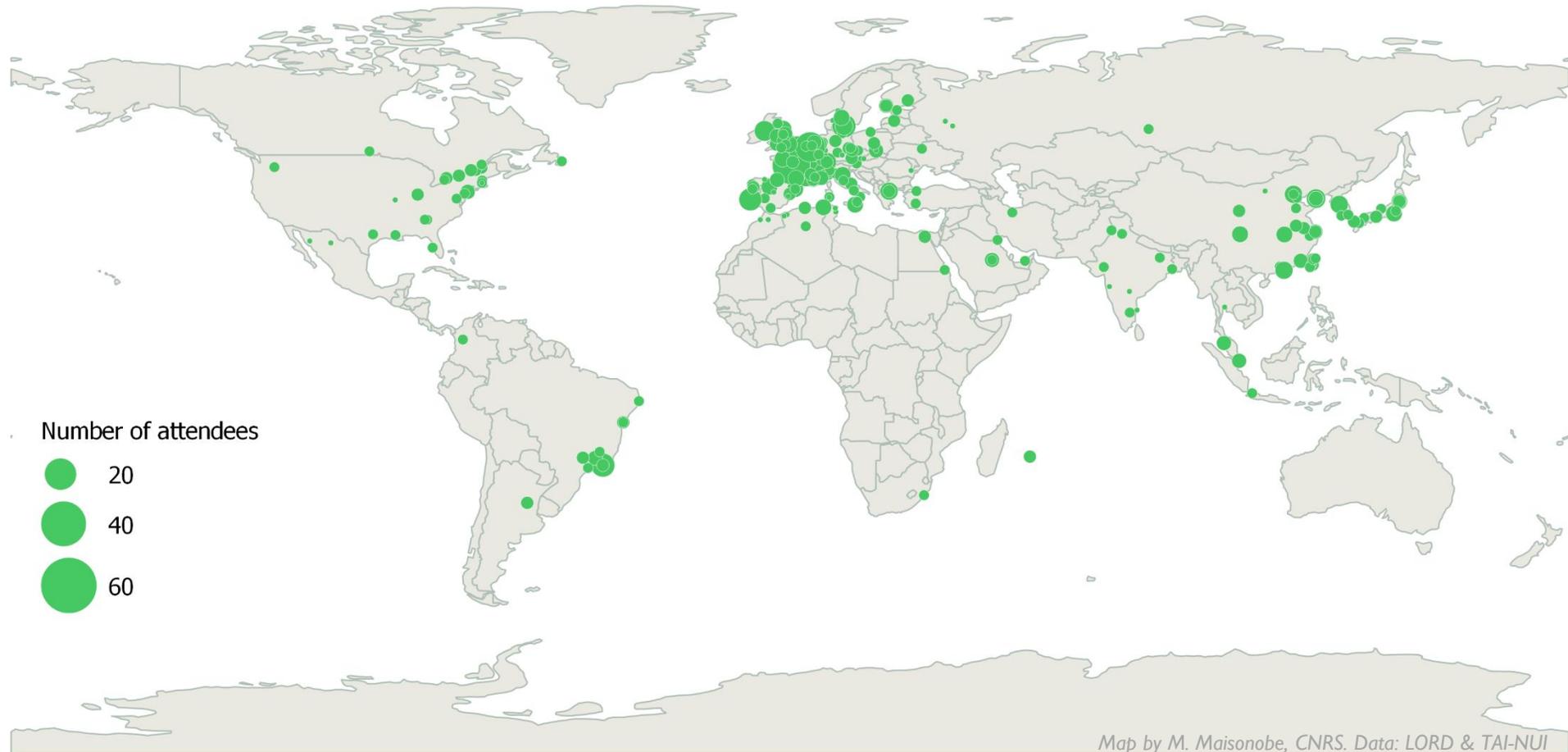
# ISGC's attendance in 2013



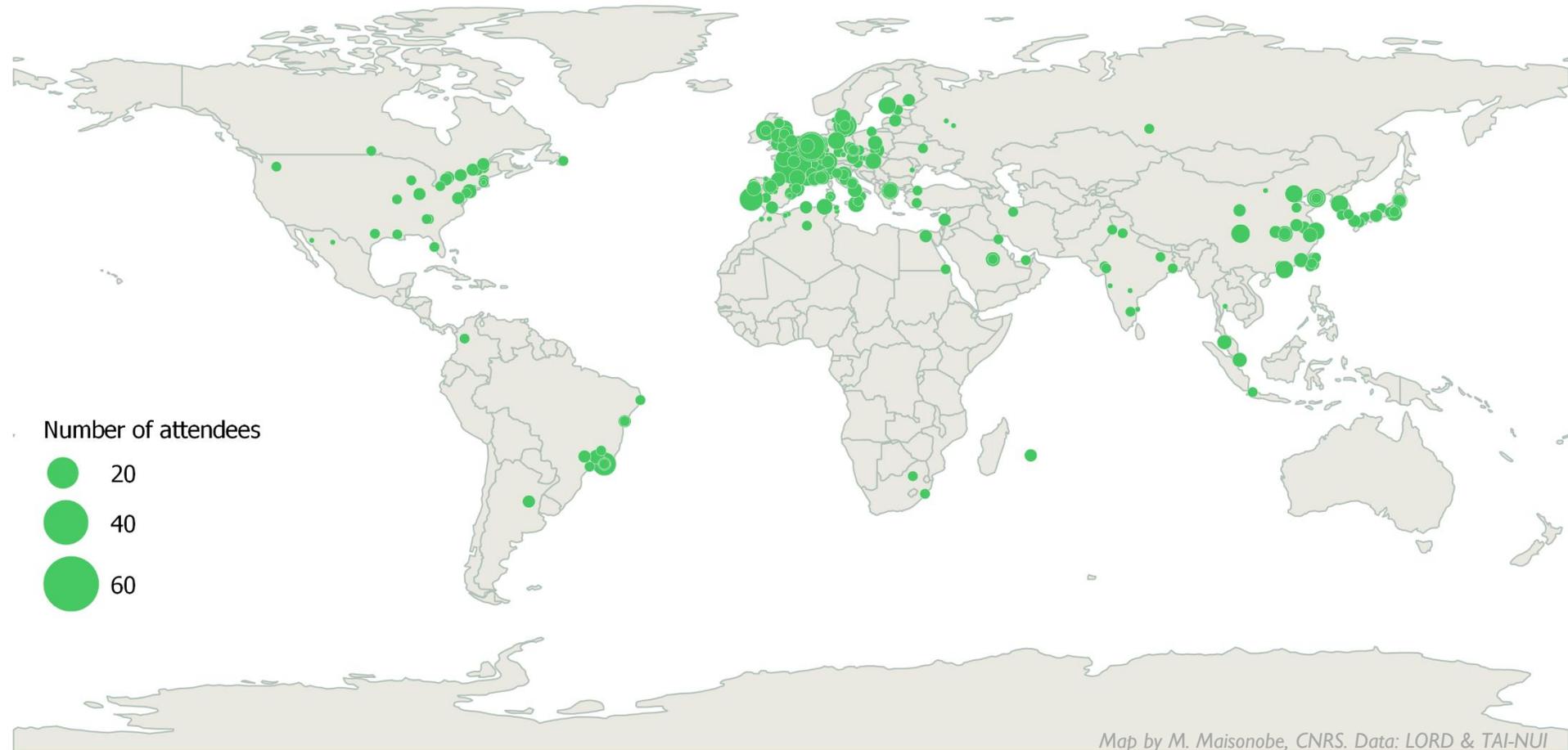
# ISGC's attendance in 2013-2015



# ISGC's attendance in 2013-2017



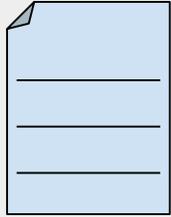
# ISGC's attendance in 2013-2019



# Input

# Netscity

# Outputs



File with bibliographic metadata

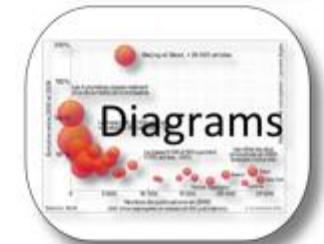
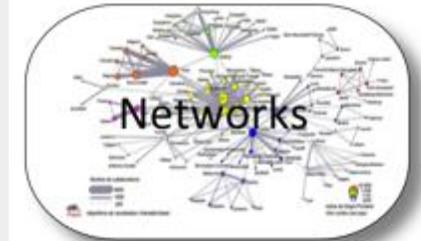


## Data processing :

- 1) Extraction of addresses
- 1) Geocoding
- 1) Clustering at the urban area/country levels



Data visualizations and analyses



Sources: Web Of Science, Scopus, or personal files in .csv

## Many heterogeneities, transliteration issues and data entry errors

ALGE

ALGEIRS

ALGER

ALGER

ALGER-RP

ALGERIE

ALGIERS

ALGIERS

ALGIERS

ALGIERS-DZ

ALGER

ALGER-GARE

ALGER-OUEST

ALGERIS

ALGIER

ALGIERS

ALGIERS

AIX EN PROVENCE

AIX MARSEILLE

AIX-EN-PROVENCE

AIX-EN-PROVENCE

AIX-EN-PROVENCE

AIX-LA-CHAPELLE

AIX-LES-BAINS

AIX-LES-BAINS

AIX-LES-BAINS

AIX-MARSEILLE

AIX-MARSEILLE

AIXEN

AIXEN-P

TAO-YAN-GUAW-SHAN

TAO-YUAN

TAO-YUAN-HSIEN

TAO-YUAN-HSIEN

TAO-YUAN-SHIAN

TAOYAUN

TAOYUAN-CTY

TAOYUANG

TAOYVAN

# WHY SHOULD WE PREFER GEOCODING « CITY, PROVINCE, COUNTRY » STRINGS INSTEAD OF POSTAL ADDRESSES?

- Geocoding help solving some ambiguity issues but add new ones!
- By geocoding postal addresses the risk for ambiguities is increasing:

Example of “Chang Gung Mem Hosp, Tao Yuan, Taiwan” →

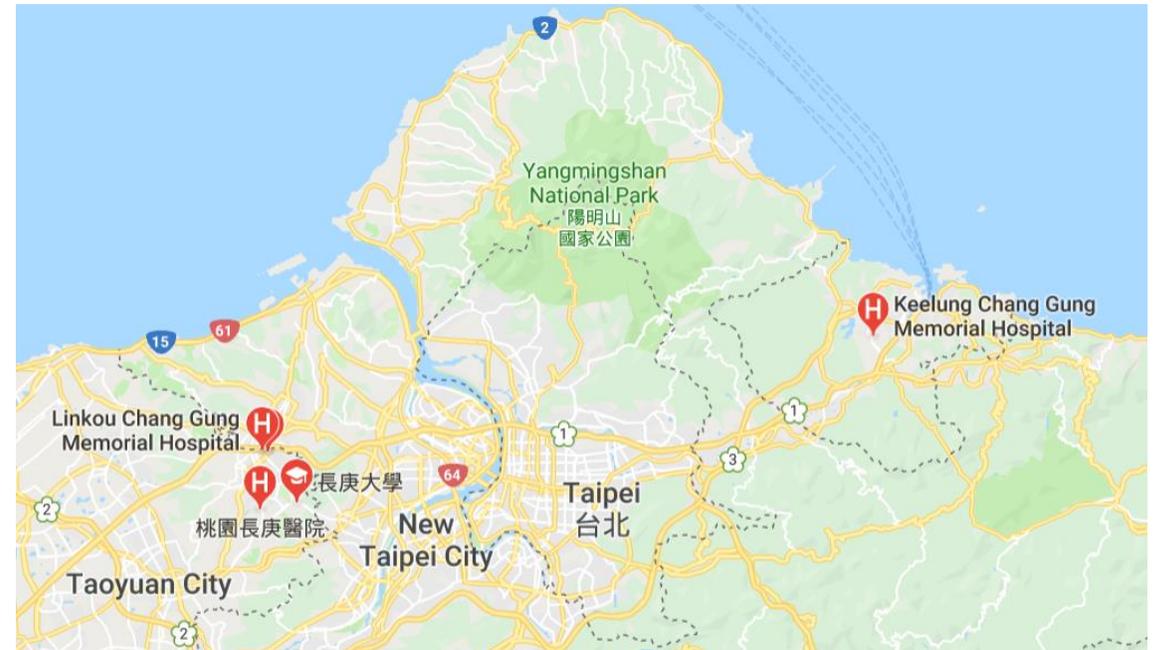
**Chang Gung Hospital,**

in **Taoyuan District,**

**Taoyuan county of**

**Taiwan Island, 15 km west of the capital,**

**Taipei**

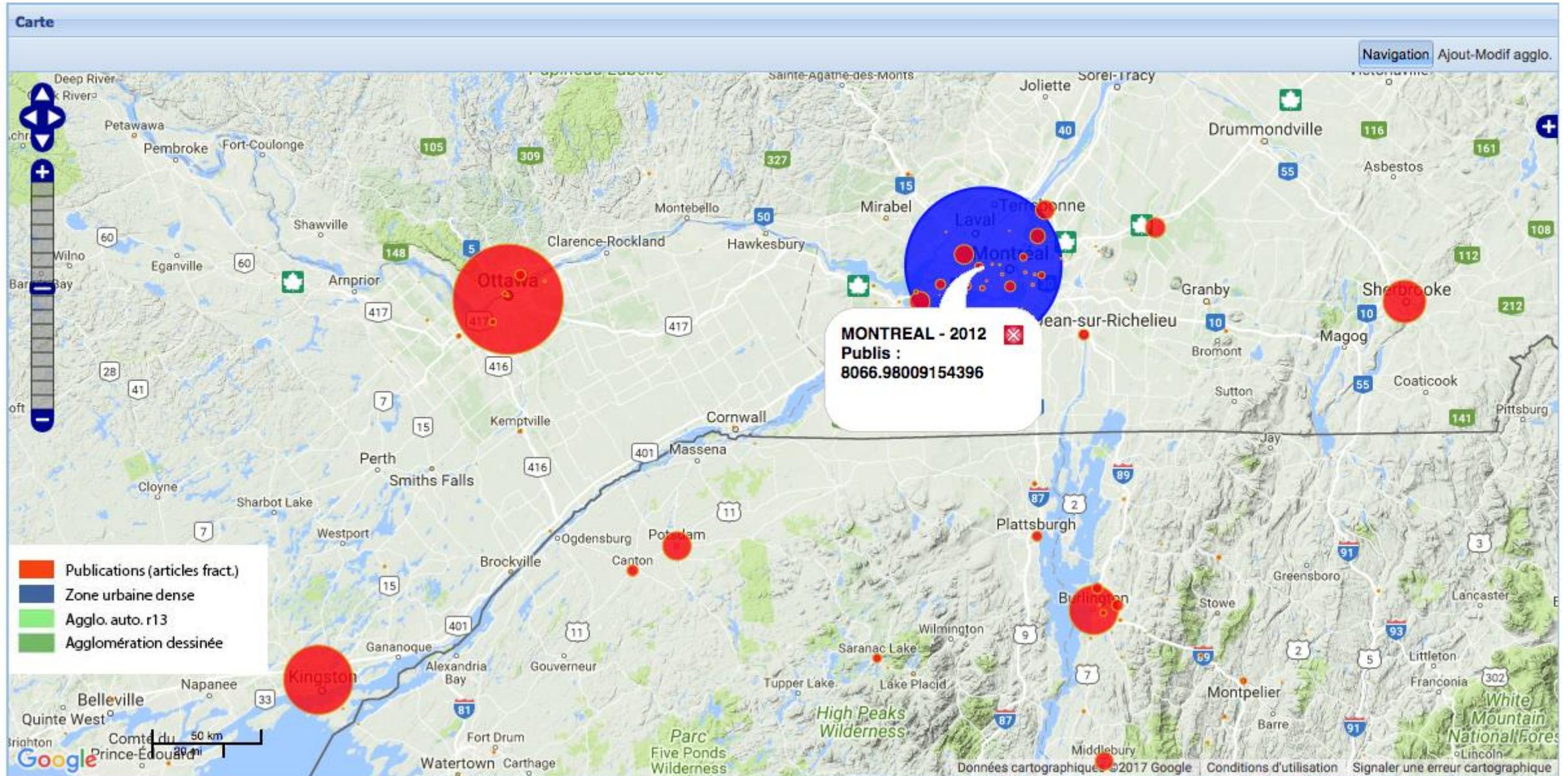


**The district name is similar to the county name and to the island name**

# GEOCODING SERVICES

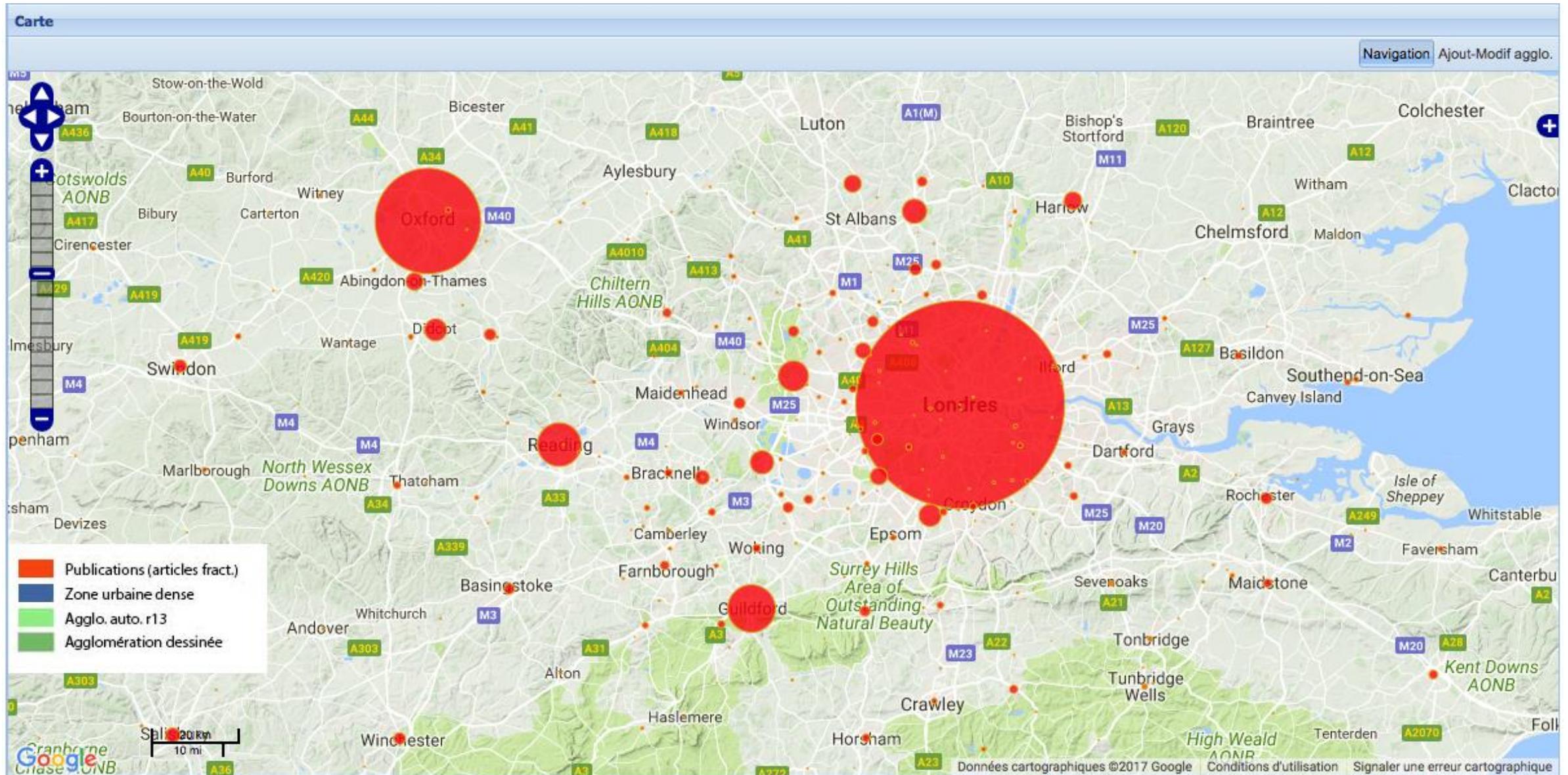
- Multiple geocoding tools are available online such as [GPS Visualizer](#), but relies on external API: Google Maps API, Yahoo! Maps API, Bing etc. → a latitude and a longitude per address → identification key needed
- Python library [Geopy](#) “to locate the coordinates of addresses, cities, countries, and landmarks across the globe using third-party geocoders and other data sources” (identification key needed to use the Google Maps APIs)
- The R package [Photon](#) (only on Github) uses OpenStreetMap data and is based on elasticsearch
- NETSCITY detects and corrects much of the common misspellings found in Web of Science and Scopus data by parsing the given addresses to extract “**city, province, country**” **triplets**, comparing them with a list of known misspellings variants and, in the absence of a match, by using internal and external online geocoding services: [LocationIQ](#) and the [Geonames](#) gazetteers

# Why should we aggregate the geocoded data at the urban area level?



The output of the geocoding process for 2012 Web of Science publications – Québec area

# Why should we aggregate the geocoded data at the urban area level?



The output of the geocoding process for 2012 Web of Science publications – London area

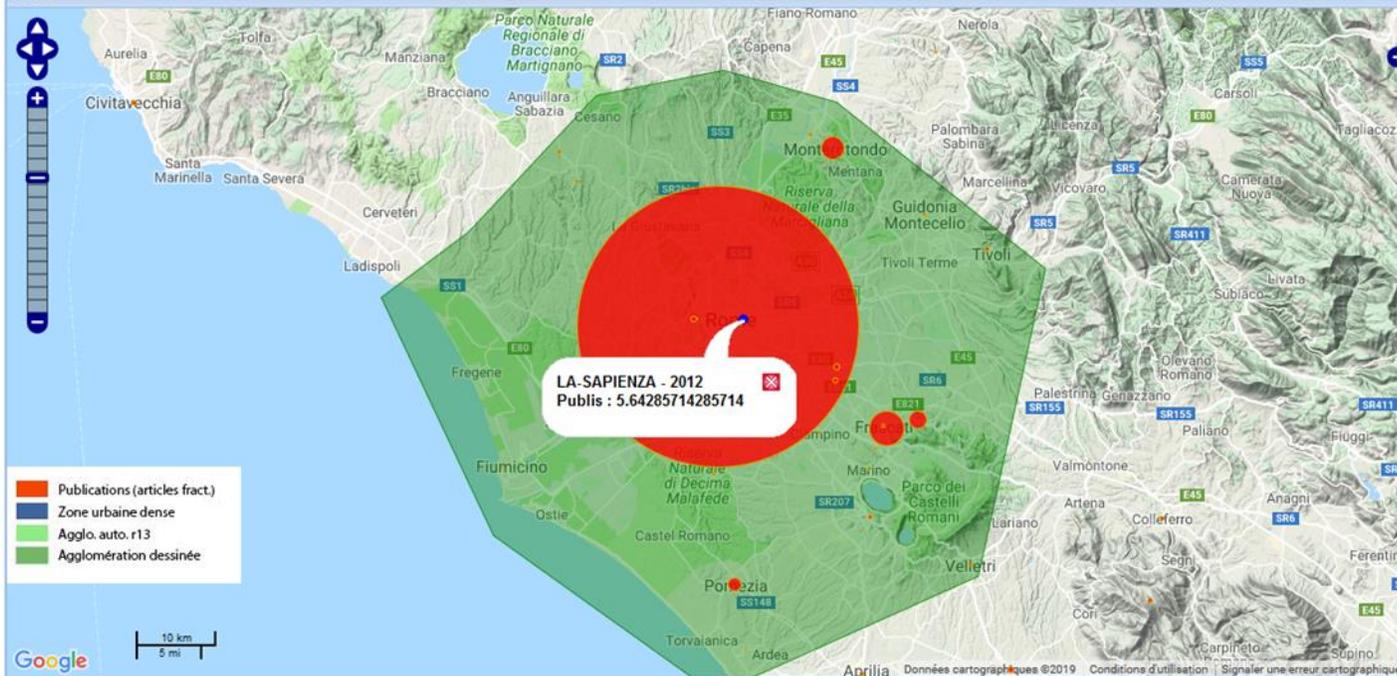
# THE CASE OF ROME

Cartographie comparative des agglos

Localités lr13 Localités lr15 Agglos GC Agglos Densité Agglos LM Agglos. auto Retour outils

Taille des symboles :

Carte

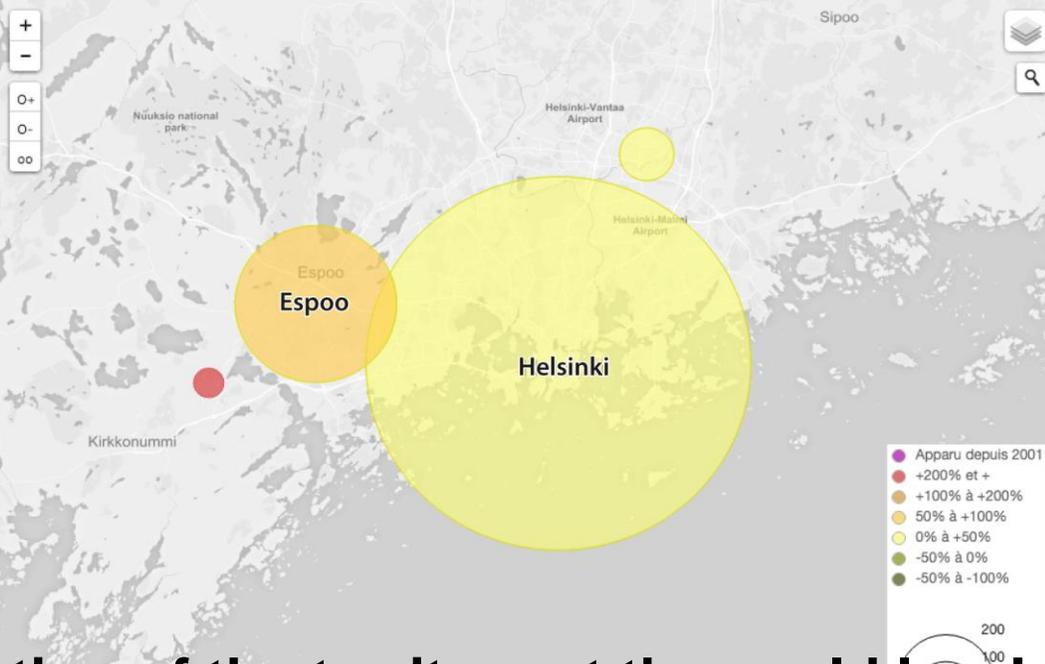
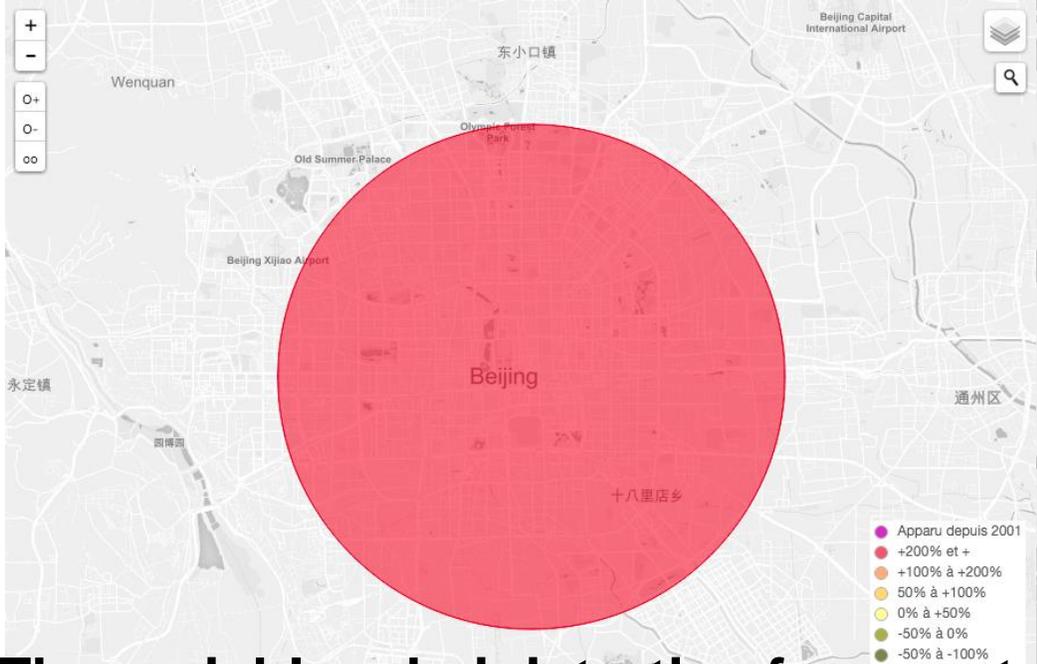


Localités WoS - OST Paris recette n°13

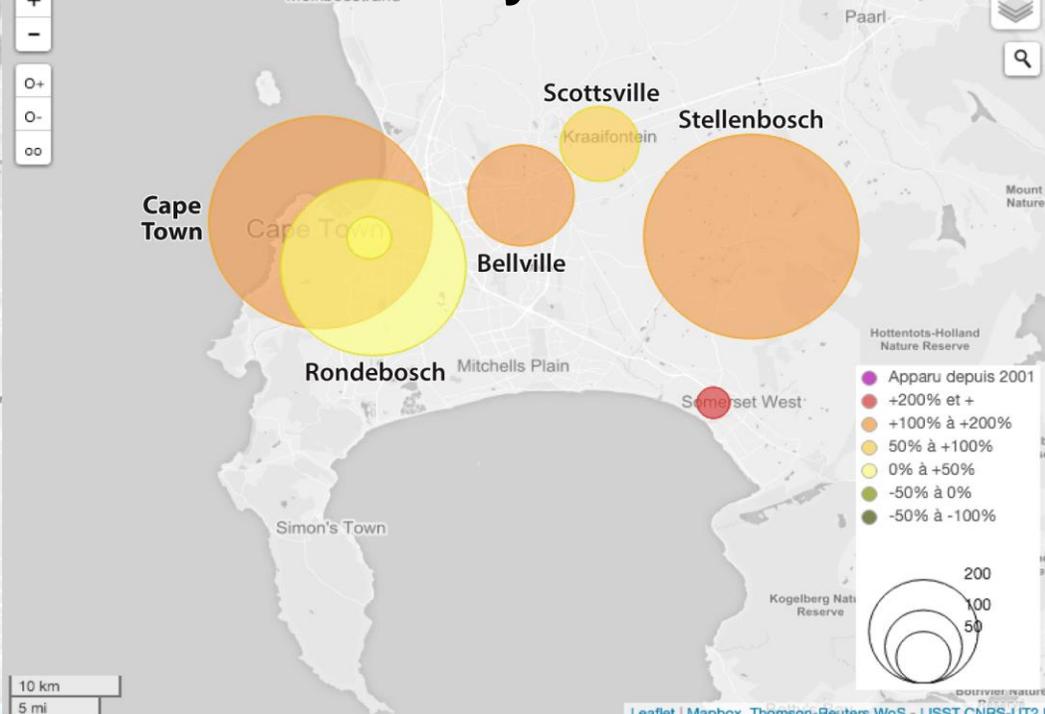
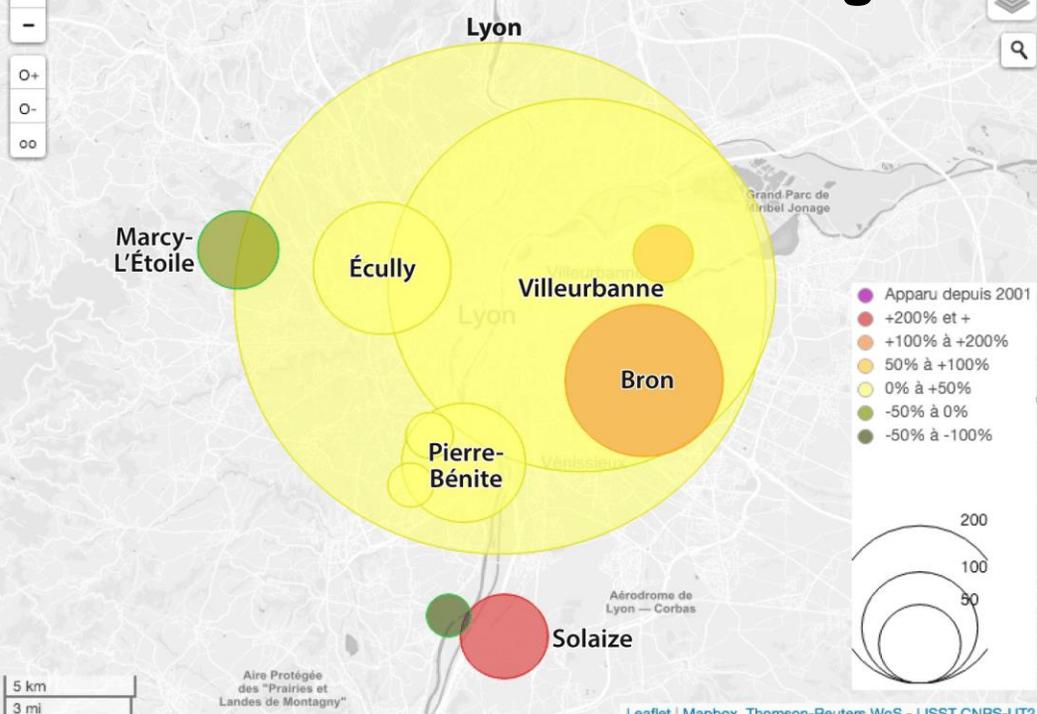
Nom	1999	2000	2001	2006	2007	2008
POZZUOLI	0	0	6	27	57	56
AVELLINO	11	15	16	23	30	42
LATINA	2	0	3	4	4	3
MONTEROTONDO	60	59	77	73	90	86
POZZILLI	24	30	33	39	39	31
TERNI	14	21	20	19	46	23

Localités WoS - OST Paris recette n°15

Nom	1999	2000	2001	2002	2003	2004	2005	2006	2007
POZZUOLI	0	0	6	27	57	56	59	66	66
AVELLINO	11	15	16	23	30	42	44	43	43
LATINA	2	0	3	4	4	3	8	11	11
MONTEROTONDO	60	59	77	73	90	86	74	75	75
POZZILLI	24	30	33	39	39	31	40	36	36
TERNI	14	21	20	19	46	23	22	14	14



The variable administrative fragmentation of the territory at the world level

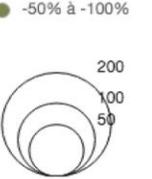
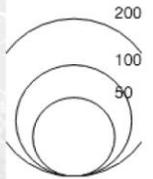


- Apparu depuis 2001
- +200% et +
- +100% à +200%
- 50% à +100%
- 0% à +50%
- -50% à 0%
- -50% à -100%

- Apparu depuis 2001
- +200% et +
- +100% à +200%
- 50% à +100%
- 0% à +50%
- -50% à 0%
- -50% à -100%

- Apparu depuis 2001
- +200% et +
- +100% à +200%
- 50% à +100%
- 0% à +50%
- -50% à 0%
- -50% à -100%

- Apparu depuis 2001
- +200% et +
- +100% à +200%
- 50% à +100%
- 0% à +50%
- -50% à 0%
- -50% à -100%



5 km  
3 mi

10 km  
5 mi

# METHODS: GROUPING INTO AGGLOMERATIONS

Issues :

- Group together publication sites that are in the same urban area.
- Produce globally comparable spatial entities, despite very different urban realities
  - Search for a delimitation adapted to the urban phenomenon
  - Delimitation by spatial crossing between the urban population density's distribution and scientific publications' spatial distribution

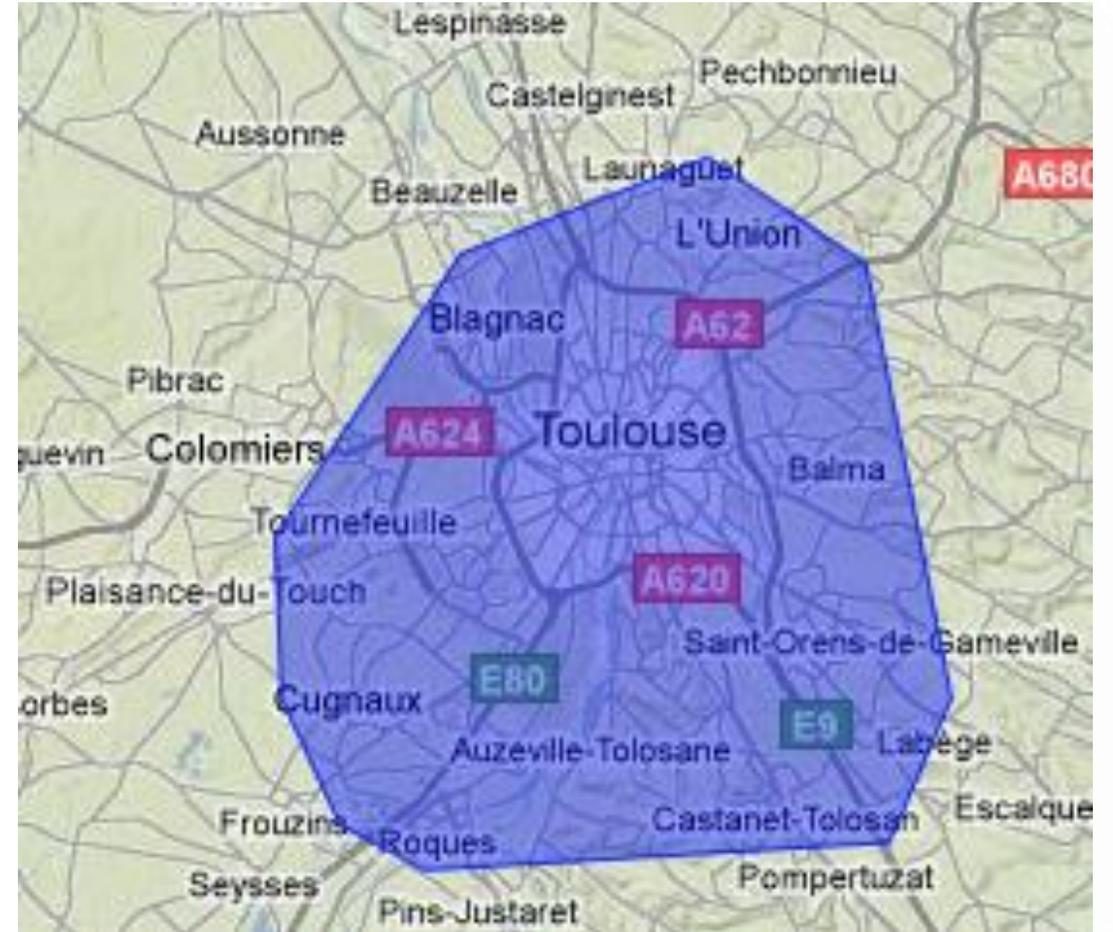
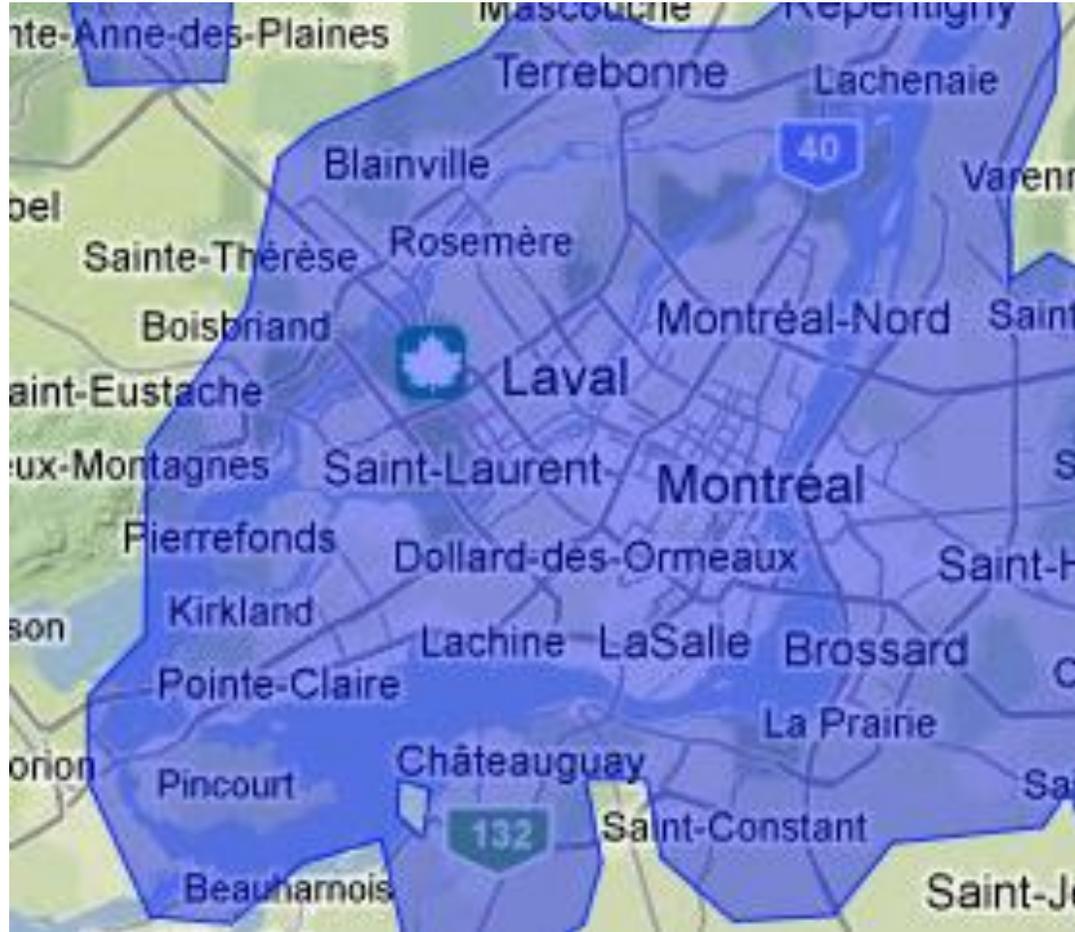
**Global LandCover: free, 300m resolution, but automatic interpretation of land use.**

**2005 data**



# Global Population of the World

→ thresholding by a statistical indicator of local concentration (I local de Moran)

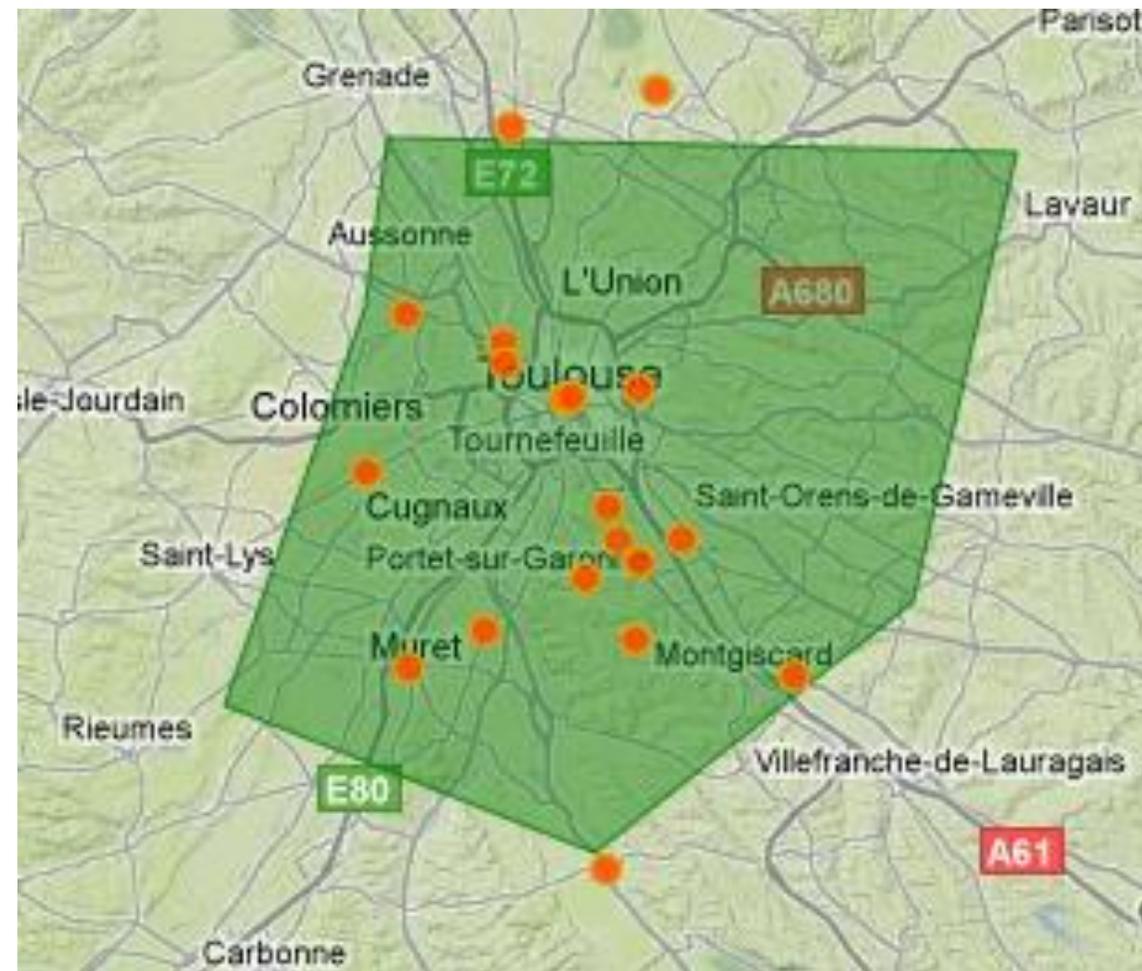
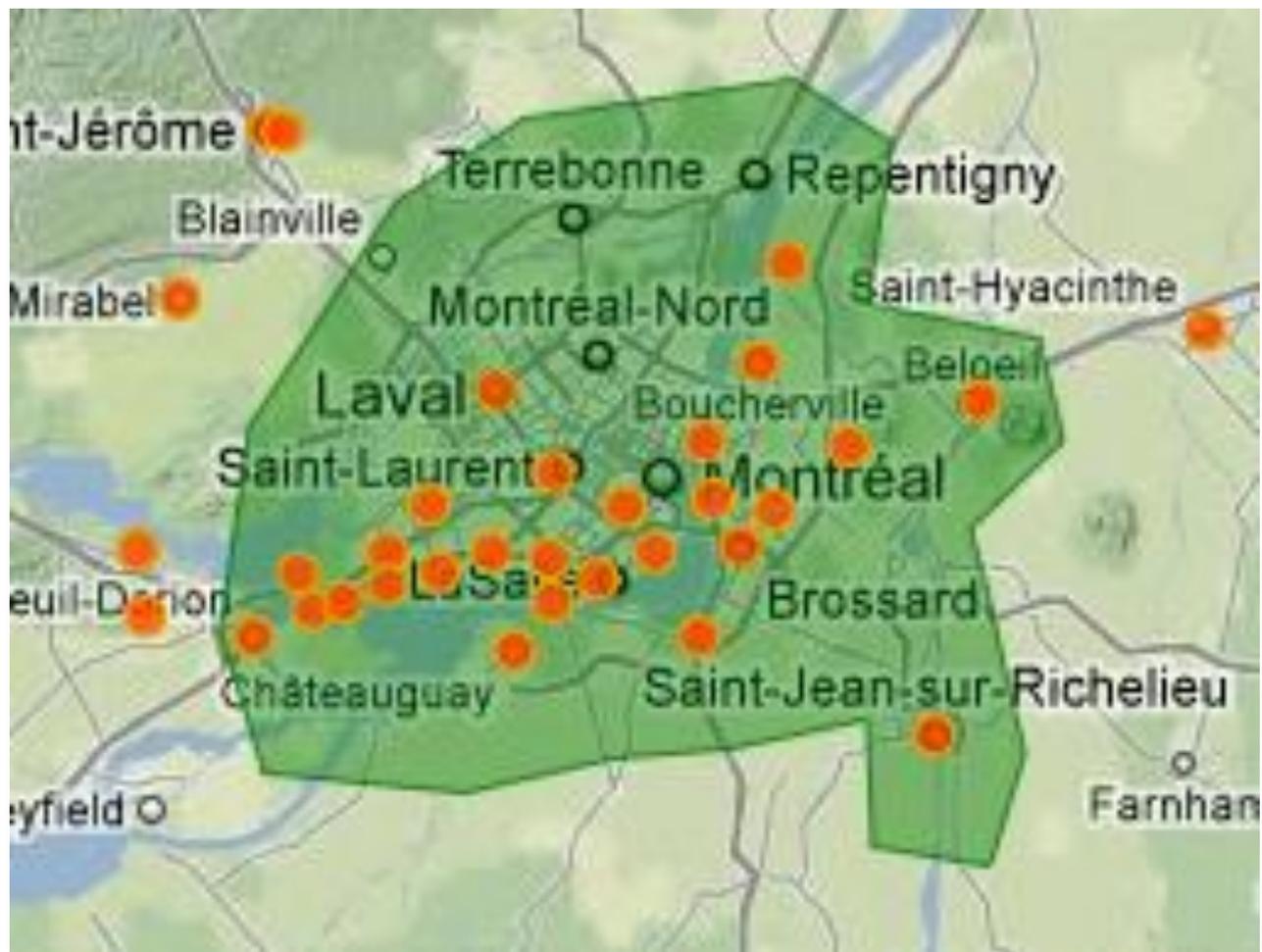


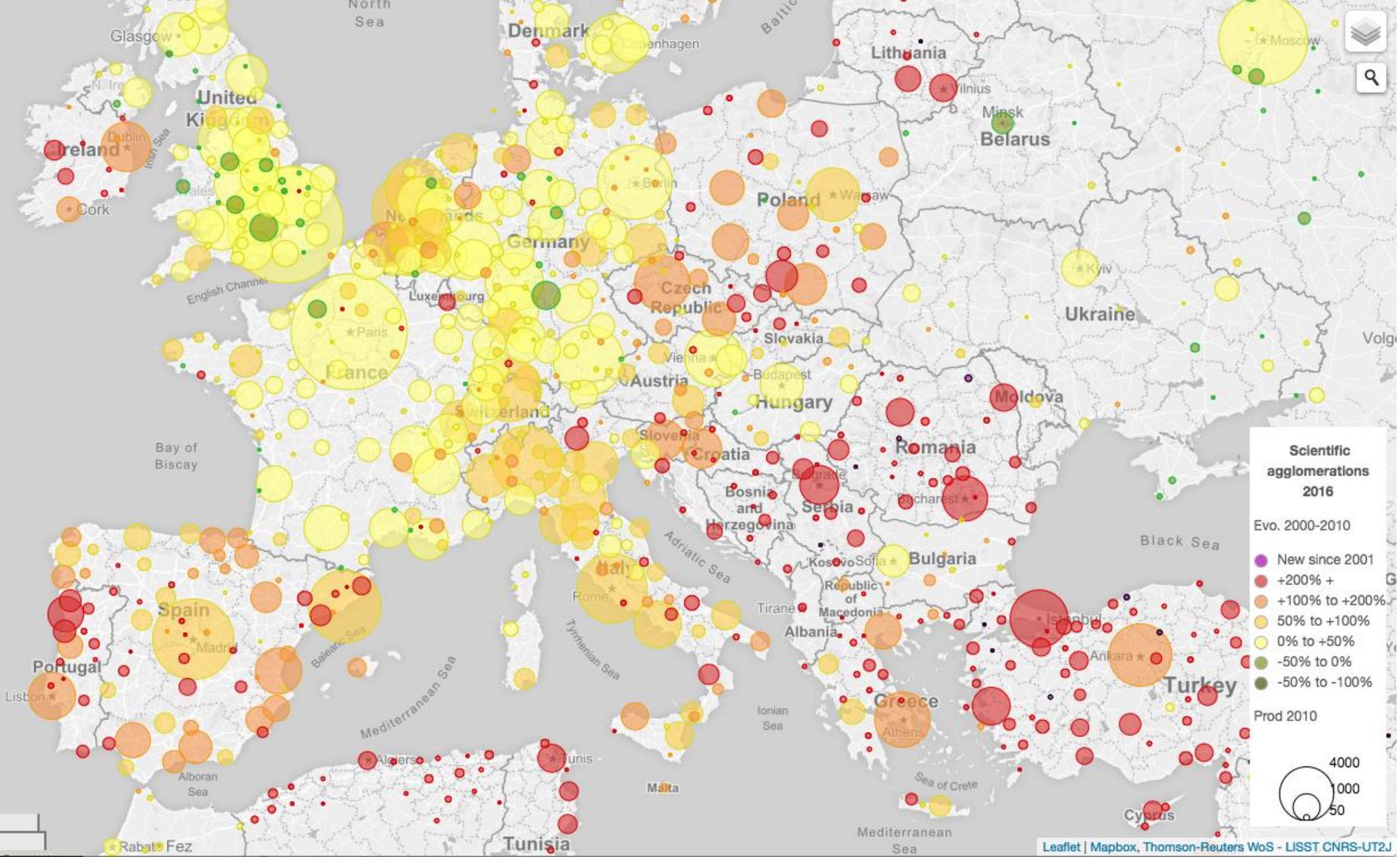
Maisonobe, Jégou & Eckert, 2018,  
Delineating urban agglomerations across the world: a dataset for studying the spatial distribution of academic research at city level,  
DOI : 10.4000/cybergeogeo.29637

## a visually assisted and expert-based delimitation

→ the 500 most publishing localities served for the delimitation of agglomerations based on the visual comparison of their spatial distribution with urban shapes

→ the other 7500 agglomerations were automatically created by a distance criterion to the city centre (40 km), then visually checked





**Scientific agglomerations 2016**

Evo. 2000-2010

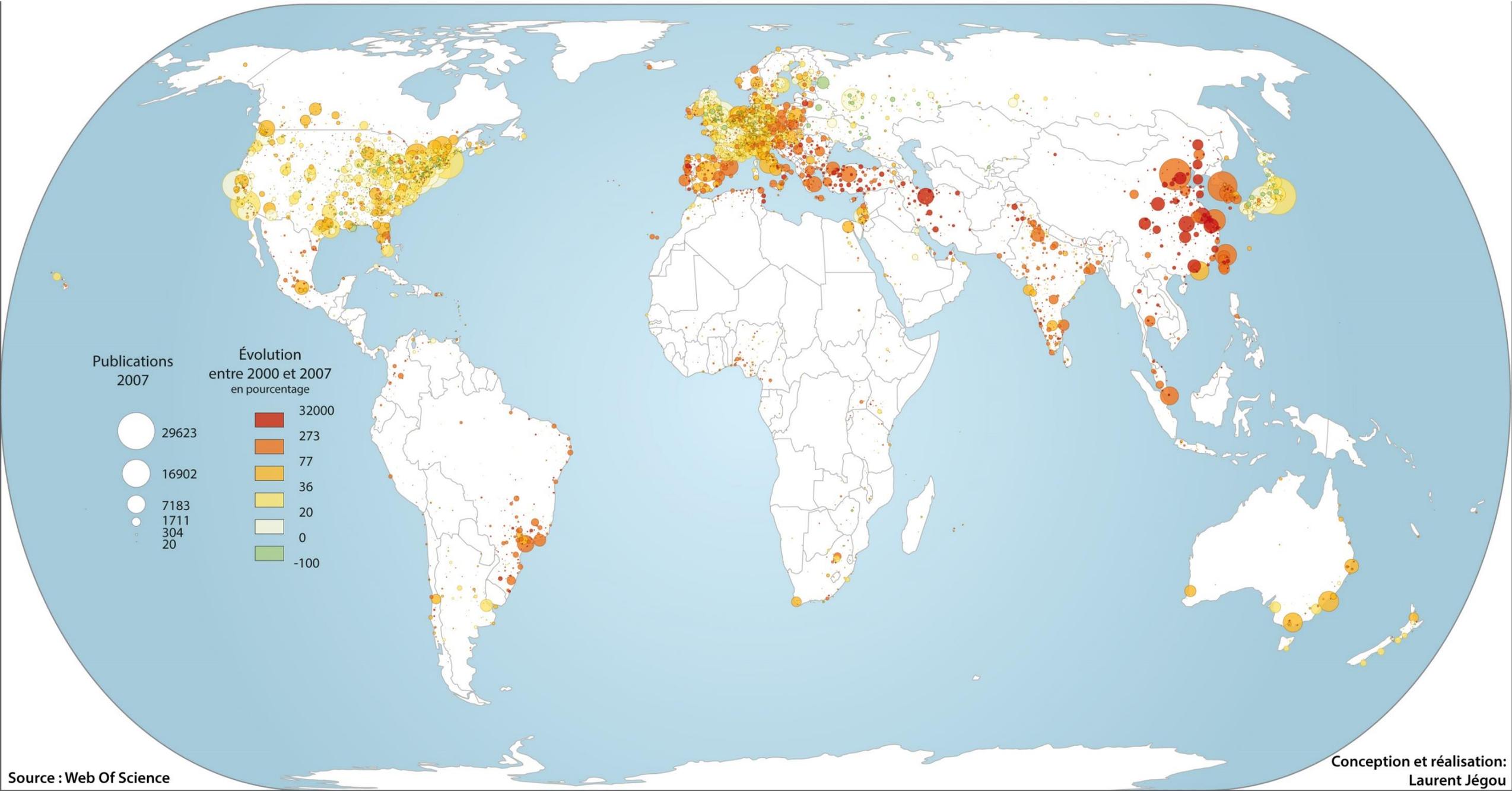
- New since 2001
- +200% +
- +100% to +200%
- 50% to +100%
- 0% to +50%
- 50% to 0%
- 50% to -100%

Prod 2010

4000  
1000  
50

300 km  
200 mi

# An increasing deconcentration of the spatial distribution of scientific production



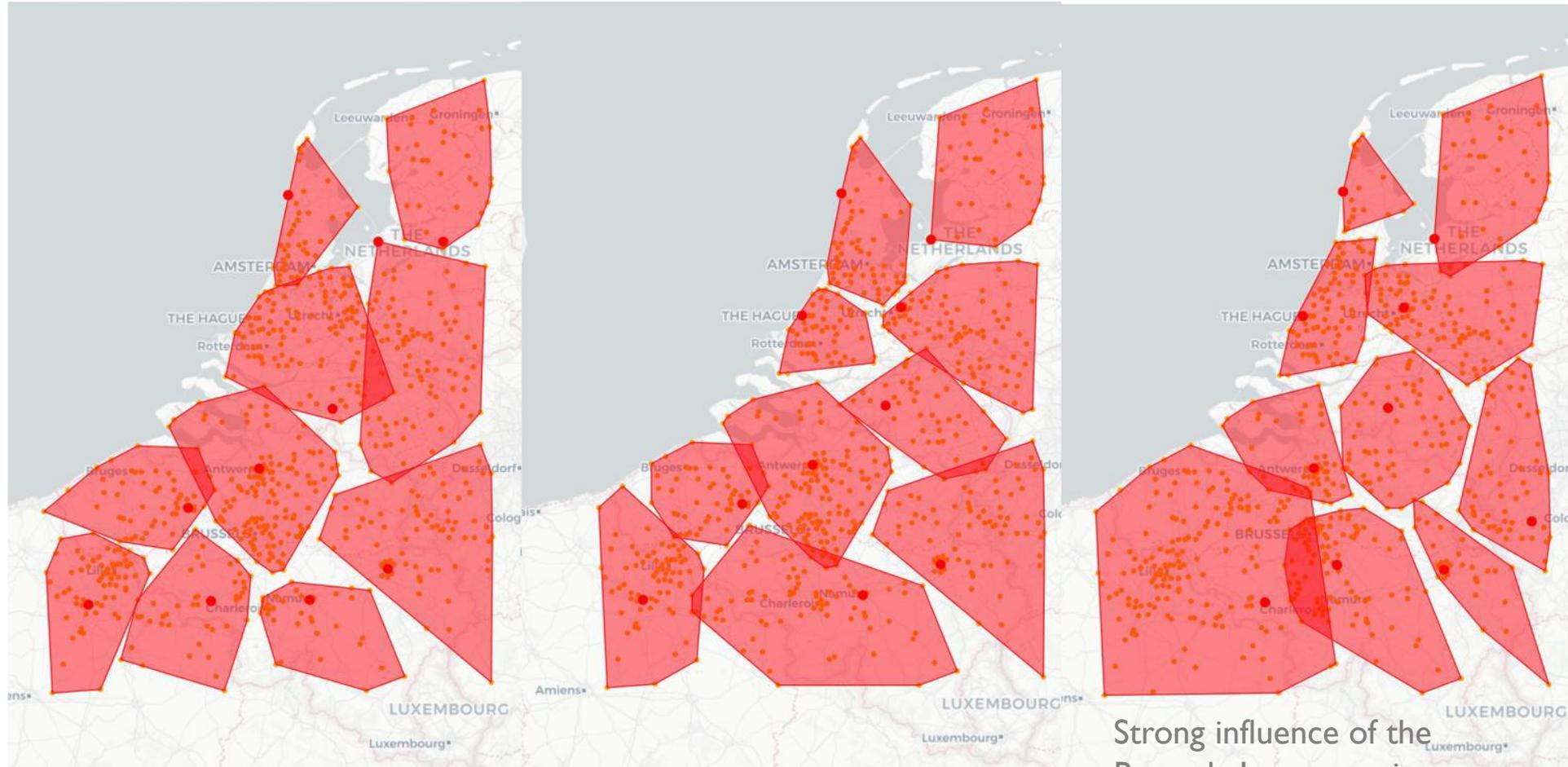
# SPAGREG: hierarchical clustering comparison

WORK in  
PROGRESS!

AGNES  
(Ward distance)

HCLUST  
(Ward distance)

HCLUSTGEO  
(Ward distance + Euclidian  
position matrix)



Strong influence of the  
Brussels-Leuven region

<http://www.geotests.net/spagreg/>

# SPAGREG: user interface

WORK in  
PROGRESS!

The image shows a screenshot of the SPAGREG user interface. The interface is divided into several sections:

- Hull type:** A section with two radio buttons, "Convex" (selected) and "Concave".
- Aggregation methods:** A row of buttons for "HC-AGNES", "HC-HClust", "HC-HClustGeo", "DBSCAN", and "HDBSCAN".
- Distance type:** A section with a dropdown menu labeled "Choose a method" set to "average".
- Interactive parameters and graphic dendrogram:** A section with a slider for "Percentage of the t" set to 10, and a dendrogram showing hierarchical clustering. Below the dendrogram, it says "Agglomerative Coefficient = 0.96".
- Main map results:** A map of the Netherlands showing red clusters of points. The map includes labels for cities like Amsterdam, The Hague, Rotterdam, and Antwerp, and countries like The Netherlands and Luxembourg. A legend on the right shows "CartoDB", "Admin", "FUA", and "UMZ".
- Existing Geo context:** A text label at the bottom right of the map area.
- Map footer:** A scale bar showing 50 km and 30 mi, and a footer with "Leaflet | © OpenStreetMap © CartoDB".

# COUNTING METHODS: ARBITRATING BET. FULL & FRACTIONAL COUNTINGS

**References:** Van Hooydonk, 1997; Gauffriau et al., 2008, Leydesdorff & Park, 2017,

- Full: the total number of addresses/urban areas/countries per publications
- Fractional: the sum of each fractioned credit total one (avoiding double counts)
  - With NETSCITY the reference unit for normalization can be the address, the urban area or the country

**2 types of variables can be normalised and mapped with NETSCITY (Maisonobe, Jégou, Cabanac, 19):**

1. Number of publications per geographical entity (*the total number geographical entities involved in a publication*)
2. Intensity of scientific collaboration between geographical entity (*the total number of links between the geographical entities involved in a publication*)

For instance, if a given publication stems from three different urban areas, each inter-urban link receives 1/3 as a weight for this publication. More generally, if a publication is co-signed from  $n$  urban areas, each pair of urban areas (A, B), with  $A < B$ ,

is assigned a value  $l$  equals to:

$$1/n(n-1)/2 = 2/(n(n-1))$$

# EXAMPLE OF THE « ROV/AUV » DATASET TO TEST THE APPLICATION

Select a database

Web of Science Core Collection

Basic Search

Cited Reference Search

Advanced Search

+ More

("ROV" OR "AUV") AND "robot\*" AND "underwater"

Topic

Search

Search tips

+ Add row

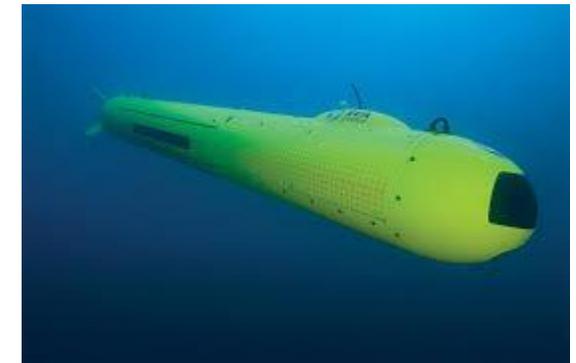
Timespan

All years (1900 - 2018)

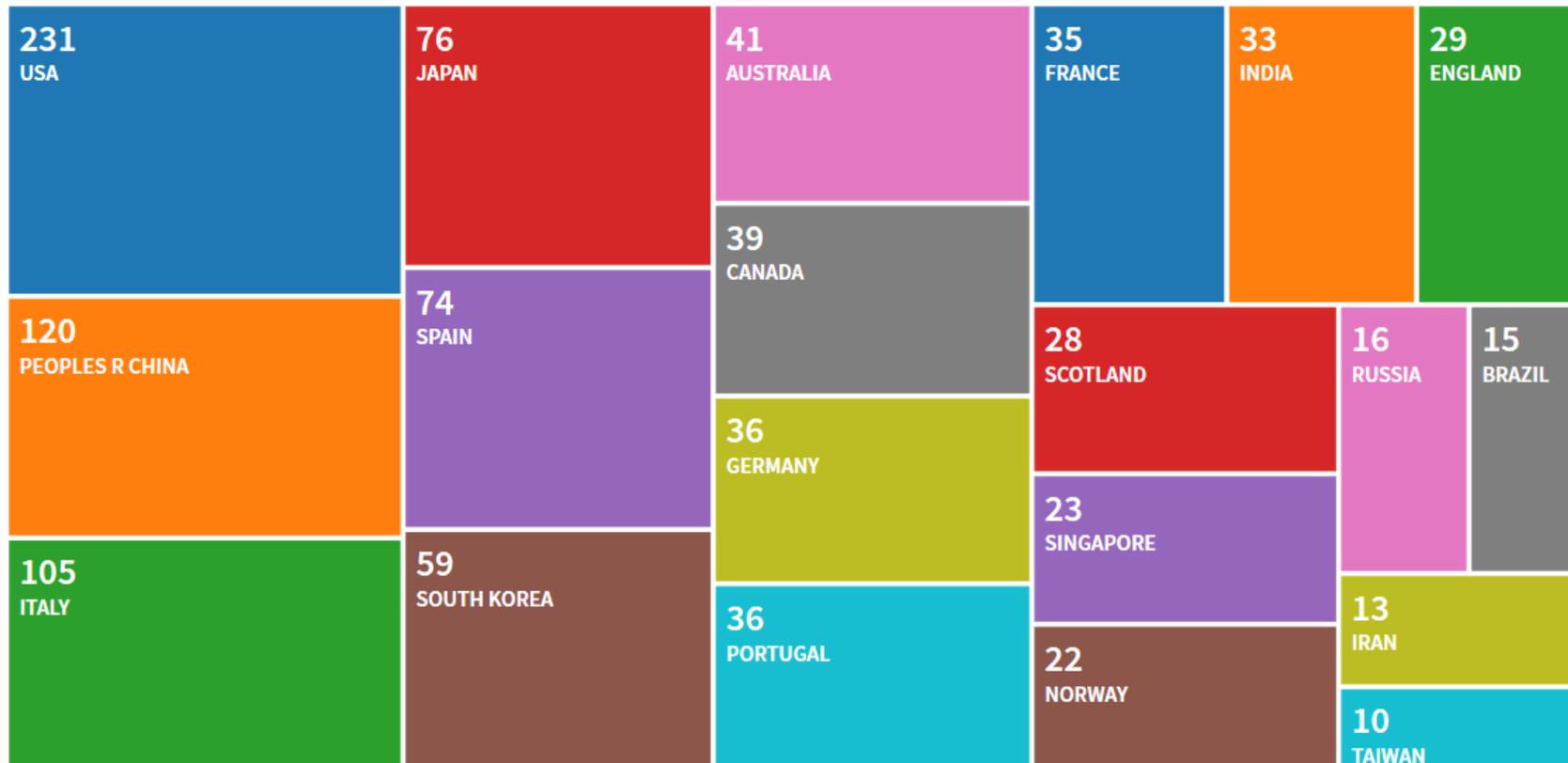
ROV: Remotely Operated underwater Vehicle



AUV: Autonomous Underwater Vehicle

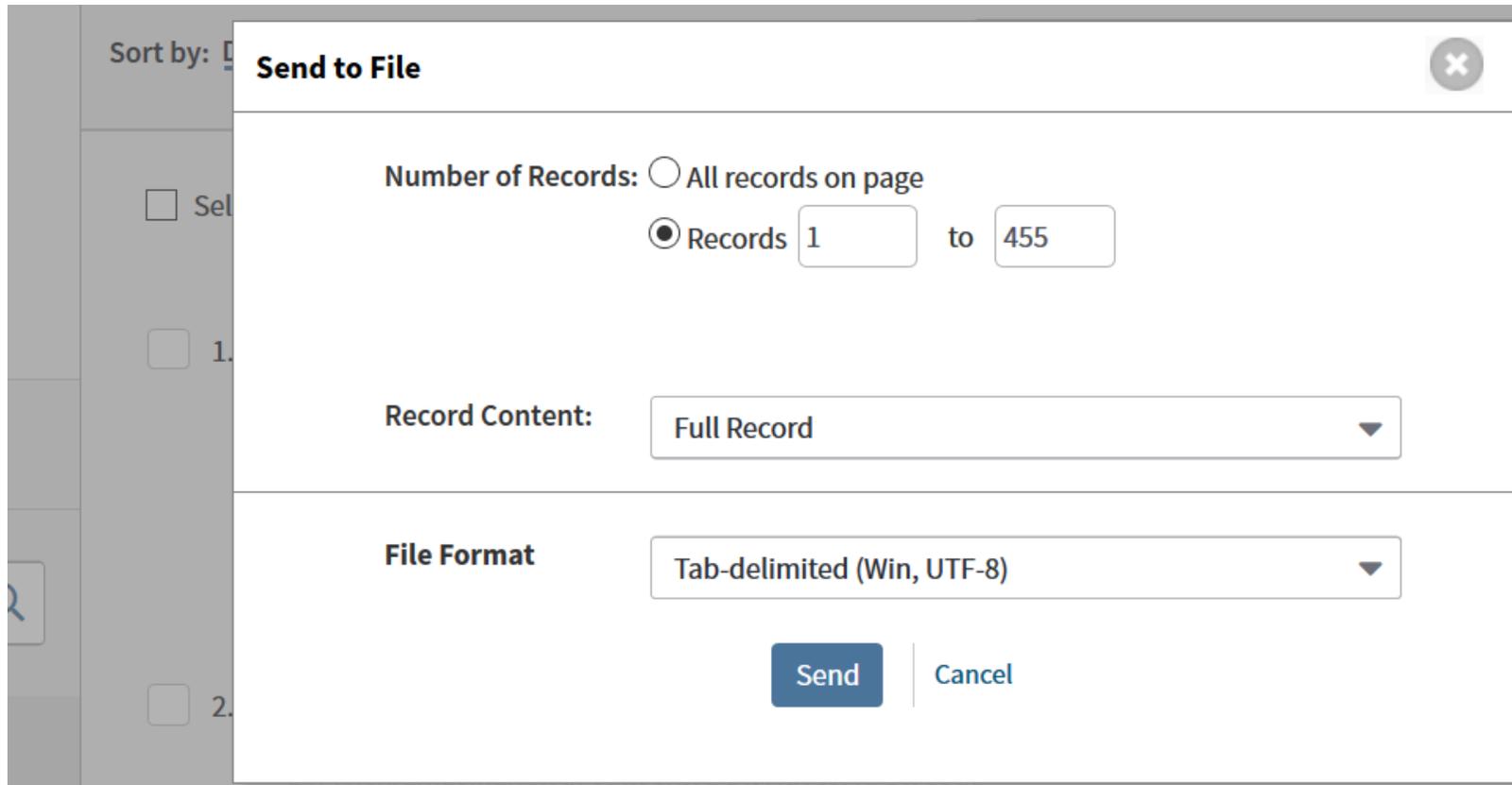


# THE COUNTRY DISTRIBUTION OF THE ROV/AUV CORPUS



Web of Science dashboard

# EXTRACT THE RESULTS USING THE EXPORT FILE FORMAT: « TAB DELIMITED » AND « UTF 8 »



The image shows a 'Send to File' dialog box with the following settings:

- Number of Records:**  All records on page,  Records 1 to 455
- Record Content:** Full Record
- File Format:** Tab-delimited (Win, UTF-8)

Buttons: Send, Cancel

Limit of 500 records per export

# OPEN NETSCITY



**NETSCITY**  
BY NETSCIENCE

**A TOOL TO STUDY THE GEOGRAPHY OF SCIENCE AT THE SCALE OF THE CITIES**

Uses files from bibliographic databases,  
produces tables, maps and networks graphs,  
from the NETSCIENCE project, by the SMS LabEx at Toulouse

## ACCESS THE CONFERENCE PAPER



# NETSCITY

BY NETSCIENCE

**Netscience** aims at analysing the geography of contemporary scientific activities focussing on both the evolution of the spatial distribution of the scientific production and on scientific networks of collaboration at the global scale.

The NETSCITY tool makes the methods developed during this project available.

NETSCITY allows you to analyse the geography of a set of scientific publications extracted from the Web of Science or Scopus or provided in a custom CSV file.

A **paper introducing NETSCITY** was presented at the **ISSI 2019 conference**.

# CLICK ON THE « IMPORT » OPTION

NETSCITY



< Addresses: 4153 >

Erase your data 

## Hub

Choose an option



Import Bibliographic Records from Another File



Display Results



View and Correct Addresses **12**



Export Results

CLICK ON « WEB OF SCIENCE »

## Choose a file format

You can upload a file of **128M maximum**.

Web of Science 

Scopus

Custom file in CSV format

UPLOAD THE WOS FILE « ROV1.CSV » AND CLICK « SUBMIT »

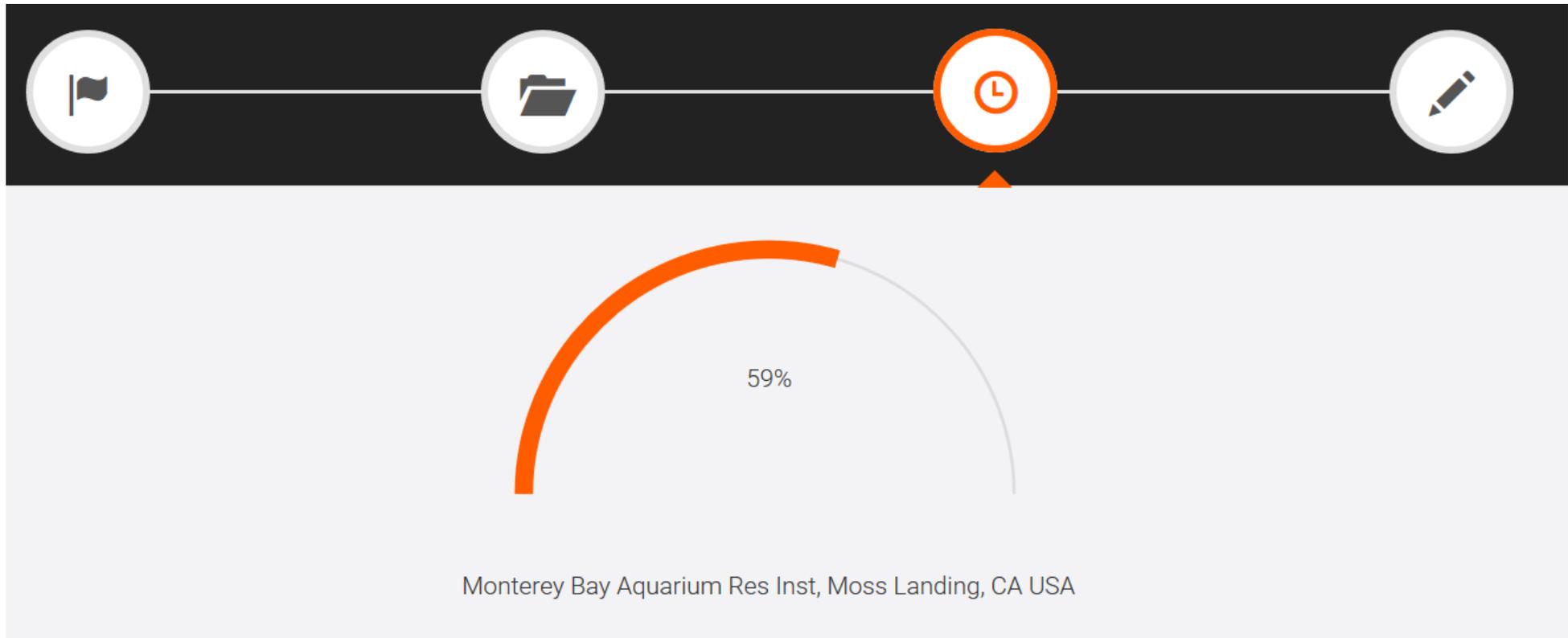
## Import a Web of Science file

Select .txt, .csv, or .zip file

Parcourir... ROV1.txt

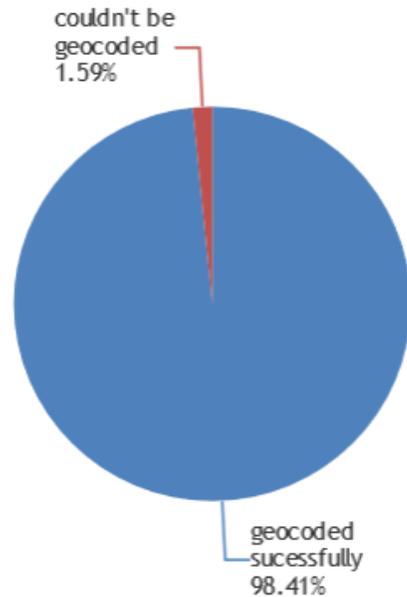
**i** Test files are available for download: [ROV1.zip](#), [ROV2.zip](#), and [ROV3.zip](#) (500 + 500 + 4 records).

# WAIT FOR THE GEOCODING



CORRECT THE 16 NON GEOCODED ADDRESSES, UPLOAD ANOTHER FILE, OR GO « BACK TO THE HUB » TO EXPLORE THE RESULTS

### Import results



**File imported successfully**

993 addresses imported successfully

**Some addresses couldn't be geocoded**

Click here to correct/consult errors

**Correct 16 Errors**



Go back to hub



Add another file

# CORRECT THE NON GEOCODED ADDRESSES

Identifier		city*	province*	country*	
WOS:000380550000310	ULPGC, Dept Informat & Sistemas, Las Palmas De Gc 35017, Spain	<input type="text" value="S-PALMAS"/>	<input type="text" value="GC"/>	<input type="text" value="SPAIN"/>	<input type="button" value="edit"/> <input type="button" value="delete"/> <input type="button" value="Save"/>
WOS:000388777700004	Inst Teknol Sepuluh Nopember, Dept Math, Kota Sby, Jawa Timur, Indonesia		JAWA-TIMUR	INDONESIA	<input type="button" value="edit"/> <input type="button" value="delete"/>
WOS:000388777700004	Inst Teknol Sepuluh Nopember, Dept Mech Engn, Kota Sby, Jawa Timur, Indonesia		JAWA-TIMUR	INDONESIA	<input type="button" value="edit"/> <input type="button" value="delete"/>

CLICK ON « ADD ANOTHER FILE » AND UPLOAD ROV2 & ROV3

1 addresses corrected sucessfully

15 addresses still incorrect

Correct



Go back to hub



Add another file

# VIEW, CORRECT OF EXPORT THE GEOCODED ADDRESSES DISPLAY OR EXPORT THE RESULTS (URBAN AREA/COUNTRY LEVELS)

## Hub

Choose an option



Import Bibliographic Records from Another File



Display Results



View and Correct Addresses **15**



Export Results

# EXPLORE & EXPORT THE RESULTS OF THE GEOCODING PROCESS

Export

Show  entries

Search:

identifier	date		city	province	country	latitude	longitude	Confidence
WOS:A1991HY78400003	1991	BALCHEN, JG (reprint author), NORWEGIAN INST TECHNOL,DIV ENGN CYBERNET,N-7034 TRONDHEIM,NORWAY.	TRONDHEIM		NORWAY	63.4346	10.3984	SANS_API
WOS:A1991FM16900002	1991	GOHEEN, KR (reprint author), CARLETON UNIV,DEPT MECH & AEROSP ENGN,OTTAWA K1S 5BS,ONTARIO,CANADA.	OTTAWA	ONTARIO	CANADA	45.4116	-75.6982	SANS_API
WOS:A1991GW33300001	1991	EGELAND, O (reprint author), NORWEGIAN INST TECHNOL,DIV ENGN CYBERNET,N-7034 TRONDHEIM,NORWAY.	TRONDHEIM		NORWAY	63.4346	10.3984	SANS_API

# DISPLAY THE RESULTS WITH TABLES AND MAPS

## Visualization

Choose a visualization

Stock Table

Scientific production per geographic unit

OK

Flow Table

Scientific collaborations per geographic unit

OK

Stock Map

Scientific production per geographic unit

OK

Flow Map

Scientific collaborations per geographic unit

OK

# FRACTIONAL NUMBER OF PUBLICATIONS PER URBAN AREA

## Geographic level

- Country  
 Agglomeration

## Counting method

- Full counting  
(number of addresses)  
 Normalized by agglomeration  
 Normalized by address

Show  entries

Search:

agglomeration	Production
TOKYO	36.867
BOSTON	30.893
GENOA	28.5
SHANGHAI	28.25
GIRONA	28.226
SINGAPORE	21

# INTERURBAN COLLABORATION TABLE (FRACTIONAL COUNTS)

Geographic level

- Agglomeration  
 Country

Counting method

- Full counting  
(number of addresses)  
 Normalized by Agglomeration

Show  entries

Search:

**Agglomeration**



**Agglomeration**



**Collaboration Weight**



FLORENCE

PISA

9.9

WATERLOO-GUELPH

SHANGHAI

6

GENOA

PISA

4.667

FLORENCE

GENOA

3.5

OSLO

TRONDHEIM

3.167

CORK

LIMERICK

3

GEELONG

SAN-ANTONIO

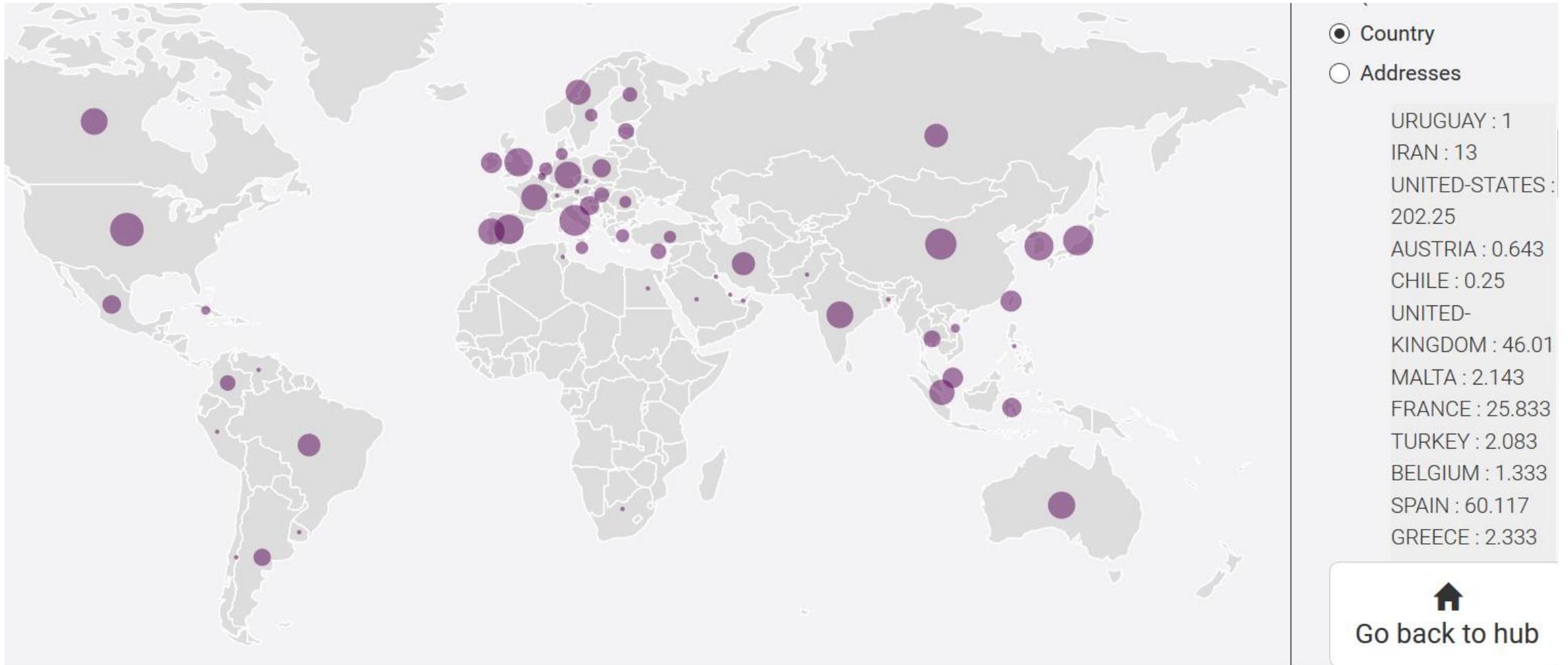
3

WOODS-HOLE

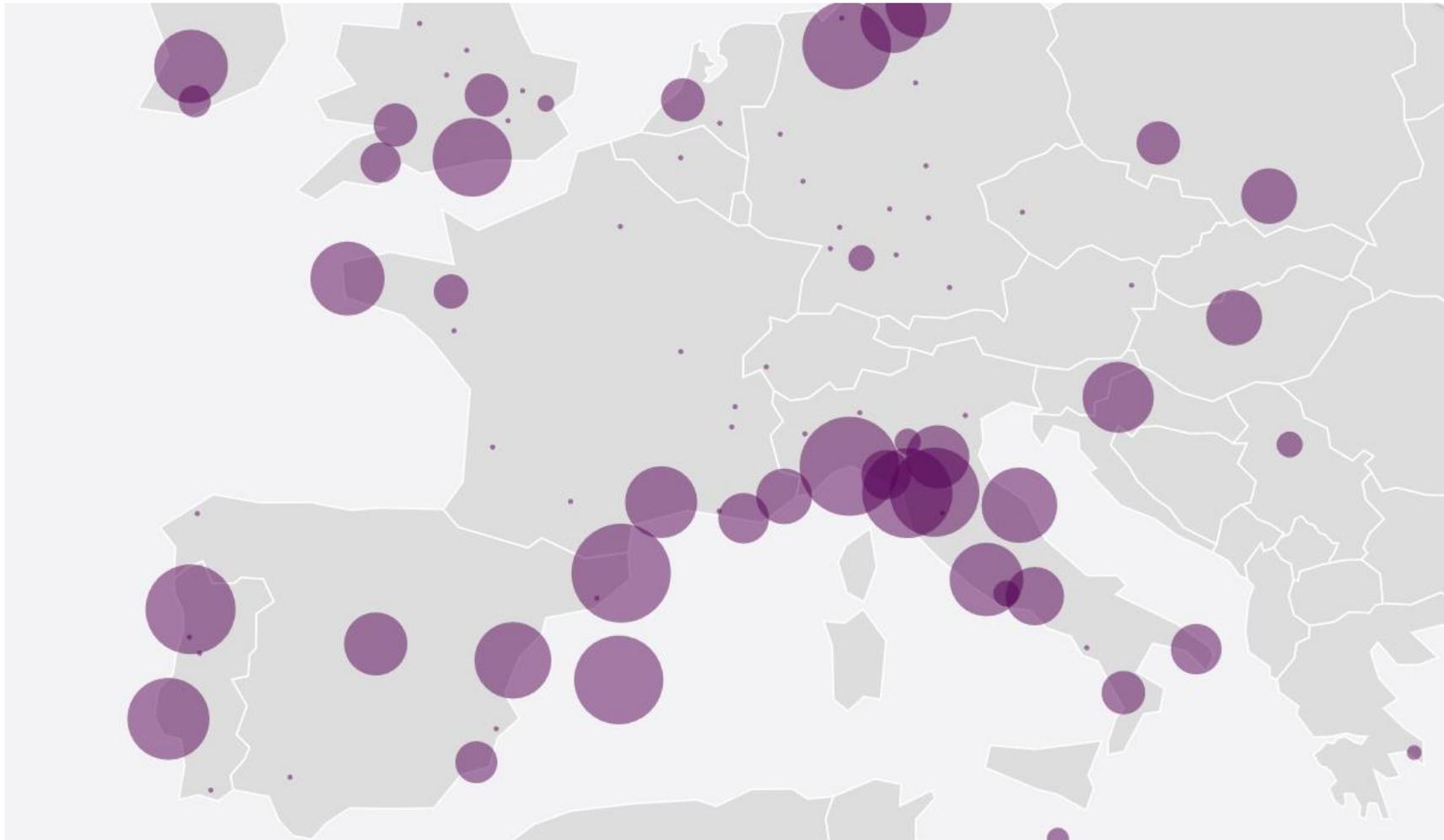
BALTIMORE

2.933

# PRODUCTION MAP AT THE COUNTRY LEVEL (FRACTIONAL COUNTS)



# PRODUCTION MAP AT THE URBAN AREA LEVEL



# MAP OF INTERNATIONAL COLLABORATION



# EXPORTING THE INTERURBAN COLLABORATION DATA

## Export

You may tune the options below before exporting your results.

### Type of Report

- Stock = Production
- Flow = Collaborations

### Fractionning

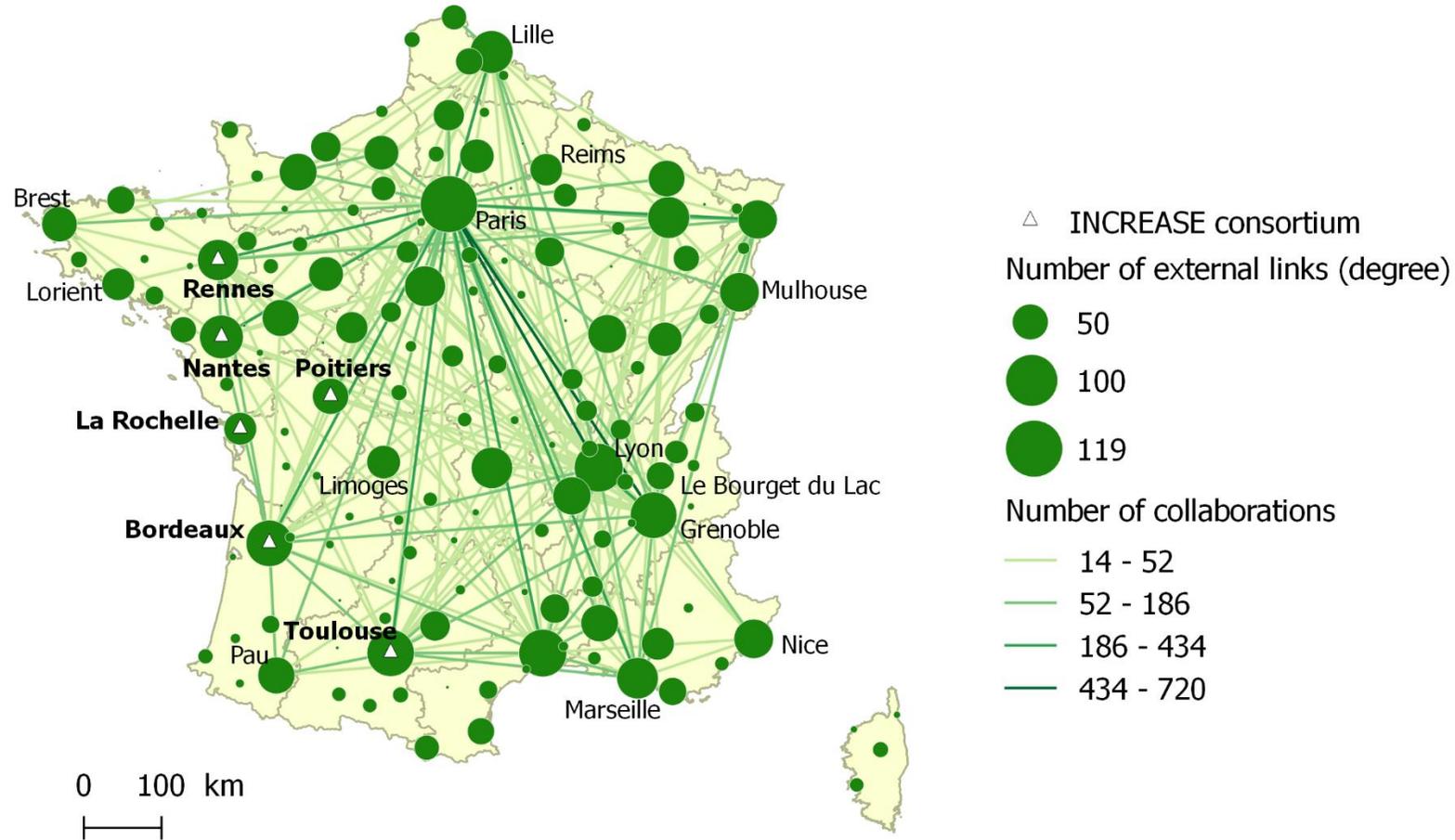
- Agglomeration
- Country

[Download Report as CSV](#)

# OUTPUT THAT CAN BE UPLOADED IN A NETWORK ANALYSIS OR GIS SOFTWARE FOR FURTHER ANALYSES...

A	B	C	D	E	F	G	H
agg1	lat1	lng1	agg2	lat2	lng2	comptageCo	fracAgglo
FARO	37.0734451	-8.0376259	EXETER	50.3759167	-3.5715555	1	0.06666667
FARO	37.0734451	-8.0376259	TRONDHEIM	63.4491396	10.6425202	1	0.06666667
OSLO	59.6785783	10.6307113	PORTO	41.1930983	-8.3109146	1	0.16666667
PISA	43.9420463	10.1928772	ROME	41.9943317	12.7857208	2	0.4
PISA	43.9420463	10.1928772	TURIN	45.0166634	7.48123098	1	0.16666667
PISA	43.9420463	10.1928772	SYDNEY	-33.971613	150.989186	1	0.33333333
XIAN	34.4463743	109.116014	SINGAPORE	1.30786404	103.825433	1	1
BREST	48.3375895	-4.422731	SHANGHAI	31.3206019	121.476998	4	2.5
BREST	48.3375895	-4.422731	BUENOS-AIR	-34.729427	-58.464076	1	1
CHEJU	33.3923706	126.534738	PUSAN	35.152116	128.984419	1	0.33333333
DELHI	28.6172145	77.2340386	PORTO	41.1930983	-8.3109146	1	0.06666667
FUKUI	36.0902854	136.301846	TOKYO	36.0461135	139.384917	1	0.33333333
GENOA	44.345802	8.86437956	OSLO	59.6785783	10.6307113	1	0.16666667
GENOA	44.345802	8.86437956	ROME	41.9943317	12.7857208	1	0.33333333
GENOA	44.345802	8.86437956	PORTO	41.1930983	-8.3109146	1	0.16666667
GEOJE	34.8890056	128.547493	TAEJON	36.3872386	127.34403	1	0.33333333

# E.g. using QGIS to make a flow map of scientific collaboration



Collaboration network between french urban areas in chemistry (2007-2014). Only the cities with at least 10 collaborations co-signed between 2007 and 2014 are included.  
Source: Web of Science (articles, reviews, letters)

map by M. Maisonobe

The example of the french scientific production in chemistry: <https://groupefmr.hypotheses.org/4742>

# THANK YOU FOR YOUR ATTENTION!

- For any questions please contact:
- [marion.maisonobe@univ-tlse2.fr](mailto:marion.maisonobe@univ-tlse2.fr)
- [guillaume.cabanac@univ-tlse3.fr](mailto:guillaume.cabanac@univ-tlse3.fr)
- [jegou@univ-tlse2.fr](mailto:jegou@univ-tlse2.fr)

