



The current structure of key actors involved in research on land and soil degradation.

Analysis of the strengths and weaknesses of links

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ABSTRACT

In order to better understand the size, breadth and depth of the scientific communities involved in providing advice to this convention and to other bodies, this study explores the corpus of international publications dealing with land and/or with soils. A database of several thousands records including a significant part of the literature published so far was targeted using the Web of Science and other socio-economic databases such as FRANCIS and CAIRN.

We extracted hidden information using bibliometrics methods and data mining applied to these scientific publications to map the key actors (laboratories, teams, institutions) involved in research on land and on soils. Several filters were applied to the databases in combination with the word “desertification”. The further use of Tetralogy software merges databases, analyses similarities and differences between keywords, disciplines, authors and regions and identifies obvious clusters. Assessing their commonalities and differences, the visualisation of links and gaps between scientists, organisations, policymakers and other stakeholders is possible. The interpretation of the ‘clouds’ of disciplines, keywords, and techniques will enhance the understanding of interconnections between them; ultimately this will allow diagnosing some of their strengths and weaknesses.

This may help explain why land and soil degradation remains a serious global problem that lacks sufficient attention. We hope that this study will contribute to clarify the scientific landscape at stake to remediate possible weaknesses in the future.

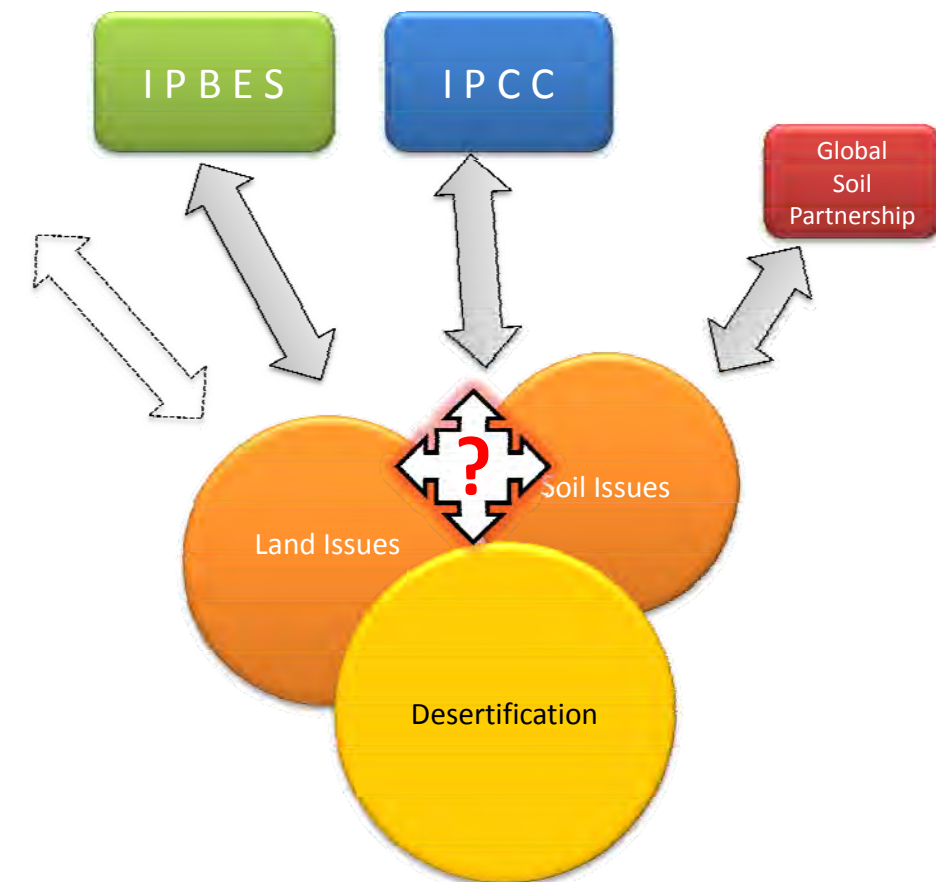
RATIONALE

Global environmental issues are dealt with at the international level through Multilateral Environmental Agreements, where decisions should be based on the most recent scientific results, and at the same time on consensus among the countries part of those agreements (‘Parties’).

Each of the two larger RIO conventions have now the support of a mechanism to provide them with well grounded and policy oriented science-based recommendations: the UNFCCC can benefit from the IPCC on climate issues, the CBD will receive advice on biodiversity issues from IPBES.

The UNCCD is also looking for ways to design and implement a mechanism to get scientific advice to strengthen its actions, and the current debate about how to do it is stirred by different questions such as : should such a mechanism serve only the UNCCD, should it deal with land degradation globally or should it focus on the drylands. Whatever directions, an advisory mechanism should anyway consider other initiatives under development on soils such as the Global Soil Partnership.

In a attempt to contribute to clarify the debate, we have undertaken an analysis of the papers published on desertification to find out what are the current features of the scientific community working on this issue, if trends can be distinguished and if it makes a difference to consider “soils” or “land”.



BIBLIOMETRICS APPLIED TO DESERTIFICATION

Data set explored

In this first exploration of the publications in relation with the UNCCD objectives, we have used the “Web of Science”¹ on-line system (from Thomson Reuters) to query the whole data base of references from 1899 to May 2012.

¹ WoS from Thomson Reuters who describes it as the largest accessible citation database

We have progressively narrowed the focus through different queries :

1st query : Topic=(dry*land* or arid or semi*arid or subhumid) yielded **41 806** references

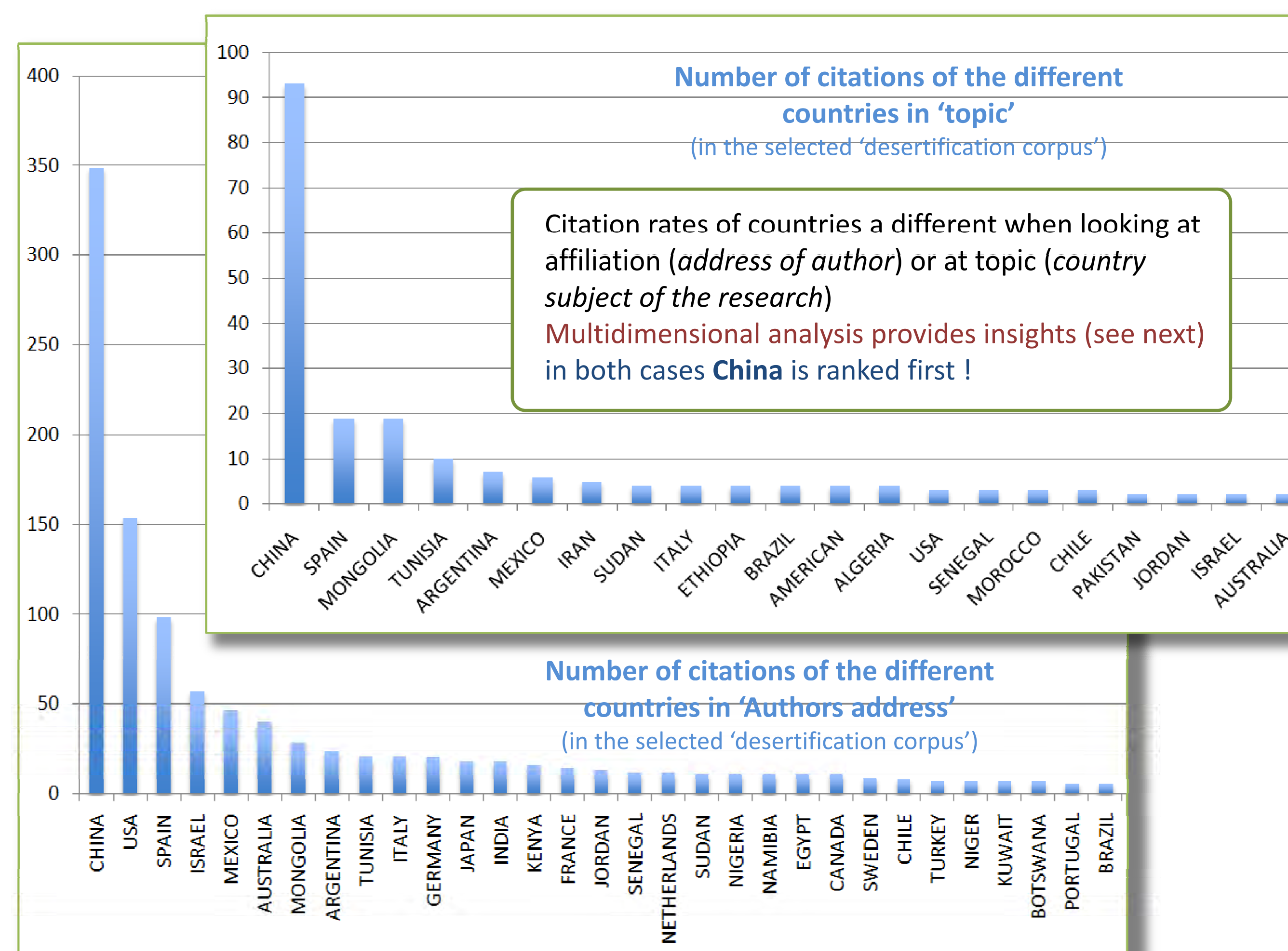
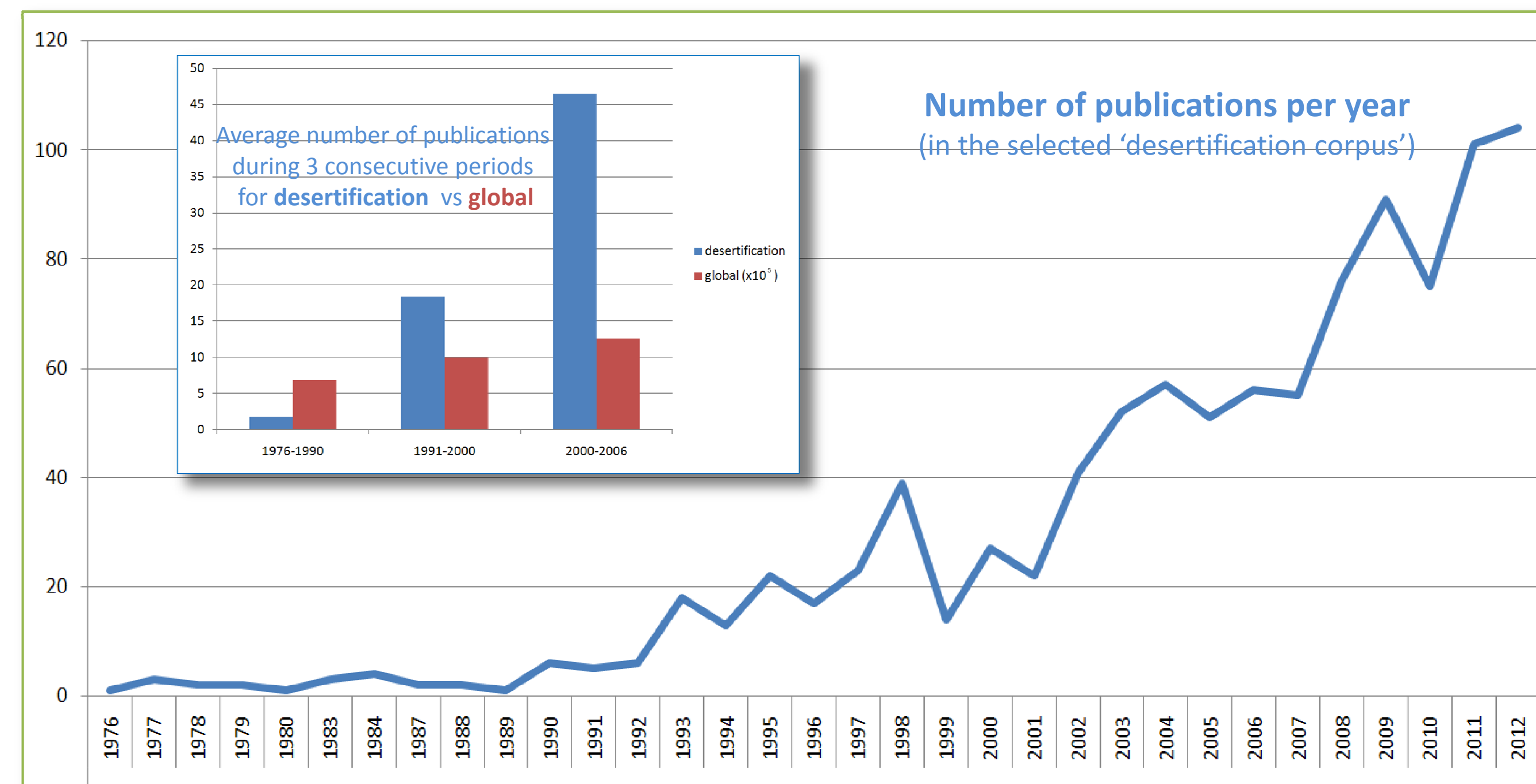
2nd query : Topic=(dry*land* or arid or semi*arid or subhumid) AND Topic=(desertification) yielded **1 144** references

¹ in the WoS a “Topic” is a word found either in the title, the abstract or in keywords

This set of references forms the ‘**desertification corpus**’ we have analysed in two steps: first with the simple tools available online, then with the multivariable analysis

Basic Statistics

On line statistics on our ‘**desertification corpus**’ show the strong increase in the number of references per year, the growth rate in the recent period is x 2.5 compared to x1.26 for the **global** one (all topics considered)

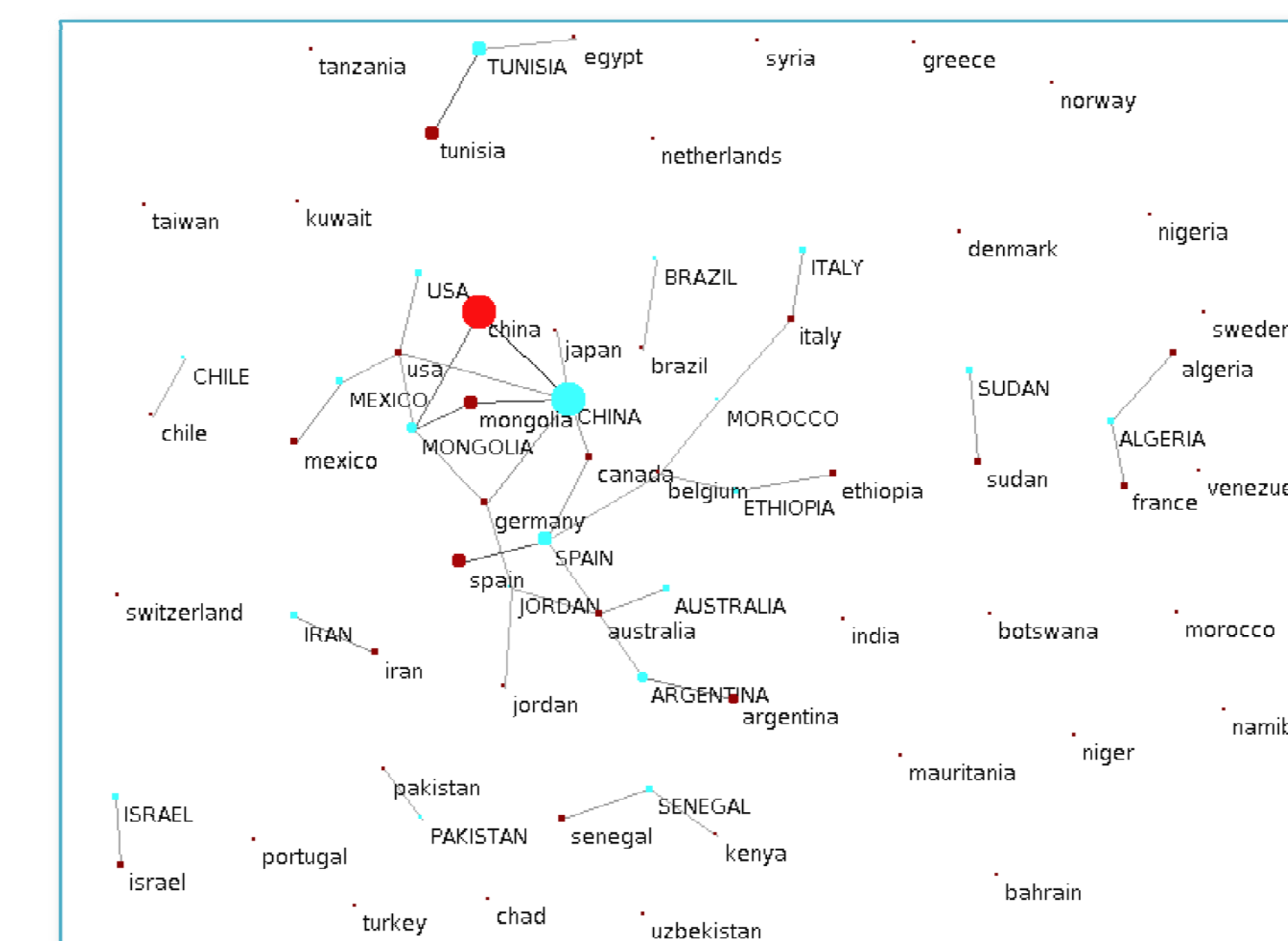
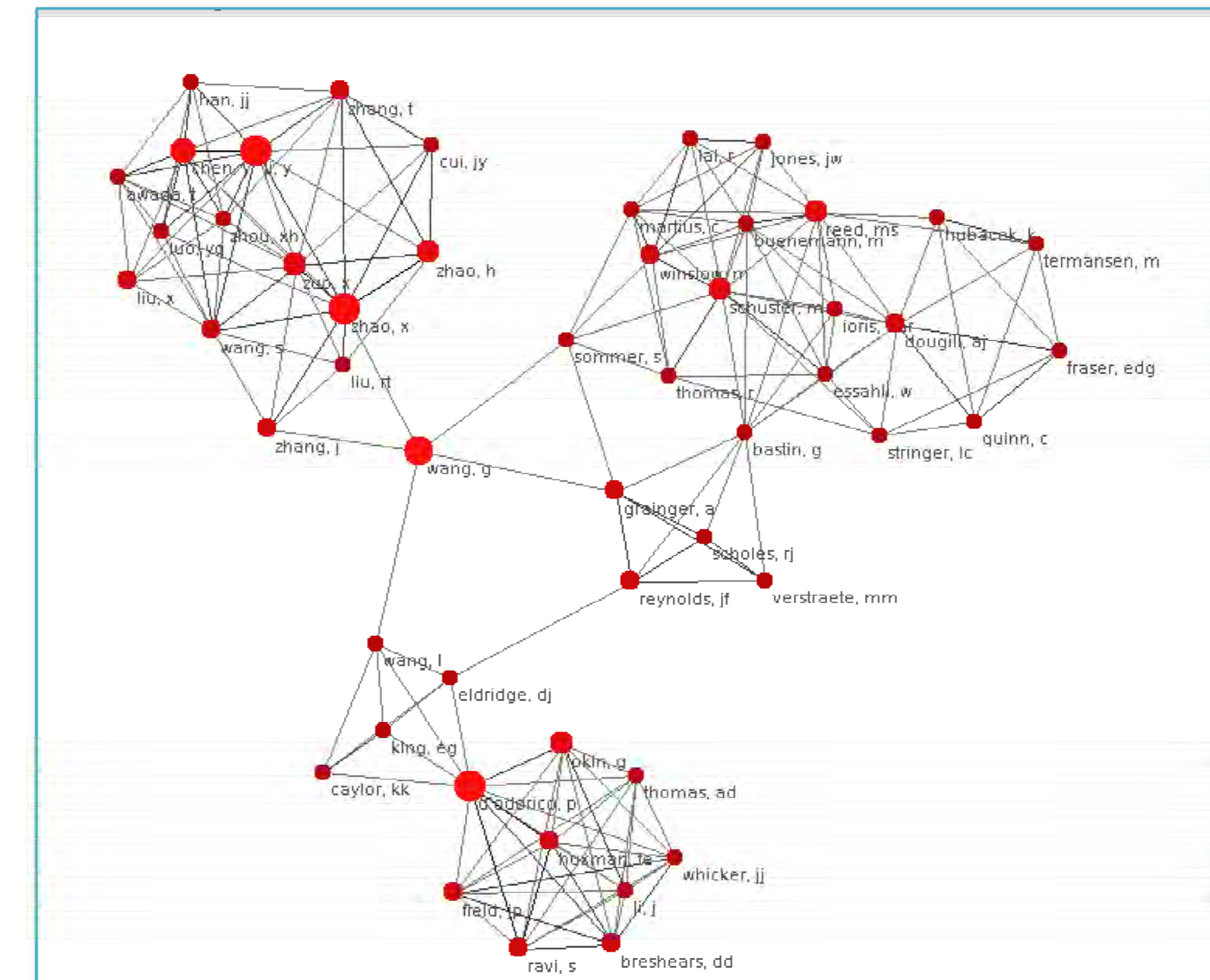


Multicriteria analysis

The multidimensional analysis performed by the TETRALOGY software⁽¹⁾ allows to show collaborations between authors based on the number of co-authorships. Clusters are evidenced as well as *pivot* authors establishing *bridges* between teams

(names have been abbreviated for data processing and are cited just for illustration, the graph does not portray any ranking)

(1) Property of Institut de Recherche en Informatique de Toulouse, France

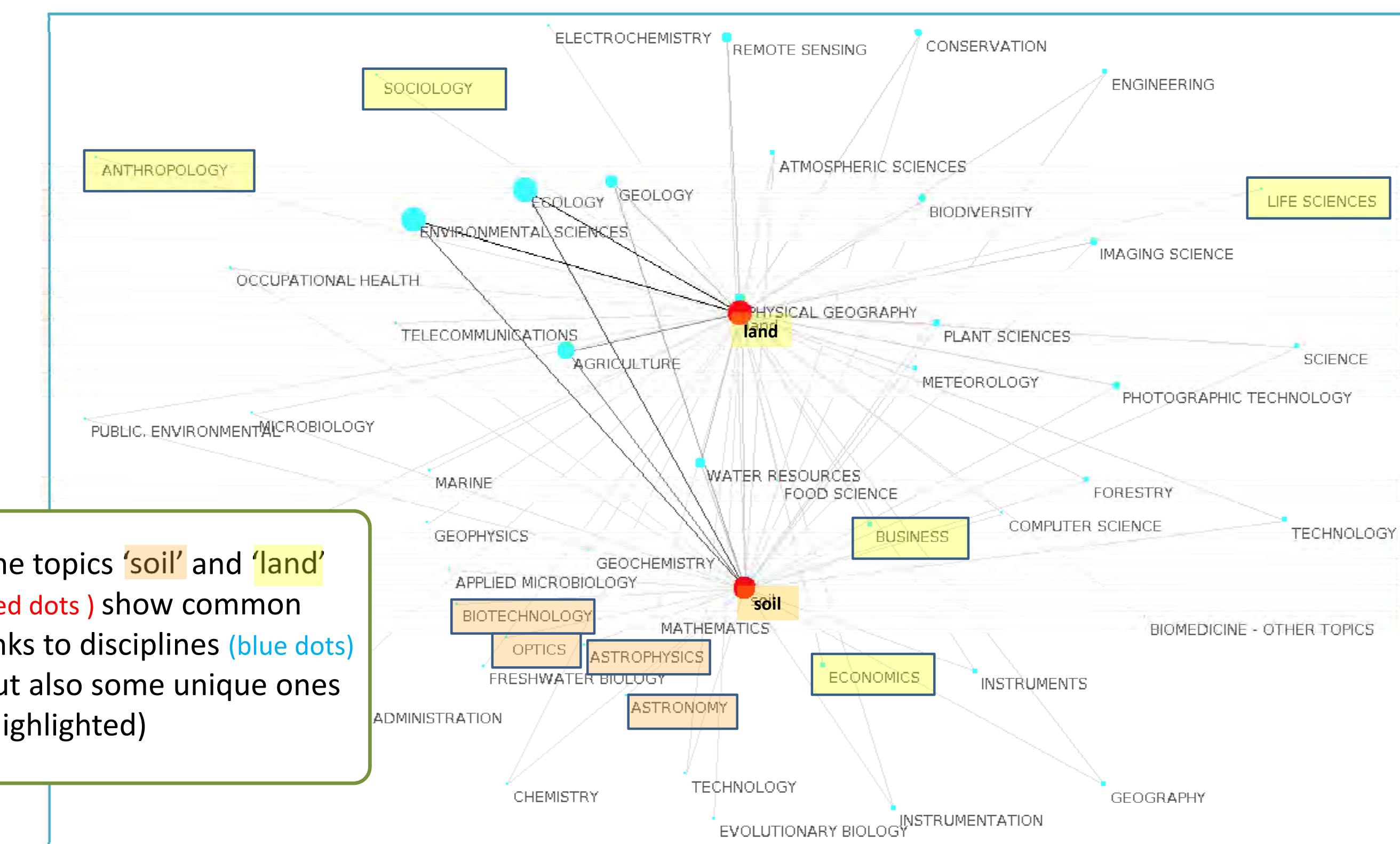


in **blue dots** and capital letters countries where the research takes places , in **red** and small letters countries of authors affiliations

Pair correspond to countries is doing research “on themselves “

Strong nodes appear : USA working in China, Mexico, Mongolia, USA. Conversely China predominantly works in its own territory and in Mongolia, but is cited by authors from Canada, Germany, Japan, Mongolia (and the USA, as mentioned). More surprising, Spanish scientists work only in Spain, but scientists from Australia, Belgium, Canada refer to Spain in their work description.

(Some countries do not show identified countries of application (isolated dots), there numbers are lower than the threshold for visualization)



The topics ‘soil’ and ‘land’ (red dots) show common links to disciplines (blue dots) but also some unique ones (highlighted)

CONCLUSIONS

The set of references analysed represents only a limited part of the scientific community involved in desertification, but its analysis led to some interesting findings :

•The fast growing number of publications on desertification demonstrates a **strong interest**

•A large part of the recent growth is linked to the involvement of **chinese** institutions and journals

Text mining techniques combined with multi-dimensional analysis allowed to:

- evidence clusters of authors bridged by ‘pivot’ authors
- shed light on established cooperations among countries

Plenty of room remains for strengthening links and collaborations

Land related papers seem more *social sciences* oriented, whereas **soil** related ones refer more to ‘*hard sciences*’