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NetScience, Visualizing the geography of scientific production at the global scale, from 1999 to 2014

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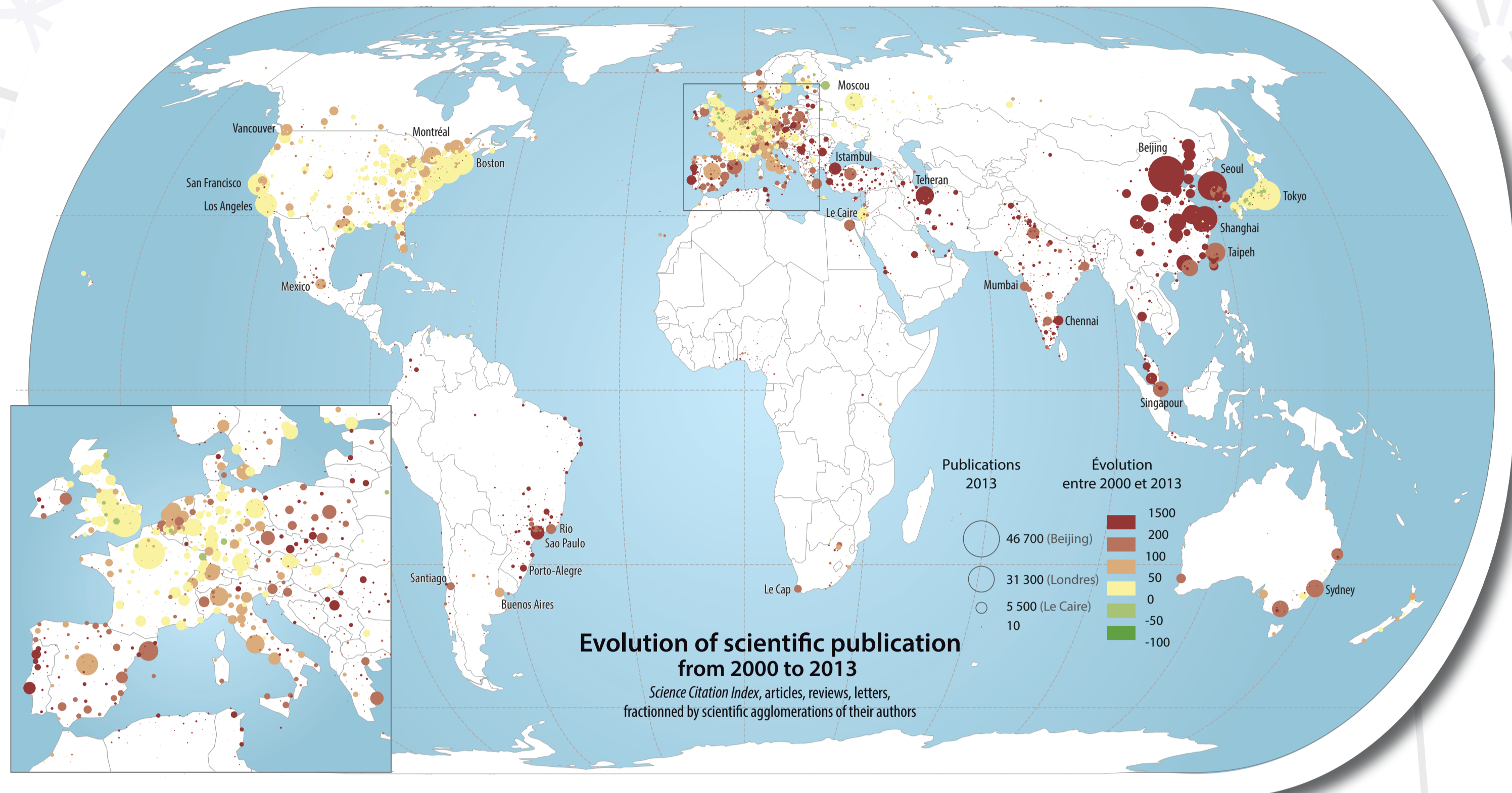
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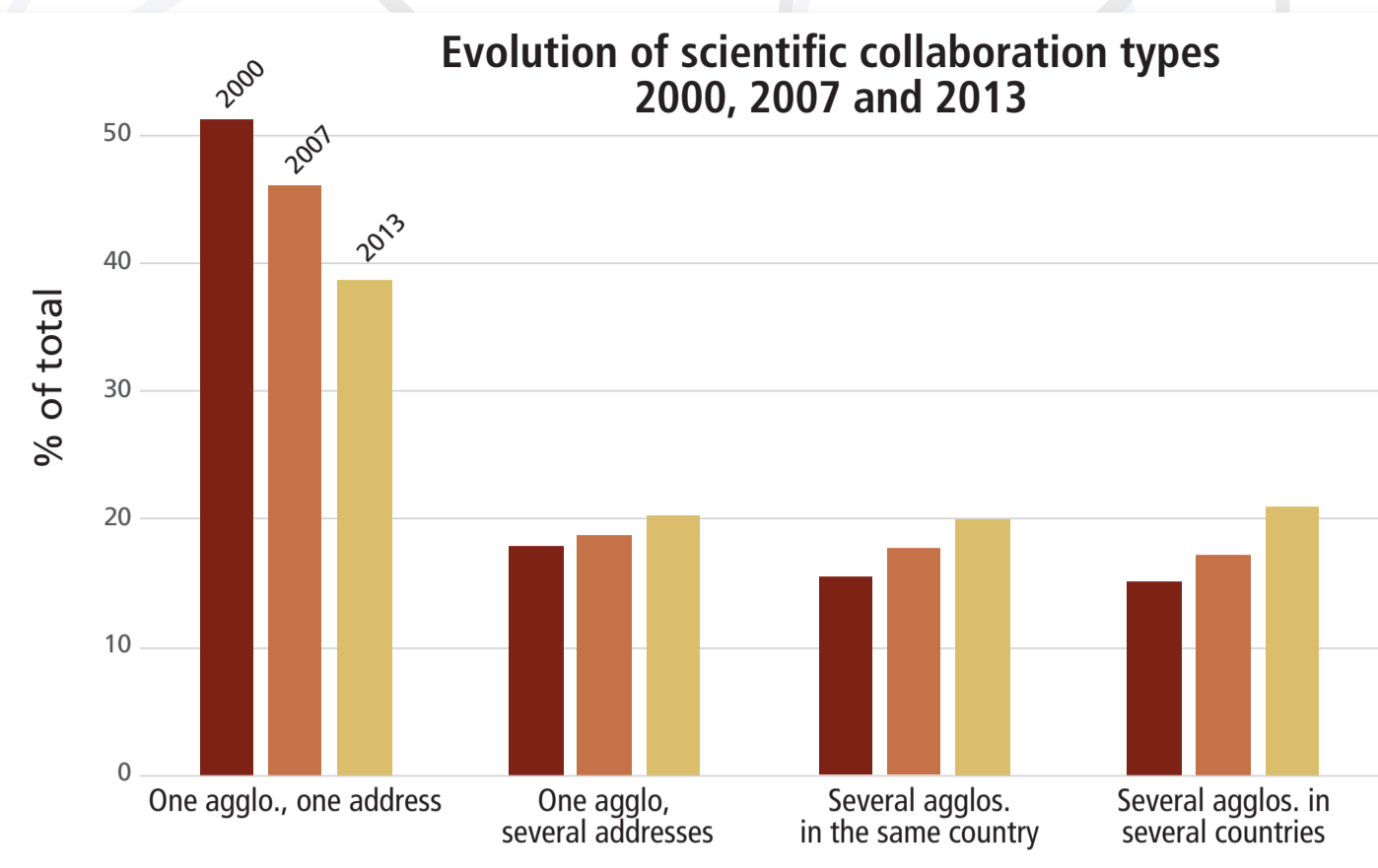
Our results undermine seriously the postulate that only large metropolises are "naturally" a good environment to quality scientific production, able to absorb human resources and financial subsidies.

The global scientific deconcentration did not accentuate the quality gap (as measured by citations), between "world-cities" and others. On the opposite, we are witnessing the emergence of new higher education and research polarisations.

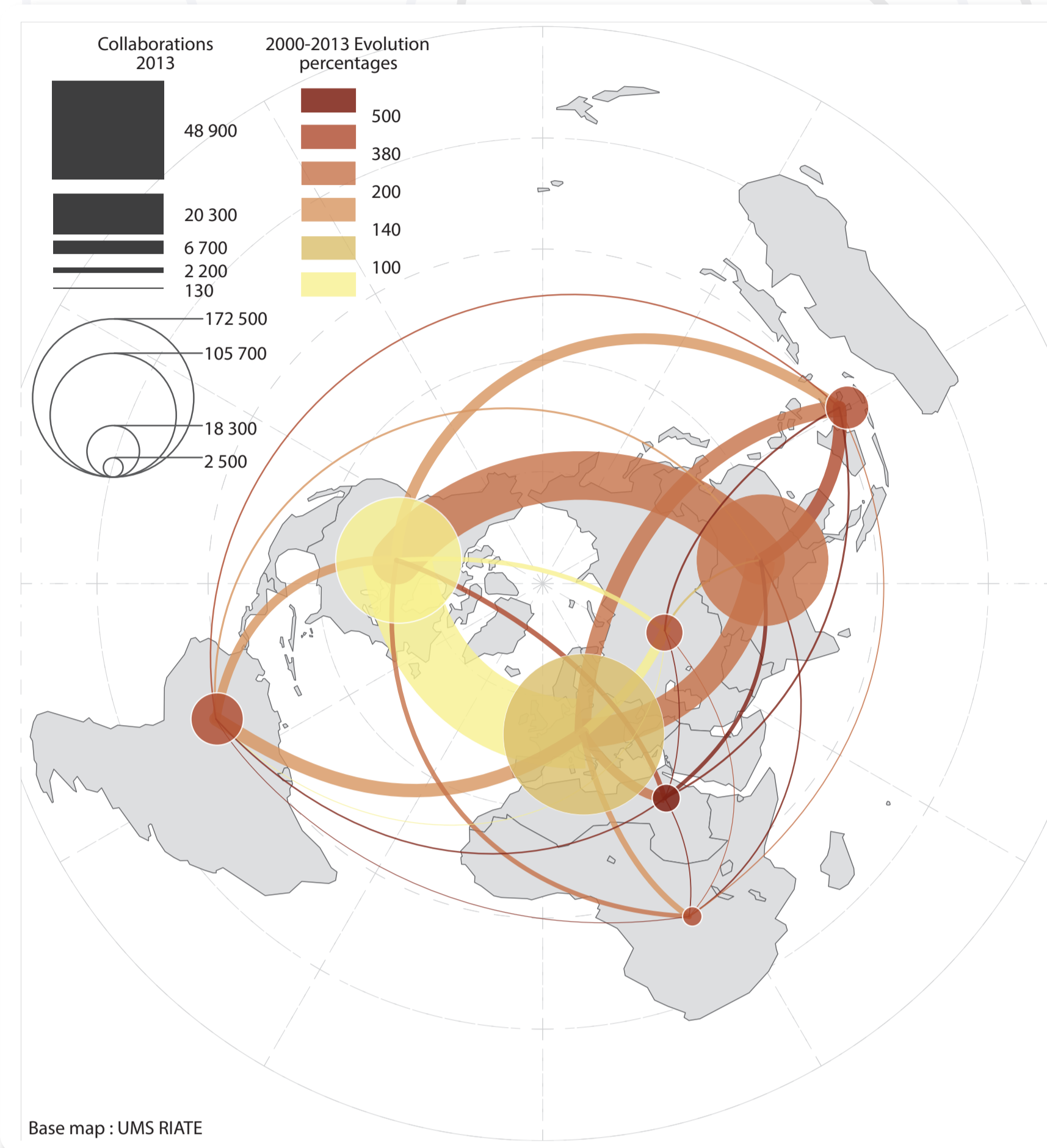
Where does science come from ?



More and more cities in the world contribute to the world system of science. Not only do they publish more but they also collaborate with a growing diversity of cities and receive a growing number of citations. In all countries, there is a trend toward the deconcentration of scientific activities (production, collaboration and citations). Scientific activities tend to be more equally distributed around the world and inside countries between major and more secondary cities.



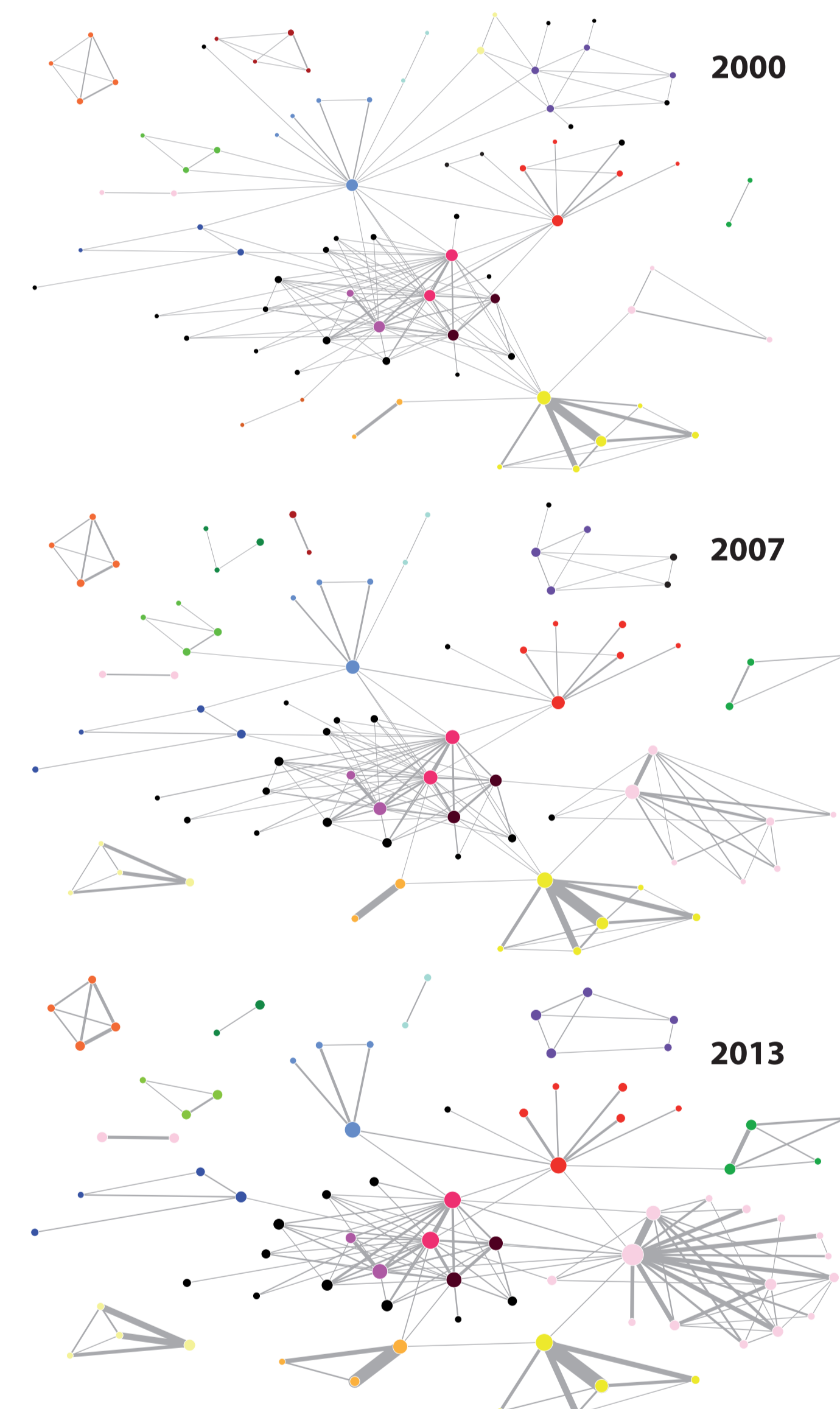
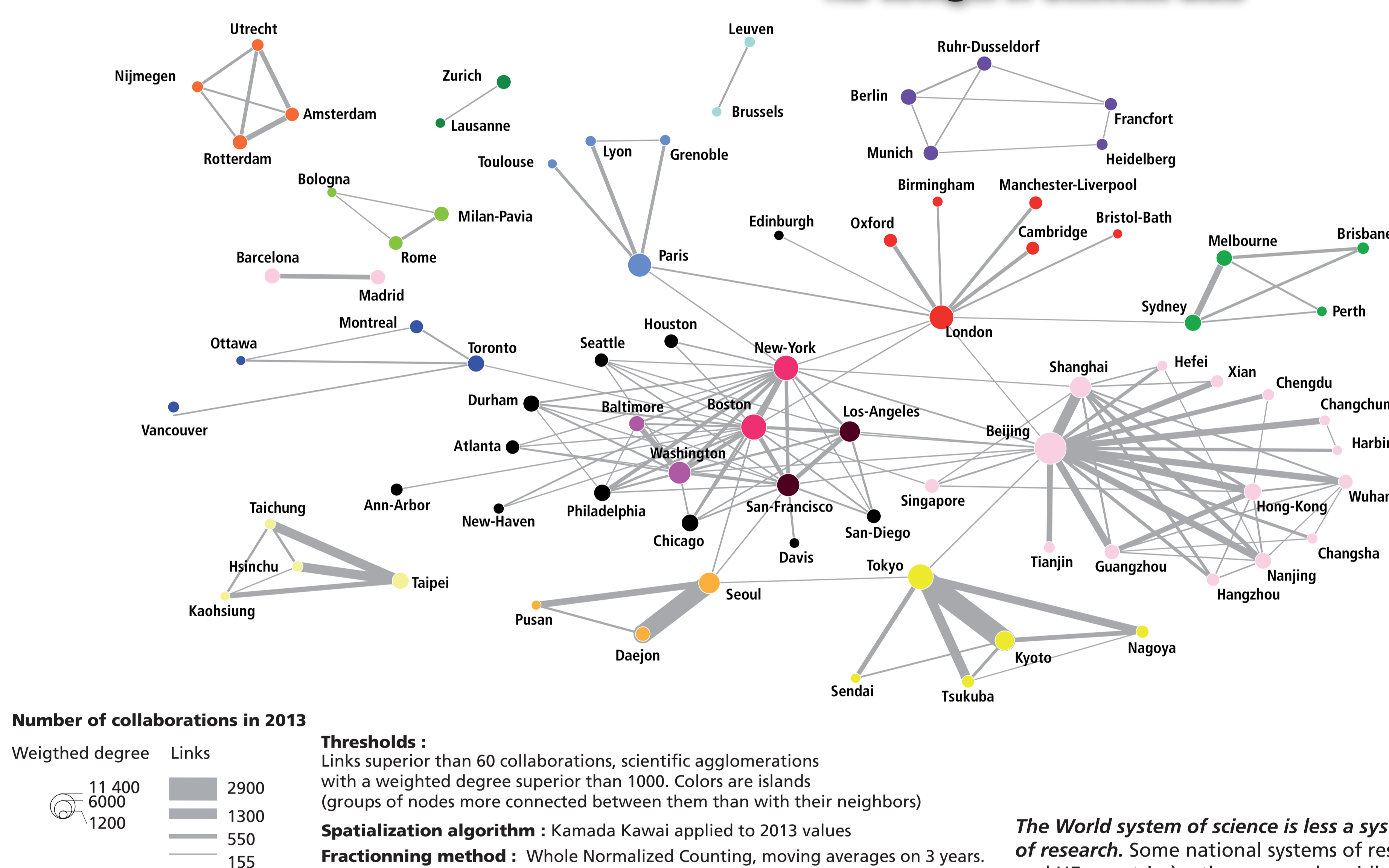
The major change in the geography of production between 2000 and 2013 is the decline in articles written from only one locality. More and more publications are signed from at least two urban areas. This growth of collaboration is happening both inside national contexts and between them. Internationalization is only one aspect of the overall growth of interurban collaboration.



Scientific collaborations are first growing at the national level but they are also developing between macro-areas of collaborations. This map shows that the fastest increasing collaborations are South-South collaborations.

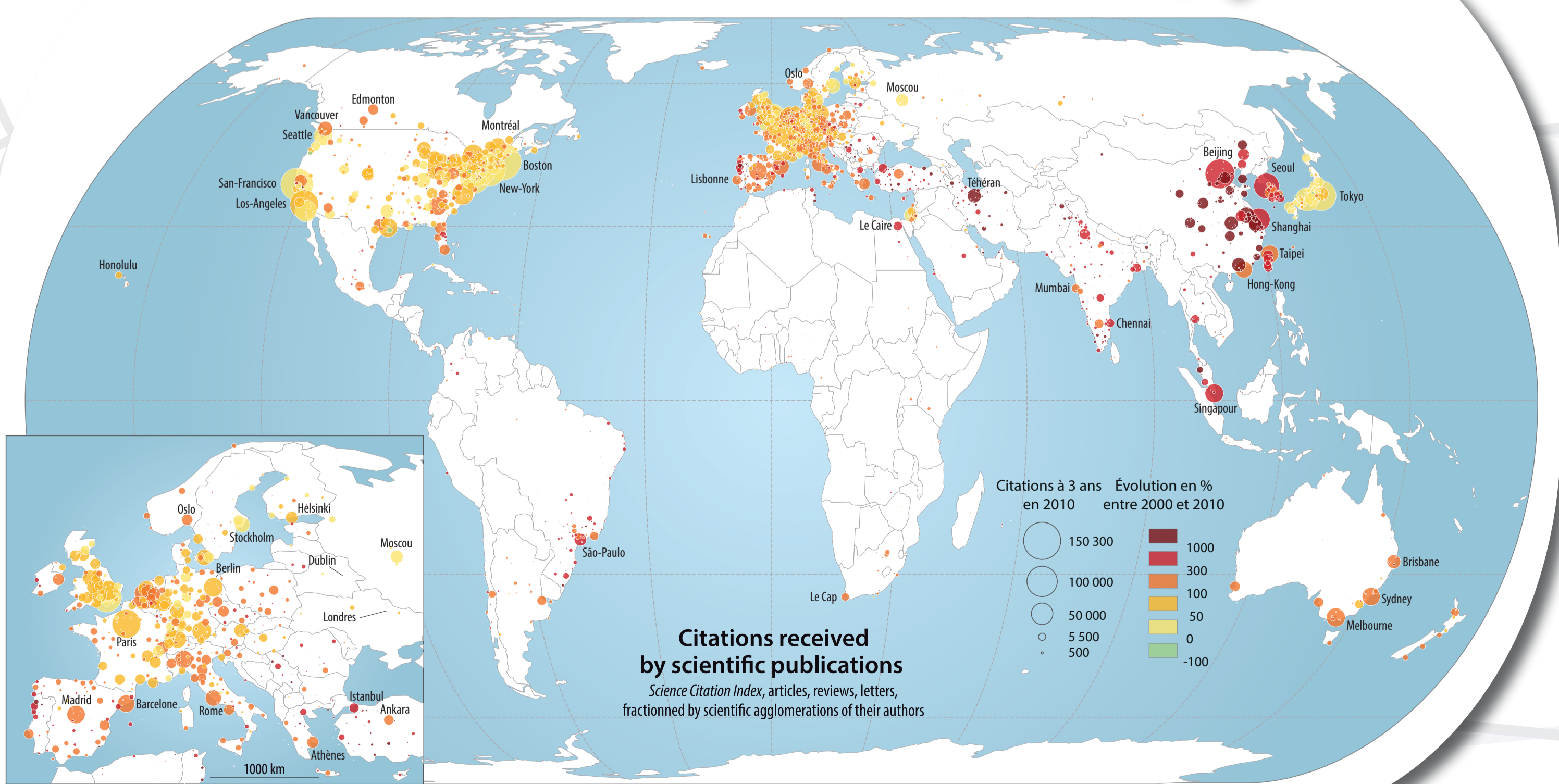
The world system of science

The strength of domestic links



The World system of science is less a system of world cities than a system linking together national systems of research. Some national systems of research are very well structured since 2000 (the US, Australia, Japan and UE countries); others expand rapidly, notably the Chinese system of research (right).

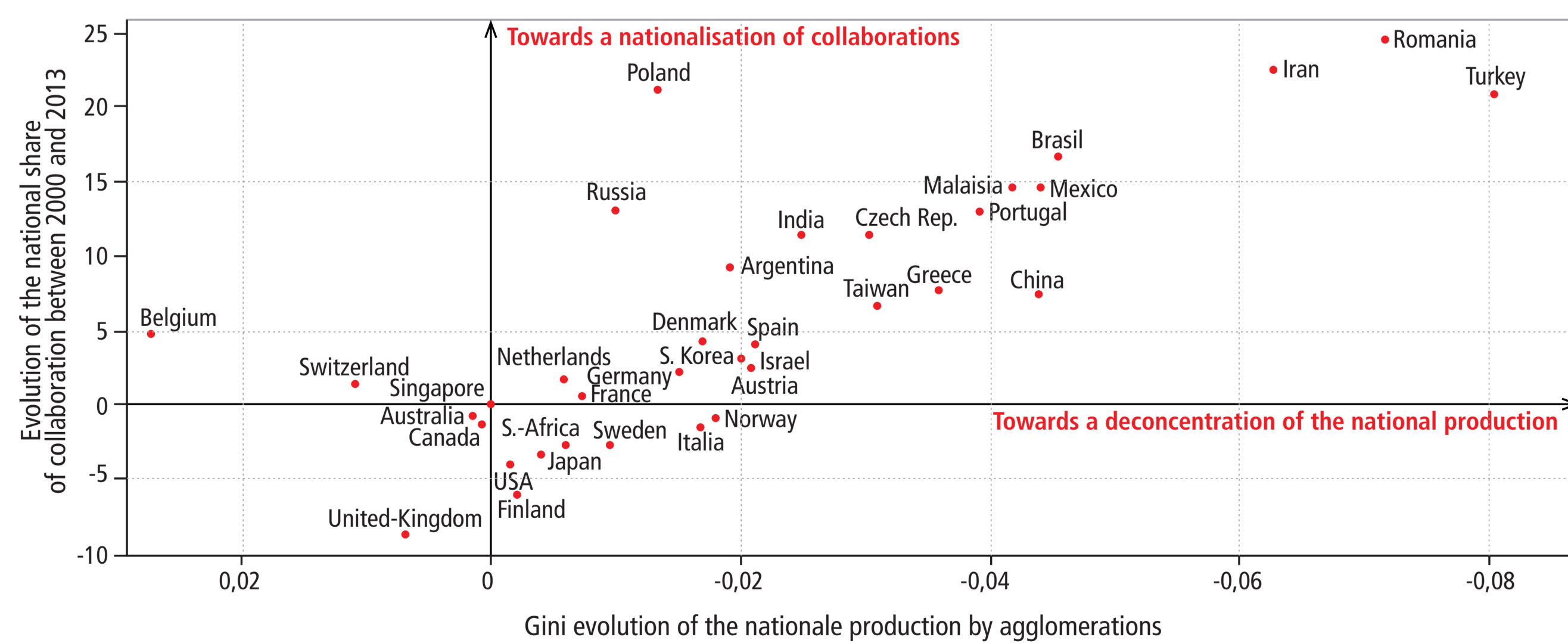
What about the scientific visibility ?



The geography of citations is following the geography of production. Since more and more cities contribute to the world production of science, they also tend to be more cited. Thus, since Chinese cities are the cities that have experienced the highest growth of scientific production, they are also the cities which have benefited from the highest growth of scientific visibility between 2000 and 2013.

Iran, China, Brazil : densifying scientific systems

Correlation between Gini indice evolution of the national production and that of the national share of collaborations in the 36 main countries



The changes in the geography of production are influencing the changes in the network of scientific collaboration. In countries where the scientific production tend to be more distributed among cities, the share of intra-national collaboration has increased to the expense of international collaborations. Iran, China and Brazil are in this case. It testifies to the growing autonomy they sustain and to the strenghtening national system of research they can count on. Long-standing countries of science demonstrate a stabler pattern of scientific production and collaboration.

