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Françoise Bahoken, Laurent Beauguitte, Serge Lhomme

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VISUALIZING WORLD FLOWS: A CHALLENGE BETWEEN EFFICACY, ACCURACY AND AESTHETICS

BAHOKEN

Françoise

Université Paris-Est / Ifsttar / UMR Géographie-Cités / groupe fmr
frcse_bhk@yahoo.fr

BEAUGUITTE

Laurent

CNRS UMR IDEES / groupe fmr
beauguittelaurent@hotmail.com

LHOMME

Serge

Ecole des Ingénieurs de la Ville de Paris (EIVP) / groupe fmr
serge.lhomme@eivp-paris.fr

ABSTRACT

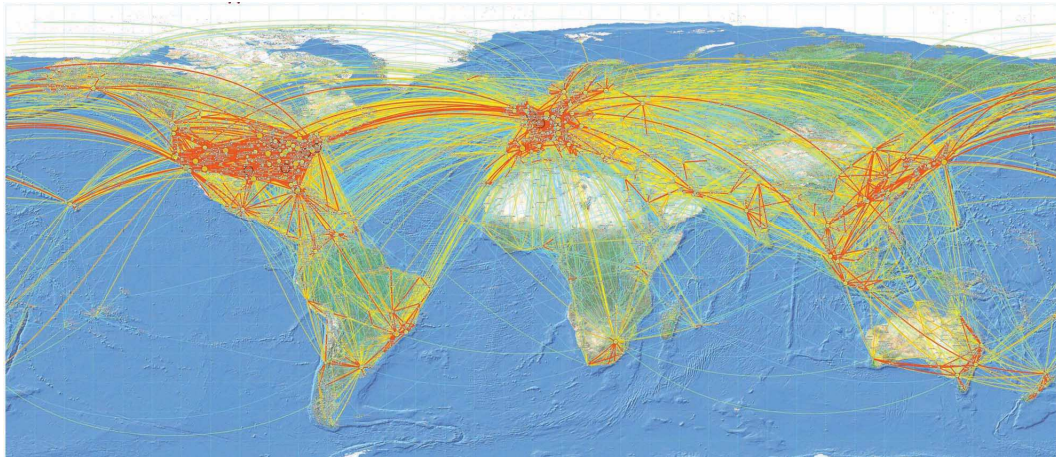
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We observed since a decade a rising interest concerning world networks visualization. More and more options, often interactive, are now available in order to explore, to visualize and to depict world flows. Nevertheless, many of them do not take into account spatial constraints which can disturb some geographers. So we propose to investigate different methodological solutions to represent these phenomena.

The case study we choose to work on is 2012 world flight patterns between airports (and cities) (<http://openflights.org/data.html>). This topic is both relevant for globalization process and is well-documented in scientific literature. Then, the pictures already produced can be compared to ours. Moreover, taking a well-known example presents a didactic interest. Our question here is not the data reliability, always questionable when dealing with world statistics, but the visualization challenge involved if we aim to keep a geographical constraint regarding flows' destinations and origins.

Several procedures are tested in order to highlight their advantages and drawbacks. From the classical model of node-link maps (Fig. 1), we tested the variations of the result in order to suppress or to reduce the “spaghetti effect”: flows filtered or not (dominant, major...), aggregated or not (from node or links points of view). We also tested alternatives cartographic ways of representations such as cartogram (Dorling, 1991), merge and edge bundling graphical options (Holten, 2006 - Fig. 2). Another classical option regards the projections' choices (Mercator, Polar or 3D globe).

Figure 1: Mercator projection, spaghetti effect and color gradient



Source: <http://media.aerosociety.com/aerospace-insight/2012/01/06/vision-of-the-future/6100/world-traffic-flows-icao/>



Figure 2: Polar projection and edge bundling

Source: <http://tulip.labri.fr/TulipDrupal/?q=node/1291>

Our aim is not to define the best solution nor to impose a normative or a "geographically correct" point of view but to propose a reflection about the efficacy, the accuracy and the aesthetic (Tufte, 2001) of the selected methods. If producing nice world pictures is easy today, the major issue remains to produce relevant scientific content.

KEYWORDS

World flows, map visualization, flight patterns.

References

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