

Benefits of vector mapping to valorize cultural heritage: a digital device in Lyon Historical Museum

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Abstract. The use of Geographic Information System (GIS) to create a vector map of Lyon in the late 18th century opens up many perspectives in the valorization of historical and artistic documents. The goal of this work was to produce a high quality vector base map in GIS, in order to study iconographic representations of Lyon in the 18th century (paintings, engravings, drawings) very finely. Taking as a reference the vector town map of Lyon based on the cadastral map c. 1824-1832 (Gauthiez 2008), we used the regressive method to create a vector map of Lyon in 1792. This reconstructed map was used as a basis to study a view of Lyon drawn c. 1719-1720. Using two different methods, five points of view have been located on the vector map. Part of the results of this study has been added to a digital tool for valorization of cultural heritage developed by the author and currently available in Lyon Historical Museum.

Keywords: GIS, Geohistory, 18th century, Lyon, cultural heritage

1. Introduction

In previous work, we have established a corpus of 199 old urban representations of Lyon between 1701 and 1800, including paintings, drawings and engravings. Within this corpus, we have focused on 124 pictures which are realistic views of the city i.e. that are reliable enough to be studied from a spatial perspective. The aim of this study was to create a vector map of Lyon in the late 18th century, which makes it possible to study those 124 pictures of the city with a spatial approach, by locating their points of view on the map.

2. Building a map of Lyon in 1792

2.1. Acquiring Spatial Data

In most historical mapping projects, the spatial data are obtained by scanning ancient paper maps (Tice & Steiner 2005, Gregory 2003, Gregory & Ell 2007) or by digitizing these sources to create a vector map usable in GIS (Archives municipales de Toulouse 2006/2012,

Gregory 2003, Gregory & Ell 2007). It raises the problem of the superposition of the same objects at two different dates.

Unlike the map of Nolli for Rome, maps of Lyon in the 18th century are not suitable enough to be used as reference to locate old pictures. For example, while georeferencing in GIS the map of Lyon by Séraucourt (*Figure 1*) important discrepancies appear between this document and the current map of Lyon (Grand Lyon 2010).

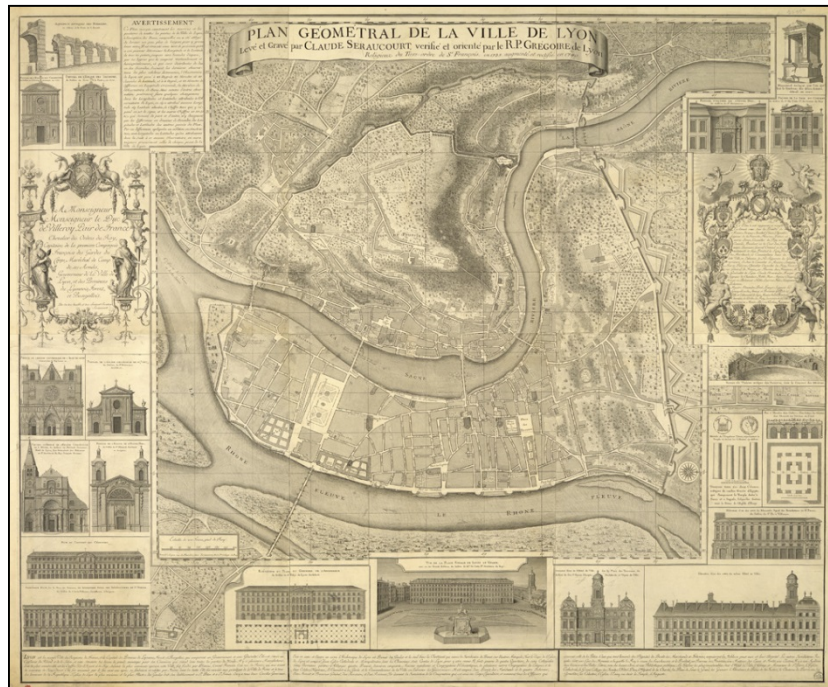


Figure 1. Claude Séraucourt, *Plan géométral de la ville de Lyon, levé et gravé par Claude Séraucourt, vérifié et orienté par le R. P. Grégoire de Lyon, religieux du Tiers Ordre de Saint-François, en 1735, augmenté et rectifié en 1740, 1735-1740, copper engraving.* (© Archives municipales de Lyon, 1S110a)

2.2. Regressive Mapping

Taking as reference the vector town map of Lyon based on the cadastral map in the early 19th century (Gauthiez 2008), the choice has been made to use the regressive method in order to reconstruct a map of Lyon in 1792.

The chosen year for this vector map is 1792 for several reasons. It is just before the Siege of Lyon in 1793 which caused a lot of building destructions in the town. Additionally, most of the urban pictures of Lyon from this time have been made during the last quarter of the 18th century. The vector map of Lyon in 1792 is to be used to locate the place from which each view has been drawn.

The advantage of the regressive mapping is that it enables a perfect superimposition of the two maps. In GIS, five layers were drawn: buildings, bridges, rivers, fortifications, islands.

The objects which are the same in 1792 and 1830 have been duplicated from the 1830 layer to the 1792 layer. The objects which did not exist anymore in 1830 have been entirely drawn using three old maps of Lyon (Séraucourt, c. 1735-1740; Joubert, 1773; Villionne, 1799), which helped to check the location of those objects in 1792.

The map of Lyon in 1792 was drawn at the urban block's scale. In addition, the reconstructed vector map (*Figure 2*) was shown to perfectly superimpose to Lyon's urban reference system (Grand Lyon 2010). This opens up interesting possibilities for future valorization of cultural heritage. A version of this map has been converted in a vector graphics editor, in order to be usable for other applications.

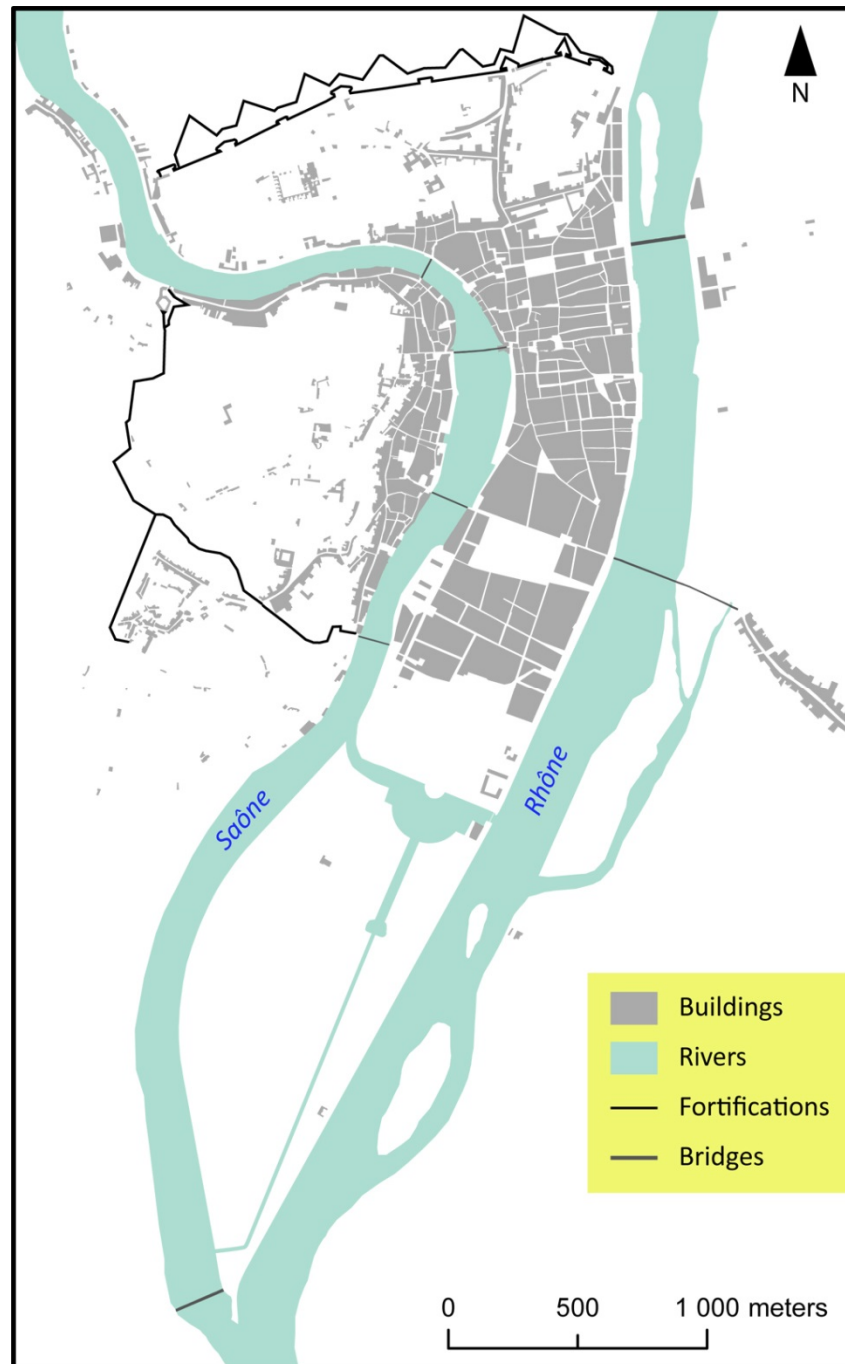


Figure 2. Vector map of Lyon in 1792 (© D. Petermann 2013). This map is based on the vector map of Lyon c. 1824-1832 by B. Gauthiez (2008).

3. A View of Lyon in 1719: the “*Vue de Cléric*”

3.1. Context of the study

The *Vue d’une partie de la ville de Lyon désignée dans la maison de Mrs les chanoines régulliers de St Antoine* was drawn in 1719 by François Cléric and engraved c. 1720 by François

de Poilly (*Figure 3*). This work – commonly known as “*Vue de Cléric*” – exists in several copies. One of them is preserved in Lyon Historical Museum (Musées Gadagne, Inv. 333). Another copy is part of collections of the Lyon Public Library (Fonds Ancien, Inv. Coste 259).



Figure 3. François Cléric and François de Poilly, *Vue d'une partie de la ville de Lyon dessinée dans la maison de M^{rs} les chanoines régulliers de St Antoine (Vue de Cléric)*, 1719-1720, copper engraving, 60 x 190 cm. (© Lyon, musées Gadagne, Inv. 333)

Our hypothesis is that the artist has used spatially separated points of view. Old urban pictures, especially panoramas, are quite often a collage of several views drawn from different places (Arnaud 2008). A careful examination of the picture reinforces this supposition. The orientation of some neighboring buildings varies strongly, which presupposes the existence of multiple points of view.

3.2. Methodology

Two methods have been used to determine the number and exact locations of the different points of view.

A first method consists in detecting the known urban elements (bridges, churches) in the picture. If two known elements are on the same vertical line, it is possible to draw a vertical axis. For example, *Figure 4* shows the drawing of two axes on the picture and on the map. Axis #1 connects the church of Saint-Just and the pont de l'archevêché. Axis #2 links the Chapelle de Fourvière and the palais de Roanne. By drawing those two axes on the vector map of Lyon it can be seen that Axis #1 and Axis #2 intersect at one point, which is the corresponding point of view.

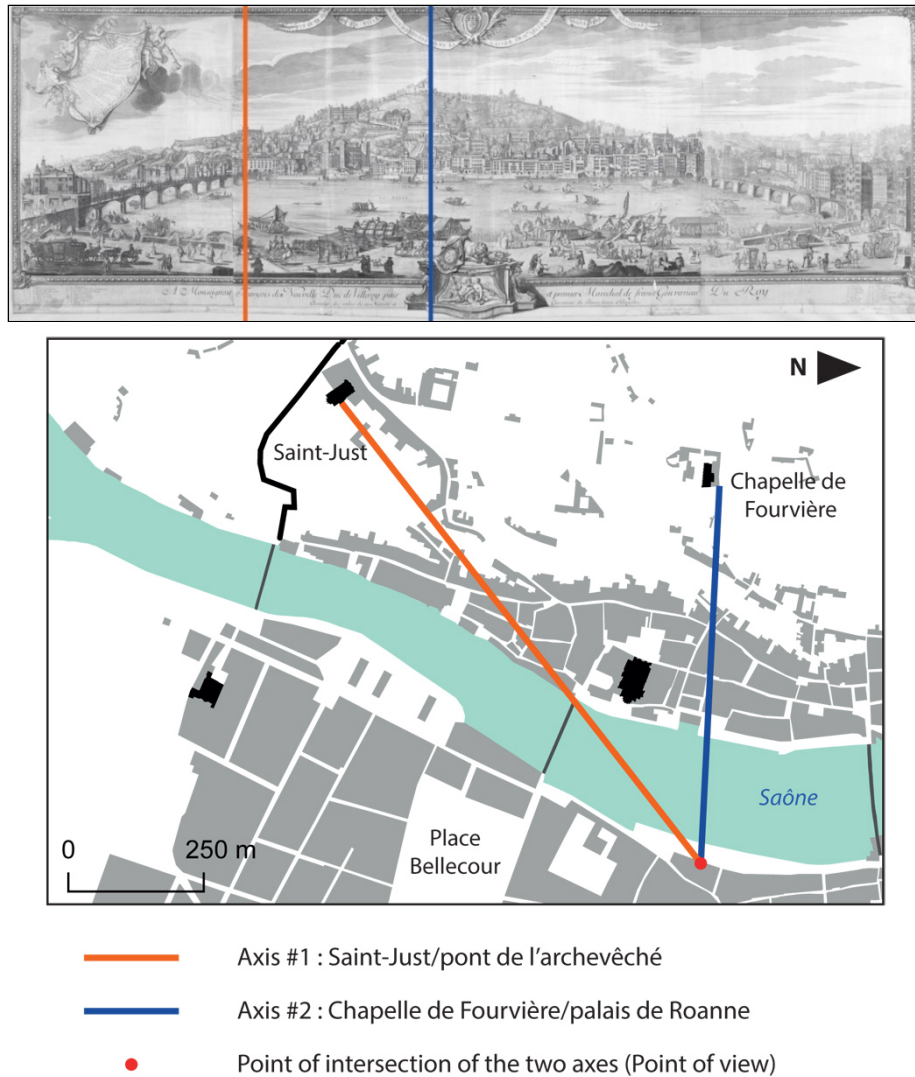


Figure 4. Drawing of the two axes on the “*Vue de Cléric*” and on the map of Lyon in 1792, allow determining the location of a point of view. (© D. Petermann, 2013)

In theory, two axes are sufficient to locate the point of view. However, additional lines (as many as possible) would be preferable, in order to determine the location of the point of view very accurately. In the present case this is a crucial step to verify our hypothesis i. e. the “*Vue de Cléric*” combines entities drawn with several points of view. This method has thus been repeated to find different points of views used in this picture.

Another method is based on John Orrell’s work on the view of London by Wenceslaus Hollar (Orrell 1983). Orell studied the view of London drawn by Wenceslas Hollar in 1647, in order to measure Shakespeare’s Globe. One part of Orell’s method consists in drawing the central ray of the perspective, i. e. the vertical axis which passes through the picture plane at 90° . The elements which are on this axis are strictly drawn front view because they are in the artist’s line of sight. *Figure 5* displays the drawing of the central ray corresponding to the main

point of view on the picture and on the vector map of Lyon which makes it possible to find the axis on which the main point of view is located.

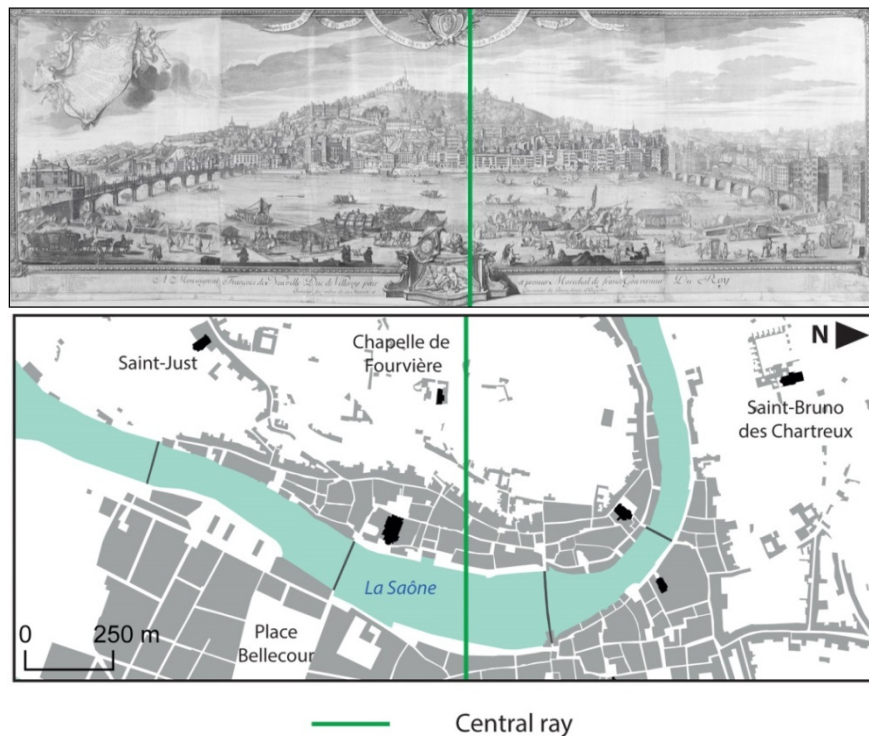


Figure 5. Drawings of the central ray on the “*Vue de Cléric*” and on the map of Lyon in 1792 allow to locate the main point of view of the image (Point of view #1). (© D. Petermann, 2013)

Those two crosschecked methods allow to determine the exact location of a point of view.

3.3. Results

Those two methods have been used to precisely determine the number and locations of the points of view present in the “*Vue de Cléric*”. This study reveals the existence of at least five different points of view (*Figure 6*):

- **The main point of view** is located in the building des Antonins (Point of view #1). A big portion of the picture has been drawn from this place.
- **Point of view #2** is located in the neighboring building’s block. The left part of the picture has been drawn from this place.
- **Point of view #3** is located on the quay, close to the pont du Change.
- **Point of view #4** is located on the quay, close to the pont de l’archevêché.
- **Point of view #5** is located on the first pier of the pont du Change.

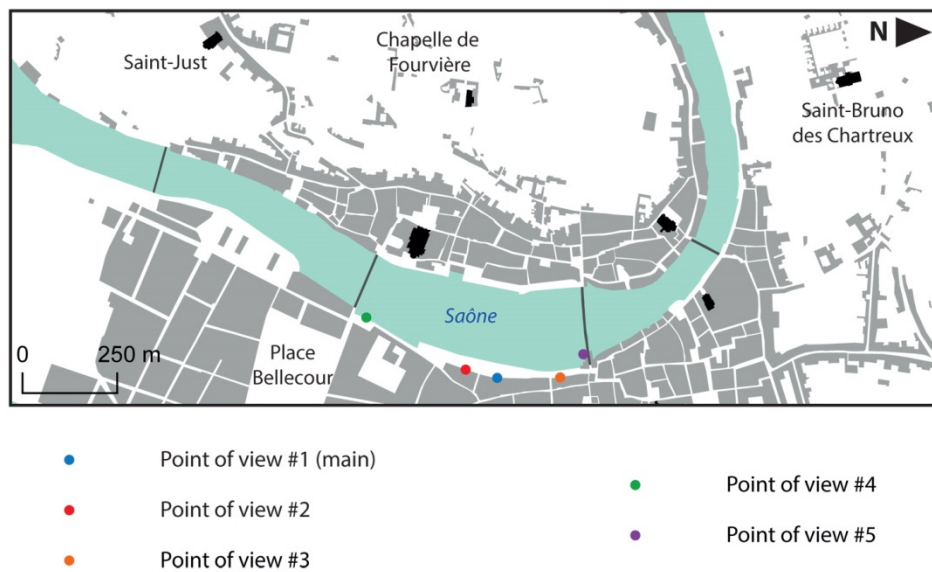


Figure 6. Locations of the five points used of view in the “*Vue de Cléric*” on the map of Lyon in 1792. (© D. Petermann, 2013)

Figure 7 summarizes the results of this study by partitioning the whole picture into five areas. It easily visualizes which part of the picture has been drawn from each point of view.

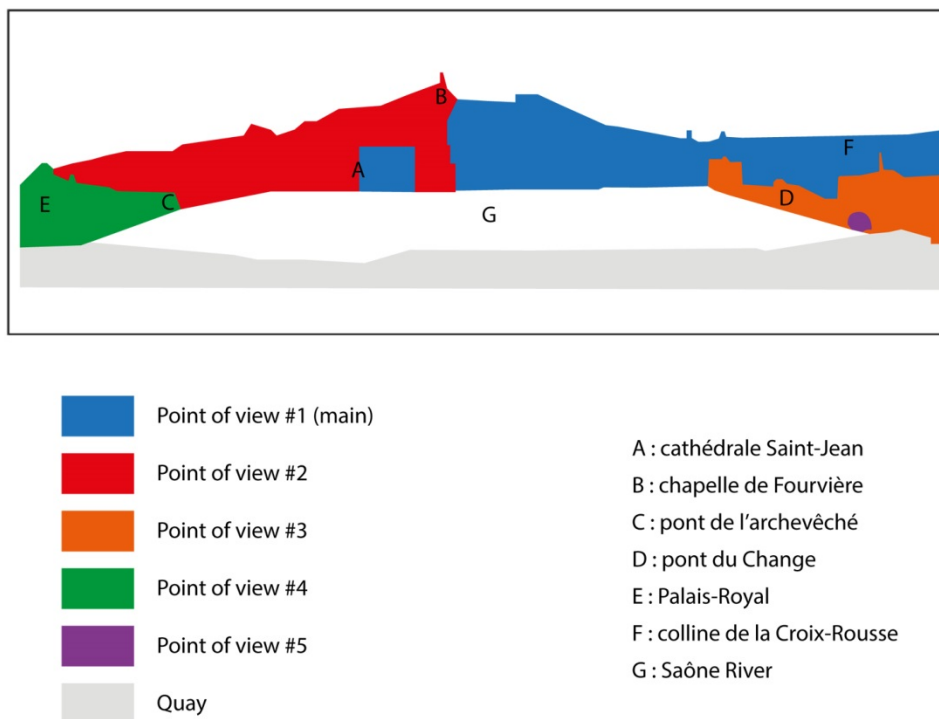


Figure 7. Partition of the “*Vue de Cléric*” into five areas corresponding to the five points of view. (© D. Petermann, 2013)

3.4. Developing a Digital Tool for Valorization of Cultural Heritage

Some of the spatial data produced through GIS have been added to a digital tool, which is part of the permanent exhibition of Lyon Historical Museum (Musées Gadagne) since October 2014. This tool is dedicated to the view of Lyon c. 1719-1720 (*Vue de Cléric*). It consists of three separate sections as shown in *Figure 8*.



Figure 8. Screen capture of the home page of the digital tool. (© D. Petermann, 2013)

The first section presents several ancient pictures of Lyon which have been drawn from the same place, the left side of the Saône River in front of the Fourvière Hill. The second section allows the user to navigate through the “*Vue de Cléric*”. Some urban elements become highlighted as the user points the mouse on them. Then, for each element, a short historical note and a slide show of five pictures –made at different period of time (from the 16th century until today)– may be accessed.

The third section focuses on the creation the “*Vue de Cléric*” by François Cléric in 1719. This section aims at explaining the visitors how the artist combined several drawings to achieve this large panorama. An interactive interface links the vector map of Lyon in 1792 and the picture (*Figure 9*). It helps the user understand the way the artist created this piece of work by using several points of view. By clicking the corresponding buttons the user can visualize which part of the picture matches each point of view (*Figure 10*).



Figure 9. Screen capture of the interactive interface linking the picture and the map of Lyon in 1792 (Third section). (© D. Petermann, 2013)

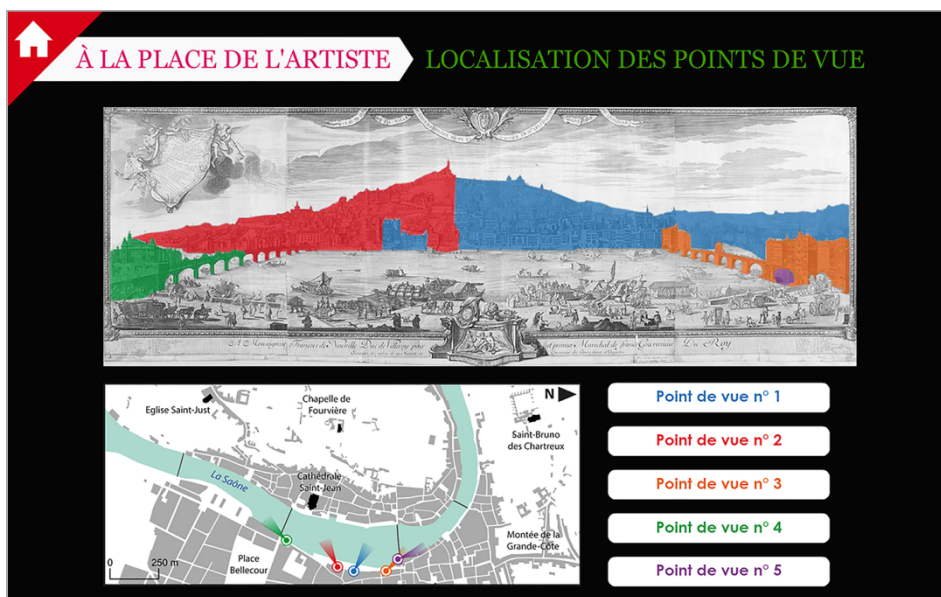


Figure 10. Screen capture of the interactive interface linking the picture and the map of Lyon in 1792 (Third section). The five buttons (Point de vue n°) have been pressed on. (© D. Petermann, 2013)

One of the major challenges of this digital tool is to make the museum visitors aware that these ancient urban pictures are not perfect representations of reality and always need to be viewed with a critical eye.

4. Conclusion and Perspectives

The spatialization of ancient urban pictures requires accurate maps in order to determine accurately the places from where the artists drew those pictures. In this work, regressive mapping has been shown to be a method of choice in order to build such maps. The reconstructed vector map of Lyon in 1792 may be used as a basis to produce other maps –especially to study ancient urban pictures. The study of the “*Vue de Cléric*” performed using two methods revealed the existence and the exact locations of five different points of view. The results of this work are now available to the public through a digital tool developed by the author for Lyon Historical Museum.

Further research will focus on studying the traveler’s itineraries and locating the points of interest in Lyon in the 18th and 19th centuries. By creating new vector maps that are, similarly to that map of Lyon in 1792, superimposable to the current map of the city, it will be possible to use the results of those studies to valorize historical and cultural heritage in innovative ways.

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References

- Archives Municipales de Toulouse (2006/2012) Urban-Hist
<http://www.urban-hist.toulouse.fr/urbanhistdiffusion/> Accessed 7 November 2014
- Arnaud J.L. (2008) Analyse spatiale, cartographie et histoire urbaine. Éditions Parenthèses/MMSH, Marseille
- Bernard C, Comelongue M, Friquart L.E., Krispin L, de Lavedan G, Moreau L (2012) Urban-Hist, le patrimoine toulousain à la carte. Les Cahiers de Framespa, 10
<http://framespa.revues.org/1459> Accessed 13 November 2014
- Charre A (1972) Catalogue des vues et plans de Lyon au XVIII^e siècle. Mémoire de maîtrise, université Lyon 2
- Forma Urbis. Les plans généraux de Lyon, XVI^e-XX^e siècles. (1997). Lyon, Archives municipales

Gauthiez B (1994) La topographie de Lyon au Moyen Age. *Archéologie du Midi médiéval*, 12: 3-38

Gauthiez B (2008) Lyon en 1824-32 : un plan de la ville sous forme vecteur d'après le cadastre ancien. *Géocarrefour*, 83/1:57-67

<http://geocarrefour.revues.org/4542> Accessed 15 November 2014

Gauthiez B, Zeller O (2009) Espace construit, espace social à Lyon aux XVII^e-XIX^e siècle : l'apport du SIG. In *Fonti, Metafonti e GIS per l'indagine della struttura storica del territorio*, Celid, Turin, 39-49

Gauthiez B, Zeller O (2014) Lyons, the Spatial Analysis of a City in the 17th and 18th Centuries. Locating and Crossing Data in a GIS Built from Written Sources. In Rau S., Schönherr E. *Mapping spatial relations, their perceptions and dynamics. The city today and in the past*. Springer International Publishing Switzerland, 97-118

Grand Lyon (2010) *Système urbain de référence*

Gregory I.N (2003) *A place in history: a guide to using GIS in historical research*. Oxford, Oxbow books

Gregory I.N., Ell P.S. (2007) *Historical GIS: Technologies, methodologies and scholarship*. Cambridge University Press, Cambridge

Grisard J.J (1891) *Notice sur les plans et vues de la ville de Lyon, de la fin du XV^e siècle au commencement du XVIII^e siècle*. Imp. de Mougins-Rusand, Lyon

Orrell J (1983) *The Quest for Shakespeare's Globe*. Cambridge University Press, Cambridge

Privat-Savigny M.A. (2012), *Lyon au XVIII^e, un siècle surprenant*. Musées Gadagne, Somogy éditions d'art, Paris

Tice J, Steiner E, Ceen A (2005). *Interactive Nolli Map Website*

<http://nolli.uoregon.edu> Accessed 12 November 2014

Tice J, Steiner E, Beyer D, Ceen A (2008) *Giuseppe Vasi's Grand Tour of Rome*

<http://vasi.uoregon.edu> Accessed 12 November 2014