SPATIAL HUMANITIES: AN AGENDA FOR PRE-MODERN RESEARCH

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Digital maps are objects of our time. We move about through cities in a different way today thanks to global positioning systems (GPS). We find digital content that is more relevant to us because our mobile devices share our location with providers. We interact with annotated map layers today, rather than turning the huge pages of printed atlases found in our library's reference room.

This article provides some basic context and proposes some paths forward for researchers interested in exploring digital mapping in humanities research, particularly that of the pre-modern period. It begins with a simple observation: whereas access to geographic information systems (GIS) was once limited to specialized domains due to both the exorbitant cost of licenses and the technology's steep learning curve, visualizing map information today has been significantly democratized, with a variety of simple entry points available for professional and public researchers. Whereas other humanists may find this article useful, the article is written with the pre-modern humanities researcher in mind. It will discuss some of the challenges in making basic maps with pre-modern humanities data and propose a list of practical suggestions.

Scholars have grown increasingly interested in exploring maps as a way of thinking about research materials, and the humanities provide us with endless use cases. A whole field of the digital humanities known as the spatial humanities has emerged centered on the question of location, pioneering research across and between traditional disciplines.[315] Most research topics lend themselves to some kind of location-based approach and there are usually several units of analysis in humanities research that can be associated with a place on the earth. Place of publication, place of birth or death, stops on a pilgrimage route, location of shrines, city wall borders—these are the stuff of maps. It goes without saying that the more associations we can make with those locations—that is, the more metadata, the information about information, we can collect—the more complex and dense the maps we can make are. I use the term "digital mapping" because it is in common parlance, although it is perhaps more accurate to use the term map visualization, or visualization of spatial information on a map interface. Lev Manovich has claimed, generally speaking, that the main goal of information visualization is "discovering the structure of a (typically large)

[315] A number of edited volumes centered on spatial methodologies have appeared in recent years, including A. HILLIER – A. K. KNOWLES, Placing History: How Maps, Spatial Data, and GIS Are Changing Historical Scholarship, Redlands, Calif., 2008; D. J. BODENHAMER – J. CORRIGAN – T. M. HARRIS, The Spatial Humanities: GIS and the Future of Humanities Scholarship, Bloomington, 2010; I. N. GREGORY – A. GEDDES, Toward Spatial Humanities: Historical GIS and Spatial History, Bloomington, 2014; D. R. MONTELLO – K. GROSSNER – D. G. JANELLE, Space in Mind: Concepts for Spatial Learning and Education, Cambridge, Mass., 2014.

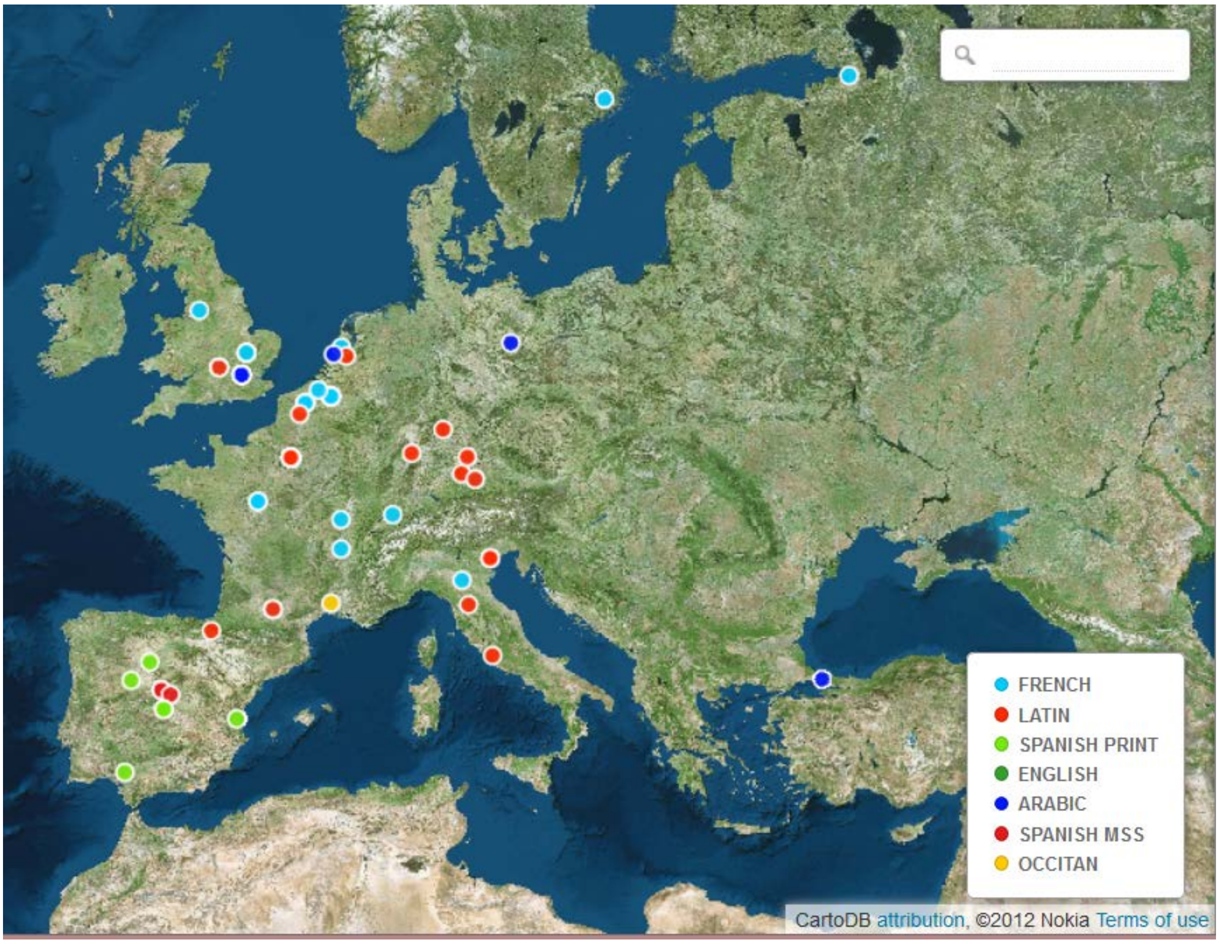
dataset."[316] In the pre-modern humanities, by contrast, the size of the dataset will likely range from small to medium, information can be highly uncertain and the data is usually manually collected.

Map visualizations can be found in all kinds of older printed materials: encyclopedias, linguistic atlases, historical atlases, as well as inserted as figures in the prose of textbooks or scholarly monographs. Depending on the age of the document, and no doubt also the budget of the publication, they can be either professional graphic representations or simple hand-drawn figures. Presentation of research findings in the form of a map usually has the rhetorical function of summary, distilling down complex information into what might be called visual argument, and yet this is only one of the uses of visualization. In recent years with the democratization of basic screen-based mapping, the researcher—guided by hypothesis or even just trial and error—is able generate multiple maps with ease and without the costly constraints of paper-bound publication. Visualization has become part and parcel of the research process. We think through our research through seeing data on maps.

We might link this to the rise of what has been called "spatial literacy" or "spatial thinking."[317] The static representations of canonical atlases are shattered, when the areas of a map are reoriented, when their constituent layers are broken down or recombined, or when the graphical features, colors or backgrounds employed are changed on demand. Current GIS-based software easily accommodates such transformation. Take as an example a static visualization of a key research document many of us deal with, the hand list of manuscripts:

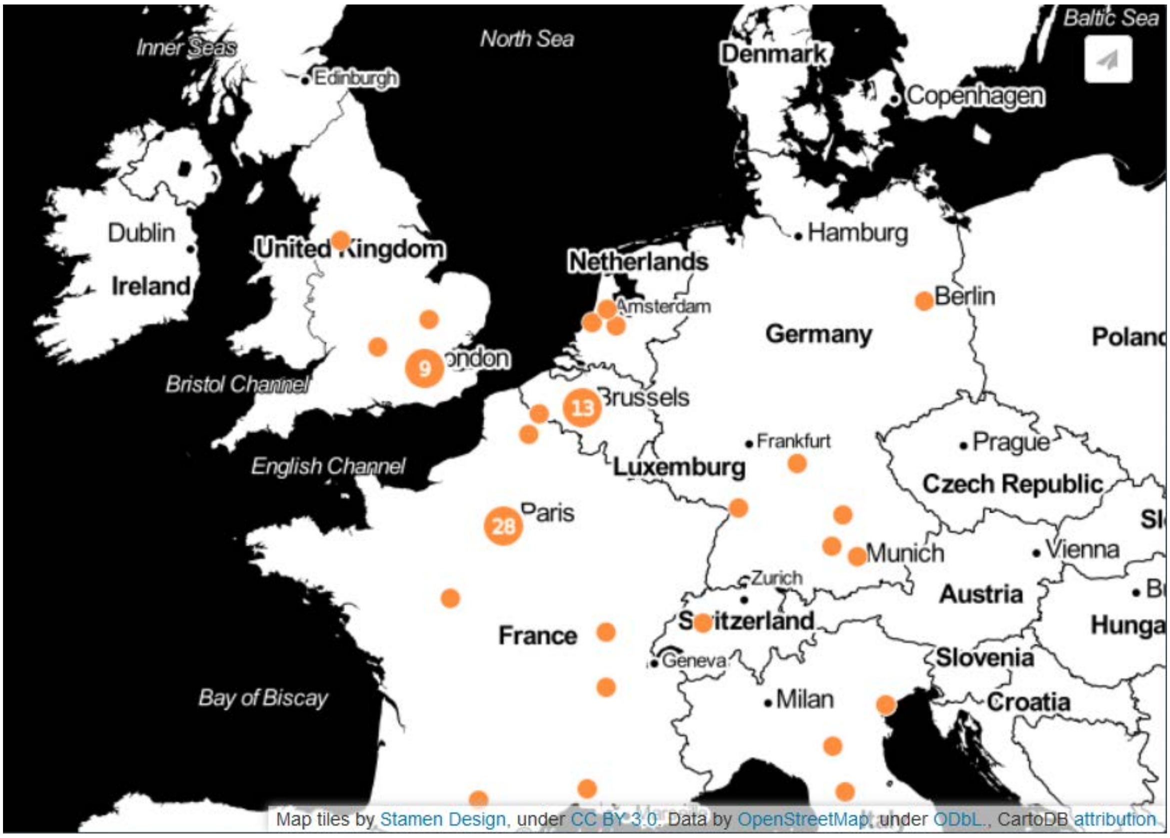
[316] L. MANOVICH, *What is visualization?*, Visual Studies, 26 1/2011, p. 38.

[317] D. UNWIN, *Numbers aren't nasty: a workbook of spatial concepts*, London 2011 http://www.teachspatial.org/sites/teachspatial.org/files/Unwin_WorkbookOfSpatialConcepts.pdf [accessed 10 December 2014].



This map has 108 points on it.[318] It represents a complex, multi-lingual transmission network, that of al-Mubashshir ibn Fātik's eleventh-century Arabic wisdom collection *Mukhtār al-Ḥikam* (The Choice Sayings) in five European languages. The glyphs (the dots) on the map indicate known manuscript witnesses and the Spanish incunabula in the tradition.[319] If you explore this map live you realize that in certain locales, glyphs overlap with each other. It makes Paris with twenty five manuscripts look as important as Valladoid with only one. Using the same data, one way of countering this is to allow the glyphs to aggregate producing weighted clusters:

[318] The map entitled "Mukhar al-Hikam translations" is available live at https://djw.cartodb.com/viz/bbcdb408-8224-11e4-8dba-0e9d821ea90d/public_map.
[319] This hand list expands on manuscript information found in the Archives de littérature du moyen âge (ARLIMA) entry for Guillaume de Tignonville, the translator of the French version: http://www.arlima.net/eh/guillaume_de_tignonville.html [accessed 13 December 2014].



Neither of these maps attempts to represent time; they show only the spatial distribution of different modern holding institutions across languages. Since some of the more effective maps for humanities are ones that adopt a diachronic, comparative approach, an interesting extension of this map would be to place it, side by side, with archival data about the original provenance of such manuscripts to depict the historical movement of this sort of manuscript. Alternatively, a fascinating map might compare manuscript distribution of other Arabic texts, such as the *Kalila and Dimna* or the *Secret of Secrets*, that were translated in Spain during the same period and witnessed similar, widespread transmission.

One of the problems of traditional GIS is the difficulty with which popular standalone software deals with the temporal element of research data. As map visualization moves into web-based formats, mapping technologies are becoming increasingly dynamic. This means, for example, that map visualizations can change as the information contained in them is updated from a live stream, such as in the case of meteorological maps or traffic flow patterns, although the use of live stream data in the pre-modern humanities is unlikely. More commonly, maps can be "animated" in time, such as the FRENCH OF ITALY PROJECT map designed by the Center for Medieval Studies at Fordham University. It illustrates centers of literary production of French documents on the Italian peninsula, with glyphs appearing and disappearing as the x-axis timeline advances.[320] Pop-up windows appear with metadata and some manuscript thumbnail images when glyphs are selected on the map.

Mapping possibilities abound in the humanities. Allow me to suggest a few hypothetical examples. Pre-modern chronicles contain a plethora of toponyms and indications of time, and historians might want a way of organizing that data visually. A static map of a chronicle might include each place mentioned throughout the text indicated by a unique glyph, where color is used to indicate the time of the event. Take, for example, this map made from a dataset of place names occurring in medieval French texts from the twelfth to fifteenth centuries curated by my project VISUALIZING MEDIEVAL PLACES:[321]

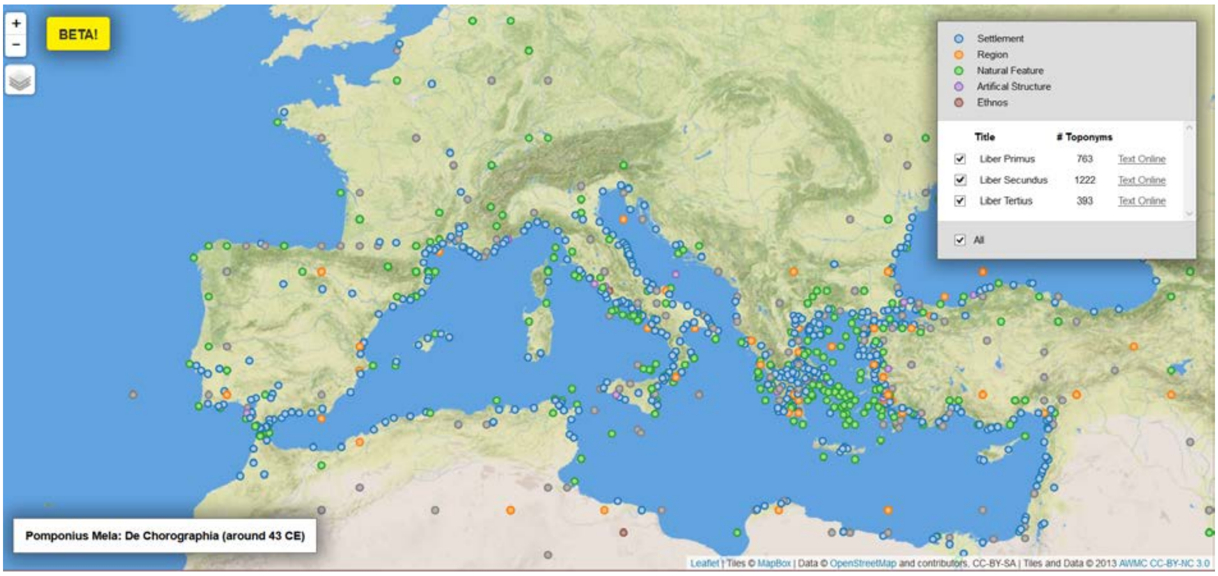
[320] This map was created using NEATLINE (http://neatline.org/), a plug-in for the digital exhibit platform, OMEKA (http://omeka.org/). The Fordham map can be explored at http://frenchofoutremer.com/omeka/neatline/show/french-of-italy-timeline [accessed 8 December 2014].

[321] The VISUALIZING MEDIEVAL PLACES project is described at the project blog http://visualizingmedievalplaces.wordpress.com.

The map depicts the place names of the Eastern Mediterranean found in some one hundred works. The rough time of composition of the work is represented by one of four colors, standing for each of the four centuries included in the project data. This map visualizes, therefore, how places are mentioned *at different moments of historical time*. On the other hand, maps visualized in the PELAGIOS PROJECT's viewer allow us to filter the toponyms found *in narrative time*.[322] The following map illustrates all the places found one single work, Pomponius Mela's *De Chorographia* where the user can filter the data by book.[323] The way that a researcher models spatial data naturally affects the way that such maps need to be read.

[322] The data used in this article can be found on the project blog: http://pelagios-project.blogspot.ca/2014/06/what-have-romans-ever-mapped-for-us.html [accessed 7 December 2014].

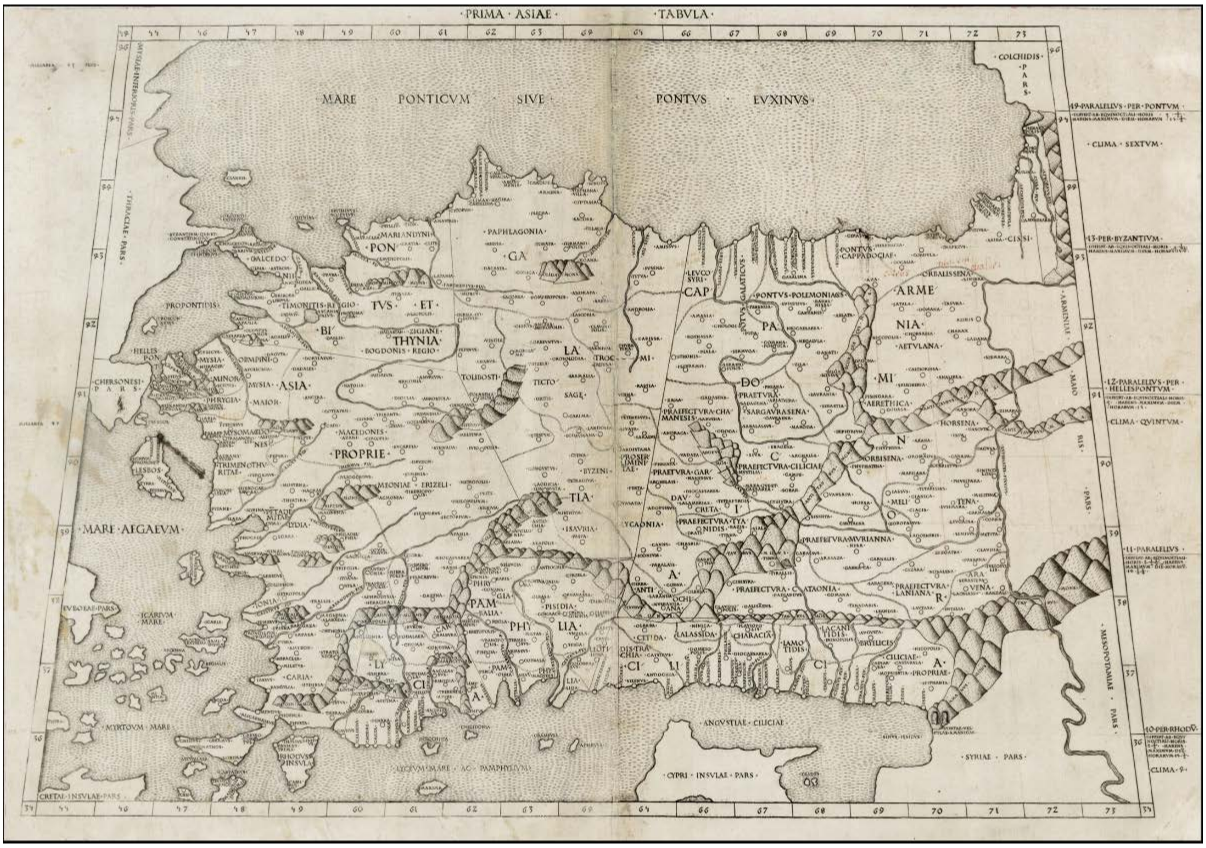
[323] The map visualized in the project's Recogito viewer can be found at http://pelagios.org/recogito/map?doc=18 [13 December 2014].

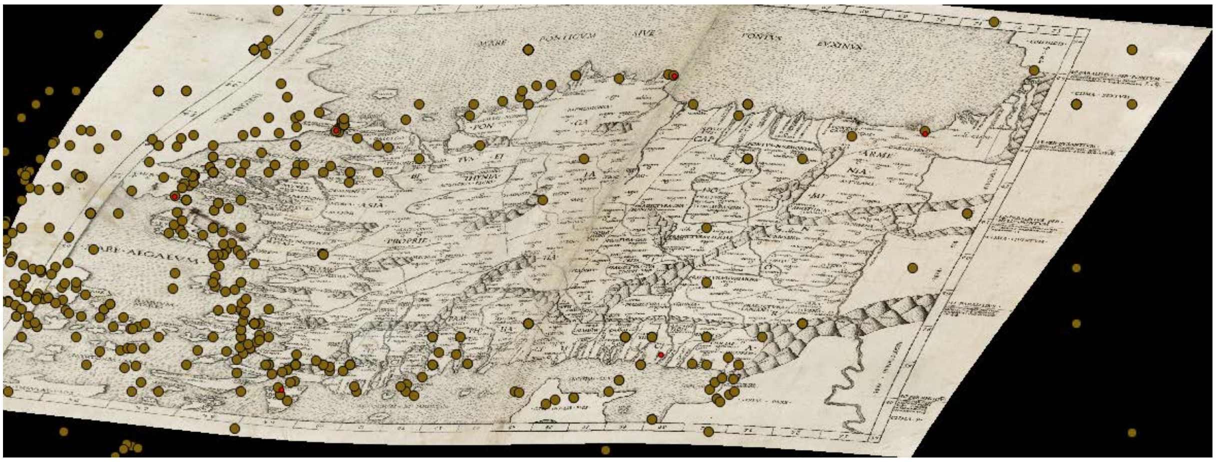


Urban historians might choose to map specific architectural patterns or population density by neighborhood. Art historians might choose to map places associated with patronage together with places of collection or artistic production. Scholars of material culture might want to collect inscriptions, visualized according to language, script or location. Manuscript historians might make point-to-point maps representing provenance trajectories. Scholars of religion might map pilgrimage sites, procession routes or shared sites of devotion. Depending on the complexity of the spaces involved, researchers may need to represents place by more than just a dot on a map, opting for polygonal descriptors. This problem takes us, however, beyond the scope of this article.

Furthermore, the kind of map layer we choose for visualizing that data can be chosen by the researcher. Given that the spatial information of Pomponius Mela's work is largely situated on the Mediterranean coast line and largely in Greece and Italy, the fixed map projection that includes northern Europe in the Recogito viewer seems like a bit of an afterthought. What if we were to map the same data onto a historical map, say, the Prima Asiae Tabula 1478 early printed map of Ptolemy?[324]

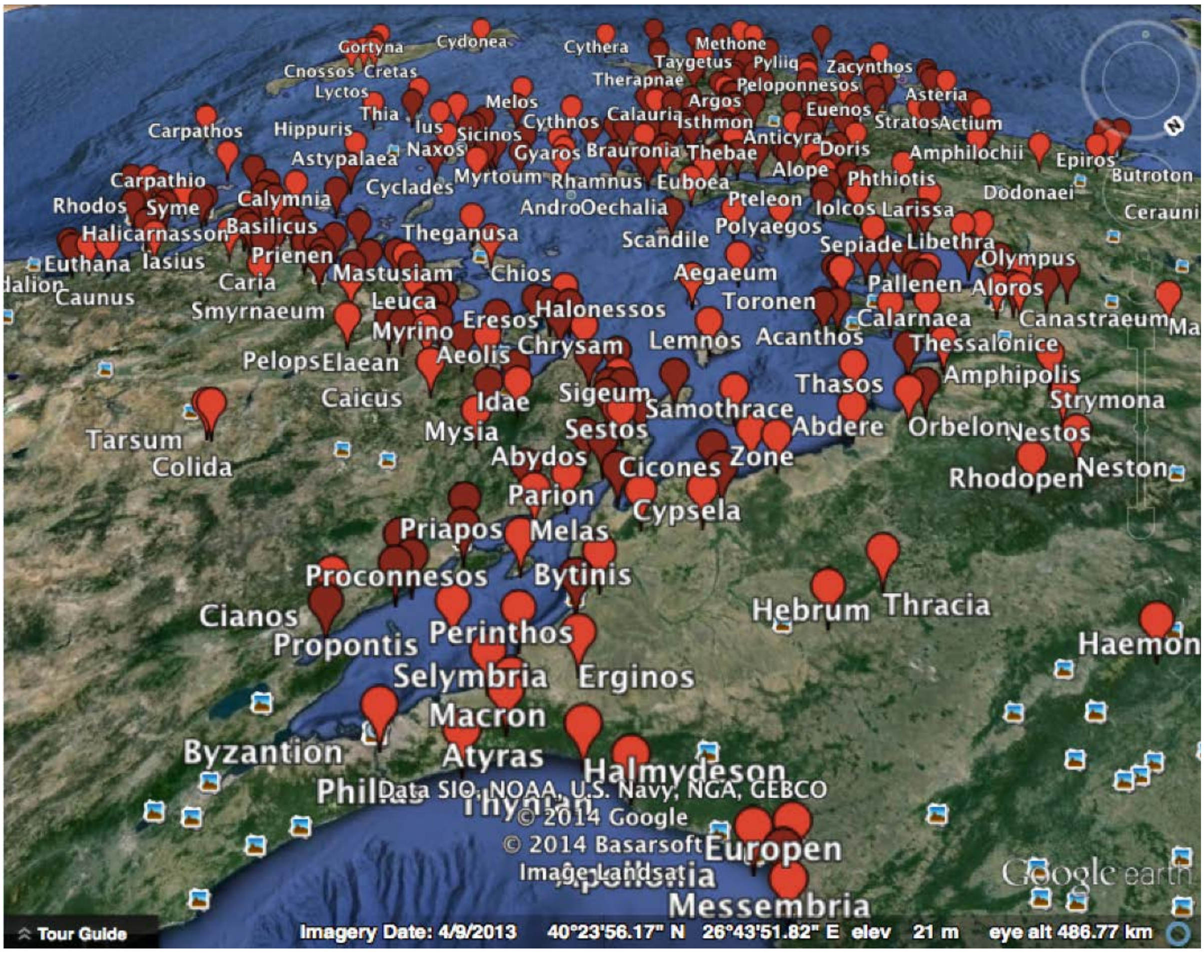
[324] The open-access version of this map can be found at http://commons.wikimedia.org/wiki/File:Prima_Asiae_Tabula_%28Asia_Minor_%26_Cyprus%29_-_Geography_%28Ptolemy%29,_Rome,_1478.jpg .





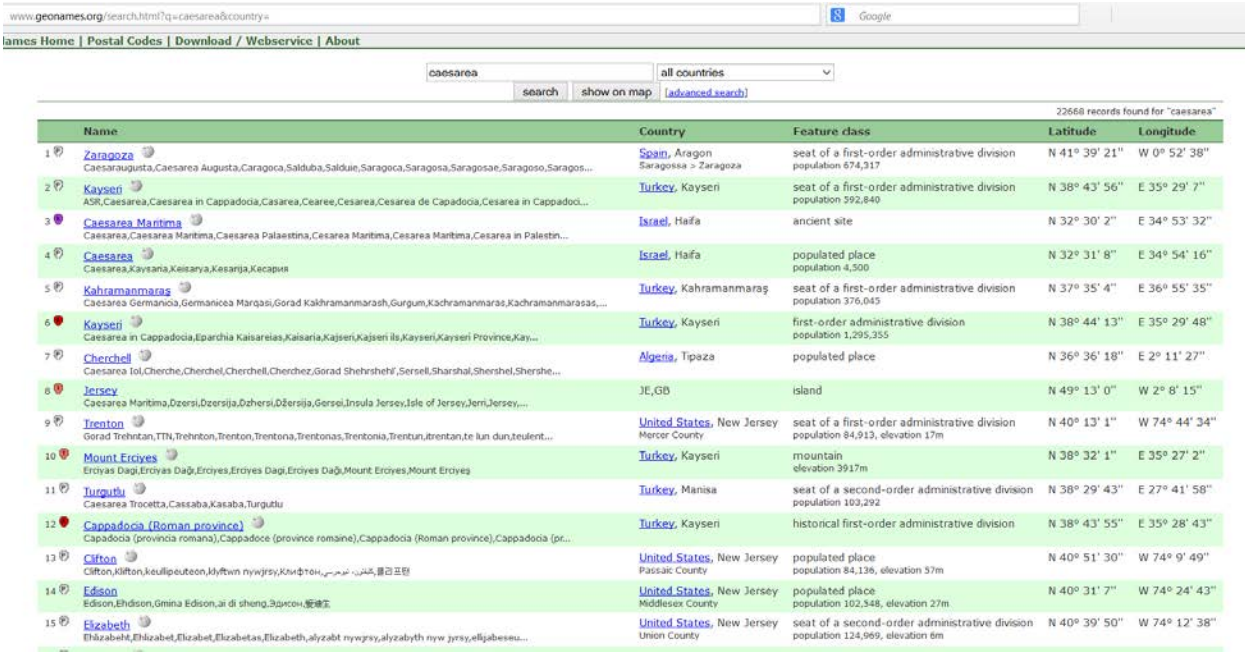
Or what if were to use today's map layers, but visualize them using a tilted view looking south from the Bosphorus?[325]

[325] This map was created in Google Earth using a KML file of the data from the Pelagios website mentioned in notes 8 and 9 above.



The last two maps provide very different ways of viewing the segment of the historical data of Pomponius Mela's text from Greece and Asia Minor, the former emphasizing a coastal perspective and the latter a sea populated with places. (Incidentally, it was possible to make these maps easily because the PELAGIOS PROJECT published their spatial data openly on their project blog for other researchers to use.)

The places that researchers interested in geography have obtained spatial data have changed over time. The traditional source of such information was the official geographic service of contemporary nation-states, but obviously such data come with limitations for the pre-modern researcher. Increasingly, web-based open, community gazetteers provide both contemporary and historical information. Since places are often palimpsests, meaning that their names having changed across languages and time, it is often possible to reach an ancient or a medieval place through its contemporary toponym. GEONAMES, a very large open gazetteer, has multilingual lists of names for common locations. A search for the common Latin place name Caesarea yields a variety of places that once bore that name: for example, Zaragoza in Spain, Kayseri in Turkey or Cherchell in Algeria.



www.geonames.org/search.html?q=caesarea&country=

Google

lames Home | Postal Codes | Download / Webservice | About

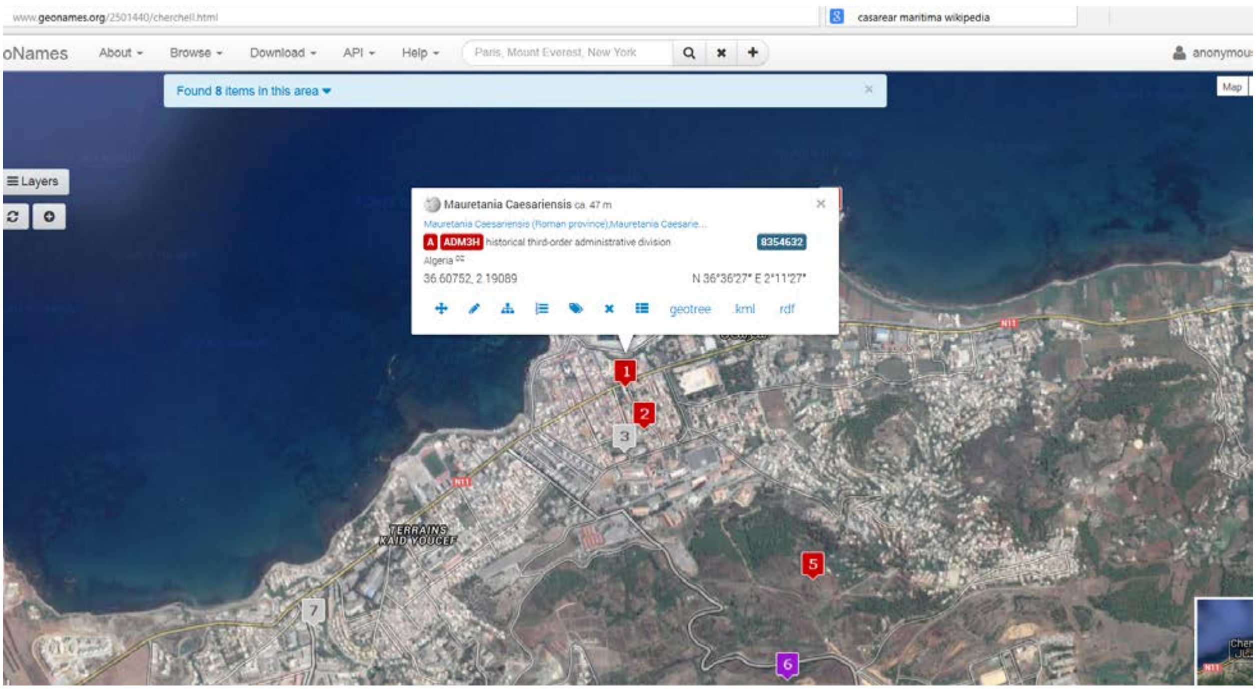
caesarea | all countries

search | show on map | [advanced search]

22668 records found for "caesarea"

	Name	Country	Feature class	Latitude	Longitude
1	Zaragoza Caesaraugusta,Caesarea Augusta,Caragoca,Salduba,Salduie,Saragoca,Saragosa,Saragosae,Saragoso,Saragos...	Spain, Aragon Saragossa > Zaragoza	seat of a first-order administrative division population 674,317	N 41° 39' 21"	W 0° 52' 38"
2	Kayseri ASR,Caesarea,Caesarea in Cappadocia,Casarea,Cearee,Cesarea,Cesarea de Capadocia,Cesarea in Cappadoci...	Turkey, Kayseri	seat of a first-order administrative division population 592,840	N 38° 43' 56"	E 35° 29' 7"
3	Caesarea Maritima Caesarea,Caesarea Maritima,Caesarea Palaestina,Cesarea Maritima,Cesarea Maritima,Cesarea in Palestin...	Israel, Haifa	ancient site	N 32° 30' 2"	E 34° 53' 32"
4	Caesarea Caesarea,Kaysaria,Keisarya,Kesarija,Кесария	Israel, Haifa	populated place population 4,500	N 32° 31' 8"	E 34° 54' 16"
5	Kahramanmaras Caesarea Germanicia,Germanicea Marqasi,Gorad Kakhramanmarash,Gurgum,Kachramanmaras,Kachramanmarasas,...	Turkey, Kahramanmaraş	seat of a first-order administrative division population 376,045	N 37° 35' 4"	E 36° 55' 35"
6	Kayseri Caesarea in Cappadocia,Eparchia Kaisareias,Kaisaria,Kajseri,Kajseri ils,Kayseri,Kayseri Province,Kay...	Turkey, Kayseri	first-order administrative division population 1,295,355	N 38° 44' 13"	E 35° 29' 48"
7	Cherchell Caesarea Iol,Cherche,Cherchel,Cherchell,Cherchez,Gorad Shehrshehl',Sersell,Sharshal,Shershel,Shershe...	Algeria, Tipaza	populated place	N 36° 36' 18"	E 2° 11' 27"
8	Jersey Caesarea Maritima,Dzersi,Dzersija,Dzhersi,Džersija,Gersei,Insula Jersey,Isle of Jersey,Jerri,Jersey,...	JE,GB	island	N 49° 13' 0"	W 2° 8' 15"
9	Trenton Gorad Trehntan,TTN,Trehnton,Trenton,Trentona,Trentonas,Trentonia,Trentun,itrentan,te lun dun,teulent...	United States, New Jersey Mercer County	seat of a first-order administrative division population 84,913, elevation 17m	N 40° 13' 1"	W 74° 44' 34"
10	Mount Erciyes Erciyas Dagi,Erciyas Dağı,Erciyes,Erciyes Dagi,Erciyes Dağı,Mount Erciyes,Mount Erciyes	Turkey, Kayseri	mountain elevation 3917m	N 38° 32' 1"	E 35° 27' 2"
11	Turgutlu Caesarea Trocetta,Cassaba,Kasaba,Turgutlu	Turkey, Manisa	seat of a second-order administrative division population 103,292	N 38° 29' 43"	E 27° 41' 58"
12	Cappadocia (Roman province) Capadocia (provincia romana),Cappadoce (province romaine),Cappadocia (Roman province),Cappadocia (pr...	Turkey, Kayseri	historical first-order administrative division	N 38° 43' 55"	E 35° 28' 43"
13	Clifton Clifton,Klifton,keullipeuteon,klyftwn nywjrsy,Клифтон,کلفتن، نیوجرسی,클리프턴	United States, New Jersey Passaic County	populated place population 84,136, elevation 57m	N 40° 51' 30"	W 74° 9' 49"
14	Edison Edison,Ehdison,Gmina Edison,ai di sheng,Эдисон,愛迪生	United States, New Jersey Middlesex County	populated place population 102,548, elevation 27m	N 40° 31' 7"	W 74° 24' 43"
15	Elizabeth Ehlizabeht,Ehlizabet,Elizabet,Elizabetas,Elizabeth,alyzabt nywjrsy,alyzabyth nyw jyrsy,ellijabeseu...	United States, New Jersey Union County	seat of a second-order administrative division population 124,969, elevation 6m	N 40° 39' 50"	W 74° 12' 38"

If, for example, we are interested in the coordinates of Mauretania Caesariensis, a former Roman administrative division, the capital of which was located at the present site of Cherchell in Algeria, we are lucky since GEONAMES has a stable uniform resource identifier (URI) for it: www.geonames.org/8354632/mauretania-caesariensis.html.



Stable URIs are not currently available for all historical locations. Scholars in coming years will need to create them so that linked data can consistently be created for the places of our research. In general, we must be creative and flexible and accept a certain margin of uncertainty or incompleteness in our spatial data.

The knowledge-sharing community WIKIPEDIA has a large amount of spatial data associated with their articles and is a good place to look for pre-modern locations, although it is important to say that the data is not equal across all languages. The classical Roman world is well documented in gazetteers, as well as archeological sites important for contemporary national identities. An excellent community-built gazetteer named Pleaides for the ancient Greek and Roman world will be expanding to include the Near East, Byzantium and the early medieval world.[326] Detailed historical GIS data is available for China.[327] A gazetteer for Syriac has recently been created.[328] A community sourced gazetteer exists for the ancient world. A few pilots are underway for the historical Arabograph world.[329] Funding has been recently secured for a gazetteer of Byzantine Cyprus.[330] VISUALIZING MEDIEVAL PLACES is collecting pilot data for a multi-dialect gazetteer of medieval French.

When collecting spatial data, a structured table can be as basic a multi-column spreadsheet with an identifier for the research object—here a medieval toponym—spatial coordinates of that place and the source of the data (the URI). It can also be helpful to have a disambiguated contemporary place name associated with it.

medieval name	real place	coordinates	source geodata
Turquie	Turkey	39, 35	http://www.geonames.org/298795/republic-of-turkey.html
Tir	Tyre, Lebanon	33.27333, 35.19389	http://www.geonames.org/267008/tyre.html
Walinforde	Wallingford, England	51.59982, -1.1248	http://www.geonames.org/2634869/wallingford.html
Warrewik	Warwick, England	52.28333, -1.58333	http://www.geonames.org/2634725/warwick.html
North	Winchester, England	51.06513, -1.3187	http://www.geonames.org/2633858/winchester.html
Wincestre	Winchester, England	51.06513, -1.3187	http://www.geonames.org/2633858/winchester.html
Everwik	York, England	53.96396, -1.09142	http://www.geonames.org/2633351/city-of-york.html
Acre	Akko, Israel	32.927778, 35.081667	http://www.geonames.org/295721/-akko.html
Alemaigne	Germany	51.5, 10.5	http://www.geonames.org/2921044/federal-republic-of-germany.h
Alos	Aalst, Belgium	50.93604, 4.0355	http://www.geonames.org/2803448/aalst.html
Amand	Saint-Amand-les-Eaux, France	50.44718, 3.43076	http://www.geonames.org/2981839/saint-amand-les-eaux.html
Andelousie	Andalusia, Spain	37.6, -4.5	http://www.geonames.org/2521750/andalusia.html
Artois	Artois, France	50.5, 2.5	http://www.geonames.org/3036644/artois.html
Anserre	Auxerre, France	47.8, 3.56667	http://www.geonames.org/3035843/auxerre.html

Since historical places are not always represented in contemporary gazetteers, the researcher needs to make all kinds of educated guesses. Historical GIS is, after all, always based on human created data! Consider sharing data when you have brought it to an acceptable level of completion, so that a spatial "community of practice" in your specialized research field can develop.

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326 http://pleiades.stoa.org/ [accessed 13 December 2014].
327 http://www.fas.harvard.edu/~chgis/ [accessed 10 December 2014].
328 http://syriaca.org/geo/index.html [accessed 10 December 2014].
329 See http://alraqmiyyat.org/2014/11/al-thurayya-gazetteer-ver-02/ as well as F. Alotaibi - M. Lee, *Automatically Developing a Fine-grained Arabic Named Entity Corpus and Gazetteer by utilizing Wikipedia*. Proceedings of IJCNLP 2013, pp. 392-400.
330 http://stuartdunn.wordpress.com/2013/10/11/gazetteer-of-byzantine-cyprus/ [accessed 10 December 2014].

There are many platforms for visualizing spatial data on a map interface, each with its own balance of entry costs, openness and functionality. Geographical Information Systems emerged in the 1960s and their powerful standalone applications that are most commonly used today include ArcGIS (by ESRI) and the open-source QGIS. Web-based visualization engines have such as MapBox or CartoDB have also become available in recent years. Companies such as Google, Yahoo and Microsoft are increasingly integrating map visualization technologies into their internet-related services. Map creation solutions are also emerging rapidly for both collaborative research and the mobile environment. Both the technology and the services provided are evolving rapidly at the time of the publication of this article. Digital humanities institutes and training opportunities are the best ways to learn the ropes of more complex platforms. The individual researcher can begin collecting some sample data and experimenting with simpler platforms such as CartoDB and Google Maps.

In lieu of a conclusion, I offer a list of tips for working with historical spatial data:

1. Consult a variety of gazetteers to collect your spatial data, including WIKIPEDIA. Make sure it is in decimal form and not in degrees, minutes, seconds (e.g. Constantinople 41.01384, 28.94966).
2. Save the canonical URI for the spatial data you capture, as you would a citation of a printed or written source (e.g. for Constantinople http://www.geonames.org/745044/istanbul.html or for Herion http://pleiades.stoa.org/places/521034).
3. Make sure that you create structured data, that is, it should be organized in tabular form. It is as simple as using Excel or Access, or their equivalents.
4. Use a consistent vocabulary for your metadata.
5. Take advantage of pre-digital, spatial information found on historical maps. Historical maps are atlases are scholarship and they can help us. Consult digital atlases that have spatial data such as the Digital Atlas of Roman and Medieval Civilization (DARMC) http://darmc.harvard.edu/icb/icb.do. Learn how to geo-rectify analog maps.
6. Do not hesitate to capture the uncertainty of your data, using a typology appropriate for the kind of data you have (e.g. educated guess vs. occasionally attested toponym vs. commonly attested toponym).
7. Record the indigenous terms of place and time in your sources as you work with them (e.g. Julian vs. Gregorian calendar). Find a way to translate these as adequately as possible to match the formats your computer understands.
8. Make maps as you proceed in your research. Think through maps. Do not think of them only as final products.
9. Share your maps on a web-based map visualization engine like Google Maps or CartoDB. Learn to embed them in your blog or websites. Consider sharing portions of your spatial data in CSV (comma separated value) file so that others can work with it, and build upon it.
10. Consider starting a scholarly blog in which you discuss your pre-modern data. As more researchers use spatial technologies, the more useful infrastructure such as region-specific historical gazetteers become.

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