



## *Mapping Dante: A Digital Platform for the Study of Places in the Commedia*

Andrea Gazzoni

### Abstract

This essay presents *Mapping Dante*, a project for the study of the geography of the *Divine Comedy* through a digital map visualizing all of the place-names mentioned in the text. First, the project background is sketched out by a concise overview of the history of the reception and visualization of Dante's geography, of the constellation of digital Dante projects, and of GIS literary mapping. Second, specific stages and issues of *Mapping Dante* are discussed: the making of the dataset and its categories, the heterogeneity of medieval geography, the structure of the map with layers and pop-up cards. Conceived as a repository of Dante's encyclopedic use of geography in the *Commedia*, the map is also an experiment in connecting text and cartography through the possibilities offered by GIS technology. By exploring different visualizations of a set layers based on textual, cultural and rhetorical categories, users can search for patterns in the distribution of Dante's geographical references, and can retrieve information relevant to each passage in which a place is mentioned.

*Mapping Dante* [[www.mappingdante.com](http://www.mappingdante.com)] is a project in progress for the study of the geography of the *Divine Comedy*. Launched in May 2016, it consists of a digital interactive map with all of the place-names mentioned in the poem, and of additional non-cartographic materials: the Italian text of the *Commedia* with links to all of its geographical references, a network visualization of the relations between individual cantos and places, and a set of charts with quantitative analyses of the same dataset on which the map is based. The constellation of digital projects about Dante and his *Commedia* is remarkably wide, certainly wider than for any other Italian author, with some outcomes at the cutting edge of digital literary scholarship. So far, however, none of these projects has taken advantage of digital mapping technologies to address the full scope of the geographical imagination recalled in the poem by Dante's "cartographic impulse" (Cachey, Jr., "Cartographic Dante", 325). The purpose of *Mapping Dante* is to fill this gap, providing readers of the *Commedia* with a map that is complete and reliable, and also capable of posing questions about the ways in which its very content has been cartographically generated.

The major encyclopedic websites on Dante, given their organization of a panoply of hyperlinked resources, highlight the value of interconnectivity. The multimodal configuration typical of Dante's work and of its reception require links between the modes of space and language. The digital artifact must be an extensive and intensive hypertext that points to an underlying composite encyclopedia of materials. If *Mapping Dante* moves away from that "panoply-model" that governs websites like *Princeton Dante* (Hollander), *Digital Dante* (Barolini) or *The World of Dante* (Parker), it does so out of apparent practical constraints on time and resources, as illustrated in section 2 of this essay. Yet, making a virtue of necessity, it might be also said that the real *raison d'être* of *Mapping Dante* has to do with the evolution of digital scholarship from "digitization" of pre-digital materials (Burdick et al. 8-9) to "knowledge design" (Schnapp), that

is, from a use of computational technologies mostly as the infrastructure of data repositories to an approach that tries to investigate the forms in which we receive, produce, and circulate knowledge. With a number of successful encyclopedic Dante websites already online, it may now be time to design not as much big repositories as relatively small-scale experiments characterized by a sharper focus on the issues raised by a specific subject and on the possibilities offered by specific digital interfaces,<sup>1</sup> GIS literary mapping being a case in point. As in Digital Humanities at large, the making of new projects goes along with the making of new questions and the re-examination of old ones.

### 1. Reading Dante's Geography: from Glosses to Maps to GIS



Fig. 1. Complete extent of Dante's geographical references. Source: [www.mappingdante.com](http://www.mappingdante.com).

A complete map of the *Commedia*'s repertoire of places has been long overdue, for cultural and material reasons. The interest in the geography of the *Commedia* dates back to its early commentaries (14th century) containing glosses with localization, description, and identification of places. The *Commedia* is the first vernacular work glossed line by line as if equated to the great poems of the ancient *auctores*, Virgil, Ovid, Lucan, and Statius, which were commonly read also as encyclopedic repositories of knowledge in a number of fields, including geography. The quantity and extent of geographical references in the *Commedia* covers what was believed to be the inhabited world (Moore, 114-119), from Scandinavia to the African desert, from the Pillars of Hercules to India (see fig. 1); the invention of the location of Purgatory in the Southern hemisphere first visited in Ulysses's last voyage (Boyde 109-111) is the exception that proves the

<sup>1</sup> See for example *Intertextual Dante* (Van Peteghem), a sub-project added to *Digital Dante* (Barolini), *DanteSources* (Bartalesi et al.), or the Twitter version of Petrarch's *Rerum Vulgarium Fragmenta* (Lollini and Rosenberg).

rule. The Middle Ages, however, did not visualize space as modern maps do, that is, as a dimension regulated by the uniformity of linear standard measurements (Farinelli, *Geografia* 15-16): the world addressed by medieval geography, in fact, remained an ensemble of ontologically different places that did not sit on a uniform space (Rouse 18), whether written as a *descriptio orbis* or visualized as a *mappa mundi* (Harvey 19-38).<sup>2</sup> The standards of uniformity, exactness and proportion typical of modern cartography are partially anticipated in the late Middle Ages by some of the extant regional maps from the late Middle Ages (Harvey 82-93) and by nautical charts (Harvey 39-50). As suggested by Cachey, Jr. (“Cosmology” 238-239), Dante may have integrated these two cartographic forms with the more traditional view of the *descriptio* or *mappa mundi*.

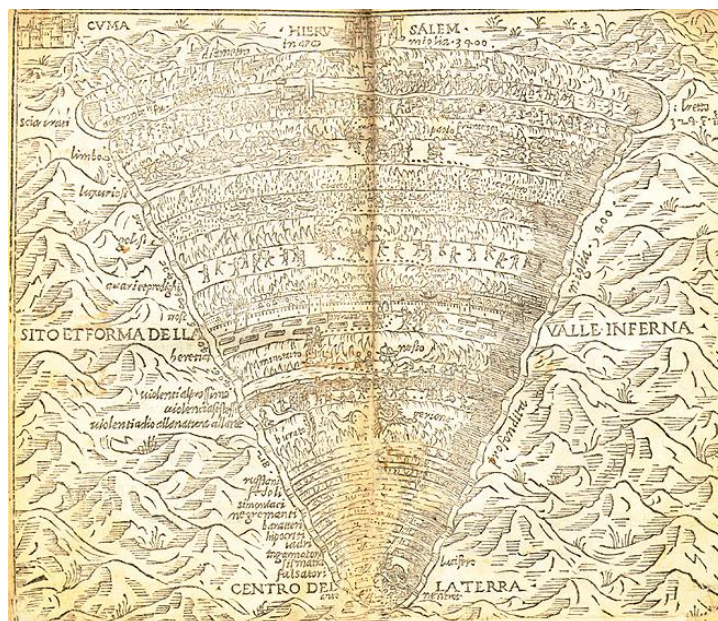


Fig. 2. An example of diegetic map: the cross-section of Dante's hell from *Lo'nferno el Purgatorio e'l paradiso di Dante Alaghieri*, the 1515 Aldine edition of the *Commedia*. The calculations of infernal mileage are derived from the study of Antonio Manetti (1423-1497). Source: [www.italnet.nd.edu/Dante/text/Hell.html](http://www.italnet.nd.edu/Dante/text/Hell.html).

It was only in the age of the rise of modern cartography (between the 15th and 16th centuries) that the first maps of the *Commedia* were produced, with representations of the realms of afterlife, particularly hell (Kleiner 23-34), rather than of the “real” place-names in the poem: diegetic maps of the spatial architecture of the narrative (see fig. 2) instead of non-diegetic maps of its geographical encyclopedia. It could be argued that while the subject of diegetic maps (the immutable spaces of afterlife) was held to be stable, uniform, regular, and measurable despite some inconsistencies on Dante's part (Kleiner 34-56), the potential subject of non-diegetic maps was considered imprecise, erratic, and impervious to the homogeneity of visualized space. In any event, diegetic cartography soon became a standard companion to the text of the *Commedia*; its format has remained unchanged even after the switch to the digital.

<sup>2</sup> See <http://www.themappamundi.co.uk/> for an interactive visualization of one of the most important extant *mappae mundi*, the Hereford map, rich with elements and places drawn from mythology, biblical stories, bestiaries, etc.





Fig. 3. Non-diegetic maps of Italy and Tuscany from Mary Hensman, *Dante Map* (David Nutt: London, 1892). Source: [www.worldofdante.org/dantemap\\_detail.html](http://www.worldofdante.org/dantemap_detail.html).

It is only in the second half of the 19th century that the *Commedia* provides the basis for non-diegetic maps, when for the sake of erudition and cultural tourism some literati in Italy and Europe compiled lists and descriptions of the places Dante mentioned and visited (Cavaliere 111-122). The approach was innovative, but such illustrations could not render the full scope of Dante's geography, which reaches well beyond Italy, although the Italo-centric focus was certainly reasonable, for the self-evident reason that the majority of the *Commedia*'s place-names are Italian (fig. 3). This is the kind of map that we still find in the apparatus of recent editions of the poem.<sup>3</sup> Conversely, the most authoritative scholarship on the Dante's geography from one end to the other of the 20th century (Moore; Boyde 96-111; Cachey, Jr., "Cosmology") has been interested more in analyzing the overall outlines of Dante's world and cosmos than in studying how the *mappa mundi* virtually present in his *Commedia* becomes concrete through the distribution of local references in the text.

A complete non-diegetic map would be a support meant to make visible the geography of the *Commedia* both in its wider cultural understanding and its particular instantiation. Nevertheless, with cartographic techniques based on static printed surfaces the resulting format would simply be too large and unwieldy: materially, it should be at the same time large-scaled, to

<sup>3</sup> See the maps in Singleton's commentary on the *Inferno*: the course of the Po River, the region of Virgil's birth, Italy, and Tuscany. The *Princeton Dante* has two maps of Italy and Tuscany, while *The World of Dante* reproduces the maps of Italy and Tuscany originally in Mary Hensman's 1892 compilation *Dante Map*.

legibly visualize even the most densely referenced areas like Tuscany, and wide enough to extend into the distant expanses of Africa and Asia. This is the first limitation inherent in modern cartography, insofar as it is static: on a fairly small-sized map with a fixed scale only a certain amount of legible information can be graphically inscribed; the second limitation is that mapped surfaces do not allow the inscription of much more than name and location of a geographical item, thus cutting off most of the relations between text and place-names.

A possibility of reconnection has emerged with digital mapping platforms known as GIS (Geographic Information Systems). If decades ago GIS was a notion familiar only to specialists such as geographers and map-makers, today this technology pervades our lives (e.g. Google Maps) by virtue of its versatility and inclusiveness, with a range of purposes that goes well beyond its original geo-coding function and that makes it integral to the present and the future of the “spatial turn” in the humanities (Bodenhamer). GIS puts control of the digital representation in the hands of a mapmaker who is capable of manipulating the data tables from which a map is generated and the way they are visually translated into a set of cartographic layers. By creating and editing connections between the “spatialized variables” in the map, a GIS operator is able to produce a range of “composite mappings, visual representations, and spatial models for analysis” (Travis 5). Three points are most relevant to the study of how texts negotiate their references to the external world (Piatti 89): a GIS map is – in form and content – built up by the arrangement of multiple layers, each of them being a particular take on the dataset; it is open to variation and manipulation; it can integrate, on a cartographical basis, a huge volume of non-cartographic data. Along these lines, GIS mapping proves to be structurally closer to the way literary texts work (multiple perspectives, deformation/construction of realities, multimodality); even more significantly, they end up resembling the ways medieval geography worked. As scholars involved in mapping projects clearly pointed out, what we can reap from maps are patterns and conjectures rather than full-fledged interpretations, the elaboration of which will be the task of a reader/viewer and will require careful cross-analysis of text and map. (Moretti 53-54, Piatti 91, Travis 19-20).

The development of an increasing number of GIS-based mapping projects attests to both the *standards* imposed by new technological platforms and the *variations* that digital humanists can elaborate in step with their field and object of study. One major distinction that emerges against this general background is one addressed before between diegetic and non-diegetic maps. Diegetic maps are much used for studies in modern novels, usually qualified by realistic spatial configurations within which the narrative unfolds as if on a modern map, but they cannot properly visualize the composite ensemble of places that is frequently found, for example, in medieval literary texts; nor can diegetic maps properly visualize any geographical imagination that is not directly related to the architecture of a narrative. Although not able to solve certain issues like the positioning of “imaginary” places, non-diegetic maps illustrate the geographical encyclopedia of a given corpus without trying to mirror the spatiality of a narrative that unfolds in a real (or realistic) world. Obvious as this characteristic can be, it implicitly underscores the non-correspondence between page and place: how do we mentally and materially connect two dimensions apparently so heterogeneous? This may not be immediately manifest in non-diegetic mapping projects either outside the realm of literature or dealing with a corpus too large to allow in-detail examination.<sup>4</sup> Yet the question arises from the very process of map-making, and becomes central to projects based on medieval culture (Wrisley, “Spatial Humanities”). Conversant with those approaches but with a substantially smaller corpus, *Mapping Dante* investigates the connection of text and place both extensively and intensively: in an encyclopedic way, but studying only one source text.

---

<sup>4</sup> See for instance the *Digital Atlas of Roman and Medieval Civilizations* (McCormick) and *Visualizing Medieval Places* (Wrisley).

I have to note beforehand that a GIS map of the places of the *Commedia* did already exist (Soars), though quite raw and hardly known, probably because it appeared on an information design blog rather than on a dedicated scholarly site: its dataset was taken from Wikipedia, and the visualization consists of only three layers (places mentioned in *Inferno*, *Purgatorio*, and *Paradiso* respectively), with no additional information incorporated: in this first attempt the scholarly and didactic potential of GIS technology lies almost completely untapped. The only other GIS Dante project which I have known was part of the site *Mapping the Medieval*, and was limited to Florence, being the outcome of a collaborative classroom work on Florentine places referred to by Dante and his fellow citizen Dino Compagni (Hamilton). None of these GIS projects was known to me until months after the launch of *Mapping Dante*, as they have not been included in any online list of digital Dante resources, and are no longer functioning.<sup>5</sup>

## 2. Project Description

The delimitation of the corpus of *Mapping Dante* and the definition of its purpose were first determined by the time and resources available. The plan was to have the project completed and usable in a year of intermittent work supported by an Early Incubation Grant from the Price Lab for Digital Humanities of the University of Pennsylvania. At the same time, I intended to be able to complete, manage, and update both map and website without extra funding and specialist assistance. By envisioning a low-cost and medium-scale project realistically manageable, I intended to demonstrate that even without considerable financial and technological resources, a satisfactory outcome should be possible to a scholar with average computer skills and limited access to funding.

The first step of *Mapping Dante* was the choice of a map-making tool among many options. I opted for ArcGIS, a high-end software produced by Esri, most suitable in terms of interface and versatility, with customizable pop-up cards and practically no limits to the number of layers in the map. Although the very first steps of the map were created with ArcGIS Desktop (the full version of the software, accessible through my university), then exported to ArcGIS Online to be published, I soon decided that the job could be done directly on the online platform with a free public account: fewer functions, but still enough for the task. Moreover, while the transition to the more basic online version placed some constraints on map-making, it gave me full control of the process, with a gentler learning curve.

Dante's *Commedia* has 340 geographical items, for a total of 724 mentions. Before going digital, however, I had to start off with an analog exercise: close reading of the entire *Commedia* in order to compile a dataset with the help of commentaries, repertoires, and gazetteers.<sup>6</sup> No machine reading; what was needed, on the contrary, was annotation and description of the places and of the passages where they are mentioned. How can information be extracted from the text and made into a workable format? The integrity of the source text had to be fragmented and translated into another textuality determined by spatial models and computing protocols rather than by the sequential reading. In this respect, Harley's contention that maps are a "cultural text" (7) and that all the steps of its making, namely "selection, omission, simplification, classification" are "inherently rhetorical" (11), rings quite true, though with a caveat: maps and texts have different rules. Since those imposed by GIS are indeed strict, having been originally fashioned for

---

<sup>5</sup> In Soars' map the base terrain on which places are pinned is not visible; Hamilton's map is no longer online so that my knowledge of it is limited to what can be read in his article.

<sup>6</sup> The two most helpful resources have been the digital *Dartmouth Dante Project* (Hollander), with easy access to more than 70 commentaries, and the entries in the *Enciclopedia dantesca* (Bosco).

quantitative approaches, to speak qualitatively in the native language of GIS is a challenge for humanists (Bodenhamer), both frustrating and fascinating. GIS functions with spreadsheets formatted in rows and columns, where each place is identified by latitude and longitude and optionally described by additional data. What elements shall we write into the spreadsheet, and by what categories? The cartographic infrastructure, whether analog or digital, tolerates no ambiguity (Farinelli, *Crisi* 21), since the mapping protocol relies on a rigid opposition between 0 and 1, yes and no. At this level, *tertium non datur* – the very opposite of a literary text.

With medieval texts, the cartographer may come across a typical problem: a location cannot be indicated by exact longitude and latitude coordinates. That could be due to destruction that left scant or uncertain archeological evidence, as is the case with the pre-Roman Alba Longa (fig. 4), the biblical Sodom and Gomorrah, or the castle of Cunio in Romagna (razed to the ground at the end of the 13th century).

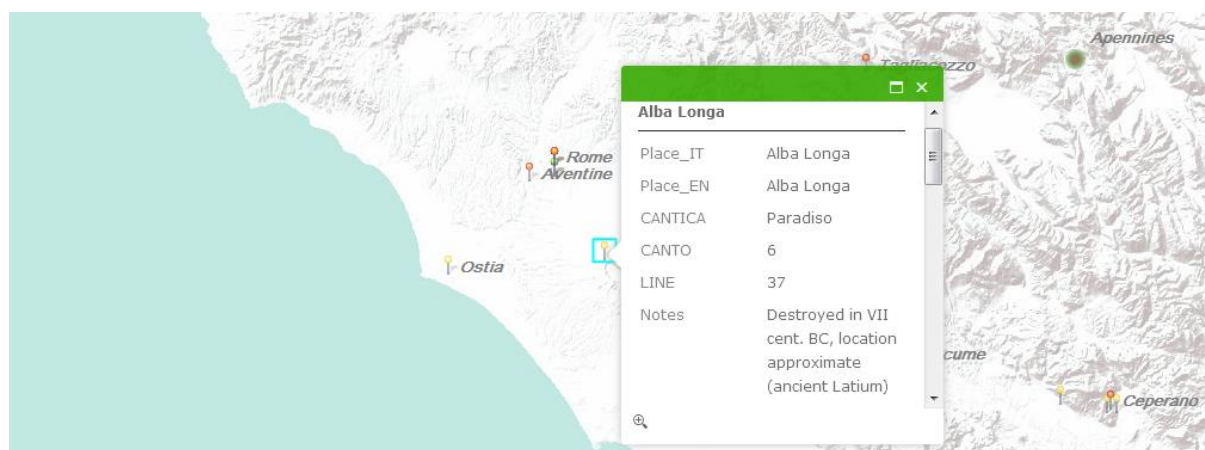


Fig. 4. Approximate location of Alba Longa. Source: [www.mappingdante.com](http://www.mappingdante.com).

Uncertainty could derive from the irremediably vague nature of a culture's knowledge of a place, in terms sometimes even bordering on legend and mythology, as happens with places such as Tartary or the Rhiphaean Mountains. In a literary map, however, these issues can be faced with the help of commentaries and gazetteers, and with an acceptable degree of approximation and arbitrariness. Another problem is posed by places of a certain extension like regions, kingdom, and the like: drawing neatly-contoured areas (what in the GIS language is a polygon) would have been a debatable choice, given the fluid and uncertain configuration of frontiers in Dante's age as well as in the classical and biblical geography to which he often refers. This is why extended areas in the map are marked only by a symbol (a radial color-gradient suggesting expansion). It is true that, if I were a cartographer this would not be an example of best practice, since on the same surface ill-defined places coexists with precise ones. Yet such problems shed light on a distinctive quality of Dante's geographical imagination already stated above: heterogeneity. What are the implications of putting all the place markers on one surface, no matter if layered? As one of the tenets of Westphal's *géocritique* goes, "space cannot be understood except in its heterogeneity" (37): ancient and contemporary, small and vast, localized and vague, near and far, imaginary and real, experienced and known by reading or hearsay.

Ambiguity and complexity point to a variety of relationships between text and world, place-names and "real" referents. Let us compare, for example, the Acquacheta waterfall mentioned in a simile in *Inf.* XVI (94-102) with the Carthaginian Zama of *Inf.* XXXI (115-117): while the former is a precise description of a place known first-hand by Dante, the latter is a faraway place famous because written accounts of Roman history mention it as the location of the final battle of the Second Punic War. By a modern cartographical standard, Acquacheta and

Zama should have the same quantitative and qualitative properties; alternatively, Dante's geography is multi-focal and differential, which is what the dataset records. Visualizing this on the map helps scholars to understand the range of effects of the mention of places in the *Commedia*.

On the one hand, the intimacy of Acquacheta augments its rhetorical function not only by providing a sonic and visual equivalent to the falling of the Phlegeton river down a steep cliff, but also by reinforcing Dante's status as direct witness of things in afterlife inaccessible to the experience of his readers.<sup>7</sup> The assumption is: "I have seen that waterfall in hell as directly and vividly as I saw that waterfall in the Apennines"; not by chance, the passage is followed by the appearance of the infernal monster Geryon and by a crucial address to the reader in which Dante swears on the *Commedia* itself that he did see this incredible creature.<sup>8</sup> On the other hand, the mention of Zama in Virgil's address to the giant Antaeus in *Inferno* XXXI is certainly a *captatio benevolentiae* that links the glory of Scipio Africanus's victory with the origins of Antaeus himself, but it also serves to distance him from Dante and his readers.<sup>9</sup> The giants Dante sees in lower hell all belong to a sort of pre-history, either biblical (Nembrot) or classical (Ephialtes, Briareus, Antaeus), their hybris having been crushed by the forces of Good; hence the inaccessibility of Zama, with its aura of mythical and historical antiquity, helps us to appreciate the full extent of Antaeus' menacing otherness. At the same time, Zama's status tells us something about the speaker in this passage: the fact that Virgil realistically uses references drawn from his pagan culture is a minor but significant instance of the divide that irremediably separates Virgil as a character from the Christian era. In short, the range of relations between the text and the places mentioned calls for an interpretation that can be effectively supported by the versatility of a GIS map.

The underlying data organization facilitates precise indication of spaces while also embracing the ambiguities of Dante's use of these geospatial terms in the *Commedia*. Each row in the spreadsheet corresponds to a specific mention, and rows are divided by columns that separate and encapsulate pieces of information (this structure is visible in the pop-up cards describing each single mention, as in fig. 4). The row begins with the place-name in Italian and English, and then continues with the data we need to locate the passage in the poem: cantica, canto, and line. The "Notes" field then gives the aliases of a place if the *Commedia* differs from today's usage (e.g. in *Inf.* VII, 22, Charybdis instead of Punta del Faro for the Sicilian tip of the Messina Straits); the same entry may signal when the location is uncertain or hypothetical, or when Dante uses a municipal landmark to recall a town or a city (e.g. Lateran for Rome in *Par.* XXXI, 35, Ponte Vecchio for Florence in *Par.* XVI, 145-146, and Rue du Fuarre for Paris in *Par.* X, 137). Next is "Place category", that could be specific place (cities, towns, mountains, castles, and the like),

<sup>7</sup> "Come quel fiume c'ha proprio cammino / prima dal Monte Viso 'nver' levante, / da la sinistra costa d'Apennino, // che si chiama Acquacheta suso, avante / che si divalli giù nel basso letto, / e a Forlì di quel nome è vacante, // rimbomba là sovra San Benedetto / de l'Alpe per cadere ad una scesa / ove dovea per mille esser recetto" (*Inf.* XVI.94-102).

<sup>8</sup> "Sempre a quell ver ch'ha faccia di menzogna / de' l'uom chiuder le labbra fin ch'el ouote, però che senza colpa fa vergogna; // ma qui tacer nol posso; e per le note / di questa comedia, lettor, ti giuro, / s'elle non sien di lunga grazia vòte, // ch'i' vidi per quell'aere grosso e scuro / venir notando una figura in suso" (*Inf.* XVI.124-133). Note also that this is the first time Dante refers to the *Commedia* as such.

<sup>9</sup> O tu che ne la fortunata valle / che fece Scipion di gloria reda, / quand'Anibàl co' suoi diede le spalle, // recasti già mille leon per preda, / e che, se fossi stato a l'alta guerra / de' tuoi fratelli, ancor par che si creda // ch'avrebber vinto i figli de la terra; / mettine giù, e non ten vegna schifo, / dove Cocito la freddura serra" (*Inf.* XXXI.115-123). The reference to Antaeus's origins comes from Lucan's *Pharsalia* (IV.589-594)



region (differentiated as small, medium and large),<sup>10</sup> river, sea, and lake. It must be noted that while waters are in the dataset, their course and extension are not visualized on the map now because of some technical limitations imposed by the free ArcGIS online account (as a workaround, they will be soon visualized by specific pins). Subsequently, we have the Italian and English text of the stanza where the mention occurs; if you need more context, quotations are followed by a link that redirects you to a page on the website where you see the passage highlighted within the entire Italian text of its canto.

Then comes the speaker who mentions a place: there are 80 of them, and their list ordered by frequency can be seen on the chart section of the website: 173 occurrences for Dante-narrator, 61 for Virgil, 42 for Cacciaguida, and surprisingly only 39 for Dante-character. Most notably, Cacciaguida speaks only in 3 cantos, *Par. XV-XVII*; Beatrice, Dante's guide from *Purg. XXX* to *Par. XXXIII*, ranks only tenth with 14 mentions. This is a good example of how a geographical approach can enhance our understanding of the *Commedia*: as eloquently indicated by the figures, while Beatrice leads Dante in his cosmico-theological transcending of the limitation of the earthly world and its geography, in the middle of *Paradiso* Cacciaguida brings Dante back to the eminently concrete geographical dimension of his origin, life and mission. These two tensions are complementary, and can be further explored by means of quantitative and qualitative analysis.

The following categories in the data sheet are filled by “Yes” or a blank, and can be grouped in two sets. One I would call historico-cultural, and signals if a place was visited by Dante,<sup>11</sup> and if it was mentioned as classical, mythological, and biblical, a tripartition not perfect but handy for the description of the diverse status of places.<sup>12</sup> The other group describes rhetorical features of how a place is referred to in a passage: explicitly or by periphrasis, as an adjective, as part of a simile, and by direct speech.

The map translates these categories into pop-up cards, one for each mention of a place, but first and foremost it plots a number of them into an extensive view of superimposed layers. The layers' list, shown in a window on the right side of the map, is as follows: two frequency layers (one with scaled pins, the other as a heat map: the warmer the color the more mentioned an area is, see fig.5); four layers per cantica, (*Inferno*, *Purgatorio*, and *Paradiso* being subdivided into specific places, small regions, medium regions, and large regions); four historico-cultural layers (visited by Dante, classical, mythological, biblical), four rhetorical layers (explicit, by periphrasis, as an adjective, in a simile, by direct speech). Within this structure, users can toggle layers on and off to customize visualization, and can also zoom in and out to analyze place distribution at different scales. By default, the map shows only the layers based on *Inferno*, *Purgatorio*, and *Paradiso*. At the most global view (see fig. 5), this really highlights how the *Commedia* is both a Mediterranean text and a North-Central Italian one. At a closer view and with the aid of layer selection, more specific distributions of place-names can be studied.

---

<sup>10</sup> Of course, this partition had to be done with a fair degree of approximation.

<sup>11</sup> To determine this value in the spreadsheet, my main reference was Inglese's recent biography of Dante.

<sup>12</sup> This classification is similar to the categories of the search tool of *The World of Dante* website (Parker), where places are arranged by “Nature” (mythical or historical) and “Source” (biblical, classical, medieval).

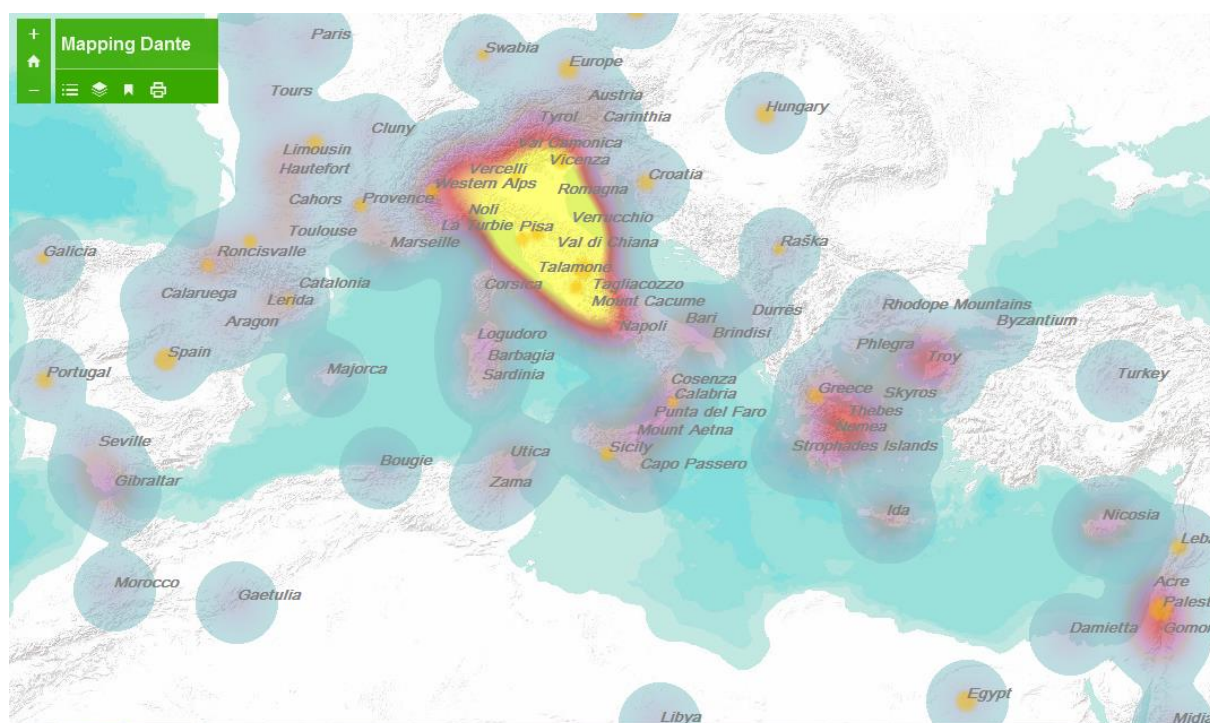


Fig. 5. The Mediterranean region as a heat map. The distinction between warm and cool areas becomes more articulate as we zoom in. Source: [www.mappingdante.com](http://www.mappingdante.com).

A dataset constructed by close reading has thus been turned into a geo-visualization that has dismembered its source text and placed it on a surface governed by the partially incompatible protocol of cartography. Yet through GIS technology we can reconnect the cartographical with the textual, insofar as we can write elements of the poem into the map through layers, pop-up cards, and links. The result is a map of relations: the places visualized recombine a network that branches off in two directions: into both text and the world. The non-cartographic visualizations present in the *Mapping Dante* website have precisely this goal: to underscore that a map is a provisional artifact, as the information it stores lies open to further investigations with diverse approaches.

The same bundle of relations inscribed into the dataset can thus be transformed in ways that create new points of entry into the *Commedia*. A visual analysis of the connections between places and cantos in an interactive graph links canti according to places in common or types of places. These links suggest pathways of analysis through the poem, much like vocabulary, metaphor, characters, or historical sources have offered for previous scholarship (see fig. 6).

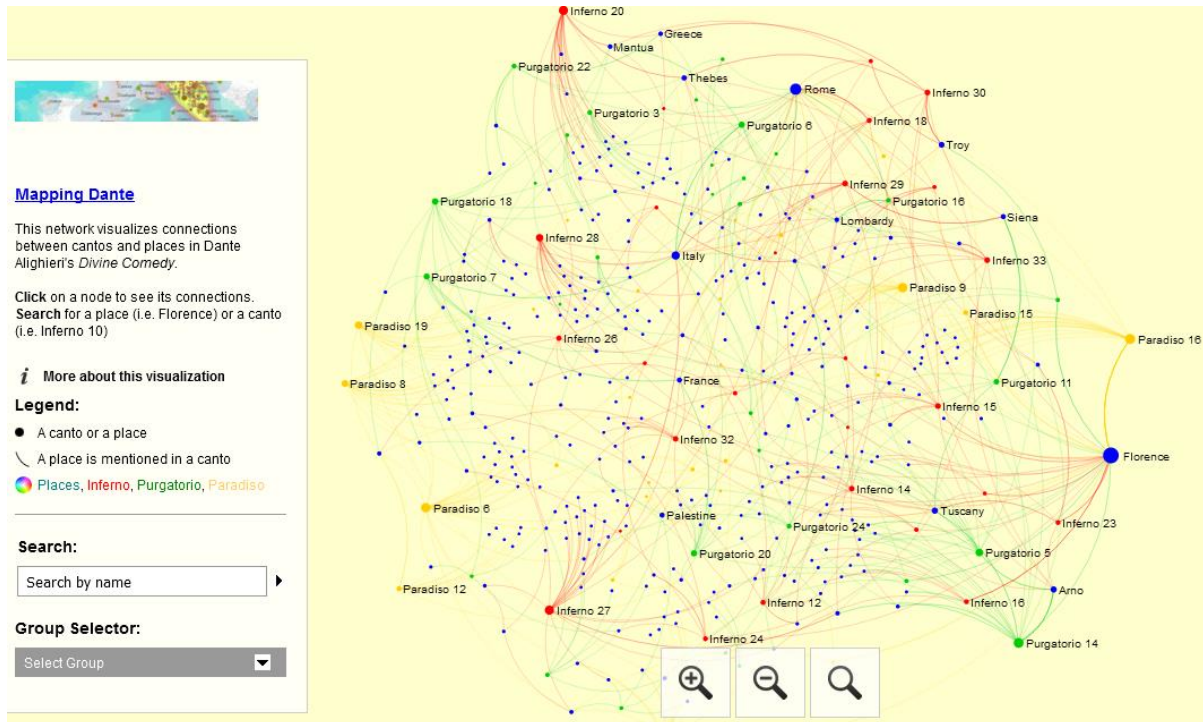


Fig. 6. Interactive network visualization of the relation between cantos and place-names. The network was built with Gephi and then web-exported with SigmaJS. Source: [www.mappingdante.com/network/index.html](http://www.mappingdante.com/network/index.html).

Similarly, quantitative analysis (in charts, see fig. 7) brings to light places that are spatially intensive while, by the very absence of tall bars in the chart below, point to moments in each cantica that are not explicitly connected to diegetical or non-diegetical spaces. These patterns offer a rich site of new investigation into Dante's poetics and “cartographic impulse” (Cachey, 325).

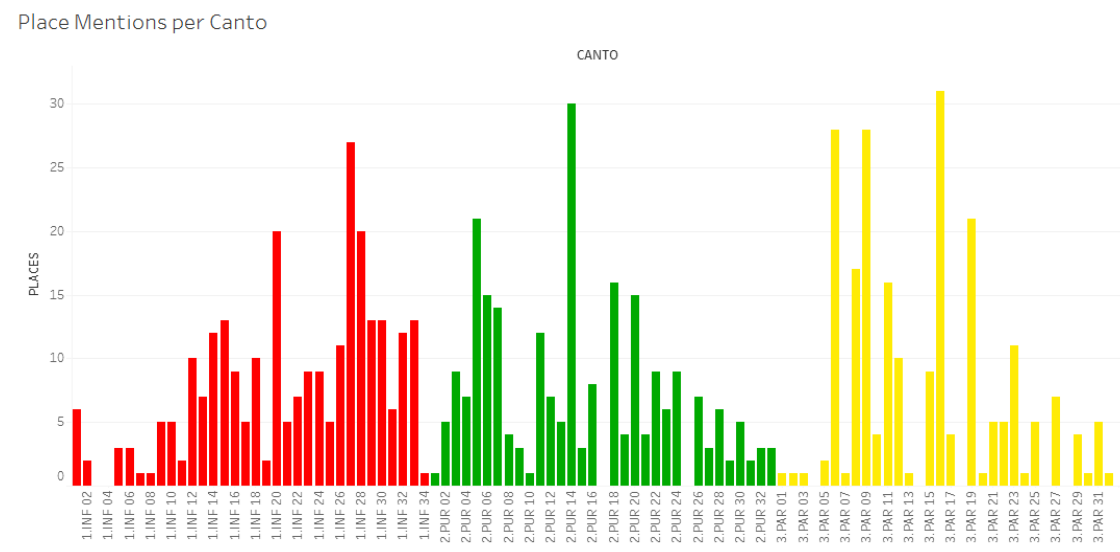


Fig. 7. Chart with number of place mentioned in each canto of the *Commedia*. Built with Tableau Public. Source: [www.mappingdante.com/charts/#placespercanto](http://www.mappingdante.com/charts/#placespercanto).

The heterogeneity embraced by those relations oscillates between effacement, dictated by the logic of cartography, and emergence, allowed by the retrieval of textual elements and patterns on the map. We cannot do without the interface of modern cartography and its ontologically uniform surface; yet we also seek to recover that type of geographical and textual knowledge that was first displayed in line-by-line glossing, and that with the advent of modern maps was pushed out of view.

### Conclusion

The potential of this type of map can be summarized in two major points: 1) it is a textual repertoire cartographically arranged, hence allowing users to find information on passages of the poem from a cartographical perspective; 2) it is a tool that, while not providing new interpretations by itself, enable users to observe patterns in the interrelation of geography and poetry, patterns that might not have been as evident without a cartographic view. Therefore, *Mapping Dante* partakes of both epistemological functions of literary maps: illustration of elements already at hand in the text, and interpretation of what would be otherwise invisible or elusive (Piatti 99). Such is indeed the double duty that GIS maps can do as mobile and tentative interfaces between text and world. By creating maps that make this condition manifest since they do not look like copies or mirrors of either world or text, we may get closer to medieval geography – not as if we were its contemporaries but from the inevitable vantage point of our own sense of geography, partly still subject to the paradigm of modern maps, partly exposed to the uncertainty and intricacy of post-modern spaces and places. Literary mapping is a work-in-progress that paradoxically aspire to break free from the cartographical rules it depends on, either analog or digital; so, we must be ready to question technologies and tool, just like medieval mapmakers who were aware that maps are plastic artifacts for the visualization and manipulation of a culture's relation with its world. "In depicting the world, medieval mapmakers tried to show the significance of places as well as their location" (Edson 164). To the restoration and reassessment of this *significance*, which is the implicit or explicit goal of any undertaking in digital literary cartography, *Mapping Dante* as a prototype tries to give its contribution. New materials and features will be added to both map and website in order to expand and intensify the experience of Dante's geography as a field of interconnectedness.

### Works Cited

- Alighieri, Dante. *The Divine Comedy*. Ed. Charles S. Singleton. 6 vols. Princeton: Princeton University Press, 1970-1975. Print.
- Barolini, Teodolinda, ed. *Digital Dante* [new version], Columbia University, 2014. Web 17 Feb. 2017. <<http://digitaldante.columbia.edu>>.
- Bartalesi, Valentina, et al. "DanteSources: a Digital Library to Study Dante Alighieri's Primary Sources". *Umanistica digitale* 1 (2017): 119-128. <<https://umanisticadigitale.unibo.it/article/view/7250/7007>>.



- Bodenhamer, David J. "The Potential of Spatial Humanities." *The Spatial Humanities: GIS and the Future of Humanities Scholarship*. David J. Bodenhamer et al., eds. Bloomington: Indiana University Press, 2010. 14-30. Print.
- Bosco, Umberto, ed. *Enciclopedia dantesca*. 6 vols. Roma: Istituto della Enciclopedia Italiana, 1970-1978. Print.
- Boyde, Patrick. *Dante Philomytes and Philosopher: Man in the Cosmos*. Cambridge: Cambridge University Press, 1983. Print.
- Burdick, Anne, et al. *Digital Humanities*. Cambridge: MIT Press, 2012. Print.
- Cachey, Theodore J., Jr. "Cartographic Dante." *Italica* 87:3 (2010): 325-354. Print.
- . "Cosmology, geography, and cartography." *Dante in Context*. Eds. Zygmunt G. Barański and Lino Pertile. Cambridge: Cambridge University Press, 2015. 221-240. Print.
- Cavalieri, Raffaella. *Il viaggio dantesco: viaggiatori dell'Ottocento sulle orme di Dante*. Torino: Robin Edizioni, 2006. Print.
- Edson, Evelyn. *Mapping Time and Place: How Medieval Mapmakers Viewed the World*. London: British Library, 1997. Print.
- Hollander, Robert, ed. *Dartmouth Dante Project*, Dartmouth College, 1988. Web. Feb. 17 2017. <[dante.dartmouth.edu](http://dante.dartmouth.edu)>.
- . *Princeton Dante Project*, Princeton University, 1999. Web. 17 Feb. 2017. <[etcweb.princeton.edu/dante/index.html](http://etcweb.princeton.edu/dante/index.html)>.
- Farinelli, Franco. *La crisi della ragion cartografica*. Torino: Einaudi, 2009. Print.
- . *Geografia. Un'introduzione ai modelli del mondo*. Torino: Einaudi, 2003. Print.
- Hamilton, Louis. "Virtual Cities: GIS as a Tool for the Analysis of Dante's *Commedia*." *Pedagogy* 13:1 (2013): 115-123. Print.
- Harley, J. B. "Deconstructing the Map." *Cartographica* 26:2 (1989): 1-20. Print.
- Harvey, P. D. *Medieval Maps*. Toronto: University of Toronto Press, 1991. Print.
- Inglese, Giorgio. *Vita di Dante. Una biografia possibile*. Roma: Carocci, 2015. Print.
- Lollini, Massimo, and Rebecca Rosenberg. "E-philology and Twitterature". *Humanist Studies & the Digital Age* 4 (2015): 116-163. Web. 20 Sept. 2017. <http://journals.oregondigital.org/index.php/hsda/article/view/3634>.
- Moore, Edward. "The Geography of Dante." *Studies in Dante: Third Series*. Oxford: Clarendon Press, 1903. 109-143. Print.
- Moretti, Franco. *Graphs, Maps, Trees: Abstract Models for Literary History*. London: Verso, 2005. Print.

- Parker, Deborah, ed. *The World of Dante*, University of Virginia, 1997. Web. 17 Feb. 2017. <[www.worldofdante.org](http://www.worldofdante.org)>.
- Piatti, Barbara. "Mapping Fiction: The Theories, Tools and Potential of Literary Cartography." *Literary Mapping in the Digital Age*. Eds. David Cooper, Christopher Donaldson and Patricia Murrieta-Flores. New York: Routledge, 2016. 88-101. Print.
- Rouse, Robert Allen. "What Lies Between? Thinking Through Medieval Narrative Spatiality." *Literary Cartographies: Spatiality, Representation and Narrative*. Ed. Robert T. Tally Jr. New York: Palgrave Macmillan, 2014. 13-29. Print.
- Schnapp, Jeffrey T. "Knowledge Design. Incubating new knowledge forms/genres/spaces in the laboratory of digital humanities". Herrenhausen Conference, 5-7 December 2013, Hanover. Keynote address. Web. 20 Sept 2017. <[https://www.volkswagenstiftung.de/uploads/media/HH\\_lectures\\_Schnapp\\_01.pdf](https://www.volkswagenstiftung.de/uploads/media/HH_lectures_Schnapp_01.pdf)>.
- Soars, Marco. "La mappa divina: tutti i luoghi citati da Dante." *Cartesiani*, 30 Oct., 2013. Web. 17 Feb. 2017. <[www.cartesiani.it/mappa-divina](http://www.cartesiani.it/mappa-divina)>.
- Travis, Charles B. *Abstract Machines: Humanities GIS*. New York: Esri Press, 2015. Print.
- Van Peteghem, Julie. "Digital Readers of Allusive Texts: Ovidian Intertextuality in the *Commedia* and the Digital Concordance on *Intertextual Dante*." *Humanist Studies & the Digital Age* 4:1 (2015): 39-59. Web. 17 Feb 2017. <<http://journals.oregondigital.org/index.php/hsda/article/view/3584/3493>>.
- Westphal, Bertrand. *Geocriticism: Real and Fictional Spaces*. Transl. Robert T. Tally, Jr. New York: Palgrave Macmillan, 2011. Print.
- Wrisley, David Joseph. "Spatial Humanities: An Agenda for Pre-Modern Research." *Porphyra* 22 (2014): 96-107. Web. 17 Feb, 2017. <[www.porphyra.it/Porphyra22.pdf](http://www.porphyra.it/Porphyra22.pdf)>.
- Wrisley, David Joseph, ed. *Visualizing Medieval Places*, 2013. Web. 17 Feb. 2017. <[vmp.djwrisley.com](http://vmp.djwrisley.com)>.