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[GUCKELSBERGER]Two Great Maps of Italy – A Comparison

KURT GUCKELSBERGER[1*]

[1] *Freie Universität, Friedrich-Meinecke-Institut, Berlin, Germany*

[*] kurt.guckelsberger@gmx.de

Abstract

Two large maps, contemporary with Flavio Biondo's *Italia Illustrata*, create a rather comprehensive image of Italy. In this paper, I show that the Cotton Roll XIII.44 of the British Library is put together from two maps of different scale: one for Italy north of Rome and a smaller scale for southern Italy. It displays more than 1200 toponyms and six-thousand kilometres of rivers. The second map, Ms.1816 of the University of Strasbourg, is almost identical to the northern part in content. Devoid of political boundaries, there is no orography and an unusual flat hierarchy of icons. Despite large differences in appearance, they share a common data base. Both derive probably from a lost master chart. Despite necessary overlap, Biondo's regional inventories differ substantially. He may have seen these maps but he did not rely on them.

1 1. Introduction

This article makes the case that two of the seven "grandi carte d'Italia" of the early fifteenth century, proposed as a subgenre of historical maps by Marica Milanesi in her talk in 2006,[1] evolved from a common but yet unknown source document or 'ancestor'. Indeed, the map known by its shelf mark as Cotton Roll XIII.44 now in the British Library (henceforth "the Cotton") and manuscript Ms.1.816 at the Bibliothèque nationale et universitaire (henceforth "the Strasbourg") share a large part of their toponyms, rivers, size, and general layout characteristics. Both appear as a visual complement to the

textual vision of Flavio Biondo's *Italia Illustrata*, namely a complete survey of mainland Italy from the Alpine arc to the Ionian Sea, albeit with different coverage areas. The present study is part of the quest for the maps Biondo used as sources for his seminal work *Italia Illustrata*. As shown in a companion paper (Guckelsberger and Geus),[2] Biondo reports more than 2000 toponyms, far outnumbering the labeling on any map of the fifteenth century hitherto known and discussed – except one: the Cotton, with its 1220 vignettes denoting settlements, from single buildings to large cities. In addition, an extended river system provides hundreds of landmarks for orientation and localization, such as springs and sources, confluences and estuaries. Strangely enough, this early masterpiece of Venetian terrestrial mapmaking, has somehow largely escaped historical attention, with very few scholars making any reference to it over the centuries. Perhaps to Italian scholars it was not easily accessible due to its location in the British Library, where, although carefully preserved, it was presumably perceived as 'just another' (albeit interesting) map of Italy, one among thousands.[3] Even scarcer are studies of the Strasbourg map, which also escaped historical attention, perhaps arguably due to its poor preservation.[4] Hence it was a surprise that both maps – or rather what has survived of them – share almost identical content, shape, and size, albeit presented in radically different styles. This discovery opens a new window on early European mapmaking and 'database studies'. Early on in this study, it became clear that, despite the richness of content and obvious overlap, Biondo certainly did not use either of these two particular maps, as in many areas the structure and content are widely different in both Biondo's text and the maps. However, Milanesi recently showed that Biondo must have used or consulted the Cotton – or a very similar map – in one particular region at least, namely in the Rhaetian Alps.[5] Biondo's accounts of three rivers – the Adda, Oglio, and the River Non (a tributary of the Adige) – share a common error with the Cotton: the rivers appear to rise from a single source, which is not possible because they are separated by passes. This error is unique to the Cotton because the mutilated Strasbourg shows only the passage of the Oglio across the Passo Tonale to the Noce river, and on other surviving maps (and in chorographical texts), the connection of the Oglio and the Adda across the Passo Gavia persisted into the sixteenth century. The discovery that Biondo must have stud-

ied a Cotton-like map (if not the Cotton itself) and the fact that we have two surviving artifacts displaying quite different versions hints at other maps of similarly grand design that have, however, since perished. This all suggests that in both the Cotton and Strasbourg, a big effort was made to map the whole Italian peninsula in detail, on a scale greater than the known regional maps. It surely was an expensive enterprise to collect quite precise information on distance and direction for more than 6000 kilometers of nearly every river of Italy – including all tributaries – and collate and design a consistent image without the required cartographic and surveying tools of the coming centuries.[6] The scope, reach, and erudition of the two maps equal or better complement the ambition and mental image of a unified Italy as embodied in Biondo's *Italia Illustrata*.

In the following, I will give a very brief overview of the main characteristics of the Cotton on a somewhat numerical basis to establish its outstanding properties before exploring the familial relationship between the two uneven 'sisters'. Although the Strasbourg covers the peninsula only down to Rome, both objects share an outline of Italy clearly derived from portolan charts with a rich and (relatively) precise mapping of settlements, rivers, and lakes in the interior. Thus, they uniquely combine the outlines of a maritime chart with the content of a truly land-based map. This clearly distinguishes them from the numerous maps created in the second half of the fifteenth century which use the (geographically inaccurate) outlines of Italy as described by Ptolemy in the third book of his *Geography*. This fundamental change in fifteenth century cartography is deeply rooted in the work of Donnus Nicolaus Germanus, a German monk who arrived in Florence around 1460.[7] In his (and others') *tabulae novae* (or *tabulae modernae*), he interpolated between known ancient sites many new towns unknown in Antiquity. Prior to this shift, early humanists apparently completely ignored the first book, in which Ptolemy explains the mathematics required to properly project the spherical coordinates of a spherical Earth onto a flat surface with minimal distortions.

Early fifteenth-century cartography is generally associated with Venetian craftsmanship in providing increasingly reliable maps for religious, economic, and military enterprises (Crusades and long-distance trade). They were soon augmented by the works of mapmakers based in Genoa, Mallorca, and

other predominantly maritime communities. Known as portolan charts, this genre of nautical map survived for roughly the next 400 years. Relying predominantly on landmarks on shorelines and associated settlements and river mouths, they rarely showed settlements of the interior. As a result, maps of whole countries were generally less known. In chapter 20 of the extremely influential *History of Cartography*, published in 1987, P.A.D. Harvey writes:

> A very few are maps of entire countries: the maps of Palestine, the Matthew Paris and Gough maps of Britain, the maps of Germany and central Europe by Nicolas of Cusa and Erhard Etzlaub. But most are maps of small areas. [8]

Harvey goes on to list in appendix 20.1 only eight regional maps of Italy, without mentioning either of our maps. [9] After discussing Paolino Veneto's map of Italy of circa 1340, containing few toponyms, he continues:

> [I]t is not until the fifteenth century that we find further detailed maps of the whole of Italy. Two seem to be unique productions, but five others form a single series of closely related maps from which further maps were indeed derived in the early sixteenth century. Three of the five occur in copies of Ptolemy's *Geography* [...] [10]

By leaving out all details, it might be that these 'obscure' specimens indeed refer to our maps. Later, in 2006, Milanesi suggested a generic name, the "grandi carte d'Italia", mostly due to their common large size. [11] They usually measure at least 110 centimeters in height and are designed to a scale of around 1:1.8–1:2 for the size of the peninsula, measured horizontally between Nice and Pola and the Simplon Pass to Cape Leuca at the southern end. This is comparable to the map scale of 1:1.9 of a modern-day sheet map. Taking into account the actual size of Italy, this gives us an average scale of approximately 1:600,000 or 6 kilometers/centimeter. According to Milanesi, several of these seven maps had a distinct purpose: displayed in antechambers of princely palaces they had to demonstrate the mastery of territory and superior knowledge of the prince, or, in the case of Venice, the magistrate. Only these seven specimens have survived. Considering the 'natural habitat' of such maps, princely *palazzi*, the two maps presented here form an unlikely couple. The Cotton is a spectacular display-piece, which Peter Barber, recently retired Head of Map Collections at the British Library, believes was probably presented as a gift to the English king sometime in the fifteenth century (personal communication, February 6, 2018). More than 1200 toponyms, 64 river systems, and carefully crafted miniature vignettes char-

acterize this outstanding testament to terrestrial cartography. By displaying subtle designations of rank instead of crude (even brutal) representations of the size of the powers that be, and by ignoring political boundaries and adopting a remarkably precise scale (albeit of a shifting magnitude), it is a unique early 'topographic' enterprise. It shares the same vision of a united Italy from the Alpine watershed to the Ionian Sea (subsequently only realized in 1919 with the annexation of Trentino-Alto Adige but already described by Ptolemy), as cited both by the author of the Cotton in the first sentence of the text accompanying the map and by Biondo in *Italia Illustrata*.[12]

In the following, I focus on the geographical 'ground truth' by first presenting the Cotton's main features – the coastline, the settlements, and the river system – followed by a description of the Strasbourg map with its unique grid system and a discussion of its southern end. Following this I explore the similarities between the two maps by first looking at the coastlines and then at possible distortions in the parchment and cotton support which may have altered the images, quite independent of the mapmaker's original intentions. The probability of a common source is discussed and, lastly, some of the remaining differences are highlighted, such as the drawing of the rivers, the rendering of extended objects, including a strange 'mutilation' of the Strasbourg.

2 2. The Description of Italy by the Cotton

From a geographical, cartographical, and historical point of view, the Cotton map is of the highest interest and helps in understanding contemporary attitudes toward all three fields of learning. In this paper, the emphasis is on the historical perspective in relation to Biondo's project of *Italia Illustrata*. However, it adds to our understanding if one also considers the two other facets – the geographical and cartographical – in gaining further insight into the problems Biondo probably faced when setting out on his agenda. In that respect, for a terrestrial map of the early fifteenth century, the Cotton's 'vital statistics' are nothing less than impressive when one considers all three points of view. The two diagrams combined in fig. 1 best summarize the extraordinary craftsmanship involved.

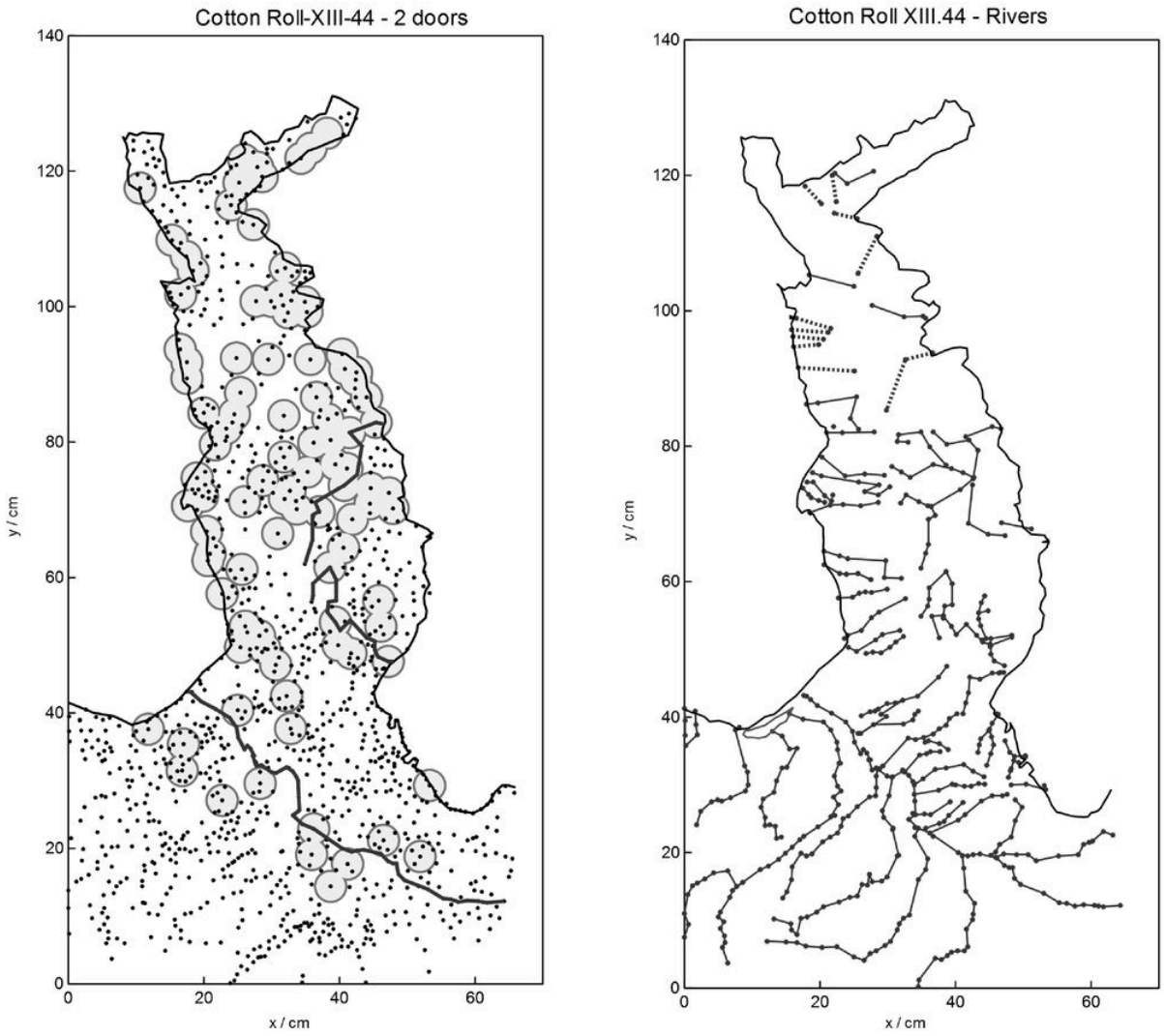


Figure 1. The Cotton in outline.

The left diagram shows the locations of all 1220 vignettes. The 100 cities highlighted with two or more doors are shown with circles of ca 30km radius. The right diagram traces part of the extensive river system of more than 8000 km.

Three main elements come together:

- The outline is apparently derived from portolan charts. It features 245 littoral points: 191 harbors – coastal towns (some of them in the interior, as represented on all maritime charts of the time) – and 54 estuaries, good for shelter or up-river travel. Distributed over about 3450 kilometers from the mouth of the Isonzo to mouth of the Var in what is now France, it covers every 14 kilometers of the 'lay of the

land', or more precisely, the coast. It is richer in detail than contemporary maritime charts: Among these, only 128 (52 percent) are found in Tony Campbell's 'magisterial' list of 2015, which in turn contains 400-plus entries from all portolan charts between Var and Isonzo.[13] From this we can extrapolate that the compilers of the Cotton did not simply copy existing portolan charts but provided more points than the sailors deemed worthy of note. The coastline provides the frame for the other two data compilations, namely the inland settlements and rivers.

- The total number of settlements amounts to 1220. As far as I know, no other fifteenth century map that has come down to us boasts a similar number. Erhard Etzlaub's *Romweg* map of 1496 of Central Europe to Rome only has 515 marked settlements. The extremely well-studied and publicized Gough Map of Britain displays 600-plus place names, with the exact number no longer determinable as some have faded over the centuries.[14] None of the German fifteenth century maps approaches the 1220 named settlements in the Cotton.[15] Settlement and city rank is expressed through subtle indications in the miniature vignettes. In 288 vignettes, roofs are emphasized by a blot of lapis lazuli, the most precious of pigments. However, this color distinction seems not to convey rank, because even some tiny hamlets are so adorned and I could find no correlation between these points with places of power, political or ecclesiastical, in times predating or concurrent to the map. In contrast, for six vignettes, the rendering of three portcullises in the city wall does indeed serve to emphasize the city's importance. These cities are Rome, Narnia (Narni), Florence, Venice, Verona, and Alessandria.[16] Another 93 vignettes show two portcullises and all 100 two- or three-portcullis entries represent important cities, from Rome to Urbino or Milan, or similar regional 'heavyweights'. The remaining vignettes have only one portcullis and pertain to all manner of settlements: important sites ranging from single fortresses, such as the Castello di Canossa, to isolated monasteries, hamlets, and villages, to small towns which have sometimes since dwindled, now with only two or three buildings remaining. In

fig. 1 the 100 important cities are emphasized by a circle representing 'a day's ride' radius of roughly 30 to 40 kilometers depending on local scale, to underline the sophistication of the vignette choice. The pattern is still dominated by a large number of port towns and a cluster in the region around Naples.[17] In the Papal States, the Tiber river basin does not dominate, but Latium and the Umbrian and Ancona territories stand out, contrasting with a relative paucity in the Po Basin. In the left diagram of fig. 1, one first sees the spine of the Apennine Mountains – especially in the south – separating the central valleys from the coastal plains. Interestingly, an unbroken chain of wealthy towns can be observed, stretching over more than 400 kilometers from Sulmona in Abruzzo to Modena and following the ancient Roman roads of the Via Salaria, Via Flaminia, and finally Via Aemilia. Mountainous regions stand out, especially in the foothills of the Alps. The map includes outlines of the Po, Arno, and Tiber rivers and faithfully traces their bends and turns as a further sign of well-researched and detailed features.

- A network of 6324 kilometers of rivers[18] structures the interior into interconnected smaller domains, allowing the mapmaker to plot the settlements' relative position from each other, using fluctuating local scales in the absence of a uniform scale for the entire area coverage.[19] This fluvial scaffold covers 59 rivers emptying into the sea and 67 tributaries, with 693 settlements documented on their banks and 139 settlements at their mouths.[20] In a sense, this intricate lattice can and probably did stand in for the thoroughly abstract mathematical grid of astronomically determined parallels and meridians proposed some 1200 years earlier by Ptolemy. It was a much simpler mapmaking technique than using a laboriously determined solar altitude (with its considerable scope for error) and a longitude based on pure guesswork.[21] Indeed, Ptolemy's work was not fully understood or even accepted after its rediscovery in the thirteenth century and would arguably only be so later in the fifteenth century, after the Cotton had been made.[22] After all, in real terms, the adjacent headwaters of the Arno and Tiber provide a satisfactory topographical point of reference, being some-

where halfway between Rimini and Montevarchi.[23] However, we also see that the second most important river in Tuscany after the Arno – the Ombrone – has been forgotten entirely.[24] Together with a scarcity of major settlements in the lowlands, one reason for such an omission may well be that the area was of little interest for military and economical enterprises at the time due to the swampy conditions of the terrain and the threat of malaria. As already pointed out by Milanesi, the Cotton's representation of the coastal plain of Tuscany is much too narrow, implying a rapid scale-change over the last few centimeters before the coast. Another reason for the missing river and spatial inconsistencies may be that the chart was 'filled in' from left to right, from the Adriatic toward the Tyrrhenian coast. If the general outline was fixed first, then the impressive crowding of vignettes and their names in the Adriatic half may have crowded out the last entries before the western coast was reached. Against the background of careful execution in the Po Basin, these omissions appear as ad-hoc decisions during the drawing-in phase, not a deliberate truncation for other reasons. Together with flexible scales along the rivers, both features appear as a natural consequence of non-geodesic mapmaking.

Such complete coverage as a general map of the peninsula (ignoring for the moment some deficiencies and lacunae in the Kingdom of Naples in the south) goes far beyond military or economic surveying purposes, during a time characterized by a constant struggle for supremacy among rival principalities and states. Extensive portolan charts were also expensive but had a completely different (linear) background in commerce and warfare, piracy and domination.

This leads to the following question: what were the underlying intellectual or political ambitions that warranted the financing and commissioning of the traveling surveyors, mapmakers, artists, and executioners for such a project in early fifteenth-century Venice? (By comparison, it is perhaps worth noting that Biondo probably had a variety of helpful assistants but essentially worked alone.)

The next subsection presents the fascinating subject of how near or far the two maps with their almost identical chorographic content resemble each other, given their dramatically different appearance. Before doing so, it is first necessary to provide a brief description of the Strasbourg map, before embarking on a more detailed comparison.

3 3. A Brief Description of the Strasbourg Map

Every image, painting, or map, 'speaks a language' to communicate with its readers or audience. The Cotton (140 x 66 centimeters), for example, consists of an elaborate headline "Italie provincie modernus situs", a laudatory text describing the historic excellence of the land – and the map. The image of the peninsula is surrounded by beautifully executed sea creatures and a variety of maritime scenes. The islands and adjacent countries are indicated by twelve round medallions that merely allude to their existence. With gold lettering on lapis lazuli for the title, clear calligraphic script, and a precise execution of the illustrations, the Cotton conveys a sense of power, confidence, and aesthetic ambition.

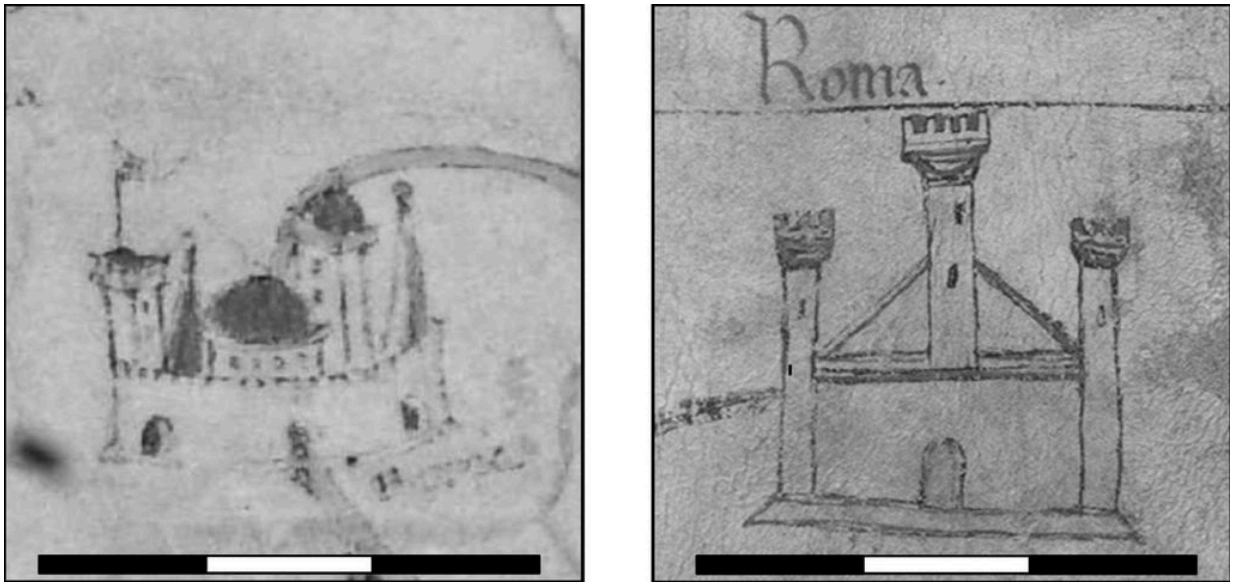


Figure 2. The two images representing Rome in the two maps juxtapose the aesthetic and factual differences between them. The name Roma on the Cotton is nearly obliterated by frequently pointing at it.

left Coll. et photogr. BNU de Strasbourg, right (c) British Library

In contrast, the Strasbourg (65 x 95 centimeters) presents a rather austere image which is best illustrated with the two vignettes for Rome, both fitting into a 3 x 3 centimeter frame. The Cotton has finely crenellated city walls and towers (one even flying a flag), a cupola (perhaps the Pantheon?), and steeples. The Tiber enters at the front and flows out the other side, thereby creating a more natural image of a real city. The Strasbourg map, by contrast, only shows a clumsily drawn front of a strange building with the outline of a church with three spires and some military apparatus, with the river simply stopping at the left edge of the building.
[25]

Figure 3. The image of the vicinity of Arezzo displays the typical graphical features of the Strasbourg map: The alternately coloured grid-lines, the large vignette and red lettering of important towns (Arezzo), the tiny other vignettes like ulmo below Arezzo and the thin, discontinuous black sketch-line for the rivers with its blue-green thick enhancement.

Also, whereas the Cotton has a finely drawn red frame around the cartographic image and is bordered by a carefully drawn, nearly straight initial border (see below), the raw outlines of the animal hide, including the neck, are good enough for the Strasbourg, and indeed most portolan charts of the time look the same. A faded dark-green, rather sloppily applied wash represents the Adriatic and Tyrrhenian Sea without any embellishments, whereas the Cotton displays decoratively rippling waves and joyful images of dolphins and miniature scenes of busy maritime life. In short, the Strasbourg is indeed a poor relative, as Milanesi states.[26]

To us today, the Strasbourg looks much like a technical sketch rather than a (princely) map. Modern geographers would call it a brouillon (rough sketch) that nevertheless contains important data for distance and direction, brought back from fieldwork to be turned into a polished draft in the office.

Tiny crenellated vignettes, 3 x 3 millimeters wide, indicate settlements and towns. A few important ones are marked in red, with Rome naturally the largest. Thin black lines, retraced by a slightly broader green line represent rivers and lake outlines; lake surfaces are washed in light grey-green. The sharp thin lines, visibly preceding the overlay of color and broader lines for rivers and coasts, indicate a preliminary sketch. In many passages, this likely 'first attempt' was not subsequently laid in with the bolder lines of the more visible final image. All these features are visible, for example, in the detail around Arezzo in fig. 3. Here we see the thin sharp lines sketched in black along part of the Arno river to the left, emphasized later in greenish-grey ink, the tiny crenellated town-vignettes below, the clumsy attempt at a vignette in perspective reserved for important towns, including red lettering, and finally the alternate coloring of the rhumb lines.

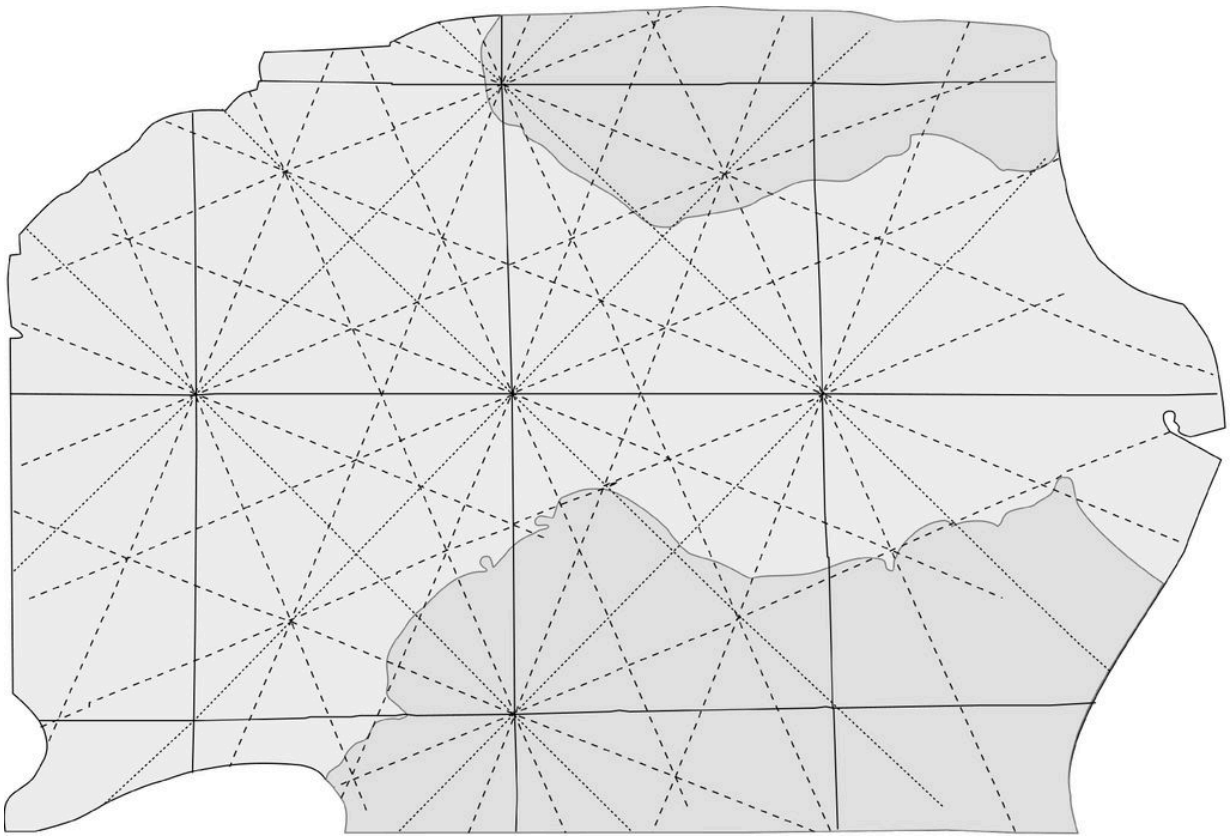


Figure 4. This redrawing of the system of terrestrial wind-rose lines visible in MS 1.816 shows that the mapmaker developed the classical system of 16-fold symmetry only up to eight nodes plus a central node and using it only in certain places.

From a modern perspective, the Strasbourg gives the impression of a 'work in progress'. This impression is reinforced by a unique feature for land maps: superimposed on the map are three primary, equally spaced land-based sixteen-point 'stars', placed near Arezzo, Roteglia (near Modena), and Lecco, with additional stars placed off-shore from Venice and Genoa, and yet others (albeit incomplete) ten-point secondary stars located at the four 45-degree angles from the central star near Arezzo.

They form a set of rectangular cells approximately 24 x 24 centimeters wide. Where the lines do not help (outside terra firma and beyond Fermo), they appear incomplete and peter out, thus suggesting a half-hearted attempt to imitate the manner of the portolan charts of the day. Nearly all these maps are first sectioned by a central horizontal line extending from the neck to the tail forming the west–east axis and a vertical, central line forming the north–south axis.[27] Additional rhumb lines complete the wind roses,

mostly with a sixteen or thirty-two-fold symmetry. In the Strasbourg, there is no relation to geographical north nor to the size of the animal skin. In fig. 4 one sees that the center line does not form the bisecting axis and the horizontal subdivision does not lie halfway down from any discernible future format the mapmaker may have originally had in mind. The 45-degree system is marked by a short dotted (. . .) line and the bisecting red lines in the original are denoted by dashed lines (- - -). One has the impression that the two vertical markers in the Adriatic and Tyrrhenian Sea are merely there to help place the coastal towns and the center line through "arezo"/Arezzo and the inland sites. The additional tighter grid at 22.5 degrees (with a 9.3 x 9.3 centimeter grid width, roughly equating to 50 x 50 kilometers) just happens to somehow organize the landmass into more manageable sections. The grid is irregular and appears haphazard and perhaps not well thought out. In short, it structures map-space, not the geographical relation of the peninsula with its surroundings. Questions as to why, when, and how these markings were made require complex historical cartographic study and are therefore excluded from the present article. Suffice it to say that this unique map merits further study and opens a rare window onto early European mapmaking.

Another feature which the Strasbourg shares with portolan charts but not with the Cotton is the use of red lettering in the labeling of some cities. On his website on the history of cartography, Tony Campbell found that 630 of the grand total of 2750 (or 23 percent) of the names collected from portolan charts are written in red. He adds:

> As an indicator of responsiveness to political and commercial developments, the red names are a disappointing witness [and] there was little relation between the historical record and the introduction or abandonment of red names.[28]

On the Strasbourg map, this ratio is 95 out of a total of 649 vignettes (see Table 1) or only 14.6 percent (roughly one in seven) and the more sparingly used distinctions generally relate to important cities. Such differences suggest that the mapmaker liked the lettering in red (probably) seen on portolan charts, but modified the criteria for its application on his own map.

Very little is known about the origin of the Strasbourg. It was first presented to the public in 1933.[29] According to records, it was acquired (after 1883) from the estate of Karl Witte (Halle), renowned translator and founder

of the German Dante Society who spent many years in Italy.[30] It is possible that while in Italy he searched of Biondo's or Petrarch's/Dante's map. Characteristics of script and toponyms date the Strasbourg to the Italy of the early 1400s. Not much else is known and precious little literature has been published on the subject.[31]

Paraphrasing an earlier study of the northeastern part of the country by Franz Grenacher,[32] time has not treated the Strasbourg map kindly: the outline is mutilated because someone cut off the corners at the bottom of both sides. Crude pin holes at the periphery show unsophisticated tacking and rough use, while water damage and mold renders many names difficult or impossible to read. For some time the skin lay, not rolled, but folded – while still damp. Evidence for this are red smudges near Florence which match mirror-image counterparts of heavily smeared red inscriptions for Perugia and Orvieto, which have become nearly unreadable as a result.

What the Strasbourg shares with the Cotton is a 'flat' hierarchy of little difference in the vignettes' rendering of ordinary towns and important cities: the more important ones are only marginally larger and only slightly more elaborate in detail. This might indicate a similar restraint on their common source (or mutual copying past).

The Cotton shows the complete peninsula and is of superior craftsmanship. This leads to the question where was the lower third – essentially the territory of the Kingdom of Naples? The River Tronto forms, in a certain sense on both maps, the frontier between central and southern Italy. After 1272, it was the southern border of the March of Ancona under papal control with the Duchy of Abruzzo, part of the Kingdom of Sicily until the nineteenth century.[33] It is not difficult to demonstrate a sudden shift in scale on the Cotton using the locations of 21 river mouths into the Adriatic south of Rimini. On these rocky shores, estuaries do not move position over the course of just one millennium, in contrast to swampy areas, which may.

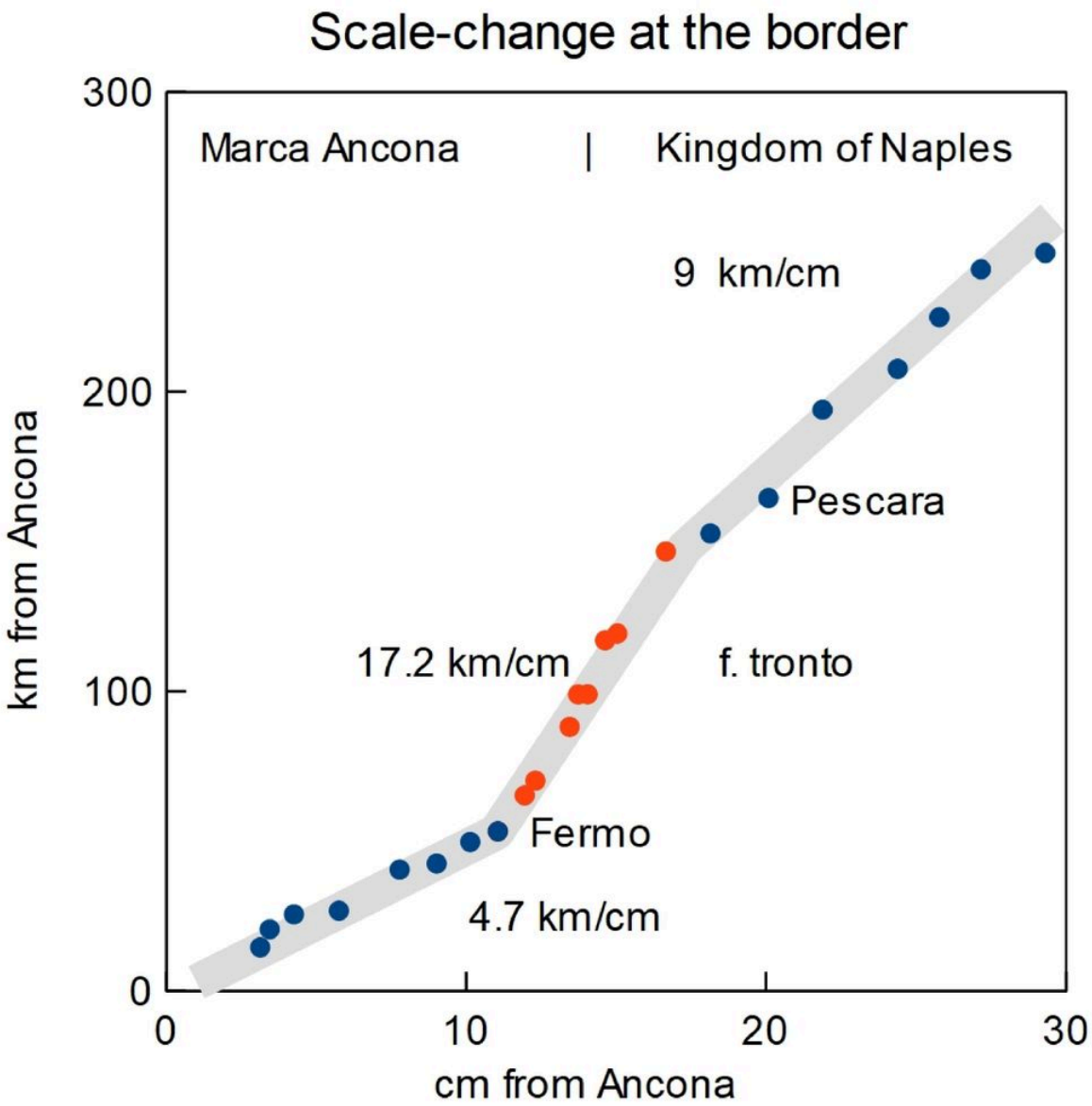


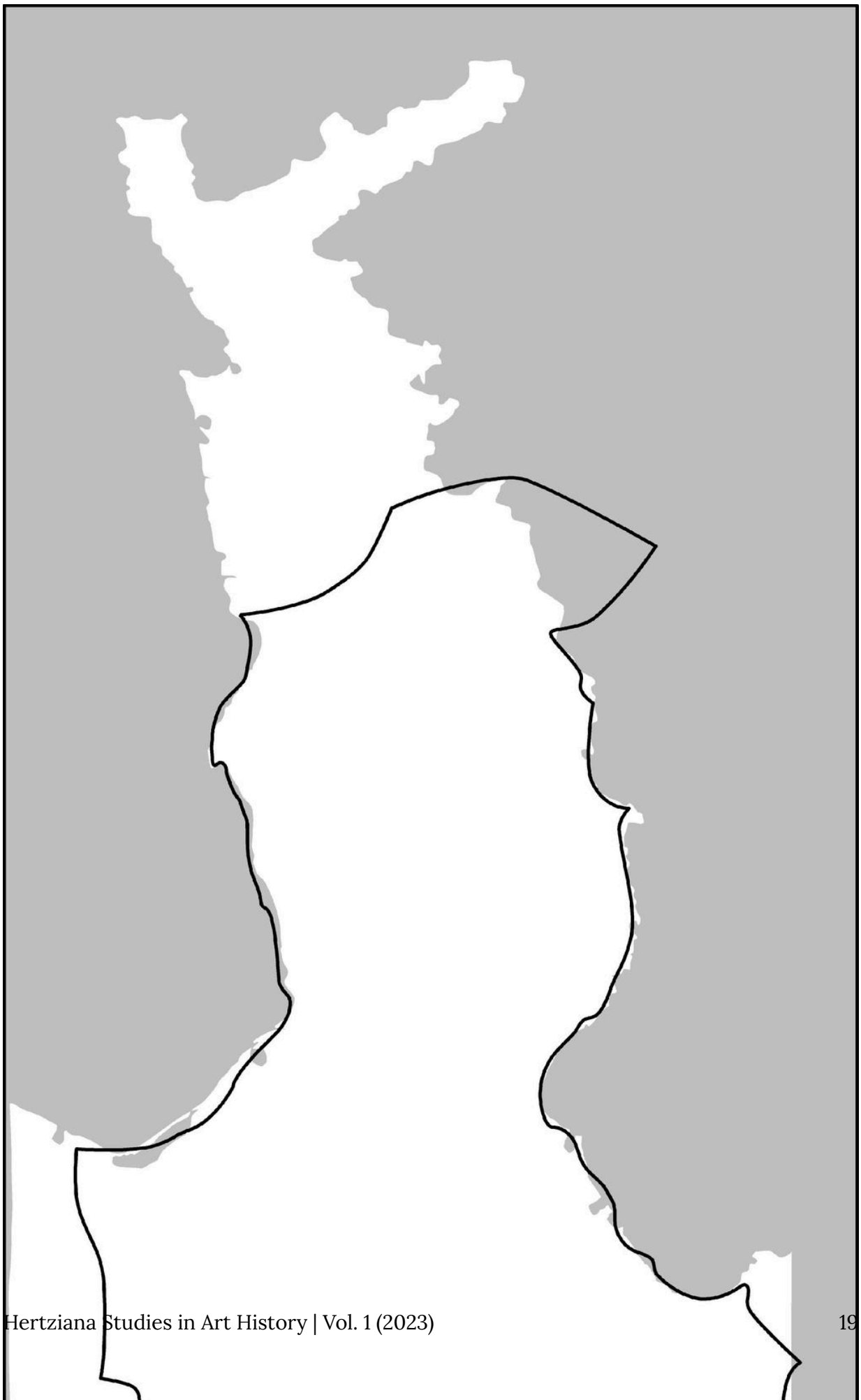
Figure 5. Plotting the distance on the map along the coastline in centimetres against the distance on land in kilometres gives a local scale. The discontinuity near Fermo indicates that two dissimilar images of different scale were patched together.

Down to the River Chienti, a scale of approximately 1:600,000 (= 6 kilometers/centimeter) prevails which characterizes the scale used to map northern Italy.[34] After this come three estuaries at an artificially compressed scale which runs until the Tronto, after which further southwards a scale of approximately 1:900,000 (= 9 kilometers/centimeter) is used until the mouth of

the Tiber.[35] This regional scale-change of the Cotton is unique among contemporary maps. However, shifting scales are a well-known feature of portolan charts, where some parts, say the Black Sea, have an orientation and size that are different to those of the Mediterranean, and so on.[36] All this happens precisely where the Strasbourg ends, and this is significant. The outline of the southern part of the peninsula on the Cotton is appreciably slimmer than its northern part. Had the mapmaker decided to continue with the 'northern scale', the entire peninsula would have required an additional 33 centimeters or so in space, resulting in a total height of 170 centimeters. One might speculate that, in view of the expenses already incurred, another half-sheet would likely not have mattered much. However, given the idea that is basically suggested in the accompanying text, of uniting Italy under the leadership of Venice,[37] it perhaps came in handy that the Kingdom of Naples was expertly 'shrunk'.[38]

4 4. A Visual Comparison of the Outlines of Italy

In this section, I argue that the two maps are of the same size by discussing the outlines of the peninsula. This differentiates the pair from many other 'copies' of fifteenth century maps. As far as I know, there are few direct copies of fifteenth century maps.[39]



The first sign that both maps share a common data set stems from comparing the contours of Italy. Milanesi already notes that both maps look very much the same, so that the Strasbourg "appears as a bad copy or a poor relative".[40] Although all portolan charts tend to share a similar general appearance, differences in the details abound. This is also true in the case of the Cotton (which at 140 x 66 centimeters is made up of two skins glued together, of approximately 66.5 x 68 centimeters and 66.5 x 71 centimeters respectively) and the Strasbourg (65 x 95 centimeters, a single sheet). In keeping with a well-known method in philological studies, where questions arise as to what extent author A depended on author B or simply plagiarized content and meaning, one pores over maps for similarities and distinctions/marks of innovation. With the passing of time, however, the comparison is not always easy. In this section, I look at external agents influencing a more detailed comparison of the two artifacts. In the case of maps and their scaling, the predominant concern is of course shrinkage and warping of animal skins over 600 years. Albeit largely irrelevant in other medieval documents, in the case of maps these factors must be addressed in context, although such factors are difficult to quantify as they are heavily dependent on largely unknown historic storage conditions.

Peter Mesenburg reports of warping of circles with an approximately 29 centimeter radius on contemporary portolan charts in the millimeter region.[41] Shrinkage is of more concern, however, because after 600 years, lines rarely remain straight or at right angles: the Cotton has a two-millimeter-wide red frame just inside its outer edge. While the upper and lower boundaries run flush within a one millimeter margin, the vertical boundaries are indeed warped. The left margin (Adriatic side) deviates by ± eight millimeters from a straight line, the right margin (Tyrrhenian side) by even more. Hence, the width of the map between the red boundaries varies, starting with 63 centimeters at the top and (irregularly) increasing to 65.6 centimeters at the bottom. Assuming that the freshly drawn document really did have parallel vertical borders, shrinkage appears to have increased from the top (i.e., the outer layer when rolled?) to the bottom by 26 millimeters. From the fiducial marks, we can tell this number also includes, of course, warping by a (barely noticeable) pin-cushion distortion in the photographs and other errors made during the reproduction process and digital display. A tendency of

more shrinkage toward the upper end is possibly connected to the differential drying of the outermost layer(s) when rolled. Compared to other similar documents, the Cotton appears to have been stored as a roll (hence its superior readability) and generally enjoyed careful handling during use. It should be noted, however, that a physical inspection of the original may alter some of the above measurements slightly. [42]

For the Strasbourg, we have the unique opportunity to quantify distortions with the help of the superimposed portolan-like grid lines, presumably conceived and drawn parallel and at right angles as intended. Inspecting fig. 4, we see a number of rectangular grids of variable widths which during their genesis were (presumably) intended to be at right angles and rotated by 22.5 degrees, as required. Close analysis of the grid indeed reveals differential shrinking of the parchment. Assuming an originally regular quadratic design of the system of rhumb lines (see the ■ markings) and comparing them to the actual stars (x markings in the figure) reveals increasing distortion toward the upper-left corner of the map with up to one centimeter mismatch. The overall size of the deformation is similar to that of the Cotton but the pattern suggests more of a warping than the shrinkage of the Cotton. The corollary is of course a uniform or homogenous shrinkage of the Cotton roll depending on the distance of the ■ markings to the map margin, which cannot be tested in the same unique way as for the red border of the Cotton. However, it is reasonable to assume, considering the greater care the Cotton received over the centuries.

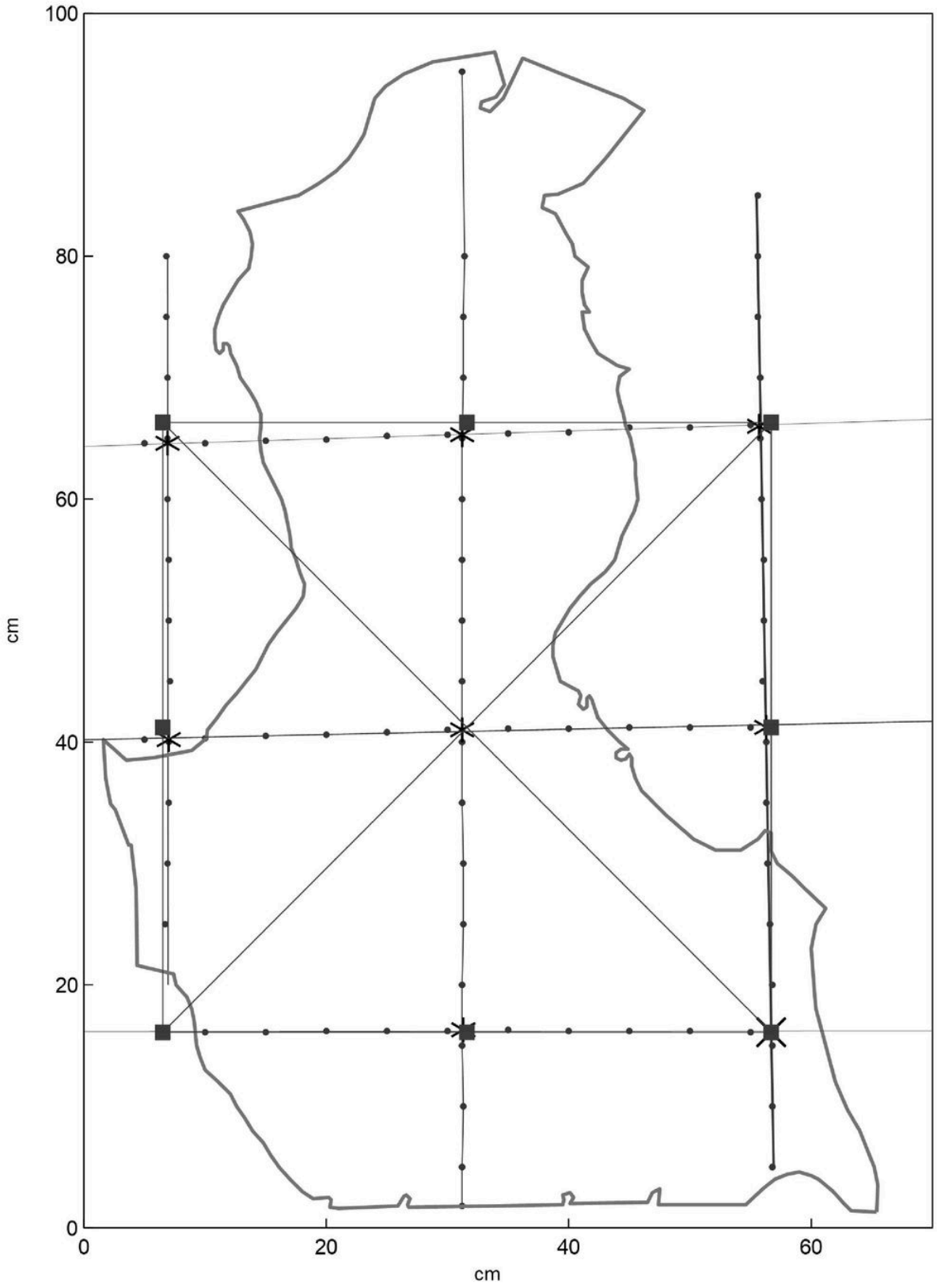


Figure 7. A (simplified) rendering of the shrinkage documented in the Strasbourg map via its superimposed grid image.

To summarize, we do thus have a 'component of mismatch' up to the order of one centimeter which is independent of the cartographic intent and graphic ability of the mapmakers and occasioned by the passage of time. It correlates well with the overall (mis-)matching results.[43] Hence, supporting the assumption, we have two independent findings of a relatively more severe mismatch on the Adriatic and the estimated average distortion of the Strasbourg based on a reasonable model for the original design of the map. The visually excellent match of the coastlines is subject to (small) distortions which were not present when both maps were made. The next section presents a number of additional differences of interest between the two maps.

5 5. Other Differences between the Two Maps

Which map is the copy of the other and which is the original? Both remain open questions. As already noted, the coastal outline of the Strasbourg is much simpler compared to the finely detailed inlets and promontories of the Cotton. This increased local content would suggest the Cotton is the original. In this context, if both depend on a primary (unknown) source, the Cotton appears a 'higher resolution' copy.

The next clue comes from the fact that a good match is obtained by rotating the Strasbourg map by three degrees in a clockwise direction, as shown in fig. 6.[44] As both maps have a similar sheet width of 65 centimeters, this leads to insufficient coverage at the Istrian end of each map. Remarkably, the remaining maximum differences between the two contours after optimizing their match are still about a centimeter or less. As both measurements are randomly distributed, they neither cancel out nor compensate the 'fuzziness' of the coordinate matching, but in fact tend to increase it somewhat.

The actual coastline from Genoa to Latium is carefully depicted and well matched for both maps except at both ends. In the Levante region, the coastline on the Strasbourg stops at Albenga (illegible because written into the sea but well defined by comparison with the Cotton). Inspection at high resolution shows that the pale green wash indicating seawater first forms a non-existing promontory and then departs at right angles to the coast, although until this arbitrary excursion it had curiously followed the (secondary) Torrente Aroscia closely, before the latter flows into the Tyrrhenian

Sea at Albenga. This strange or arbitrary 'coastline' is verifiably continued up to the settlement of Mendatica, documented at precisely the same location on the Cotton and located next to the border with France. As far as I know, neither Albenga nor the small stream had a significant function in any historically documented regional treaties, wars, or border disputes.[45]

The reason for this deviation from the coastline on the Strasbourg is entirely unclear but similar to another deliberate departure at right angles from the coastline which is observed at Latium. There, the end of the excellent fit is reached at an unknown spot marked "gulorai" which on the Cotton is the last point before the port of Fiumicino at the mouth of the Tiber.[46] Beyond that point, the coastline of the Strasbourg map shows a right-angle trajectory out to sea which is, of course, contrary to ground truth, for the coast in fact continues straight on and forms the triangular protrusion seen in fig. 6 and fig. 7. Close inspection reveals that the thin preparatory tracing line does indeed continue out to sea, thus forming part of the original design. Therefore, the unrealistic right-angle bend of the coast was meant to signal the end of the studied area. These curious deviations from 'standard practice' may shed light on the mindset (one might say 'mental map') or intent of the mapmaker(s). One likely explanation could again be that it reflects a brouillon-type action signaling to a subsequent user the immediate end of reasonably ascertained knowledge. However, this speculation would have the Strasbourg adopt the role of precursor rather than plagiarist, without any further evidence to substantiate such a claim.

As to the coastline in the lower left-hand corner of the map (i.e., northeast Italy), there is no trace of the Venetian Lagoon in the upper Adriatic and the easternmost readable city is "exol"/Jesolo on an untraced coastline marked only by the green color of the sea to the northeastern end of the map. Again this may be interpreted as an unnecessarily subtle detail in an already well-known territory or as a sign of negligent tracing during hasty copying. At the upper end (i.e., southeast Italy) beyond Fermo, the mapmaker appears to have simply joined the end of the animal skin with a haphazard stroke which does not reflect the passage of the real coastline. This implies that he had reached the neck of the animal skin and, with it, the limits of his map's area coverage. It occurs at the same height as and is similar to the turn-off in the Tyrrhenian Sea. Also, no settlement above Fermo is marked out and

the 'neck' is left empty, except for Rome. Apparently the mapmaker originally planned to cut off the neck of the skin at that level and was thereby willing to scarify the Rome vignette which thus only serves a 'placeholder' function as a landmark. This would in turn explain the noticeable scale-change between Lecco and Arezzo (approximately seven kilometers/centimeter), when compared to the distance between Arezzo and Rome (approximately nine kilometers/centimeter), as noted by Grenacher. Strasbourg's Rome is located at the same place as on the Cotton, already implementing the scale-shift from northern to southern Italy.

We have no evidence that the mapmaker intended such a continuation into southern Italy and a reasonable estimate for the rectangular part of the skin (minus the neck) is 65 x 81 centimeters, which just about covers the carefully copied parts. To summarize, the coastline at all four corners of the map was left undetermined, thus reinforcing the sense of a 'work in progress'. However, the overall bad condition of the skin, with tears, nail holes, and missing parts, makes it equally likely that the project was abandoned at a rather late stage.

More generally, the detailed comparison of the outlines of the peninsula shows that the Strasbourg map cannot be a copy (or certainly at least not a careful copy) of the Cotton and cannot have served as a cartographic source for the Cotton, at least when considering the outlines of rivers and streams. The following sections present three separate regional studies focusing on extended objects like rivers and lakes and their toponym inventory. The aim here was to elucidate what could have happened during the elaboration of the two documents.

Beyond differences in contouring or geometrical placement, and the ensuing differences in geographical information density, there are other structural elements that differ between the two maps which merit further study. One important item on this list is the visual communication of 'importance', in other words, the ranking of Italian places of significance. Biondo searches for and glorifies the ancestry of historic sites, but what about his contemporaries, the two makers of our maps?

As shown above, there is little hierarchy expressed through graphic mark-making: lapis lazuli is applied randomly and only two-portcullis vignettes are a sign of 'importance' on the Cotton. In contrast, the Strasbourg transfers

another element from portolan charts to its inland design: rubrication of place names. On average, about every fifth entry or so in these charts is rendered in red, many of them without reflecting any particular merit in our modern understanding but generally denoting 'significance'. The relevant numbers for our maps are compared below intbl. 1.

Table 1. Statistics on the Content of the Two Maps [47]

	Cotton	%	Strasbourg	%
Total vignettes	1220		649	53.2
Total important vignettes	104	8.5	95	14.6
On common site	937		649	69.3
Missing	12		278	42.8
Important towns therein	62	6.6	95	14.6
Agree	55	76	55	
Disagree	7	11	40	

The Strasbourg retains only about 70 percent of the entries in the Cotton but has a much larger percentage of important towns and only twelve entries which do not appear in the Cotton. The distribution of these 'political statements' is interesting. Only seven two-portcullis names are not rubricated and four of those are missing entirely: Spoleto, Todi, Ostia, and Tivoli. Toscanello and Montefiascone are normal vignettes, and Asti in Piedmont is marked but unnamed, hence could not be rubricated. Thus overall concordance on the importance of two-portcullis sites is good. Among these, we have (of course, one might say) the important places like Rome, Florence, Pisa, Milan, and so on but there are also notable omissions. More importantly, north of the River Po, where the Cotton only has nine distinguished cities, the Strasbourg has eighteen rubricated entries – twice the number. Clearly, there must have been a different understanding of 'importance' – and this alone merits further study in future.

6 6. The Mutilation(?) of the Strasbourg Map

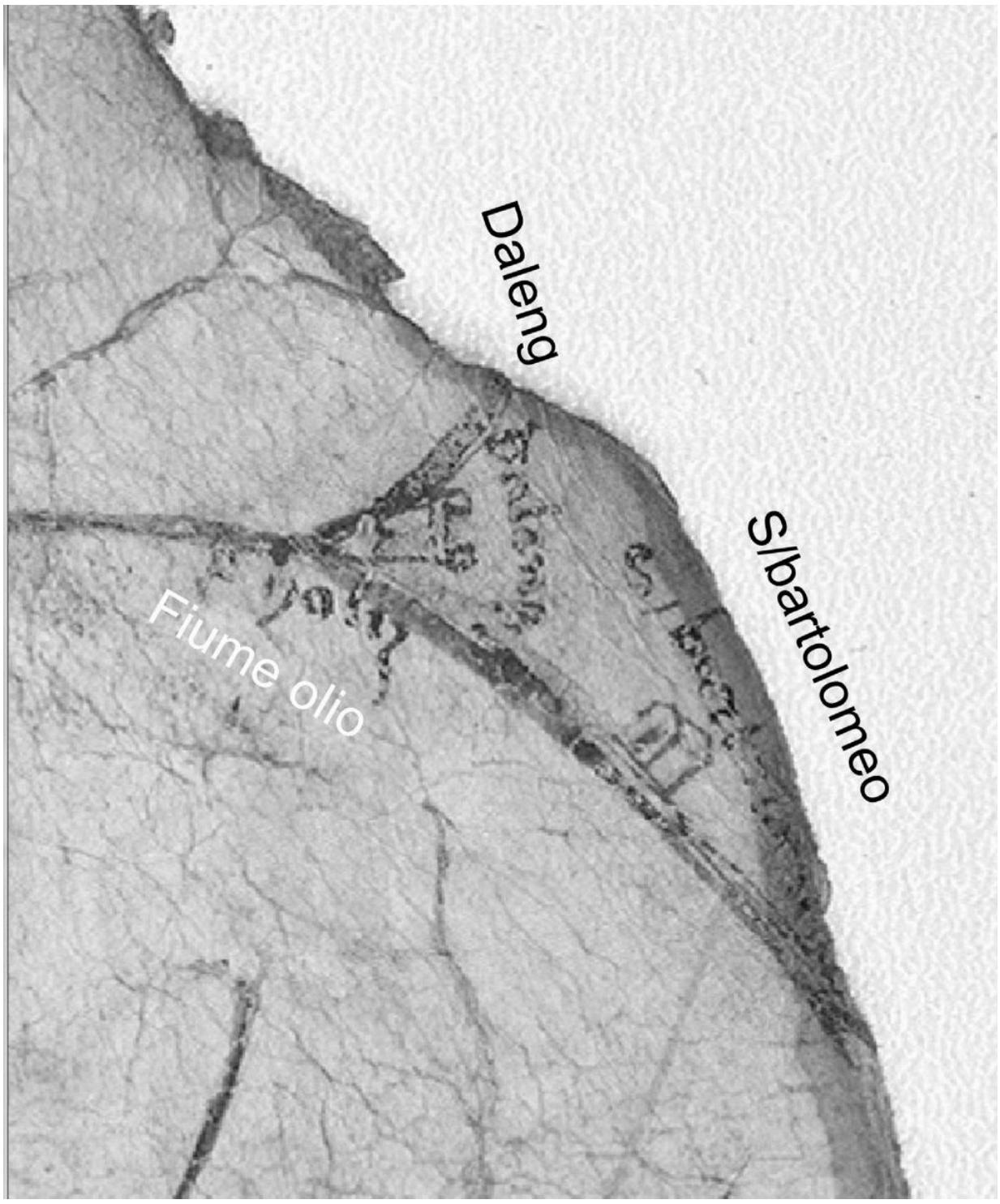


Figure 8. This small excerpt of the Strasbourg map shows the ragged lower edge in the vicinity of the river Oglio. The Vignette of Daleng fits into a 3 x 4 mm rectangle. The dark band at the edge is taken as an indication that the cut was deliberate.

We have seen that one probably needed three sheets of (readily) available animal skin to render Italy at the scale of 1:600,000, as used in the Strasbourg map. Hence for a general survey map, the sheet-size of 65 x 95 centimeters is insufficient in width and, of course, in height, too, but more than that, the image of the Alpine region is severely abridged and has been strangely mutilated, as evidenced by its ragged edges. However, there is some evidence suggesting that the northeastern corner may have been already removed during the inscription phase. As shown in high resolution, the ragged cut was apparently made along a trace line marked in the same color as the river markings. The name of San Bartolomeo appears to have been squeezed into the margin *after* the removal of the missing part. The pale green ink along the rim otherwise serves to emphasize rivers and lakes. But here it was apparently used to delineate the cut.

Intriguingly, all this happens at the headwaters of the "olium"/Oglio river and up to San Bartolomeo on the Passo del Tonale. For centuries up to the present day, this little-known pass has marked the border between Italian Lombardy and German-speaking Trentino. The missing part depicts what in the Cotton is the Val Telline (Valtellina) – a pass that was heavily contested over the centuries between, on the one hand, northern powers that would (much later) coalesce into the Swiss Confederation and, on the other, the various powers that ruled over centuries in Lombardy.

The next deliberate removal of part of the animal skin is only identifiable through a comparison with the Cotton and clearly happens at the confluence of the Adige (German: Etsch, marked on the map as "f. addax") and the Torrente Noce from the Val di Non which descends from the Passo del Tonale described above. Again, the brutal cut follows a marking and, although undecipherable, the two vignettes facing each other across the river at this point are readily identified on the Cotton by the label "mez" (modern Mezzocorona/Kronmetz) and "conigsperg" (modern-day castello di Monreale/Königsberg, near Salorno).[48] And again, for centuries these two sites traditionally marked the southern border of German-speaking South Tyrol and Trentino, in other words between essentially Hapsburg dominions and Venetian ambitions. The deliberate cut crosses the Adige/Etsch at the last (now-illegible) entry identified on the Cotton as "formiga"/Frangart just five kilometers south of Bolzano/Bozen at the confluence of the Eisack and

Etsch. Here ends the dark blue border marking the removal of the northeastern part of the skin. The cut itself ends just north of Bressanone/Brixen, exactly where the Cotton ends. Further evidence for a deliberate 'mutilation' or elision of the northeastern corner is manifest in the coastal stretch northeast of Venice. The same dark greenish marking appears to suggest deliberate removal. Further on toward the coast, the (indistinct) coastline of the Adria runs toward the upper-right edge.[49] The last readable entries before the 'border' marked in blue are the three settlements of "ouerzo"/Oderzo, "bufoleo"/?, and "cauclan"/Cavolano on the Livenza river. However, this border does not, as far as I know, represent a border separating languages.[50] Why would the mapmaker literally cut off the Friuli?

On the other hand, both maps are clearly 'non-political', in that they have neither boundaries nor territorial labels or markers, and only indicate settlements, rivers, and the coast. A more mundane explanation for the mutilations could be that they are the remnants of a rescue attempt to halt further deterioration through rot, without linguistic or political connotations. The coincidence with boundaries would then have happened by chance alone, a possibility that Marica Milanesi, after closer consultation with me on this matter, suggests.

On the French-speaking side, a narrow strip has also been removed. The tell-tale green marker is also present, suggesting that the strip was removed purposefully and that the map was not subject to a random act of vandalism. The prominently 'saved' feature is the source lake of the River Po, which all the relevant maps[51] retain, and the cut follows the Alpine watershed, as does the modern-day border between France and Italy. The rest is difficult to read even with the help of the Cotton as a cross-reference for designations. It is subsequently too early to draw any conclusions. Specialists in minority and relict languages can perhaps better shed light on these suppositions. It is my personal belief that the unprecedented richness, diversity, and local precision of both maps may help other relevant investigations into early fifteenth-century thinking.

7 7. The Rendering of Swamp Areas

Beyond pure location, a map uses numerous conventions and symbols to communicate meaning to the audience, among them coloring and shading of extended objects like islands or lakes.[52] One example of such building blocks of what scholars call 'map-based dialogue' is an intriguing feature of the Cotton that distinguishes it from other maps of its time, namely the rendering of swamps with distinct graphic marks, quite different from those used to indicate lake surfaces. By comparison, the Strasbourg, for example, uses the same graphic marks for wetlands and lakes, making no distinction between the two.[53] This is best seen in the Chiana Valley (Valdichiana) between Arezzo and "chiusi", but other instances merit further study.

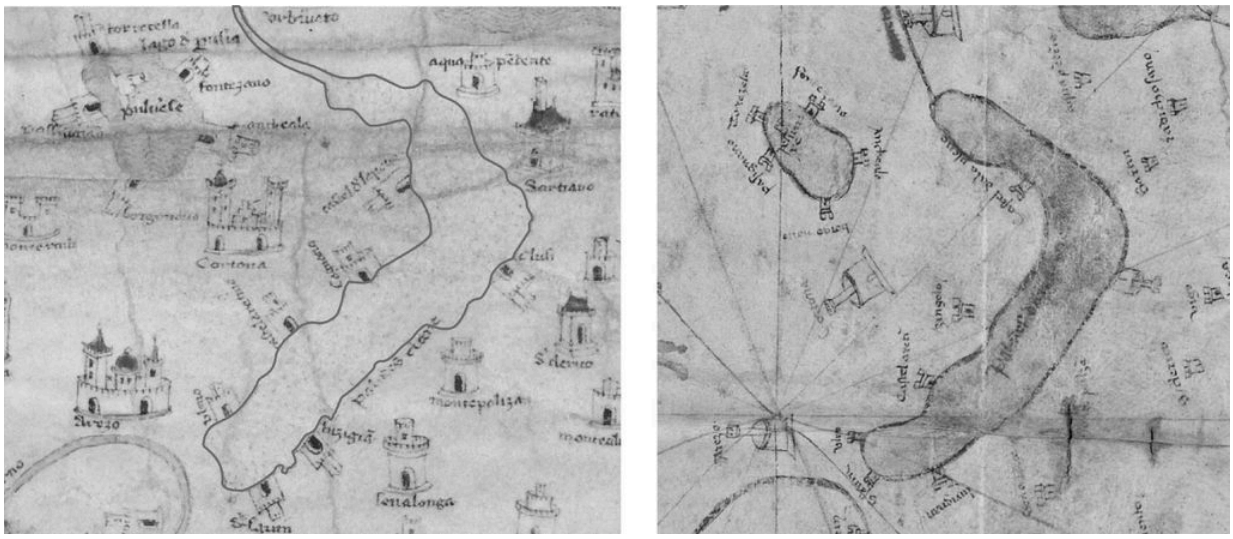


Figure 9. The rendering of the Chiana valley side by side of the Cotton (left) and the Strasbourg map (right).

The stippled surface is quite different from the wavelets representing lakes, such as nearby Lake Trasimeno.[54] Other wetlands share this feature as well: the Maremma near Grosseto in Tuscany, the Valle Padusa northwest of Ravenna, and extensive wetlands around the Venetian Lagoon, extending from the Musone river to the "padus ficariolo"/Ficarolo.[55] To Biondo, these places had significance, attested by his introduction to the territory of Venice which he describes succinctly in chapter 8.2, 'Venice': [T]he duchy is eighty miles long [...] The breadth of the region is variable, its only bound-

aries being the marshes formed by the waves of the sea, as they advance and recede toward and away from dry land.[56]

Remarkably, the Pontine Marshes south of Rome and the Clanio marshland north of Naples are simply ignored, appearing to have no demarcation at all. However, other wetlands such as Lake Fucine and those between Rieti and Terni, which have survived into our time, as well as some periodically inundated areas in the lower Arno Valley between Lucca and Pisa, are shown with the regular lake markings.[57]

One may wonder why these areas warranted a special area symbol, foreshadowing the sophisticated graphic 'special features' which tremendously enrich the vocabulary of modern maps. The consequences of the neglect of Roman hydraulic engineering works were dramatic, as, starting in the early tenth century, much traffic moved over to neighboring Val d'Elsa (Via Francigena) which then grew in political importance. However, despite flooding, the Chiana was still used for transport, as is shown by the following source:

> In the past, the hills of Chiuso (between Cortona, Valiano, and Foiano) were equipped, due to their strategic position, with castles and ports, albeit rudimentary, for the landing of boats in service on the Chiana. The name of "Il porto" remains today in the cases of Farneta, Cignano, Fasciano, Bettolle, Creti, Foiano, and Cesa. The port of Farneta is a neighbor of the port of Foiano della Chiana [...].[58]

On the other hand, the Chiana wetlands were the theater of intense military struggles between Guelph Florence, Ghibelline Siena/Arezzo, and the Papal States until 1492, when the Medici took control of Tuscany.[59] In the heavily contested territory, the marshlands (and indeed knowledge of their whereabouts) may have come in handy.[60] This area symbol thus may have had a military significance for the map's readers.

The topic of marshland markings distinguished from lake markings is apparently also taken up by Nicolaus Germanus in his *Italia Moderna* of 1467[61] and in Leonardo da Vinci's *Map of Tuscany and Chiana Valley* of circa 1503–1506,[62] which denotes marshy areas in a lighter blue. The use of such area symbols in all these maps indicates that the (educated) public – the mapmakers' patrons and clients – were aware of such subtle cartographic signals and suggests a sophisticated appreciation of semiotic features.

To summarize, the topic of special area symbols for marshland is a recurring style element in early mapping and perhaps one of the earliest (surviving) examples is found in the Cotton. For unknown reasons, the maker of the Strasbourg chose not to retain it, one assumption again being that the natural environments of such wetlands were known to its immediate users and thus did not warrant the extra effort, as was the case with the missing place names in known territory (see below).

8 8. A Common Source?

Further detailed comparison of the two maps shows that their similarities betray a common source, but with neither being an outright copy, either way. The idea does not rest only on the common overall size, but is also supported by two observations: common idiosyncrasies or errors on the one hand and distinct details in particular. Both maps share the banana-shaped outline of the swamp of the Valdichiana but the real Chiana wetlands extended only from "ulmo"/Ripa di Olmo (where the canal was later dug) to "clusi"/Chiusi on a straight north-south orientation. The bend toward the east (toward the left in fig. 9) follows the course of the Chiana through hilly terrain toward "orbiuato"/Orvieto but without the extended wetlands suggested by our two maps. Hence, the banana-shape appears unique to a particular rendering or rather misreading of a common source.[63] By comparison, Germanus's and Da Vinci's Valdichiana are pretty straight.

The outlines of extended objects (rivers and lakes) reveal a free-hand style of draftsmanship common to both the Cotton and Strasbourg. A typical example is Lake Trasimeno: all settlements are present, but the size and orientation of the oval are quite different. Note also the simplified outline of the swamps in the Strasbourg, which, within a margin of one to two centimeters, follow those of the Cotton – not bad for a manuscript map 60 x 100 centimeters in size!

The toponym inventory has a high degree of common places, albeit often with different spellings and selection. For instance, Cortona (494 meters ASL)[64] sits high above the valley floor and to the side, as shown in both maps. Below it, at the shoreline, the Cotton has the settlement of "cam?ia"/Camucia, whereas Strasbourg instead marks out "a zingolo"/?, which may possibly

represent nearby Monsigliolo (Camucia-Monsigliolo; 273 meters ASL). Next to these sites, the Cotton has a "castel d'lapena" which cannot be identified, whereas Strasbourg displays a "castel dalla plane". In the area of Tuscany (for which high-resolution digital images taken from both maps are available) other examples include the entry "bolsena" on the Cotton which becomes "Bolgena" on the Strasbourg, while "toscanello" becomes "Toschanela", and "vicarello" and "anguillara" similarly lose an "l" on the Strasbourg, and so on. The lettering evidently holds many potential clues and perhaps paleolinguistic and paleographic studies of the name forms will provide further insights into the origin and/or makers of these exceptional charts.

A strikingly similar geographical lapse can be found at Lake Lugano where nine toponyms and the outline of the lake are squeezed into an area of only 3 x 4 centimeters. Here the characteristic U-shape of the lower half of the lake is faithfully reproduced by both maps but the upper-right half of the real lake to the northeast of Lugano is missing in both renderings. This clearly demonstrates their dependence on a similar (or same) source which also carried this inaccurate information. More detailed study is bound to unearth yet more telling examples but the message seems clear (to me): underlying these two maps is a common source.

9 9. The Coastline in *Liguria*

Having dealt with inland sections, a third detailed comparison deals with (part of) of the extensive littoral outline and hydrologic network of the two maps. Here, I choose the layout and marked settlements along a 115-kilometer-long stretch of the Ligurian and Tuscan coast between Portofino and Pisa.

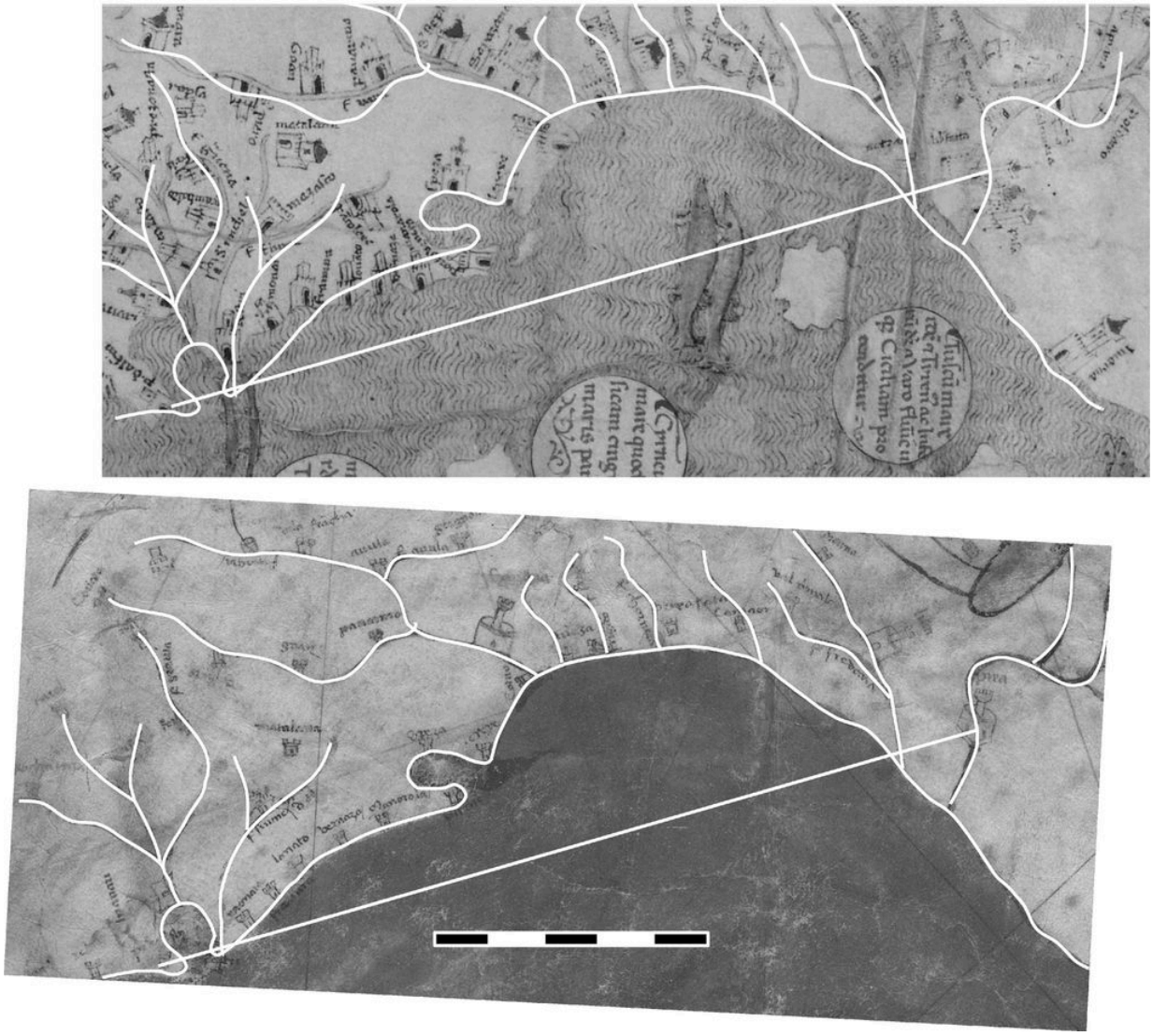


Figure 10. Comparison of the coast and rivers between Pisa and Portofino of the Cotton (on top) and the Strasbourg map (below).

The distance from Pisa to Portofino (116 kilometers) is shown by the straight line which is 15.2 centimeters long.[65] First the coastline will be discussed and then the placement of the rivers compared.

The bight of Portofino is not rendered accurately because in reality it already ends at Chiavari, the next marked point on both maps. This suggests that a verbal description of the coastline may have inspired the deep recess, whereas the bight running from Portovenere to La Spezia ("larexa"/Lerici) shows a fair degree of fidelity to ground truth. In between and beyond Sestri Levante (marked on both maps), the Strasbourg gives a schematic represen-

tation of the five equidistant vignettes of the Cinque Terre communities (not all named), whereas the Cotton clearly faces problems fitting and naming them in the space available. Apart from this, there is concordance as to the estuaries and the general curvature of the coast in both maps. In the hinterland, Sarzana, Lucca, and Pisa are each marked with two portcullises on the Cotton, whereas the Strasbourg assigns Chiavari distinctive red lettering. Starting with the Arno river, crossing Pisa, one immediately sees that the actual rendering of the river courses is largely dependent on the space available between the differently sized but accurately placed vignettes with, I believe, one significant exception: whenever a tributary reaches a main river or a river reaches the sea, their locations match. At least to the craftsmen of both maps executing the drawing, these geographical places held a significance, which is also attested by the numerous vignettes nestled in the confluences. These afford place recognition, confirming at least three elements and their relation to local space: river A flows into river B at town C.[66] In a sense, they provide spatial clues similar to promontories in portolan charts: direction from place A to B changes into the new direction from B to C at B. The continuation of the zig-zagging or curving lines further into the interior is subsequently subject to less stringent rules and accuracy.

10 11. Conclusion

As an image, the Cotton appears to follow the same principles that guided Biondo in structuring his narration of the *Italia Illustrata*. It 'illuminates' Italy from the Alpine Arc to the Ionian Sea and excludes the islands to form a single, magnificent unity, not the three-partite political structure of its day. It also applies the ancient technique of patterning the subsets of data along the rivers, just as Strabo did. And, finally, it even shares with Biondo's work the relative paucity and incompleteness of information in the region of the Kingdom of Sicily. But there the similarities end. Despite containing 1200-plus toponyms, the interior plotting is very different from Biondo's account, which features 2000-plus place names[67] (see also Guckelsberger and Geus in this volume). Obviously, the Cotton and Biondo share the noteworthy cities, the *poleis episemoi*, but the distribution of the other settlements differs locally. As such, we can come to the conclusion that the Cotton was

certainly not Biondo's source but, perhaps, Biondo did see the map at some point, somewhere in northern Italy, and it might have inspired his literary write-up of a general survey purely in words. Also, Biondo's desire to resurrect Antiquity and its splendor has very little to do with the Venetians' detailed information on trade routes, military intelligence, and administrative knowledge of the various powers which the Cotton so clearly demonstrates.[68] They are, to me, two views of the same entity: an illustrated and indeed *illustrious* Italy seen from different perspectives.

The existence of such extensive pre-modern maps of Italy firmly argues against the notion that Italian cartography developed rapidly after the discovery of Ptolemy's *Geography*: it was already emerging independently of his great legacy. The crossover from portolan charts to terrestrial maps of similar 'precision' is impressively documented by the two specimens discussed here. Indeed, Milanesi has already diagnosed the relative similarity between them to a lost or unknown prototype.[69] Furthermore, their widely different cartographic languages argue for a vigorous program or at least clear awareness of the cartographic requirements yet to be developed in subsequent centuries. After all, both maps are the earliest surviving attempts at a constructed landmap as evidenced by the portolan-like overlay. I believe in two master-maps, one for northern and central Italy and another for the Kingdom of Naples. The Strasbourg may even have been nearer to a source map (or be a copy thereof), despite its poor graphics. (Indeed it may be a brouillon or a draft copy?). In the area covered by both maps, the Cotton has 1220 names, while the Strasbourg contains only 649, at last count. Conversely, it has twelve names that do not appear on the Cotton and a clear case of alternate names in a sequence in the Chiana Valley demonstrates (among other things) independent or alternate input data.[70] The same applies for rivers. Such an exchange and correlation of nearby place names suggest that an itinerary-type data set was available from which one mapmaker chose one name and the other another. Of course, both mapmakers would have had additional information at their disposal and decided to add in or omit other points. Numerous variant spellings of the selfsame place names may well provide further clues on the relationship between the two artifacts. Clearly more examples are needed, but the case is now open.

The overwhelming majority of details suggest a common source but different graphical dexterity or attention. Finely traced – and in detail superbly faithful – inlets and promontories on the Cotton suggest superior local knowledge, while the Strasbourg's preparatory markings and penstrokes and factual but rather crude vignettes may signal a more technical 'preliminary', even preparatory stage of the same compilation. Furthermore, a study of the lettering by palaeographic experts would be a welcome approach to dating the document.

It seems likely that the master chart not only served Cotton and Strasbourg and Biondo, but also those mentioned below. (Indeed it would support, rather than contradict, the author's argument.) In fact, in her article cited at the start, Milanesi writes that in 1999 Molly Bourne vehemently advocated the hypothesis that one of these maps, the Cotton, is somehow related to the wall map of Italy designed for the second time by Antonio Leonardi in the Palazzo Ducale in Venice after the fire of 1483 and continues in footnote 21 that Peter Barber in personal communication with her on the matter believes that the two maps may have had, at least, a common source, which seems to me more than possible.[71] The Strasbourg may generally lack river names but not systematically. Without an extensive search, it appears to me that those names which *are* given may have served as a means of quick orientation in answering practical questions like "Where are we at the moment?" either during the drafting of the map or during a copying process. For instance: there are six rivers issuing into the Adriatic Sea between Ravenna and Rimini and each one is named in the Cotton, but only the fifth is named in the Strasbourg. Nearby, a total of nine rivers flow into the Valle Padusa between Bologna and the coast. On the Cotton they are named and simply stop at the edge of the stippled area, whereas on the Strasbourg, they namelessly merge into a lake, but, again, only the next to last is named. More study is surely needed here.

Finally, it is unclear whether the imaginary boundary from Ostia to the River Tronto was a political, linguistic, or cultural watershed. The Tronto was indeed for many centuries the southern limit of the March of Ancona, whether under Langobardian, Carolingian, or Angevin rule. Note also that the earliest map of the whole of peninsular Italy,[72] the bisected map of Italy

by Fra Paolino, continues its northern half down to the Gargano Peninsula so that this terminus cannot be considered a fixture of historic geography.

11 Acknowledgements

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Thanks also to Lance Anderson for editing assistance.

Notes

1. (Milanesi 2008).

2. (Guckelsberger and Geus 2022)

3. A notable exception is (Harvey 1991, 77), which shows a slither of the map around the Venetian Lagoon and the Po Delta. Milanesi gives the few available citations prior to 2006, (see Milanesi 2008), specifically note 3 there. Since 2009, a few remarks have been included in some book publications referring to Milanesi's text, but a thorough discussion or analysis has yet to come to my attention.

4. (Grenacher 1948). It reports the few facts known about its provenance and is accessible online, URL: http://doi.org/10.5169/seals-323083 🟠🟠🟠 (accessed 15.07.2020).

5. (Milanesi 2019), preprint available through personal communication with author in 2019. Milanesi also shows that Biondo depends on Cotton-like maps and not the other way round because he ignores some other Alpine rivers which are presented in great detail on the Cotton.

6. The corresponding cartometric enquiry is vast and thus outside the scope of the present publication. See also fig. 8 in this article.

7. (Meurer 1999). URL: https://www.deutsche-biographie.de/pnd100955037.html#ndbcontent (accessed 15.07.2020).

8. (Harvey 1987, 464).

9. (Harvey 1987), note 8, appendix 20.1, p. 498.

10. (Harvey 1987, 481).

11. (Milanesi 2008, 153).

12. (See also Cachey Jr. 2018).

13. (Campbell 2011), URL: https://www.maphistory.info/portolancensus.html (accessed 09.09.2017).

14. (Lilley and et al., n.d.), http://www.goughmap.org/about/ (accessed 15.07.2020).

15. A compilation of such maps was published in the 1950s, see (see Bennet Durand 1952). By the 1990s, however, this designation as a 'corpus' was shown to be meaningless, (see Dalché 1996).

16. Why is Narnia a member of this illustrious assembly? Mapmakers are known to have sometimes highlighted their home towns in a particular way. See, for instance, the French scribe Hugo Comminelli (Hugues Commineau) and his illustrations in the "Octavus et ultimus liber" of Claudius Ptolomaeus, Cosmographia, Jacobus Angelus interpres, 1451–1500[?], (Commineau 1451). The online "Historique de la conservation" on this object (Latin 4802) states: "Le copiste, originaire de Mézières sur la Meuse, a indiqué sa ville natale au f. 126 en petites lettres noires: 'Macerie supra Mosa(m)'", URL: https://archivesetmanuscrits.bnf.fr/ark:/12148/cc63677b (accessed 15.07.2020).

17. Within a radius of 40 kilometers there are eight important towns in the region: Salerno, Naples, Nola, Aversa, Castel Volturno, Capua, Benevento, and Ariano-Irpino.

18. The distance and graphical representation of the network is solely based on the identification of locations which I could identify along the rivers, not on their course in the landscape.

19. On the central role of rivers as a reference grid for organizing urban space see, for instance, (Dalché 2005). With respect to the twelfth-century Expositio mappa mundi, he writes: "Il y a des points fixes ou des lignes, par rapport auxquels les peuples et les cités sont disposés. […] les réalités géographiques les plus importantes pour la structuration de l'espace continental sont internes à celui-ci: ce sont les fleuves."

20. At the moment of writing, not all of the tributaries to tributaries are documented but the importance for mapmaking, organization of space, and the

impressively detailed knowledge displayed are sufficiently clear.

21. See the revealing chapter by Florian Mittenhuber on the catastrophic consequences for the outline of the Mediterranean due to erroneous coordinates for Tunis, Marseille, and Istanbul, (Ptolemaios 2009, 1:245–52).

22. In contrast to the stellar catalogues useful for astrology, Ptolemy's Geography was never really commented on or used before the 1460s. On its reception, (see Mittenhuber and Klöti 2009, 282–304, note 21).

23. Geodesically accurate to within 1 kilometer.

24. It is also missing from another "great map of Italy", the anonymous map of 1449, from Cicogna, preserved in Venice, at the Museo Correr, Dept. 19, (Milanesi 2008).

25. Both the black-and-white format and the lower-resolution image of the Cotton as compared to the Strasbourg diminish the visually pleasing rendering of the Cotton, which assembles five buildings behind a wall.

26. (Milanesi 2008) writes in note 60 when describing the Cotton: "[...] Strasborgo, che le assomiglia tanto da sembrarne una brutta copia, o una parente povera."

27. (Pujades i Bataller, Ramon Josep 2007, 199).

28. (Campbell 2013), URL:http://www.maphistory.info/RedNamesCommentary.html (accessed 11.10.2019).

29. According to (Grenacher 1948, 18), the Strasbourg was first presented at the Seventh International Congress of Historical Sciences that took place in Warsaw in 1933.

30. Witte was the first philological editor of the Divine Comedy. His very rich collection on Dante's writings was acquired by the Universitäts- und Landesbibliothek in the then-German Strasbourg in 1883, but was lost after 1918, it seems along with the map. (See Briguglia 2017) (link accessed 11.10.2019): "After the construction of the National and University Library, a great appeal was made to the Germanic world for donations of library funds, collections, books, manuscripts, and the Kaiser himself invested a great deal in acquiring as much as possible. This is how the library came into possession [...] of the legacy of Karl Witte, which was sold in 1883." (My translation of: "dopo la costruzione della Biblioteca nazionale e dell'università, si lan-

ciò un grande appello al mondo germanico a donazioni di fondi librari, di collezioni, di libri, di manoscritti, e il Kaiser stesso investì moltissimo nell'acquisizione di quanto più fosse possibile. È così che la Biblioteca venne in possesso [...] del patrimonio di Karl Witte, che fu ceduto nel 1883.")

31. (Milanesi 2008) only quotes (Almagià 1929, 8).

32. (Grenacher 1948).

33. (See Domenico 2002, 205).

34. By their very nature, the statistical numbers of course come with substantial uncertainties. It is thus reasonable to argue in rounded numbers.

35. Unfortunately, the counterpart to fig. 5 on the Tyrrhenian coast does not display a similarly distinctive break in scale, mostly due to a lack of named vignettes, possibly because the scribe had problems matching inconsistent information in the overlapping region.

36. Considerable scholarly effort is currently being made to better understand the emergence of portolan charts. For the general context, (see Edson 2007, 37).

37. According to (Milanesi 2008, 172), the text "De origine urbium Italie" on the Cotton proposes that: "Rome is but an episode, and not the principal, in the history of Italy; and the other cities, so important in the philo-Venetian *De origine urbium Italie*, literally disappear: the history of Italy is made complete with the foundation of Venice." (My translation of: "Roma non e che un episodio, e non il principale, della storia d'Italia; e le altre citta, cosi importanti nel pur filoveneziano *De origine urbium Italie*, letteralmente scompaiono: la storia dell'Italia si compie con la fondazione di Venezia.")

38. For example, this is indeed the case for Scotland on the Gough Map. It is depicted on a perceptibly smaller scale than England.

39. The 38 maps in the Cortona Atlas appear as an exception. To quote Tony Campbell in his entry "Anonymous Works and the Question of Their Attribution to Individual Chartmakers or to Their Supposed Workshops", on Map History/History of Cartography (March 2011): "Because the traditional (i.e., Mediterranean and Black Sea) charts in this 'atlas' – which is actually much more than that, comprising also a merchant's and navigator's compendium – were evidently copied from archival copies in some Venetian repository

around 1489," (Campbell 2011) (link accessed: 23.10.2019).

40. My translation of Milanesi (Milanesi 2008, 164).

41. (Mesenburg 1986). Mesenburg here presents a portolan chart by Ben Zar from 1497 which gave a radius of 327.5 ± 3.6 millimeters. (See also Mesenburg 1990), for the portolan chart of Petrus Roselli of 1449, which gave a radius of 257.7 ± 1.1 millimeters. These were the first and fundamental studies: the reference points for calibration were the sixteen tiny compass holes and their corresponding wind roses on the perimeter that were visible on the verso. In both cases, shrinkage was more pronounced head to tail (meaning east to west), compared to the direction perpendicular to it, 'belly to belly' (that is, north to south). This fact was confirmed in personal communication with the author in 2020.

42. Within the present investigation concerning Biondo's source maps, this is not an option.

43. Details will be presented in a forthcoming cartometric study. Several tears, expertly repaired, have resulted in jumps in the grid lines at several places not documented in the above survey which only uses coordinates spaced five centimeters apart, as indicated by the dots.

44. I did this mathematically by rotating 96 Strasbourg coordinates against the Cotton coordinates around the point (x=0,y=0) of the Cotton and minimizing the root mean square error along the common coastal stretches in both seas. The minimum was well defined as 1.3 centimeters at 3 ± 0.25 degrees. The best fit is shown above for the whole outlines.

45. In the present context, the only significant mention of Albenga that I could find is its mention in the *Liber de Existencia Riveriarum et Forma Maris Nostri Mediterranei*, see (Dalché 1995), line 1804.

46. The Cotton mentions a "geloran" at this location on the map. Campbell's list of portolan sites (Campbell 2011) has no mention of a "guloran" or "geloran" but lists Capo Linaro at modern-day Santa Marinella, which would indeed serve as the logical possible 'next stop' for seafarers after Fiumcino, but poses a wide linguistic gap in change of name.

47. Due to the bad state of preservation of the Strasbourg map, in a number of cases identification is subjective.

48. A travel diary of 1600 of August the Younger, duke of Brunswick-Lüneburg, reads: "den 28 Augusti ⛢, Laviso dorf, Bressano dorf, La rave dorf, Castell Königsperg, Castell salorno mitten dorf, Newmarckt flecken zur kronen, 4 meill, biß Brunzuol dorf, Leyfers dorf, Botzen flecken zum Cardinalßhuett 3 meill, facit 7." A transcript is viewable online, (see Ralle 2014) (link accessed 03.07.2020).

49. Better images and visual inspection of the original may clarify some of the remaining issues.

50. According to Luca Melchior: "[...] the historical Friuli are devoid of physical boundaries – hydrographic or orographic – that separate them clearly from the surrounding areas. However, if the southern border were the Adriatic Sea, then the 'natural' borders of the Friuli territory can be considered the River Isonzo to the east and the River Livenza to the west – while the territories to the left of the southern half of this are found, however, in the administrative region of Veneto." (My translation of: "Considerando il cosiddetto Friuli storico, questo risulta privo di confini fisici – idrografici o orografici – che lo separino nettamente dalle regioni circonvicine. Tuttavia, se a sud il confine è costituito dal mar Adriatico, i confini 'naturali' del territorio friulano possono essere considerati a est il fiume Isonzo, a ovest il fiume Livenza – i territori a sinistra della metà meridionale di questo si trovano tuttavia, nella regione amministrativa del Veneto.") (Melchior 2018) (link accessed 16.07.2020).

51. Many subsequent cartographers retained the source lake of the River Po, from Donnus Nicolaus Germanus's Sexta Europa Tabula in the Ulm edition of Ptolemy of 1482, to Waldseemüller's Tabula Moderna of 1513 (with an enormous lake), and Sebastian Munster's Italia XIX Nova Tabula in his *Cosmographia* of 1545.

52. For an overview (see Harvey 1980).

53. (Milanesi 2008, 164), writes: "The rendering of the Adriatic and Tuscan wetlands and the lakes of northern Lazio is equally meticulous; the basins of the Arno and Tiber are well designed and in the right proportions, even if the caesura between coast and interior is made evident by the course of the Tiber, which in Tuscia runs too close to the coast. The design of Tuscany precedes that of Pietro del Massaio (1459), which, however, does not differ

much, even in the fluid style of representation; however, the Ombrone Basin is missing, as in the Correr map, and the distribution of the centers of southern Tuscany is affected; La Chiana is also confused with Paglia, while the marshes of the Chiana and the Castiglione Lake (~Maremma) are well represented." (My translation of: "La resa delle paludi adriatiche e toscane, e dei laghi del Lazio settentrionale, è altrettanto minuziosa; i bacini dell'Arno e del Tevere sono ben disegnati e nelle giuste proporzioni, anche se la cesura tra costa e interno è resa evidente dal corso del Tevere, che nella Tuscia corre troppo vicino alla costa. Il disegno della Toscana precede quello di Pietro del Massaio [1459], che per altro non se ne discosta molto, anche nello stile fluido dela rappresentazione; manca tuttavia il bacino dell'Ombrone, come nella carta del Correr, e la distribuzione dei centri della Toscana meridionale ne risente; la Chiana è inoltre confusa col Paglia, mentre sono ben rappresentati le paludi della Chiana e il Lago di Castiglione.")

54. "Lago d' prusia" in the upper-left corner of the image.

55. (Biondo 2005, 313): "The Padusan marsh begins at the canal, according to the geographers the only marsh in Italy. Vergil says of it in the Georgics: 'or the stream of Padusa teeming with fish.' The term embraces all the lagoons, swamps and marshes that we see lying between the Po and the territory of Flaminia (or Emilia) [...]."

56. (Biondo 2016, 72), note 55: "Venetias [...] Habet autem eius ducatus regio longitudinem milium octoginta [...] Latitudo autem varia nullos habet alios terminos quam quousque cedentes recedentesque mans aquae ad siccum stanando perveniunt."

57. The remnants are now known as the "Padule di Fucecchio".

58. My translation of [Anon.]: "Le colline del Chiuso (tra Cortona, Valiano e Foiano), per la posizione strategica, erano in antico munite di castelli e dotate, sebbene rudimentalmente, di porti per l' approdo di barche in servizio sulla Chiana. Rimane oggi la denominazione de 'Il porto' a Farneta, a Cignano, Fasciano, Bettolle, Creti, Foiano e Cesa. Il porto di Farneta è dirimpettaio del Porto di Foiano della Chiana [...]", from "Gli interventi medievali e la situazione antecedente all' egemonia medicea sulla Toscana", URL: http://www.valdichiana.it/bonifica/storia2.php (accessed 15.07.2020).

59. Similarly, Guelph Grosseto was contested by Siena until 1336.

60. Warfare may also have hindered amelioration, the improvement of agricultural land by draining.

61. From the image with the highest resolution I could find in the public domain, in this case the Cosmographia Claudii Ptolomaei Alexandrini Mathematicorum Principis [...], 1467, Biblioteka Ordynacji Zamojskiej w Warszawie, Rps BOZ 2, URL: https://polona.pl/item/cosmographia-claudii-ptolomaei-alexandrini-mathematicorum-principis-seculo-secundo,NzQ1NjM4Ng/18/#info:metadata (accessed 15.07.2020).

62. See, for example, image of acc. no. RCIN 912278 in the Royal Collection, URL: https://www.rct.uk/collection/912278/a-map-of-the-valdichiana (accessed 15.07.2020).

63. Similar observations are seen in the lake district of northern Italy: in reality the Ticino issues into Lago Maggiore at a point between Ascona and Locarno but both maps show it flowing into the lake at a spot east of Locarno. Also, Lake Varese is missing on both maps, as is the Ombrone river in Tuscany.

64. Above sea level.

65. In measuring, I have used the lower central point of the relevant large vignettes on the Cotton. These usually feature a black portcullis which is easily spotted, especially in faded areas. Most vignettes on the Strasbourg are so tiny that they pose no problem when measuring the distance between two points.

66. A typical example in fig. 10 is “mazasco”/Massasco above Sestri Levante at the confluence of the River Torrente Petronio and a small stream. The vignette above that, “matalana”/Mattarano is correctly placed in the Strasbourg at the headwaters of the Petronio. In the Cotton, although at a similar place, its orientation suggests a very different location up-stream on the small stream. One may take this as an indication that the definitive placement and/or orientation of the vignette was left to the miniaturist of the map. This is also suggested by fairly frequent left bank/right bank switches, resulting from restricted space or aesthetic concerns. It is worth remembering that the map is extremely crowded, especially in the Levante, compared

to the conventional density of features on modern maps.

67. Not only vignettes but also estuaries and confluences furnish additional geographical information which also figures frequently in Biondo's text.

68. The remote but disputed Alpine valleys are rendered in superb detail.

69. (Milanesi 2008, 164).

70. A number of unreadable entries may or may not increase these numbers.

71. (Milanesi 2008, 156). "Molly Bourne, nel 1999, avanzava velatamente l'ipotesi che una di queste carte, la Cotton, sia in qualche modo da mettere in rapporto con la carta murale dell'Italia disegnata per la seconda volta da Antonio Leonardi in palazzo Ducale a Venezia dopo l'incendio del 1483[21]", (her) note 21: "(Bourne 1999, 65). Peter Barber (comunicazione personale) ritiene che le due carte possano avere avuto, quanto meno, una fonte comune; il che mi sembra più che possibile."

72. Paulini Minoritae de Venetiis opera historica, fol. 267v and 268r, known as Vat. Lat. 1960 and available in high resolution from DigiVatLib, the Vatican Library's digitized collections, URL: https://digi.vatlib.it/view/MSS_Vat.lat.1960 (accessed 15.07.2020).