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TERRAIN REPRESENTATION IN REGIONAL CARTOGRAPHY IN THE RENAISSANCE: SOME EXAMPLES

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I. INTRODUCCTION

During the first half of the Renaissance, the major European nations dedicated their best efforts cartographic to knowledge of the sea routes and possessions overseas, we notice a gap between this intense activity and low activity aimed to representation of the different national territories. Although cartographic revolution that took place in Europe during the era of great geographical discoveries, paradoxically in most countries there was no national geography, much less regional. However, in the second half of the sixteenth century this trend changes and begins to arise also a concern to describe measure and represent the Old World. There arises this way the idea of realizing this article, studying a selection of maps of the first half of the Renaissance in which represent the different regions of modern states, emphasizing the graphic conventions used to represent the territory in general and its relief in particular.

II. THE SPANISH CASE: SIMPLICITY AND PLANIMETRIC ACCURACY

1. The Atlas of El Escorial

The Atlas of El Escorial is not really an atlas but a collection of draft copies in advanced process of formation that was needed to modify or add elements, and to make a fair copy before delivery. It represents the Iberian Peninsula and is divided into twenty sheets with detailed information of the territory, plus a sheet containing a map index. Their study has attracted little interest because it is a manuscript map, incomplete, without color or ornamentation, with corrections and erasures, very different from the colorful paper maps in Atlas of the late sixteenth century.

In the atlas there is no date that allows to date it, and it is not also signed, for what his author has been a crux from the discovery of the document. The dating of the map is

intimately linked with the search for the author. For many years experts have been considered two candidates, Pedro de Esquivel and Alonso de Santa Cruz. Antonio Crespo Sanz for the analysis of the Esquivel's field book (located in Sweden) and some tests have solved the dilemma calligraphy, being clearly differentiated the two projects on one hand those who carried out Esquivel in 1555, of which only measurements are preserved, and secondly the manuscript of El Escorial, attributable to Santa Cruz, although he must have the cooperation of other cosmographers in the initial work and revisions.

The presence of a map index or general map was a novelty in the context of Renaissance cartography. This map is an approximate scale of 1:2.600.000, most of a Spanish map until Tomas Lopez appeared in the eighteenth century, even above the map published by Ortelius in 1570. The index map has a size of 37 x 46 cm, and is divided into degrees of latitude and longitude, different from all his contemporaries. This map has very few elements related to navigation. The form of representing the coastline is different to that used in the portolan or Ptolemaic maps, reasons that can be considered a geographical map or a terrestrial map. Also, this map shows the typical features of printed maps, including shaded mountains; the sea area dotted or striped perpendicular to the coast, features missing all in other 20 partial maps. Relief depiction by shaded *hill profiles*, following the main mountainous axis, which are easily identifiable but incorrectly positioned. The hydrography is more profuse than in other contemporary peninsular maps, with a large number of river names, which are better located the mouths that the sources.

After the index map they arranged twenty partial maps on landscape sheets, folded and bound leaves, with a size of 40 x 55 cm. In each sheets, the rectangular contour is divided into equal-sized whole degrees in longitude and latitude, indicative of that some projection does not exist, and the coordinates were drawn according to a flat square grid. The scale media is approximately 1:400,000. Terrain relief represented through texts, hill profiles, or combination thereof. Unlike the index map, on the sheets are small symbols that determine the position of some mountains or mountain passes that allowed circumventing them.

2. Hispalensis conventus delineatio (Map of the bishopric of Seville)

Geronimo de Chaves (1523-1574) was the first professor of cosmography in the House of Trade in Seville. His cartographic works are in various navigation books, and on Abraham Ortelius atlas. Among his works is selected map of the bishopric of Seville by the peculiar way in which Chaves represents the relief, the sea area, the fluvial network, and population centers.

The relief of the mountains is symbolized by the use of *hill profiles*, applying shading to give the illusion is achieved altitude and depth. The representation of hydrography is very interesting, to outline the coasts contour lines are used as bathymetric lines which are introduced in the riverbeds. Though it has to pass more than one century in order that Cruquius uses of scientific form bathymetric lines in the maps, Chaves, of an empirical way, it anticipates them in this map.

III. FRANCE: SOBRIETY AND SOME ITALIAN INFLUENCE

The fact that the Renaissance came to France in the second half of the sixteenth century, coupled with the medieval Portolan techniques were valid until the end of six hundred, made the modern national and regional mapping be developed on the Gallic country from seventeenth century , later than in other European kingdoms. Almost all major cartographers who made national or regional maps are located in France well into the seventeenth century.

Jean Le Clerc (c. 1560-1621) was the most important member of a family of engravers, printers and publishers. In his *Theatre Geographique du Royaume de France* we have studied a map of the region of Provence, made by Jean Picquet, apparently a copy of Ortelius map of 1584, and published by Le Clerc in 1619.

The map shows the hydrographic network in this part of Provence, which highlights the Rhone River with the city of Avignon on the right bank. Also there are the many tributaries that supply the region, the many bridges that ford and several lakes. To represent the population uses the convention of the elevation shot of several buildings around a central circle. In the case of mountain towns and cities, this symbol is located on a knoll shot elevation (represented on the horizontal plane). Widely are used labels with arabesques, so characteristic of marine cartography of the time. Relief representation is drawn small isolated groups hills or mounds and shaded profile shot.

IV. ENGLAND: A NEW APPROACH TO REGIONAL MAPPING

In the late sixteenth and early seventeenth centuries there was a change in map-making in Britain; its cartographers were at the head of a new approach: regional mapping. Christopher Saxton (1542-1608), arguably the father of English cartography school was dedicated to the tracing the maps of the various English and Scottish counties. Since early 1570, using the privileges provided by the central government, Saxton traveled around the country, until in 1579 was finally able to publish their atlas with all counties. Their contribution to regional mapping is immense, and his Atlas of England and Wales was not only the first in the country, but that was the first national atlas produced, which served as model in later centuries.

On maps of the Atlas of England and Wales are widely used labels with arabesques to filling the empty space in the border regions. The hydrographic network is fairly detailed and the orography is represented, once again, with the recurring convention of the hill profiles, which are shared between the abundant place names that accompanies to the representation of populations.

John Speed (1552-1629) was another prominent figure in scene of English mapping in the early seventeenth century. Speed maps were based on Saxton and Norden, with the addition of the plane of the cities, ornaments and miniatures, perhaps influenced by the Flemish school. Many of his works were recorded in the most prestigious workshops of Amsterdam. The popularity of his maps is due largely to the fact that the decor was very attractive, and also contains useful information for the public.

The atlas maps of the «Theatre of the Empire of Great Britain», beautifully colored by hand on hard copy, contain abundant toponymy and the boundaries between regions are represented by a thin dotted line. They show in detail the hydrographic network with its

rivers, dams and bridges, but do not indicate any path. The relief representation is made by forming isolated mounds or clusters, *hill profile* (represented on the horizontal plane), shaded by grated in the engraving, which was later emphasized by illuminating each copy manually. It is common that in one corner of these maps represent the bird's eye view map of cities in the county.

V. THE ITALIAN STATES: BETWEEN SCIENCE AND ART

Although the Italians were in the Renaissance masters in the realization of images of landscape, at that time there was no concept of a unified mapping of Italy. In the sixteenth century came a new development of cartographic creation was manifested mainly in the production of regional maps, and was made possible by the good progress made in the first half century in the printing of maps.

In Venice was concentrated the manufacturing of printed maps and among the most popular engravers outstand Giacomo Gastaldi (c. 1500-1566), who had a great knowledge of Northern Italy, as evidenced by their maps of the Gulf of Venice, Padua, and Lombardy; as well as the Genoese settled in Venice Battista Agnese, and Paolo Forlani. Of Forlani's work we studied the map called *Descrittione del ducato di Savoia, novamente posto in luce*, which represents the region of Piedmont with Turin, part of Switzerland, Lake Geneva, and France to Lyon. Cartographic relief depiction is made by drawing in parallel perspective of high vantage point, mound shaded row or forming groups, distributed over most of the territory. The same convention is used for drawing forest clusters of trees seen from above and shading. Along with the terrain also represents the hydrographic network with abundant rivers, tributaries and lakes, like in the middle of Lake Geneva (now Lake Geneva).

The humanistic impulse of the Renaissance period demanded maps with more detail and greater scale, and interest in the characteristics of the landscape began to awaken. Scientists and artists became interested in the landscape. A series of maps of Tuscany, painted by Leonardo da Vinci between 1502 and 1503 are one example of excellence in planimetric representation of the terrain. He divided the region of Tuscany and part of Umbria in 22 areas for its representation in as many maps. Leonardo, like other painters of the Renaissance, established a close dialogue with the natural setting, showing an interest in rationalizing what the vision offered in order to achieve a representation that we can almost call topographic by the accuracy in defining the detailed. To represent the relief, unlike the action of the mounds grouped in hill profiles in these maps Leonardo, with his painterly technique, gives continuity to the topographic surface, showing the landscape with a great expressive force supported by the bird's eye view perspective and shading.

VI. GERMANY. NOTABLE MAPS ENGRAVERS

In this era of great discoveries, Germany, birthplace of the father of modern printing, most of the maps were, of course, engravings. In the second half of the sixteenth century began the rise of European regional mapping, as in England, reached an important development in Germany. From this period we have studied a map of the Canton of Zurich made by Jost Murer (1530-1580). It's very interesting way of representing the relief, because to

some extent departs from the conventional way that we have observed in previous maps. Although elevations are shown in *hill profiles* (represented on the horizontal plane), a particular interest possesses in the orographical aspect to the being the symbols or forms least standardized, proving to be graphically differentiated. Previously, the maps gave the misleading impression of omnipresence of plains and valleys, devoid of any relief, between isolated symbols of mountains without showing slightly undulating forms. The result is a continuous topographic surface that holds together the land and we will now find other examples that make a difference with how to represent the relief that has been in use since the origins of cartography. Although the technique here is less spectacular than in the aerial views of Tuscany that made Leonardo, in part by the limitations of engraved opposite to drawing, the result is a painterly look of the landscape, where it has gone from the parallel projection, so common in earlier times, the oblique projection elevated viewpoint.

Philippus Apianus (1531-1589) made a series of maps of the Duchy of Bavaria, considered a masterpiece of the topography of the sixteenth century. Apianus prepared the work taking data and making measurements for the Duchy for ten years (1553-1563), finally published it in 1568. The atlas, beautifully decorated, it is composed for 24 subsidiary maps at a scale of 1:144000. The maps include a scale of longitude and latitude in the framed box. It can be verified how it is represented the orography using a bird's eye view technique, similar to that used earlier by Leonardo da Vinci.

VII. CONCLUSIONS

Although during the Age of Discovery most of the cartographic efforts centered on the urgent geographical knowledge of the new overseas territories, many European states also promoted the representation of their old possessions, leading to national and regional geography. In this rich cartographic production can be seen as the emerging concern about the representation of orography.

The form of representing land relief in the sample has a number of common points that, in general, differ little from the conventions that have been used throughout the history of cartography, from its origins. However, if you make a more detailed graphical analysis, there is a certain evolution. One of the reasons of this change is associated with the implication of other branches of knowledge in cartographer's trade like cosmography, geometry, trigonometry, optics, etc. This process did not occur in the same way in Europe, but has features for different states.

The Spanish case, represented by the incomplete atlas of El Escorial, but short on conventions for the representation of relief, is the first medium-scale map of the Peninsula, which represented the extension, is greater than in all other cases in the national and regional mapping that occurred in the rest of Europe. Until their completion mid-sixteenth century, this atlas gave to Philip II a better representation of the region than any other European area of comparable size. His manuscript pages could be the sign of domestic production that never saw the light by the indolence of its political leaders, jealous of not disclosing images of their domains, and the lack of technical and artistic means in Spain.

The Renaissance arrived in France in the mid-sixteenth century, although in cartography is conserved to date, certain medieval features much more advanced than in other states

Europeans who embraced before the new trend from Italy. With the advent of engravings like those of Jean Le Clerc or later with the work of the Sanson family, there is a substantial change in the prevailing decorative type cartography in the French school. These maps, of marked Dutch influence, impose a more modern style, simple and scientific, where the decoration is reduced to the brackets, although they are lush.

In the late sixteenth and early seventeenth century Britain became head of European regional cartography. Especially important were the counties maps of Christopher Saxton, considered the father of British modern cartography. His work came from the English surveyor tradition that stretched from the Middle Age. In his maps the representation of the relief is very simple, while there is a profusion of population data and hydrographic network, so they have a striking resemblance to the leaves of the map of El Escorial. John Speed was another British figure for the cartography of the time. Heavily influenced by Dutch artists, he developed a remarkable capacity for decoration, although not always accompanied by geographical knowledge of the same height, transforming their maps in works worthy of contemplation.

The cartographic transformation that suffered geographical thinking in the European Renaissance hinted the dual nature of the maps: scientific and artistic. In this context, there were some examples of cartographic excellence, like Leonardo's maps, which were the result the attainment of artistic and technical genius, and are well above other maps of the time. The use of symbols and conventions for representing natural forms of the mountains, it is anticipated half a century to other jobs. Good examples of these works were those of Jost Murer with his map of the canton of Zurich in 1566 and Philip Appian with his maps of the Duchy of Bavaria in 1568. In its graphic character, both sets of maps are outstanding examples of the art of engraving, which reached its culmination in southern Germany at the hand of Albrecht Dürer, Hans Holbein the Younger and others. They excel in these drawings the expressive power and clarity of linear forms.