

Visualization of the evolution and development of the tissue of urban concentrations. The case of the community of Siatista, Greece

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ABSTRACT

This paper deals with the temporal visualization of the ways the residential tissue of the community of Siatista (Fig. 1) evolves and develops. The aim of the study is the completion of the insufficient, so far, picture of this area. Such a depiction will be achieved through Geographic, Cartographic and Urban Planning tools, methods and techniques.



Figure 1: Siatista in the 19th century, [photographic archive collection of Siatistas library]

In times of economic and therefore of social-spatial crisis, the analysis, comparison, superimposition and combination of capabilities offered by the scientific areas discussed above, together with the contemporary technologies, such as Geographical Information Systems (G.I.S.), constitute the basis of the documentation of the settlements' and of the knowledge required to understand the factors that formed their structure and function. The study focuses on four - main axes:

1. Localization of all the settlements of Siatista's community.
2. Multi-temporal monitoring of territorial changes, by making use of historical conventional charts, mental maps, diagrams and orthophotomaps of the area.
3. Processing and combine all the geographic and cartographic material in an integrated record and management system.
4. The above system was employed for: a) studying all the factors that influenced the organisation and the structure of the study area through time and b) the geographic and land planning typology and classification of the settlements.

In this paper, a synthetic framework for the recognition of the settlements is proposed. The framework comprises: a) the optical interpretation of images and maps for the extraction of geographic and thematic information concerning the tissue of the settlements and b) the application of literary analysis methods in combination with the subtractive method in existing conventional maps.

There is an established fundamental relation between the literature and the maps. Both of them assist humans in perceiving a location in space. According to Turchi [2004] the literature sketches the words from imagination on a page and maps portray the 3-D world on a 2-D piece of paper. Similarly the imaginary space of Siatistas' community during the 18th and 19th century can be visualized and mapped with words or cartographic symbols, as described by Piatti and Hurni [2009].

Further to the above established research methods, the depiction of urban morphological developments and the development of the tissue can be studied on a specific ontology, according to Hubner and Golay [2007].

Keywords: urban tissue; multi-temporal monitoring; visualization; literary analysis; mental maps

INTRODUCTION

The evolution and development of multi-temporal Siatista's community residential tissue can be monitored through Geographic, Cartographic and Urban Planning tools, methods and techniques [Robinson, Morrison, Muehrcke, Kimerling, Guptill, 1995; Gerolymbou, 1997]. Previous applications of the above methods were attempted in the past by making use of supplementary historical and statistical data [Gerolymbou, 1997]. Methods are combined with the predominant methods of Cartography [Robinson, Morrison, Muehrcke, Kimerling, Guptill, 1995]. This paper proposes the use of a synthetic framework for the recognition of the settlements. The above rationale is applied and tested for Siatista. Actual maps and/or detailed layouts of the geographical framework are significant.

In other words, imaginary spaces can be mapped with words or cartographic symbols; they can be both given verbally and visualized. Application of both concepts from the field of theory of the narrative and from the cartographer's point of view, focus is placed on the various strategies as a means to map and/or remap cities, countries, or entire geopolitical situations. Thus, a theory of imaginary narratives is closely related to current developments within the nascent research area of an advanced literary geography [Piatti, 2008; Piatti et al., 2009]. The case studies that were chosen in this particular paper reflect the importance of mapping concepts, and of the maps or map-like products within the frame of the imaginary: the first discussed are an excursionists book – *Traveling to Greece*, [Pouqueville, 1806]. Examples of the basis of unreal imaginary spaces are given in international literature [Turchi, 2004; Hubner & Golay, 2007; Piatti & Hurni, 2009;]. However a lack of knowledge on the application of literary analysis methods in combination with the subtractive method applied in existing conventional maps was established. The selection of this area-model is related to the fact that the area is of particular historical interest. Also Siatista has a large number of maps which represent the above area. The assumption during the selection of the area was that the selected borders coincided with the ones of the organisation type of local government (Kapodestrian project). In particular, the research mainly develops narratives, arguments from which no-realistic statements were precluded when they conflict with rationally and/or scientific evidence, whose source is reliable statistical data and/or accurate maps and/or automated methods offered by contemporary G.I.S. systems [Robinson, Morrison, Muehrcke, Kimerling, Guptill, 1995; Longley, Goodchild, Maguire, Rhind, 2005]. In doing so the current methods of literary analysis were used based upon [Turchi, 2004; Hubner & Golay, 2007; Piatti & Hurni, 2009;]. The records used for this particular research where historical scripts [Ecclesiastical archives; Hellenic Consulate of Ellassona; Gerolympou, 1997], historical conventional thematic charts [Digital map library; E.L.I.A.'s Cartographic archive; Hellenic Military Geographical Service; Map library of Kozani], excursionists books [Pouqueville 1806; Leake, 1835; Nikolaidy, 1859; Zotos, 1878; Sxinas, 1886], diagrams [Digital map library; E.L.I.A.'s Cartographic archive; Hellenic Military Geographical Service; Map library of Kozani] and orthophotomaps [Hellenic Military Geographical Service] of area. All this information has been processed and the organization and structure of the study area through time are presented.

Delineation of the study area

The study area was the municipality of Siatista, municipality in the Kozani Prefecture, who was originally established in 1952 (as we can see on map 1 below with black-white line). With the Kapodistrias project (organisation type of local government – notice on map 1 with lineation), in 1999 it was expanded by joining neighbouring communities, who were then the districts of the municipality. The municipality was abolished with the implementation of the project Kallikratis (organisation type of local government – notice on map 1 with red line) and joined the new

municipality of Voio in 2010. It was located in the southern part of the county on the border with the Prefecture of Grevena. It was consisted of three municipal districts, it occupied an area of 158,5 Km² and it had a total population of 5.642 inhabitants (2001 Census). The headquarters of the municipality was Siatista, a mountainous settlement at an altitude of 920 meters, the western part of the Prefecture, on the southern slopes of the Askio mountain's peak Bellia (Siniatsiko), over the Valley of the Aliakmon, 28 km. southwest of the city of Kozani.



Map 1: Organisation type of local government

The area under study is the area of influence of the city of Siatista as a shaped over time. From the establishment of the city of Siatista (15th century) until today, it is a centre of the wider region with an apparent influence and importance. The factors which define the region of Siatistas are a) the geographic characteristics of the area, b) a strongly religious character, which is easily reflected by the many churches that are being implemented across the study area, c) the purely Greek-Christian population along the centuries, in accordance to the existing cartographic documentation. This is also extracted by maps and scripts, d) the strategic importance of it as a place to meet and “meeting point” in times of war or a place to trade goods, according to travelers and esteemed literary texts, e) the accumulation of wealth evident in the buildings, at peak times due to the merchants of the town who lived in places such as Austria, Hungary, Germany. The delimitation could be conducted based upon the Turkish subdivisions during the period of Turkish rule, but it would not correspond with today, so it is done on the basis of the municipalities which have been established so that we can make the

necessary statistical analyses of our region. So although the zone of influence of the city of Siatistas during the centuries could be varied and shifted, for the purposes of research we assume that the current limits as defined by Kapodistrian project (organisation type of local government) were always the radius of influence. The defined area of Siatistas which coincides with the boundaries of the Kapodistrian project includes settlements that still exist, and villages which do not exist anymore. Villages were absorbed by other larger and mainly by Siatista, which was always a center of the region. The Kalikratian project (organisation type of local government) township of Voio, such an expanded, with numerous settlements, far away from Siatista, wherein Siatista is still based today, can be said that has no equivalent to the influence it had in the past Siatista.

METHODS OF VISUALIZATION

Theories for approaching visualization of the speech of narratives

The representation or the visualization is not a simple objective and it does not belong to the objective of this particular research. Also, the representation is something significantly complex and mostly energetic and that the main characteristic of this visualization it is not a simple reflection of reality, but acts on and shape reality [Doksiadis, 2003]. For this particular research the study of the representation of the city is mainly the analysis of narratives. In particular this method the one that is proposed in the last book of Kirkos Doksiadis titled: Logo analysis. Socio-philosophical analysis [Doksiadis, 2009]. In his book in the chapter entitled 'The city as concept and ideology' the author suggests four axes with which we can approach different types of narratives or more correctly narrative process [Doksiadis, 2009]. It is not hence by accident that we make use of examples for both novels and statements of cinematographic facts. The first axis, the axis of objects is the one which studies the relation between the narrative and the facts that are not supported by narratives. This does not mean that this is a result of fictional narration but they exist as real entities which are independent from the first one. This axis gives us the ability to study the different ways of the representation of the city of Siatista assuming that we have already gained the knowledge for a period of 19th century. Representation of Siatista on the narrative field with the extratextual reality. Due to the above ascertainment related to 'objective'/extratextual data and also due to the fact that the writing which we are going to examine the time of history does not co inside with the time of the transmitter [Lintel, 1991] we are interested in the restructured by the narrative world -based on the narrative- and also in the relation between this world and extratextual reality. In a few words we are interested in the area where the plot takes place which is the town of Siatista, the ways in which it was restructured as described in the novel and also the relation between the city of Siatista as an extratextual historical and social fact. Conclusively we will need to overcome that which Christian Metz called relative illusion which he believed that is the foundation of every fiction and every 'impression of reality' which concerns mostly where in the space the above facts take place [Metz, 2007]. This is an effect

during which 'the viewer believes that different pictures were removed from a compact reality whose existence was a previous fact' [Metz, 2007]. Our analysis will be based upon the assumption that the spaces where the plot takes place are part of the reality that existed previously.

The second axis, the axis of different ways of articulation which are related to the ways where concern the narrative subject in the plot, but also the corporeal circumstances of articulation logos 'In that meaning the authors function is to describe the existence, the circulation, and the function of logo in a society' [Foucault, 1977]. The question which mainly 'answers', the axis of different ways of articulation, is who speaks every time, a question which is totally useful because it is related with the fundamental differentiation of action and description but mainly for the narrator complication in plot not as an 'active' character but as independent subject. In these axes we will use the analytical figure of Tzvetan Todorov, (1989) which includes three types of narration which are the omniscient, the subjective and objective type of narration. The omniscient type of narration, which is ruler in the novel, consists in that the narrator knew everything for the heroes' actions. The subjective type consists in that the reader watching the plot through the hero eyes and the objective type consists in that the narrator does not know anything about the hero's character but is watching through his actions. [Doksiadis, 1993] In order for Todorov's omniscience to have any meaning, it should be limited, since every narrator is omniscient. According to Todorov, (1989) the omniscient storyteller would have a meaning if it referred to the ability of the storyteller to enter in 'conscience 'of a character and simultaneously to be 'independent 'of him, which is the ability of the last to know the facts this particular character is not able to know [Doksiadis, 1993]. The third axis is the axis of meanings which deals with the study of the 'other 'logos which exist in the novel and in the manners with which the existence of this logo acts in an imperceptible way which is the object of the fourth and last axis which is the axis of the thematic. The objective of the last axis is the ideological issues which are met along the script, the state of truth which finally prevailed and comes through the victory of one of the heroes since the novel can cause and produce different ideological logos which might be recognised as novels but in most cases these words might be political where the dominant ideology nestles and brooded. We should not neglect that the literature belongs to the ideological mechanisms of the state and in particular to the cultural mechanisms. These mechanisms are the one which according to Louis Althusser function in ideology and their objective is to reproduce the relation between production and the dominant ideology. According to the Marxian closet the ideology calls the persons as subjects [Althusser, 1983]. Under this assumption the word of the novel as practical action is related to the process of the subject-reader. As soon as the fictionist cooperate in the production of new mythically existential and by stimulating an unsaturated romantic imaginary, they lead towards the production of new, pure political ideologies and mobilizations [Tsoukalas, 1999], the social role of literature is obvious. The novel as part of a wider communication network, even when it

does not affirm streamed meanings in the messages, or does not ascribe new meanings to the messages; it discovers, creates and sets new messages [Liakos, 2007].

Going back to the axes of meanings the central meaning that we are going to analyse is the city and the establishment of reality/and truth which are set the ways that are being represented by the narratives. It can be identified in a first stage the interlocking of the axes and the compliance properties which are going to be further describe below. Within this framework of the axis of thematic, the Foucault origin of the establishment of truth in which we referred above is very useful to our research. The French philosopher is the one who moved the center of gravity of knowledge theoretical analysis from the different ways of production to the authority which acts as mechanisms of composition of the criterion of justification of the existing real and unreal with in the logo field [Deligiorgi, 1976]. Hence it is a process which develops and establishes regularities. Therefore we will need to find the prepositional and conscious dimension of logos from particular groups and single persons [Varika, 2000] (axis of objects-corporeal), mostly when these individuals have accepted wittingly their contribution or their participation in a group with leading supervising roles. As it is written by Hans Rober Jauss in his classical study relevant to the theory how the literature is been taken for, the novel throughout its function 'broadens the borders of the restricted social space towards the directions of new desires requests and goals and opens new pathways of future experiences' [Holub, 2004]. As soon as the comprehension of these words of the groups that maintain their mobility has already been done, get out new questions. The last concern the analysis of the function of these words which circulate over the last half century, which borders of the experience of the city are been broadened, which restricted, which of these experiences of extratextual reality are been revealed and which are concealed, which is the relation of the city as it is represented with extratextual reality end not the autonomy of fiction [Doksiadis, 1998] which is the ideological platform on which this representation is been developed, how are the mechanism which are reproducing the major ideology are been activated and which is the way that new messages are been set into mobility through the narrative logo. As soon as the narrative writing obeys its own rules, the representation of the city within literature or more correctly of the narratives form the experience of the city within literature comprises one additional condition: of the aforementioned representation in relation to the above rules. These result in to the second theoretical figure which is coming from of the theory of the narration.

Since the objective of this study is the Siatistas' city in 19th century as it is represented in narration, we will propose a second theoretical and methodological figure which is the model that is proposed by Gabriel Zoran in his paper entitled 'Towards the theory of space in narration' [Zoran, 1998]. Zoran suggests a generic model of the structure of the space within the narrative script. The Israeli author suggests and analyses three different levels of narration structure based upon space: the topographical, the chronotopical and the textual [Zoran, 1998]. The three different structures of scene correspond to

the place the zone of action and field of vision. We will suggest the combination of the methodological scheme of the four axes of Doxiadis combined with the one that is been suggested by Zoran. And this is due to the fact that the objective of this research is not only the area of the city, as described in the narration, but mostly the ideological results of the manners with which the city is been represented along the narration. Because as the narration hosts hides and reveals the face of the established truth it seems that it represents and develops exchanges between the levels of power which every time depending on the case legalize it [Theodoropoulou, 1987].

The above combination does not necessarily mean that we will not make use of the potential of other theoretical figures, for example the revealing meanings of metonymy and the transfer from the field of theory of the literature and the cinema. According to linguistics and semiotics transfer means similarity-comparability-substitution and metonymy means adjacency-combination-conjunction [Doxiadis, 2009]. One of the most characteristic transfer cases is the relation between similarity and identification which includes the concept of identity, while the most characteristic case of metonymy is the relation part or all [Metz, 2007] which includes the meaning of difference [Doxiadis, 2009]. The method of the four axes on the one hand and on the other hand the theoretical figure for the space in narration will both allow as to find the relation between the fictional reality of the city of Siatista with the extratextualreality the action of the heroes in the city and the particularity of the narrative objective in relation to this action, the city as a system of relations and as a corporeal entity, the ideological core, which is been developed by the differentiation between public and private space and the system of relation of power which is reproduced at the level of logo.

However the following two objectives should be underlined. The first one is that the analysis of logo which will be attempted for the above novel will be developed in the framework of the representation of the city and the issues end the facts that there been endangered which are been given meaning by the city. This means that from a novel take many logo and meanings, but we will not talk about logo, only in case it is necessary for the analysis development. We will focus that point of narration which is related to towns' space rash or third party. Because although the plot takes place in many places with some characters does not 'offered' to analyse neither even the spaces nor the characters. To allow this to happen many circumstances must concur, which get through from the space experience as it recognizable from the narration process.

Creation theories of mental maps

The imaginary space of Siatistas' community during the 18th and 19th century can be visualized and mapped with written statements or cartographic symbols, as described by Piatti and Hurni (2009). Specifically mentioned: 'counterfactual spaces can be mapped with words or cartographic symbols; they can be both told and visualized 'and added 'focus is laid on various strategies in order to map

and/or remap cities, countries, as well as entire geopolitical situations. Quotes indicate 'a theory of counterfactual narratives is closely related to current developments within the nascent research area of an advanced literary geography (Piatti, 2008; Piatti et al., 2009) and concludes that 'from hidden maps (a predominance of words) up to a single narrative map (a predominance of cartographic symbols)'. The literature and the maps are fundamentally related, since they both help the human mind to perceive a location in space. According to Turchi (2004) the literature sketches the words from imagination on a page and maps portray the 3-D world on a 2-D piece of paper. Maps of the Imagination are Peter Turchi's extended meditation on the parallels between mapmaking and writing. Both processes reveal what we value and to what degree.

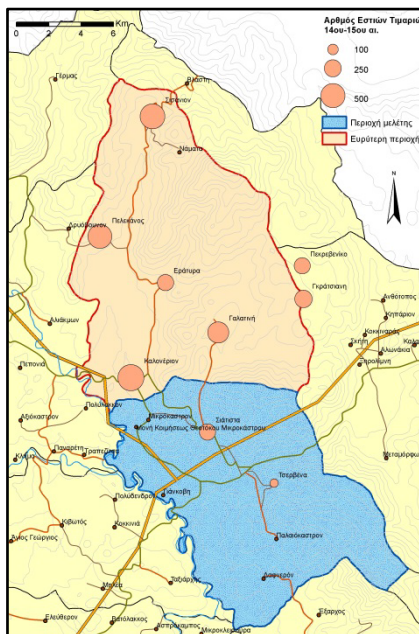
Maps and writing, as Turchi notes, put forth "a more imaginative knowledge" than what our daily perceptions offer. Both are based in some way on previous attempts. And in the end, both mapmakers and writers contend with the acrobatics of prediction and surprise, deliberation and spontaneity, form and chaos, intention and intuition, and selection and omission. "What we see," Turchi writes, "depends on what we want to see." Turchi is the kind of thinker/writer who can get away with stating the obvious, because he isn't trying to totalize. 'He's creating a book that is forgive me, dear reader, for co-opting this metaphora journey'. In addition to all these, the depiction of urban morphological developments and the ways of the development of the tissue will be studied on a specific ontology, according to Hubner and Golay (2007), as mentioned: 'The depiction of urban morphological processes needs the construction of a specific ontology based on a double temporal approach in which synchronic and diachronic relationship must cohabitate' and more precisely 'aims to explore the main contributions of the ontological approach to the depiction of a semantic model of urban morphological processes.

We will show the general background of our approach; the complexity of the models embedded on historical analysis, several matters on continuity of concepts frequently used to describe morphological processes and some conceptual problems inherent to both temporal approaches, diachronic and synchronic, needed to uncover the global complexity of urban processes'. More specifically in the theory of urban morphology: Hubner and Golay [2007] note that: 'polysemy can be found at least in three different approaches leading to the study of urban shape: urban growth and urban morphologies using formal models and techniques such as fractals or cellular automata, space syntax, which derives from a set of analytic measures of configurations based on the observation of human behavior such as people movement in any given urban environment, and the historic - geographical approach, combined with the architectural typomorphology studies led by Muratori and Caniggia in Italy, and Panerai and Castex in France. The present work is embedded in the last two schools of urban morphology attempting to formalize the multi-scale analysis of urban form'. The double perspective in this paper clearly reveals that imaginary spaces are a prosperous and by no

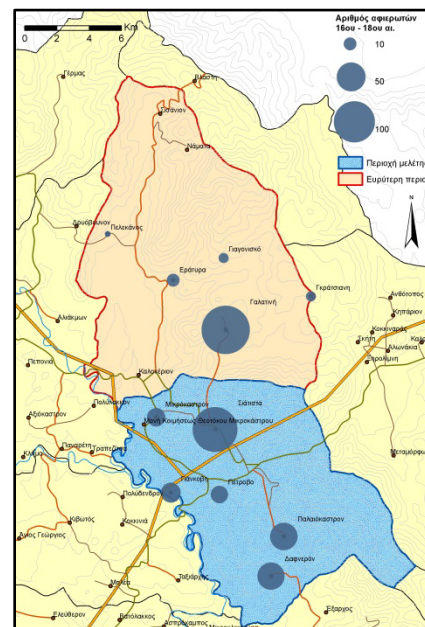
means fully explored field at the crossroads of history, literature, cartography, and art – an invitation to meditate further on the intriguing coexistence of past and present, fiction and reality.

RESULTS-DISCUSSION

The study of available historical records on the emerging settlements of the broader region of Siatista resulted in the following maps depicting the number of estate holders in the timars of each settlement, during the second half of the 15th century (Map. 2), the number of dedicators in the 16th and 17th century (in accordance to the Code Zavorda) (Map. 3) and the religion of each settlement in the 14th and 15th century (Map. 4) and in the 18th century (according to the list of Metropolis of Siatista) (Map. 5). In order to have a complete picture of the region of study, which is marked with white background, we recorded and charted certain important settlements in the northern part of our region of study, so that its diachronic development becomes more easily perceptible. More specifically, the northern part of the region of study, which is marked with a red outline, (the maps below are not updated due to constant development and change) (map 2 was constituted by bigger settlements during the 14th-15th century and are marked with adjustable radius circles that are related to the number of estate holders in the timars. During the 16th-18th century this picture is reversed, thus results the map 3, in which the settlements are marked with blue circles that have an adjustable radius related to the number of dedicators, as the sars recorded in the Code of Zavorda, which is not a demographic indicator, but an indicator of economic growth. Siatista and the other settlements begin to acquire a more significant presence in the area.



Map 2: Estate holders in the timars
at 14th-15th century



Map 3: Number of dedicators at 16th-18th.
century

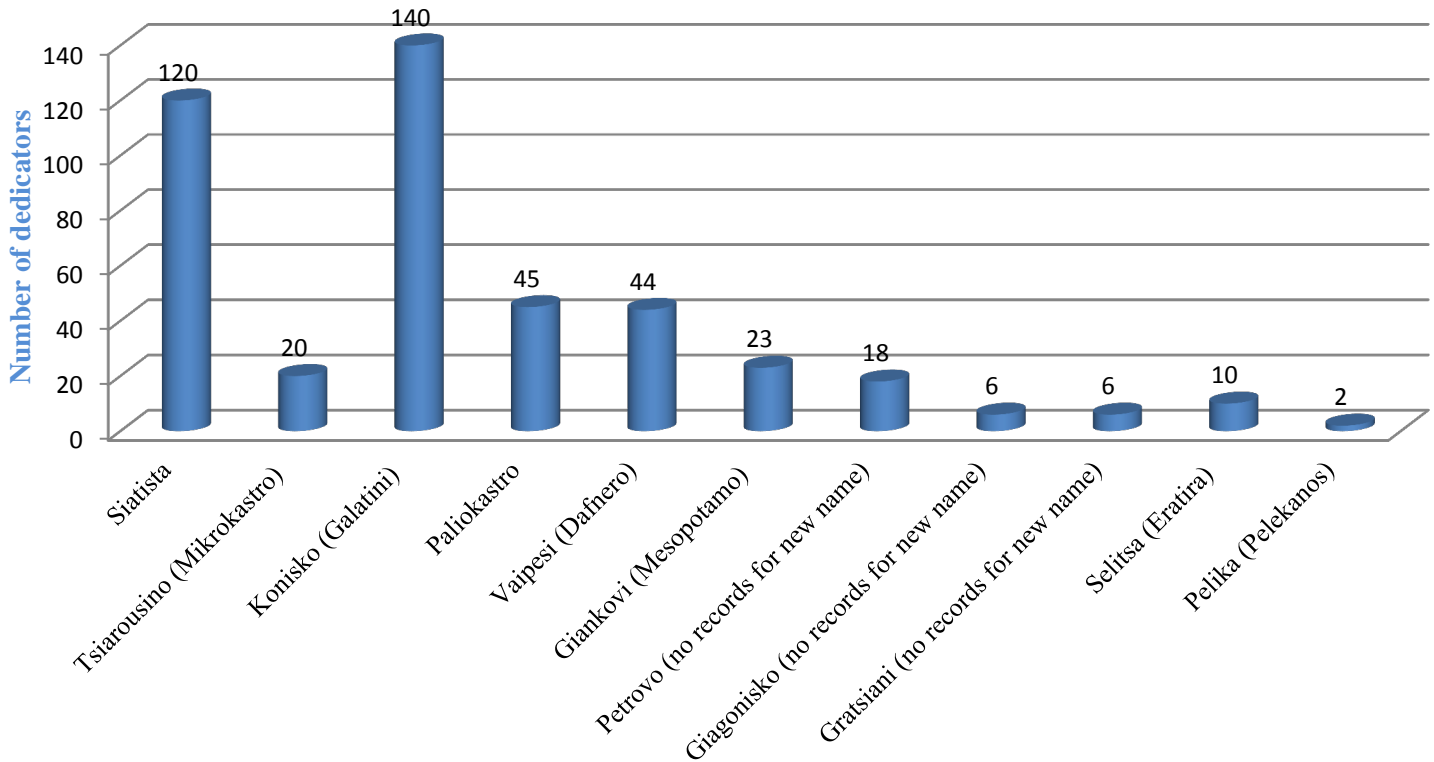
The exact conclusion also derives from a careful study of the bar diagrams 1 and 2 that follow, in which is depicted the number of estate holders in the timars. Diagram 1 with Broggista (Kaloneri), Sisani and Pelika (Pelekanos), settlements of the northern part of the region of study possessing the first place in the diagram with Siatista following on the 8th position after Pekreveniko. Pekreveniko is a settlement that is not recorded in the next period 16th-18th century.



Diagram 1: Number of estate holders in the timars during the 14th-15th century

In diagram 2 is depicted the number of dedicators that is more an economic than a demographic indicator, as mentioned before. Siatista holds the second place after Konisko (Galatini), which maintains a high place in the classification, while the settlements of Broggista (Kaloneri), Sisani are not mentioned in the recordings, with the exception of Pelika that is presented by two dedicators. Pekreveniko and Tservena are depopulated while new settlements as Petrovo and Giagonisko are presented. The settlements Paliokastro, Vaipesi (Dafnero) and Giankovi (Mesopotamo) are activated.

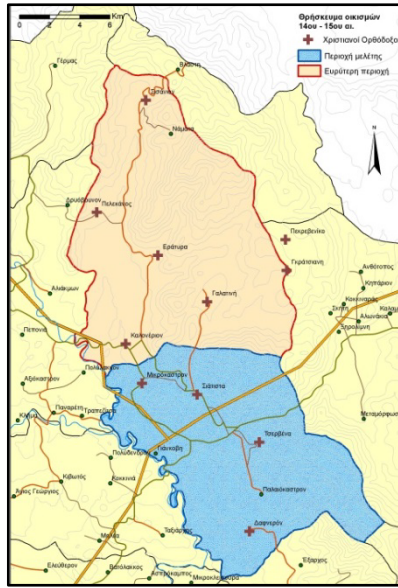
Number of dedicators at 16th-18th century



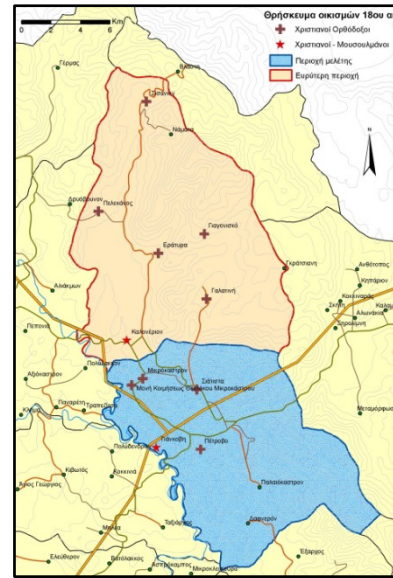
Settlements during 16th-18th century

Diagram 2: Number of dedicators at 16th-18th

As for the religion of settlements as it is portrayed in the map 3 and 4 we observe that in the 14th-15th century the population in the region of the settlements is purely Christian (Map 4) and is marked with brown cross. At the 18th century the settlements Giankovi and Broggista (Kaloneri) according to sources that have been mentioned, become settlements of mixed religion (Christians and Muslims) (Map 5) and are marked with a red star.



Map 4: Religion at 14th-15th century



Map 5: Religion at 18th century

Getting with that Siatista was a timar of 50 homes in 1481 [Sokoloski 1971 – tax records], a small settlement during the 15th and 16th century [Zavordas Code; Xatzioannou 2000] which developed demographically in the 17th century [Vakalopoulos 1973; Dardas 1993; Tzonos 1993]. In 1640 it allegedly belonged to the kaza of Kastoria while in 1660 two neighborhoods, Chora any Gerania, are mentioned, and later, at the end of the 17th century, they are cited as chora (1688) and politia (town) (1696) [Nikolaidy 1859; Vakalopoulos 1973; Dardas 1993; Tzonos 1993;]. Advanced farming gave its place to commercial and trading activities and the area evolved into a significant traffic in transit centre sustaining commercial relationships with both Venice and the Austro-Hungarian Empire [Laios 1982]. Certain facts, as the following, certify the economic and cultural development of the city: the construction of seven (major) churches in Siatista during the period 1610-1647 [Veikou & Nomikou-Rizou, 1990], the iconography of Agia Paraskevi church in 1671 [Tsompanakis 1941-1952], the dating of the construction of the first mansions of the late 17th century. [Veikou & Nomikou-Rizou, 1990], the School at the same time [Siasios, 1997], the appearance of the first Siatistian scholars during the second half of the 17th century. [Laios, 1982, Dardas 1997]. The above mentioned growth resulted in Siatista (although not playing any significant role in the Ottoman political administrative system) being integrated in a group of cities holding an exceptional place in the ecclesiastical administrative system and being appointed as the new head city of the diocese of Sisanion and Siatistia, during the last years of the 17th century. By the framework which comprises an optical interpretation of images and maps for the extraction of geographic and thematic information concerning the settlement' tissue and an application of literary analysis methods in combination with the subtractive method applied in existing conventional maps we design/συνθέσαμε the below maps (Map.3, Map.4, Map.5). These maps designed by a program, in a G.I.S. context, where the data of historical sources synthesized with our imaginary figures which come out from the travel writing of

buildings and entire cities – are still recognisable to a certain extent. Doubtlessly, imaginary cartography is a chapter yet to be written and calls for a more thorough investigation than is carried out within the limits of this paper. One reason for this lack of an imaginary culture in cartography may lie in the very understanding of the subject: traditionally, cartography is seen as a discipline in the service of other fields and topics. The double perspective in this paper clearly reveals that imaginary spaces are a prosperous and by no means fully explored field at the crossroads of history, literature, cartography and art – an invitation to meditate further on the intriguing coexistence of past and present, and fiction and reality. In addition to all these, the depiction of urban morphological developments and the ways of the development of the tissue studied on a specific ontology. In particular this paper discusses an ontology-based theoretical framework for addressing key issues of urban morphological analysis. The main outcomes are summarized as follows:

-The complexity of actual urban processes through time requires a 2-level ontology structure: single period ontologies to address changes of values due to urban change processes, and an overall, merged ontology to address changes of concepts (meta-processes).

-Complex urban morphological processes, as Conzen's redevelopment cycles, involve multidimensional spatial and temporal semantics.

-Due to scarce partial data sets usually available on urban history, urban morphologists mainly rely on a series of "synchronic cuts" through urban evolution as a basis for heuristic abduction of relevant diachronic processes.

Understanding science and harnessing technology is important, but the partnership between art, science and technology, and their contributions to the discipline, areas important. In my opinion art provides the 'public face' of cartography (and the cartographer's passion when designing particular products is perhaps the soul) and science complements this by ensuring that what is presented is scientifically correct, and what could be called 'scientifically elegant' as well. Science and technology, it is argued, are not the only way to address geographical depiction. It is most necessary to ensure that the designed interpretation product can be realised. However, the resulting artefact cannot always be the result of only science or technology interpretations of geography.

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