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Mare Oraque Tusciae

Keywords: cartographic heritage; historical cartography; Tuscany; geo-referencing; coastal dynamics; historical landscape.

Summary
Mare Oraque Tusciae is a new prototype database created by the University of Siena, Department of History and the University of Florence, Department of History and Geography**.** Developed within the framework of the Projet Archeomed, Patrimoine cultural maritime de la Méditerranée, it considers historical cartography (XVI to XIX century) as a primary source for defining coastal dynamics in the modern period. It can serve as an instrument for defining areas subject to severe coastal risk, for archaeological research and for territorial planning.
At present it takes into consideration four hundred printed and manuscript iconographies (nautical charts, isolarii, chorographies**,** topographical maps, architectural drawings, views, etc.) together with descriptive memories (portolans and travel accounts) related to the Tuscan coast and archipelago. *Mare Oraque Tusciae* offers descriptive indexes and a geographical approach. Maps are distributed in layers which cover different coastal sectors and islands. It geo-references approximately 190 defensive works (i.e. towers, castles, fortified cities and towns): the position of all towers is considered an important element in defining the coastal profile over the centuries.

The documentary value of the cartography and iconography of the past

The project is intended to cast light on the contribution that cartography, and more generally the historic iconography of the 15th to the 19th centuries, can make to the knowledge, protection and valorisation of the archaeological, historic, architectural and landscape heritage of the Tuscan continental coastline and the archipelago. The territorial base taken into consideration here is represented by the islands of the Tuscan archipelago and the coastal strip of continental Tuscany, of an extension towards the hinterland of approximately 15 kilometres.
The study is based on the computer indexing and the acquisition in digital format of a significant selection of the innumerable spatial representations conserved in archives and libraries, even outside Tuscany. These exemplars have been geo-referenced on the current cartography (Regional Technical Map, CTR) with the intention of creating a general database on the Tuscan landscape and its historic evolution.
The documents under consideration represent a vast corpus, comprising various categories of spatial representation that cannot always be referred to original surveys and metrical measurements of the terrain: nautical charts, "isolarii", choreographic, topographic, planning and thematic drawings of other kinds, architectural drawings, views and perspective representations. Here we are dealing with an extraordinary production linked – at least to a large degree – to the interests of the various Tuscan governments over time, firstly those of the Medici and the Lorraine, and secondly those of the leading families and the lay and religious institutions of the city. A cartography that has been

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consistently produced from Renaissance times up to the present, for reasons of administrative and economic control and for the government of the territory. The expansion of the research to the official archives of other Italian regions (Rome, Naples and Genoa) and various foreign countries (Spain, France, Holland and Great Britain, as well as Prague where the Tuscan Habsburg Lorraine Archive is held) has brought to light numerous other cartographies and iconographies that are largely the result of activities performed by the naval forces of the ancient Italian and European states for political and military ends. Nautical charts and land maps, constructed as planimetric scale drawings or as views and perspective representations of the coasts and the islands, intended to enhance knowledge of the features of the territories and the coastal ports, the residential settlements (especially fortified towns) and the individual fortifications. Particularly fruitful research was performed in the numerous archives of Paris (State Archives, Military Archives of the Army and Navy of Vincennes, National Library), where the numerous maps and iconographies dating from the 17th to the 19th century are historically bound up with the dynamics of maritime trade and complex geopolitical and military strategies for the exploitation and control of the Tyrrhenian and Mediterranean (Figure1).

Figure 1. Nautical chart (XV cent..).

Similarly significant was the research in Istanbul (Sulemaniye and Ataturk libraries, Deniz Muzezy museum, Prime Minister's Archive and Topkapy archive), where *inter alia* the mission led to the discovery and acquisition in digital format of the drawings of the Tuscan coast present in six exemplars of the *Kitab-Ï Bahriyye*, the portolan on a large/very large scale of the coasts of the Mediterranean drawn up in the decades at the turn of the fifteenth century by the Admiral of the Ottoman fleet Piri Reis (c. 1465–1554) (Figure2).

Figure 2. Tuscan coast and archipelago from Kitab-ï Bahriyye (XVII cent.).

In a desirable expansion of the Archeomed project, it is our intention to perform a comparative analysis of the different versions (Aya Sophia 2612, 2605; Hamidiye 971; Yeni Cami 790 and Deniz 988 and 989), to produce a direct translation into Italian of the text accompanying the most accredited exemplar (Aya Sophia 2612), and finally to carry out an empirical verification of the navigation data present in the portolan.
The 5th International Workshop on Digital Approaches in Cartographic Heritage has offered new stimulus for research in the Vienna archives, which are being studied.
In any case, the selection made led to a significant sample of choreographic and topographical maps, charts, plans, views and perspective illustrations, both manuscript and printed, produced in black and white or in watercolour (Figs. 3, 4, 5).

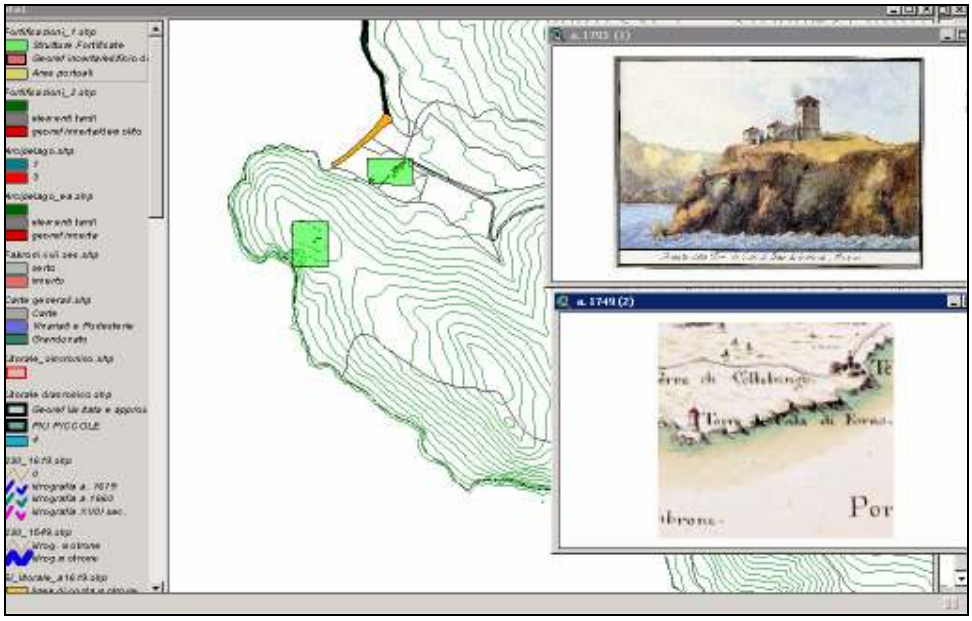

Figure 3. Geographical Database: Colle Lungo and Cala di Forno towers (Uccellina, Grosseto).

Figure 4. Piombino, Punta Ala and the Gulf of Follonica (XVI cent.)

Figure 5. Porto Ercole (Grosseto, Argentario) in a drawing (XVII cent.)

For each of the selected products we have the photographic reproduction in digital format and a descriptive record that summarises the formal characteristics and the territorial content, seeking to underscore the greatest possible amount of information that each spatial representation can offer, through the features of the drawing, the toponymics and the topographical context (general or thematic). Taken as a whole, these documentary sources appear of crucial importance for the diachronic or retrospective study of the environment, the territory and the landscape. Analysed in a comparative manner they can or could also enable a focusing of the principal transformations that have taken place over the centuries in the coastal strip and in the islands, and the historic and cultural legacies present in them. Naturally, the research has also made it possible to appraise the value of the cartographic and iconographic heritage discovered so far as a cultural asset in its own right, to be exploited as a teaching tool in the schools and in the civic education of Tuscan society. To date, the database created comprises an iconographic thesaurus of around 400 exemplars. Each map or drawing is accompanied by a descriptive factsheet structured using Dublin Core criteria.

The "Mare oraque Tusciae" database

The first result of the research is the definition of a database organised geographically to contain information on the historic cartographic and iconographic production from the fifteenth to the nineteenth centuries relating to the Tuscan coasts and the archipelago. This is a prototype still in the development phase, subject to updating, designed for progressive expansion. The data elaborated in the GIS (Geographic Information System) ambit have been entered, structured and overlaid on the Regional Technical Map (scale 1:10.000) with a view to:

- immediate consultation
- interrelation with the elements/shape files of the Regional Technical Map
- future online dissemination of coastal issues of historical character.

The database can be consulted using the ArcView releases. At the same time we produced a web gis prototype which, using the open source programme p.mapper, as well as providing access to the alphanumerical information and the images, also enables consultation via descriptive and/or toponymic indexes developed on html pages. The alphanumerical and vector data will be transmitted through PostGIS database (again open source). The raster data (historic iconography) have not yet been incorporated into the database but are linked from the file system. Various speed and reliability tests are being performed prior to possible insertion in PostgreSQL.

Navigation and search

The database currently contains approximately 320 links, organised and geo-referenced to the different grids in ten layers, that can provide information of a geographical and historic-iconographic character (maps, drawings and views of the past, descriptive and toponymic factsheets, photos). From the smaller scale maps, approximately 300 details have been extracted and geo-referenced relating to a set of 187 fortified structures (walled towns, forts, towers, castles etc.) and buildings connected with the military, fiscal and sanitary surveillance of the coasts (garrisons of soldiers and light cavalry, customs houses, quarantine stations etc.). Two large repertories illustrating on architectural scale the defensive works of the Grand Duchy in the 18th century were used (the manuscript collections of Odoardo Warren (1749) and Pietro Conti (1793), (Fig. 6), complete with the descriptions of the individual fortresses and their firing capacity, presented in specific records.
Further, each fortified structure is accompanied by a description, taken from the *Dizionario Geografico Fisico Storico della Toscana*, published by Emanuele Repetti (between 1833 and 1845), which supplies information of a historic character regarding the fortified structure or the surrounding area (Fig. 7). A photo survey carried out in the summer of 2008 has made it possible to set part of the historic iconographic documentation in relation to the current condition of the sites (Fig. 8).

Figure 6. Livorno and its surroundings (XVIII cent.).

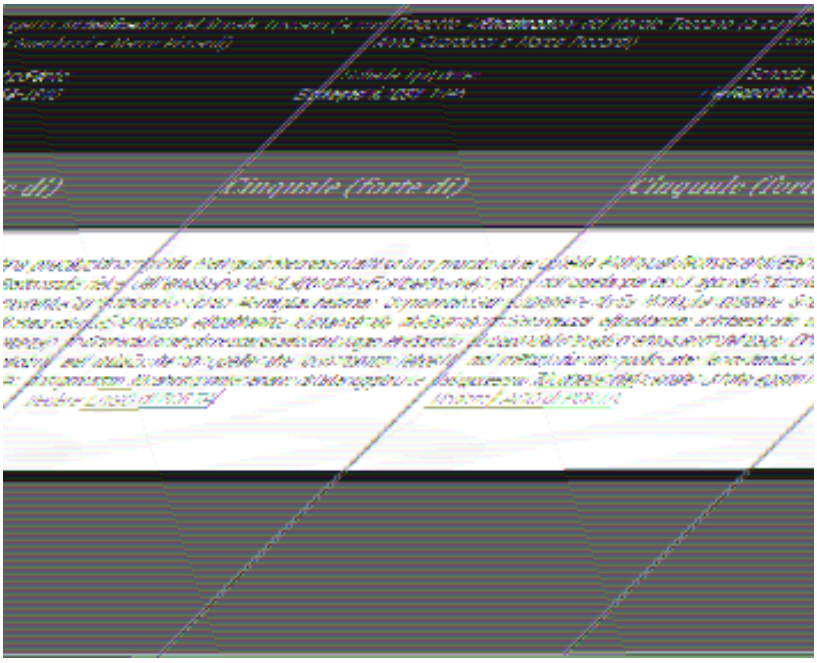

Figure 7. Web Gis prototype: record from Emanuele Repetti (XIX cent.).

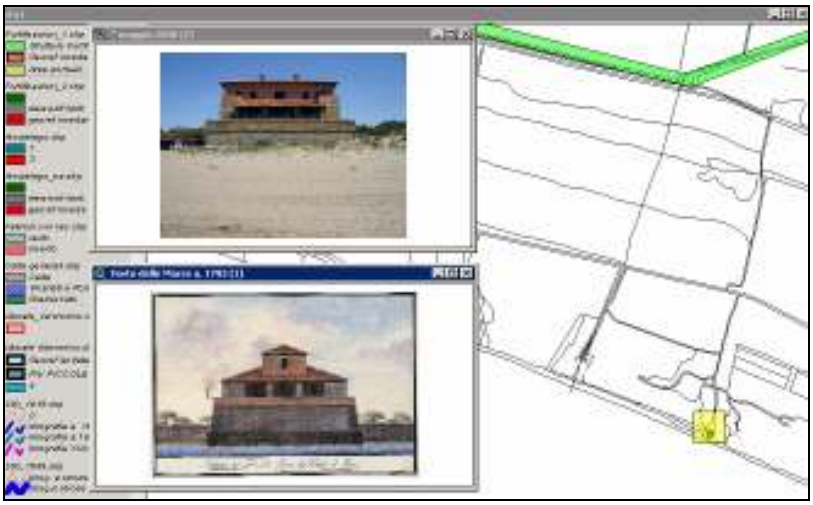

Figure 8. Geographical Database: Marze tower (Castiglione della Pescaia).

Geo-referencing

For the selection of the technique for the geo-referencing of the historic maps, we initially took into consideration:

- the principal objectives of the research (namely, putting online a source functional to the reconstruction of the dynamics of the Tuscan coast and the identification of the defensive grid existing between the sixteenth and the nineteenth centuries, and the current heritage)
- the iconographic legacy that we intend to draw on.

A legacy which, as mentioned above, features a varied range of typologies and, in the case of the cartography, was produced in a wide variety of scales. A collection capable of generating a fascinating overview: from the maps of the coasts, the position of the watchtowers in a broader territorial context; from the maps of the fortifications, an immediate and more explicit perception of the coastline, as well as – naturally – of the constructed elements. Considering the technique of direct

superimposition of the historic map over the current cartographic grid to be unsatisfactory and at times misleading, especially in the handling of pre-geodetic maps, we opted for a geo-referencing of a mixed areal-point type. Consequently (with the obvious exception of the chorographies and the small-scale maps of a general character) the representations of more or less extensive portions of the coast are organised and gathered in the polygons that are overlaid on the Regional Technical Map (Fig. 9) They define the area of interest with a degree of approximation, penetrating – as already mentioned – to a distance of approximately 15 km into the hinterland. This process is replicated in the seven layers focusing on aspects of the coast and differentiating between continent and archipelago. The historic map can be called up again by clicking on the polygon.

The geo-referencing of the defensive grid implies other considerations. For the coastline we worked on historic images of more or less extensive portions of the territory which – despite the agricultural reclamations and colonisations, the phenomena of progression/regression and the urban development of the coastline – can still be roughly identified. Instead, in the case of the fortifications, and especially of the minor coastal control structures, we are dealing with constructions which in most cases occupy only a few square metres, and which, once their defensive role lapsed, were – except for rare exceptions – demolished or altered and rehabilitated for different use. These factors render the precise geo-referencing considerably difficult and yet more necessary than ever. Such considerations led us to work on three separate levels. In the first layer we present a geo-referencing of an areal kind, which can identify a small surface area in which the fortification was plausibly situated. Specific colour grounds are used to formulate an initial, provisional hierarchy based on the structure and function of the architectural asset. The related historic iconography can then be viewed simply by a click of the mouse (Fig. 10).

In the second and third layers (dedicated respectively to archipelago and continent), after a retrospective analysis of the iconographic sources compared with the repertories of the Tuscan fortresses published in more recent times, we selected the elements of the shape file of the up to date construction network of the Regional Technical Map identified by us as the sites of fortified structures, distinguishing the level of approximation of the geo-referencing.

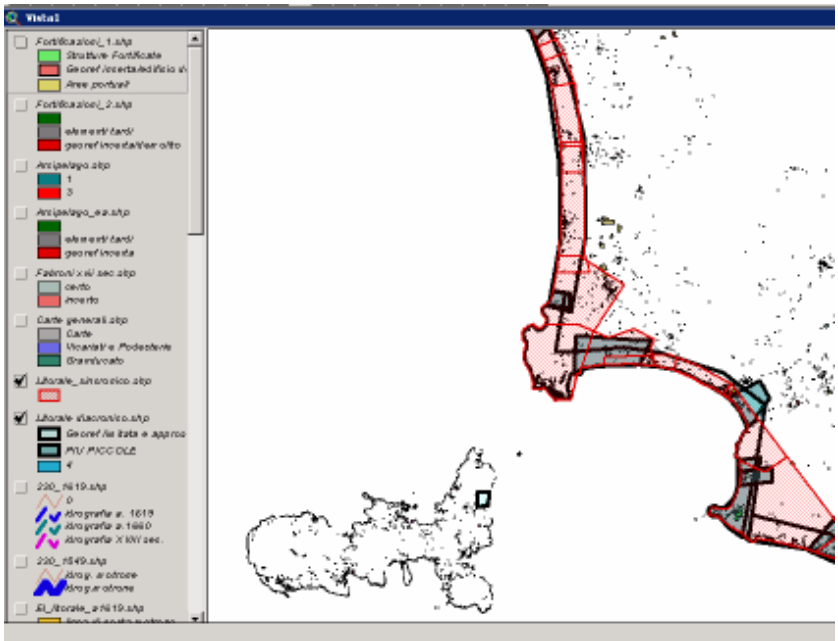

Figure 9. Geographical Database: areal georeferencing of historical cartography.

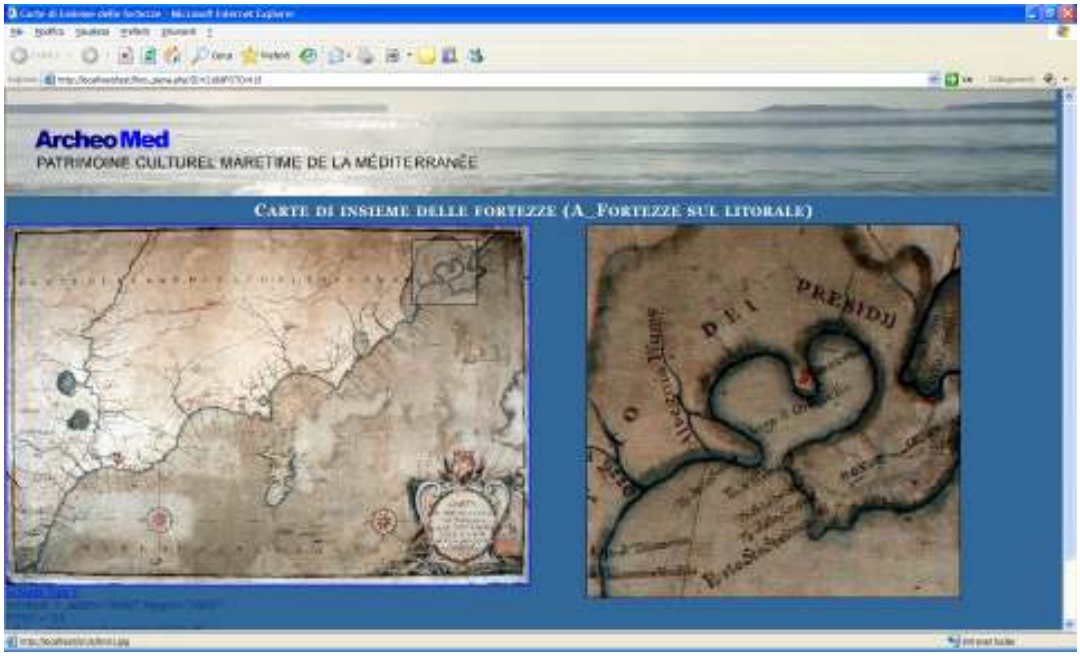

Figure 10. Web Gis prototype: Trappola tower (Grosseto).