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The very first printed map in Greek, a derived map from Dutch cartography: Chrysanthos Notaras' world map (1700) vs Jan Luyts' world map (1692)

Keywords: Chrysanthos Notaras; Jan Luyts; twin hemispherical world map; Greek Enlightenment; Cartographic Heritage

Summary

In 1700, Chrysanthos Notaras, a prominent scholar of 18th c. Greek Enlightenment and later patriarch of Jerusalem, issued a twin hemispherical world map, which was the first printed map in Greek language, printed in Padua. A similar map, in smaller dimensions, printed the same year also in Padua was inserted in Notaras' geography book. In this paper, using digital processing and visualization techniques, we analyze Notaras' world map in comparison with Jan Luyts' World map of the same typology, printed in Utrecht in 1692, which was also inserted in a geography book. The similarities and the differences in the coastline and the toponyms are investigated and evaluated, concluding to the identification of the sources and the maps that Notaras used for the construction of his two 1700 maps.

Introduction

Following the modern digital comparative methods, as implemented in the domain of historic maps content analysis, which is a major topic in the discussion on Cartographic Heritage (e.g. Livieratos, 2006, 2006a, 2008a), an emblematic map of the Greek enlightenment is studied, namely the *very first map ever printed in Greek language* by Chrysanthos Notaras, Padua 1700 (Shirley, 1984; Tolia, 2010). Notaras, (b.1663: Corinthia, Greece – †1731: Jerusalem), is a prominent figure of the Greek enlightenment. He is regarded among the first Greek scholars who transmitted the ideas of the Age of Enlightenment and the new era of geographic and cartographic knowledge to the Greeks, being at that time under the ottoman domination. Those scholars and teachers of the late 17th and early 18th c., with their geographical works and maps in Greek, have created a Modern Greek scholar, geographic and cartographic enlightenment (Livieratos, 2009).

Observing the Notaras map, under investigation here, we notice an evident macroscopic image similarity with a map been catalogued under Jan Luyts (Shirley, 1984), a 17th c. Dutch scholar and diligent Aristotelian (b.1655: Hoorn, the Netherlands – †1721). Luyts'

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map, obviously and nominally, a derivative of Sanson's map typology is put here under a comparative close-up study in association with Notaras' relevant map, studying as well some historic elements related to the Luyts and Notaras geography books in which both maps are inserted, printed in Utrecht and Padua respectively. A second map by Notaras printed also in Padua at the same year, as the one we treat here, in 1700, is put in evidence in order to highlight some important cartographic details, of Dutch interest, which are depicted in Notaras' maps.

The comparison and visualization tools used in this study, demonstrate once more the capacity of digital technologies in revealing important cartographic elements in historic maps, which are hardly visible with traditional analogue methods. Further, studies of this type enrich the international character of Cartographic Heritage because they show clearly how maps could be seen as products of human intellect which bring closer and intersect the historic cartographic cultures of diverse countries in Europe and elsewhere in the world.

Chrysanthos Notaras

Chrysanthos Notaras, descendent of an illustrious Byzantine family, was educated in Constantinople, Padua and Paris. He is well known for his ecclesiastical activities in the wider religious world of the Christian East. After his return from the Enlightened Europe, he served with dedication as Patriarch of Jerusalem for 24 years (Tolias, 2010; Hellinonimon). Notaras wrote many books with geographical, historical, mathematical and ecclesiastical content.

He lived in and travelled to numerous cities and regions in East, West and Southeast Europe, as Wallachia, Moldova, Moscow, Vienna, Venice, Padua, Paris, Bucharest, Kiev, Constantinople, Palestine, Asia Minor and the Aegean Sea. He stayed three years in Italy (1697-1700) at the universities of Venice and Padua where he studied medicine, philosophy, theology, metaphysics, mathematics, astronomy, physics and law (Hellinonimon; Stathi, 1996).

In 1700, he went to Paris to continue his studies and he attended courses in astronomy and mathematics close to the famous astronomer and head of the French Royal Academy, Giovanni Domenico Cassini. In Paris, an intellectual centre of that time, he was associated with the leading scientists and entered the circle of French scholars. In fact, at the same time Notaras was visiting Paris Observatory, the famous 18th c. cartographer Guillaume Delisle was also working there (Fig. 1). From Notaras' correspondence, we know that he exceptionally stayed as a guest for one week in the apartments of Cassini inside the Royal Academy, where they worked together on astronomical and mathematical topics. During this time, Notaras used telescopes and other scientific instruments and he also constructed an astrolabe. Moreover, this meeting with Cassini introduced him to the world of advanced astronomy and gives him the opportunity to gather all necessary information about his book "*Introductio ad geographiam, et sphaeram...*", Paris, 1716 (Stathi, 1996), where the world map analyzed in this paper, is also included (Fig. 2).



Figure 1. The organization of the Paris Observatory was undertaken by the famous astronomer Giovanni Domenico Cassini (left). The same time Chrysanthos Notaras (right) was visiting the Paris Observatory, the famous 18th-c. cartographer Guillaume Delisle (center) was also active there.

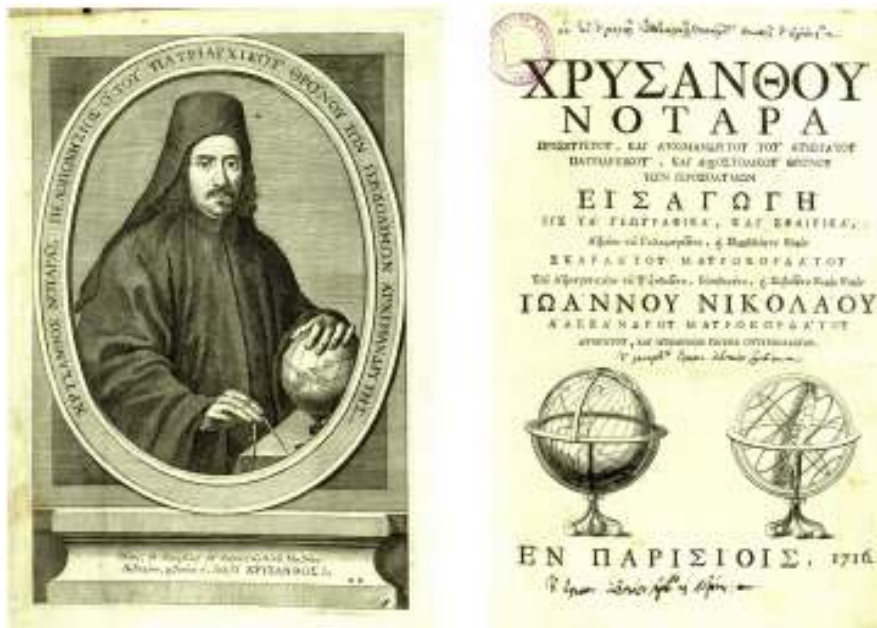


Figure 2. Engraving with Chrysanthos Notaras portrait and the page with the Greek title of his book (“*Introductio ad geographiam et sphaeram...*”), Paris 1716.

It is worth mentioning that Notaras created the only known in Greece, scientific instruments collection of the post-Byzantine period before the end of the 18th c.! In 1684, he wrote a treatise on the astrolabe and the astrolabe-quadrant based on Ottoman and Arabian sources and he constructed the instruments based on the available descriptions. He also constructed instruments for surveying, which are described in his book “*Introductio ad geographiam, et sphaeram...*” (Nicolaidis, 2000). It is known from testimonies that some of Notaras’ astronomical and mathematical instruments, globes and colourful maps

of Europe, Asia, Africa and Polynesia were much damaged and were kept in Constantinople (Stathi, 1996).

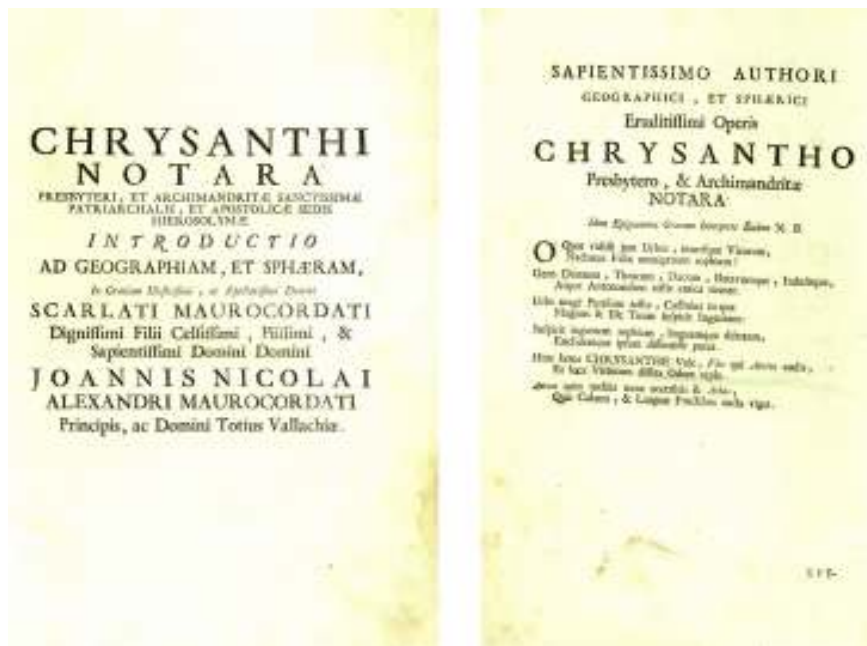


Figure 3. Title of Notaras book (*Introductio ad geographiam, et sphaeram...*) and the page in preface of the book, where it is mentioned that the great Cassini admired Notaras.

World maps by Chrysanthos Notaras

In 1700, Notaras constructed a twin hemispherical world map in two sheets under the title “*Pinax Geōgrafikos tēs te palaias kai neas egnōsmenēs gēs...*[A new general map of the known earth issued for the first time in Greek]” (Shirley, 1984: 592, entry 598).⁶ This map was published in Padua and follows the tradition of the world maps representing the hemispheres of the earth-globe in two circles, a tradition which goes back to 16th c. and becomes a main map-typology in 17th c. when it was widely used by French and Dutch cartographers. The map’s dimensions are 87 cm in longitude and 54 cm in latitude and it was the first map printed in Greek language (Fig. 4). As it is stated in the Greek title and the Latin subtitle of the map, it is dedicated to the important ruler of Wallachia Iōannē Kōnstantino Vassarava, the well known Constantin Brancoveanu⁷ depicted on the map with his coat of arms above the two hemispheres. Around the map, there are notes in Greek, astronomical diagrams and other drawings of navigation instruments.

A smaller map of this type (Shirley, 1984: 595, entry 599) with the same title but without the decorations and the dedication was also prepared by Notaras and published in Padua the same year (1700). This map is included in his geography school manual titled “*Khrysanthou Notara Eisagōgē eis ta Geōgrafika kai Sfairika*” and is published in Paris, in

⁶ According to Shirley (1984, entry 598, pp. 592, 595), an amended version of this map was published in Venice in 1751.

⁷ Saint of the Romanian Orthodox church, since 1992.

1716 (Fig. 5), dedicated to Scarlatos Mavrocordatos, son of Nicolaos Mavrocordatos, the first Greek prince of Wallachia.⁸

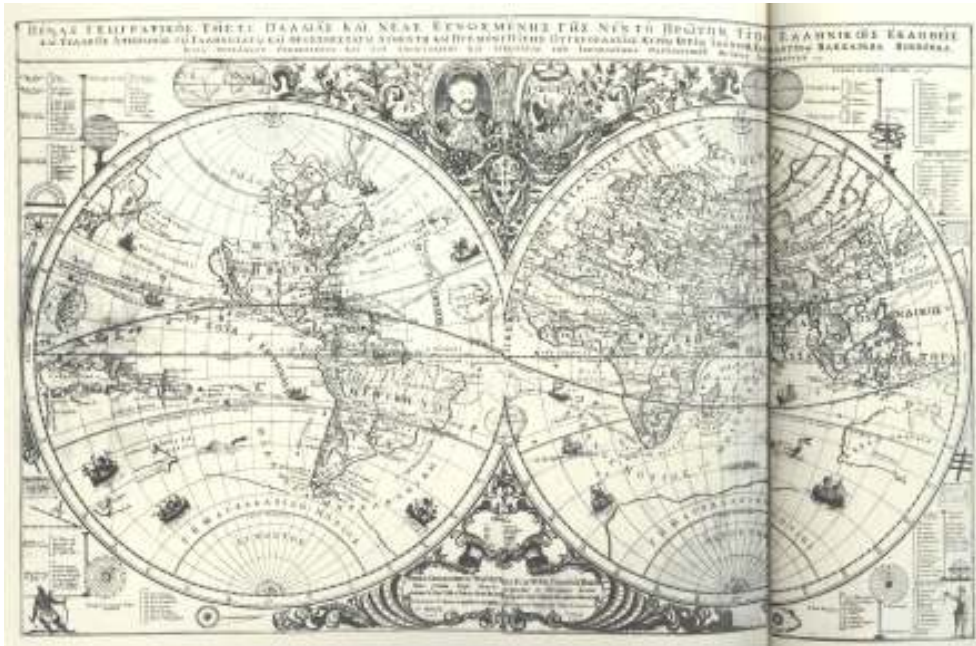


Figure 4. Chrysanthos Notaras' world map separately published in Padua, 1700.

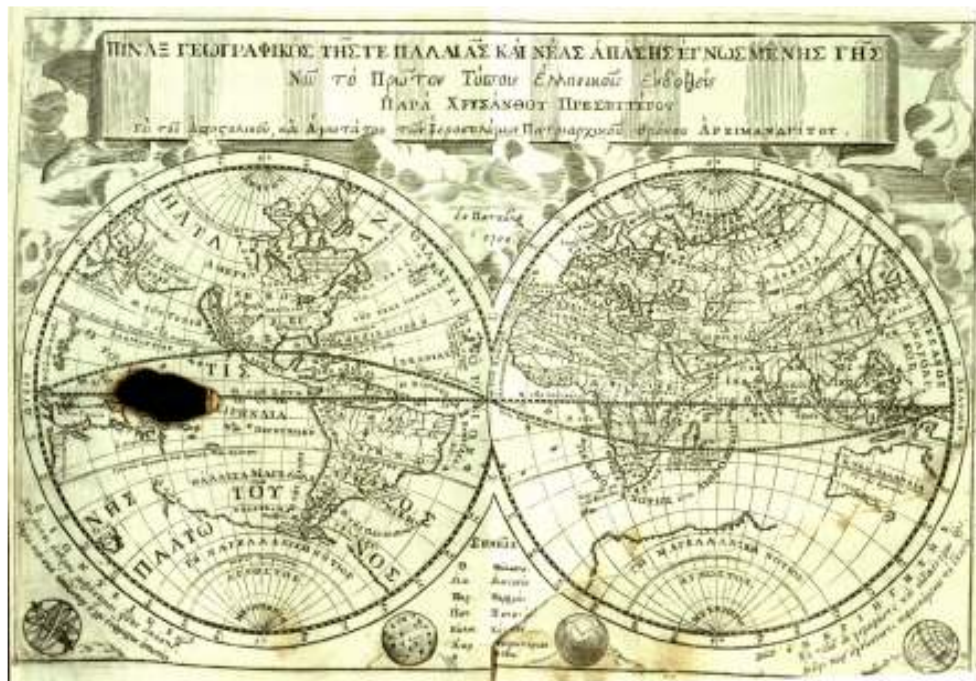


Figure 5. Chrysanthos Notaras' world map issued the same year (Padua, 1700) and published in his geography book in Paris, 1716.

⁸ According to Tolia (2010), these two maps were printed in Padua at the presses of Seminario Vescovile and the smaller map is a reduced and simplified version of the first map having been printed separately.

Jan Luyts' twin hemispherical world map

Having in mind Notaras' second map and looking for earlier maps of the same typology, mostly in Shirley's catalogue (Shirley, 1984: 553, entry 553), we found a map published in Utrecht, in 1692 by Jan Luyts, which has many similarities with Notaras' map.

Joannis Luyts was a Dutch scholar, physicist, mathematician, astronomer and philosopher, who was born in Hoorn, the Netherlands, in 1655, professor of physics and mathematics in Utrecht University until his death, in 1721. He was mainly remembered for his books "*Astronomica Institutio...*",⁹ and "*Introductio ad Geographiam novam et veterem...*",¹⁰ both published by Francis Halma in Utrecht, the first in 1689 and the second in 1692.

In "*Astronomica Institutio...*", Luyts synthesizes theories and institutions in astronomy and in "*Introductio ad Geographiam*", he includes the Sanson's maps and he records in catalogues all the toponyms, according to the country they belong.

In Luyts' geography book, there is among other maps, a world map consisting of two hemispheres, entitled "*Mappe-Monde ou Carte Générale du Globe Terrestre*" (Fig. 6). This map is engraved by Antoine de Winter and published in Utrecht together with the book by Francis Halma. In the title of the map, Luyts gives credit to Nicolas Sanson as the map's originator. The first map of this typology, constructed by Sanson, is dated in 1651 (Shirley, 1984: 414-145, entry 390) and it is updated and reproduced in 1660 (Shirley, 1984: 440-441, entry 419), by him (Fig. 7). In bigger size with more place names was issued in 1669 (Shirley, 1984: 462-463, entry 445), by his sons Guillaume and Adrien Sanson. At the bottom of the map, there are scenes and figures representing the continents and decorating the map. According to Shirley, the same map later appeared in other works published by Halma from Amsterdam in 1700 and also translated and published in Dutch under the title "*Algemeene Wereldkaart va der Aardkloot...*" and in Italian (Shirley, 1984: 552, entry 551), as well.

⁹ The full record of the astronomy book is *Astronomica Institutio, In Qua Doctrina Sphaerica atque Theorica, intermixto usu Sphaerae Caelestis, & variis Chronologicis, petractantur ; Adjunctae sunt in illustrationem Argumenti pluribus in locis Figuræ Aeneæ diversæ, Trajecti ad Rhenum, Ex Officina Francisci Halma, 1689.*

¹⁰ The full record of the geography book is *Introductio ad Geographiam novam et veterem... adjiciuntur suis locis Oceani, Terrae, et cujusque Regionis Tabulae, item Chartae LXV Sansonis, inter quas quaedam hac forma ante ineditae, Trajecti ad Rhenum, Ex Officina Francisci Halma, 1692.*

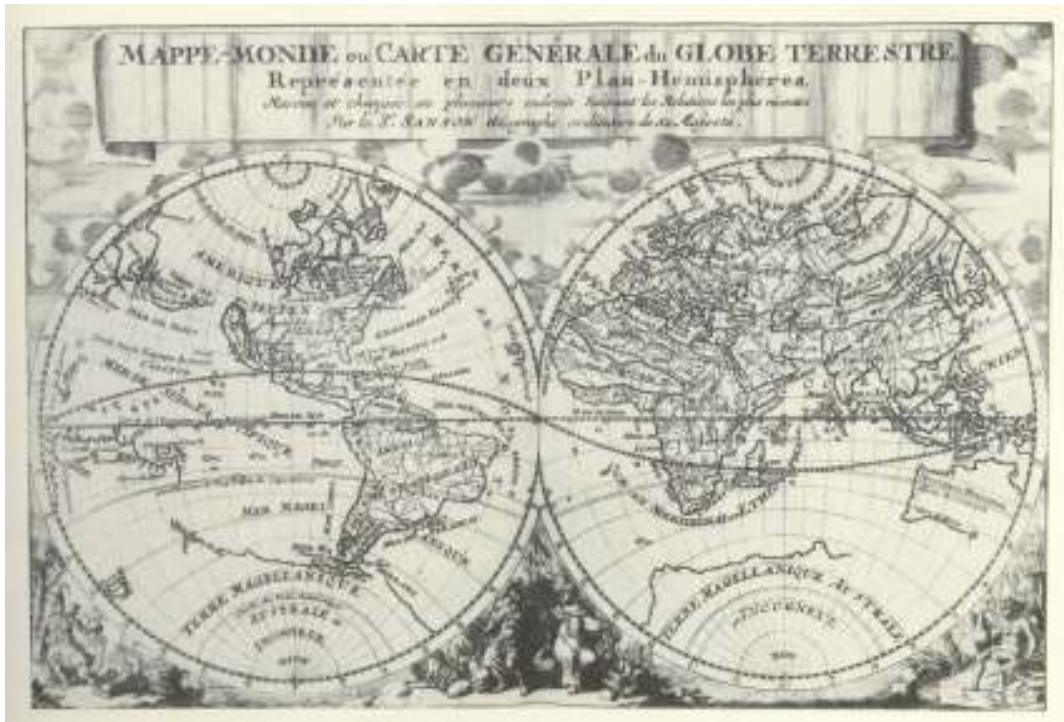


Figure 6. Jan Luyts' world map included in his geography book, Utrecht 1692.

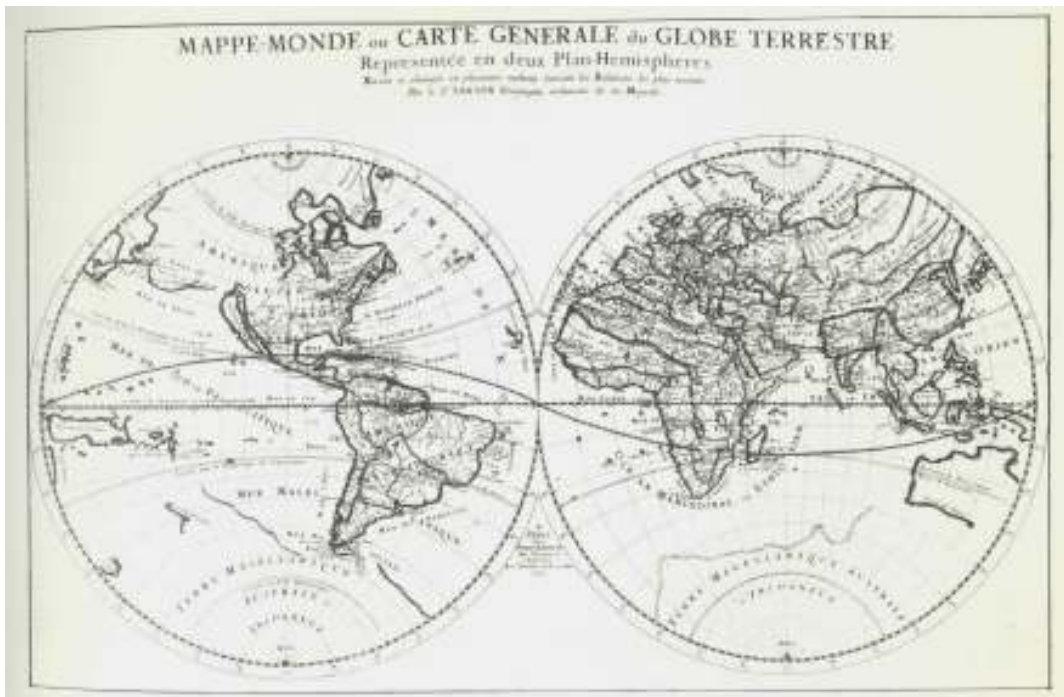


Figure 7. Nicolas Sanson's world map, Paris 1660. It's an updated version of his 1651 world map. The map is also reproduced in 1669 by his sons.

Notaras' and Luyts geography books

Luyts, in the first part of his book “*Introductio ad Geographiam novam et veterem...*”, published by Francis Halma in Utrecht, in 1692 (Fig. 8), entitled “*Geographiae Prolegomenis*” refers to the axis of the Earth, the poles, the equator, the climates, the parallels

and meridians, the winds..., etc. Then, there is a detailed description of the earth's hydrography and continents (Europe, Asia, Africa, America, Australia and Antarctica) with geographical features and descriptions. The book, apart from the world map, is illustrated with about seventy maps of Nicolas Sanson. For each area, there are detailed charts with the division of the Earth, the continents, seas, states, regions, cities, and ancient and modern toponyms.

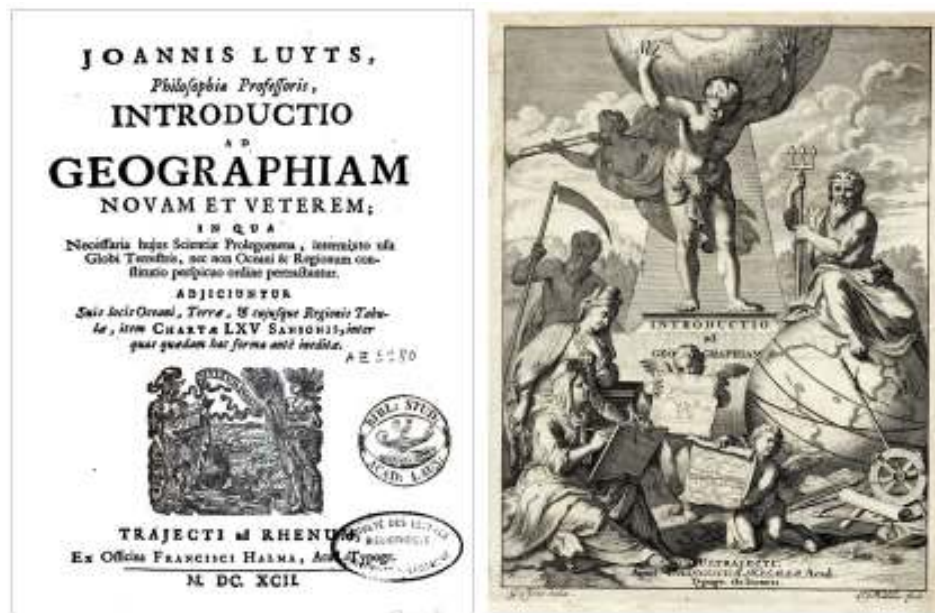


Figure 8. Title and engraving from Luyts' book

Notaras book “*Khrysanthou Notara Eisagōgē eis ta Geōgrafika kai Sfairika*”, published in Paris, in 1716 begins with the differences of Cosmography, Geography, Topography and Surveying and it focuses on global and astronomical matters such as geometric principles, division of the world, zones and climates of the earth, horizon, equator and inclination of the equator, seasons, geocentric and heliocentric system, stadiasmos, measurements of the earth size, unit conversions ... etc. Then, he refers to maps, giving instructions how to design a map and how to use the relative instruments. Finally, he describes the old and new continents, the sea, the winds and he gives a list of the longitude and latitude of known cities and islands.

In this book, which is the first book of Astronomy and physical science in the wider Greek area, Notaras, as Luyts did, follows the Ptolemaic astronomical system (for the movements of celestial bodies), according to which the sun is moving around the unmoving earth, knowing very well and having analyzed the modern theories of Copernicus, Tycho Brahe and Galileo supporting the heliocentric system. It is not possible for him as others do, to ignore the heliocentric system, so he is trying to reconstruct it with remarkable sobriety. To support his standpoint he relies on religious sources in ancient times and on the wise men who had accepted it because it was consistent with the divine Scriptures.



Figure 9. The same diagram of the seven climates in both Luyts (left) and Notaras (right) books.

It is useful to have in mind the ideas of that time, the vision of the Church and the obvious difficulties in the proliferation and the acceptance of the Copernican system in the East. It is known however that they did not dare to teach the Copernican system not even in France, during the 17th c. Even Cassini never taught it clearly. However, it was very important that Notaras was the first who made the modern cosmological theories and the scientific findings of modern astronomy known to the Greek wider area. Even his book was not established as a textbook because it was difficult to be used; it remained a scientific book from which whole sections transferred to works of other scholars (Stathi, 1996).

Comparing Notaras' and Luyts' world maps included in geography books

An important similarity of Notaras' and Luyts world maps is the fact that both of them are included in geography books and also they are of the same size. The similarities of the two maps are obvious only by looking at them without putting in practice other more specialized process (Fig. 10).

In this macroscopic consideration, the only difference between the two maps, inside the hemispheres, seems to be the translated toponyms, most of which are located in the same place in both cases. Nevertheless, there are differences in the area around the hemispheres, where in Luyts' map, there are scenes and figures representing the continents while in Notaras' map, there are astronomical diagrams and navigational instruments (Fig. 11).

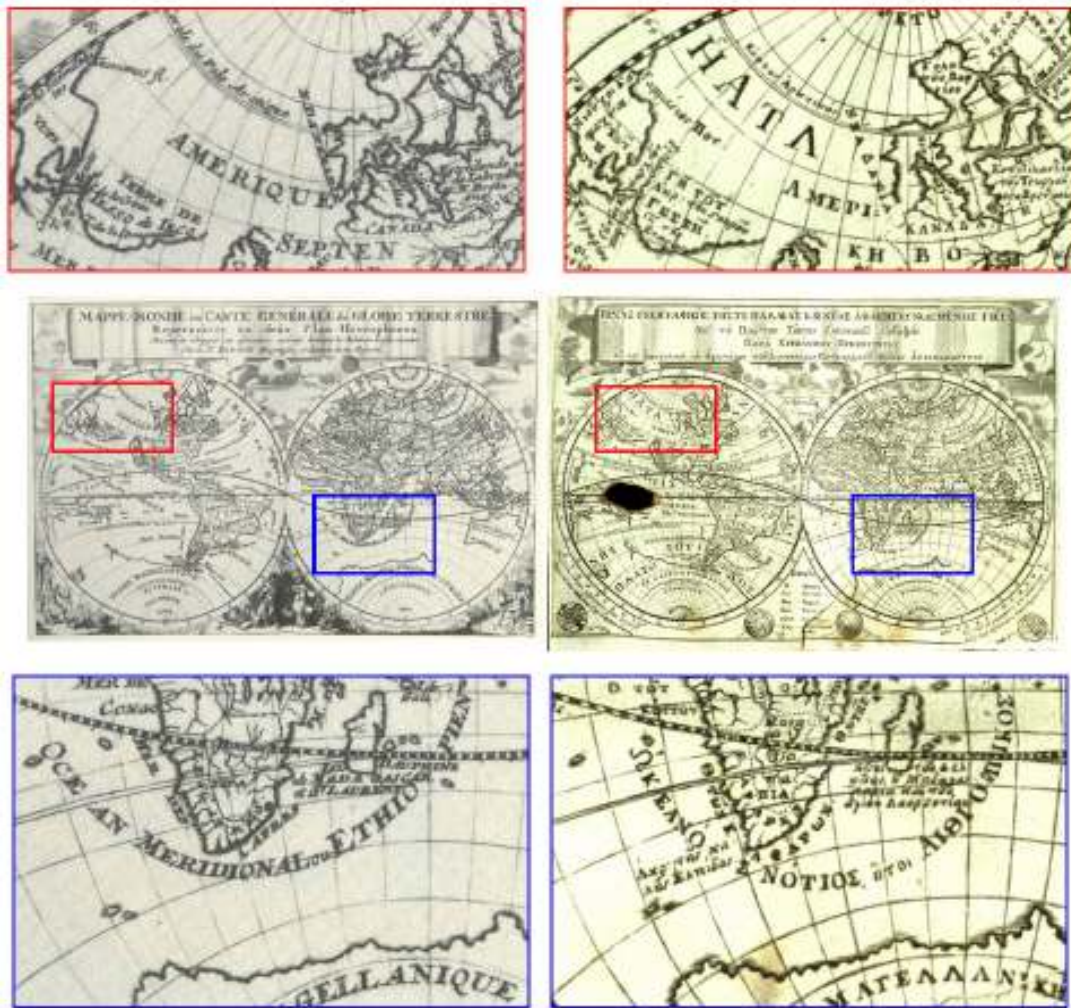


Figure 10. Luyts's world map, 1692 (left) vs Notaras' smaller world map, 1700 (right). Similarities and differences comparing the two maps.



Figure 11. Luyts's world map, 1692 (up) vs Notaras' small world map, 1700 (down). Differences in scenes and figures decorated the area around each map.

In order to compare the two maps in detail, we use the best fitting process, based to which Notaras' map is best fitted to Luyts' map using common points in both maps, properly distributed in the overall map space, applying a second order polynomial transformation (Boutoura and Livieratos, 2006). By this way, the two maps acquire the same scale and

can be easily compared. A technique used for this comparison is the “digital transparency” (Daniil, 2006) which is applied to the one of the two maps giving the opportunity to see both maps and compare them thoroughly, since the similarities and the differences between them are easily recognized (Fig. 12).

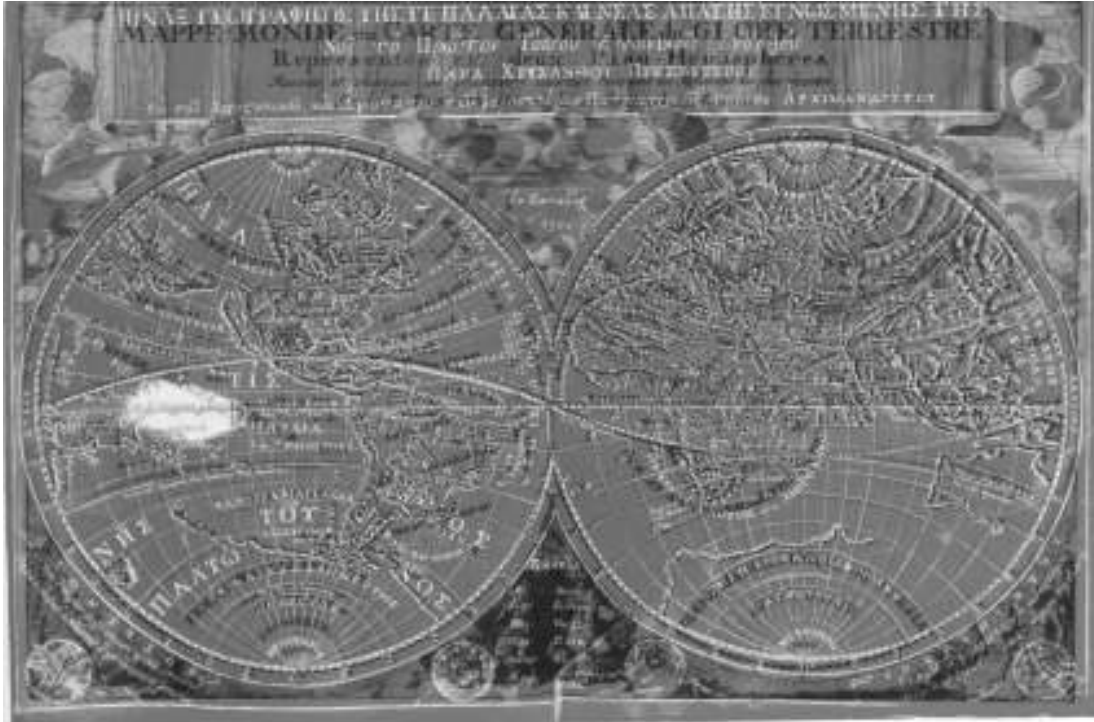


Figure 12. Best fitting Notaras' small world map, 1700 (white lines) to Luyts' world map, 1692 (black lines) using the digital transparency technique.

From this comparison, as it is obvious in the figures below (Fig. 13), the coastline, though more detailed in Notaras' map, seems to coincide in most places, something which also happens with the biggest part of toponyms written on the maps. Their only difference is that the toponyms in Notaras' map are translated from Latin to Greek language. It is interesting that even the place where each toponym is written in Luyts' map, is almost in the same position with the relative toponym in Notaras' map. An important difference is the reference to Atlantis¹¹ as the Plato's island. It is explained also in his book, in the chapter about the discovery of America where he refers to ancient authors supporting that they knew the New World (Notaras, 1692; Stathi, 1996).

Based on all these remarks, we can come to the conclusion that Luyts' map was the main source for Notaras in the construction of his maps, at least of the small map included in his Geography book.

¹¹ Η ΑΤΛΑΝΤΙΣ, ΝΗΣΟΣ ΤΟΥ ΠΛΑΤΩΝΟΣ.

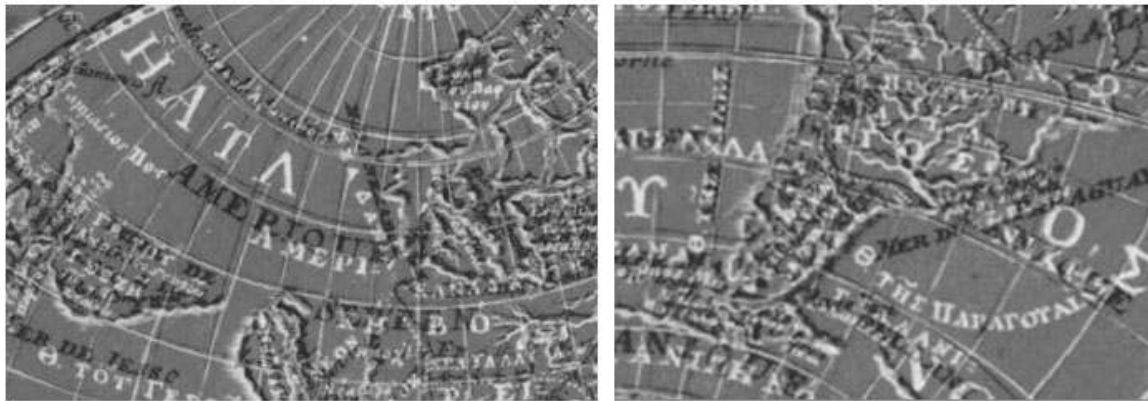


Figure 13. Details of the synthetic image of the two maps, where their similarities in coastline and toponyms are apparent.

Comparing Notaras' separate published map with Luyts' world map

Coming to the conclusion that Notaras' map from the geography book, is based on Luyts' map, it would be interesting to compare Notaras' separate published map with that of Luyts, in order to see if Luyts' map was also used by Notaras as basis for his separate map.

For the comparison of the maps, the best fitting process and the digital transparency technique are used to Notaras' separate map and the result of them (Fig. 14) shows that there are more differences between the two maps from those in the previous case detected mainly in the area around the hemispheres. In this case, it is obvious that Notaras' coastline does not fit to the coastline in Luyts' map, not only because Notaras' coastline is more detailed since his map is in larger scale, something appearing in the smaller map as well, but also because the two maps seem to follow different standards and have different sources as basis.

This happens with toponyms as well, since Notaras records more toponyms and other notes in his map from those recorded in Luyts' map. These notes are apparent in the synthetic images of Figure 15. Moreover, in Notaras' map, there are routes made by explorers, traced all over the continents. These routes are not traced in Luyts' map, confirming the fact that Notaras used maps from other sources for the construction of his separate map.

All these remarks drive to the conclusion that Notaras' smaller map included in his geography book is not just a reduced and simplified version of his separate map,¹² because these two maps use different sources in their construction which is obvious in their drawing.

¹² According to Toliás (2010: pp. 4 and 18-19), Notaras' map included in his cosmographical essay published in Paris in 1716, is the same with his separate map published in smaller dimensions with less data.

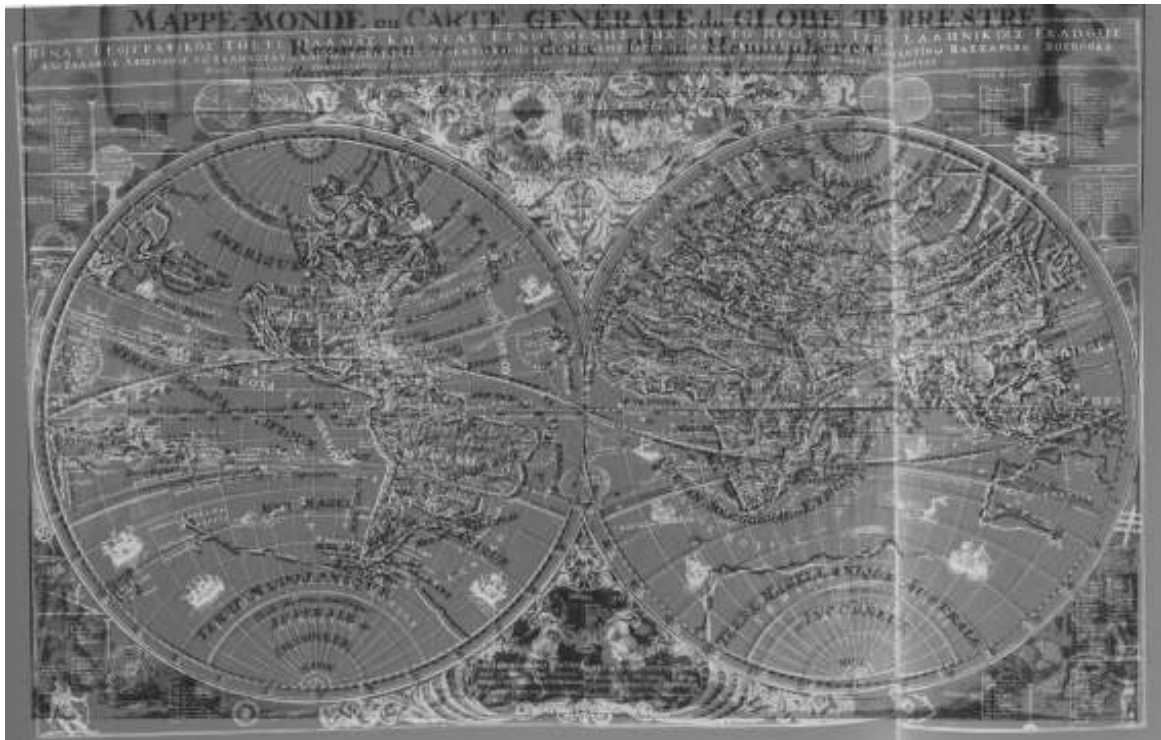


Figure 14. Best fitting of Notaras' separate map, 1700 (white lines) to Luyts's map, 1692 (black lines) using the digital transparency technique.

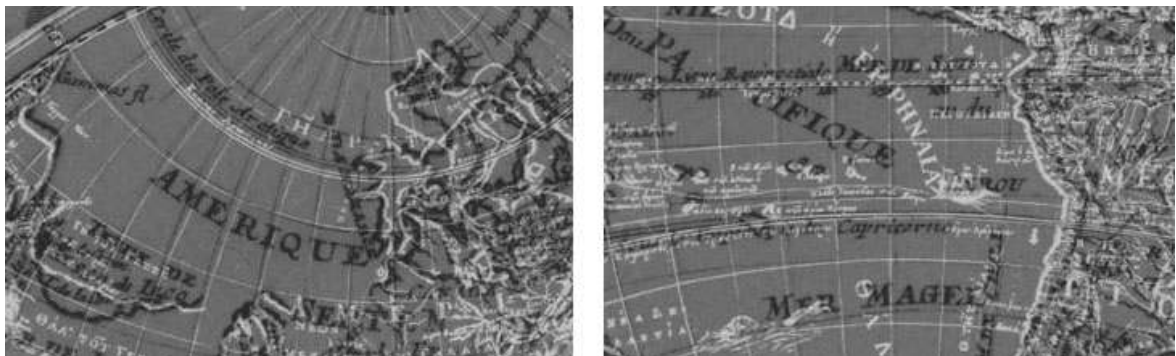


Figure 15. Left: Details of the synthetic image of the two maps, with apparent differences in coastline and toponyms.

Right: The routes traced on Notaras' map (white lines) do not exist in Luyts' map (black lines).

Searching for maps possibly used by Notaras in the construction of his separate map, we come across an anonymous map in Shirley's catalogue (Shirley 1984: 464-465, entry 447), in which the same routes are also depicted. Apart from the routes, the two maps seem to use the same basis for the depiction of continents' coastline since some characteristic parts of it are similar. This map, which dimensions are 55cm in longitude and 42 cm in latitude, is probably published in Amsterdam or Paris, around 1670 (Fig. 16).

According to Shirley, this unusual map may come from a book or a pamphlet describing the voyages and discoveries made by the Dutch East Indian¹³ and other trading companies. These voyages are described in detailed texts in this map. Some of them refer to voyages made by Dutch explorers from 1594, when the first attempt to force the north-

¹³ In Dutch: Verenigde Oost-Indische Compagnie or VOC.

east passage was made, to 1665, when New Holand (New York) is stated to have been recaptured to British and the others describe the colonial possessions of the “Company” in Asia (Shirley 1984, p. 464).

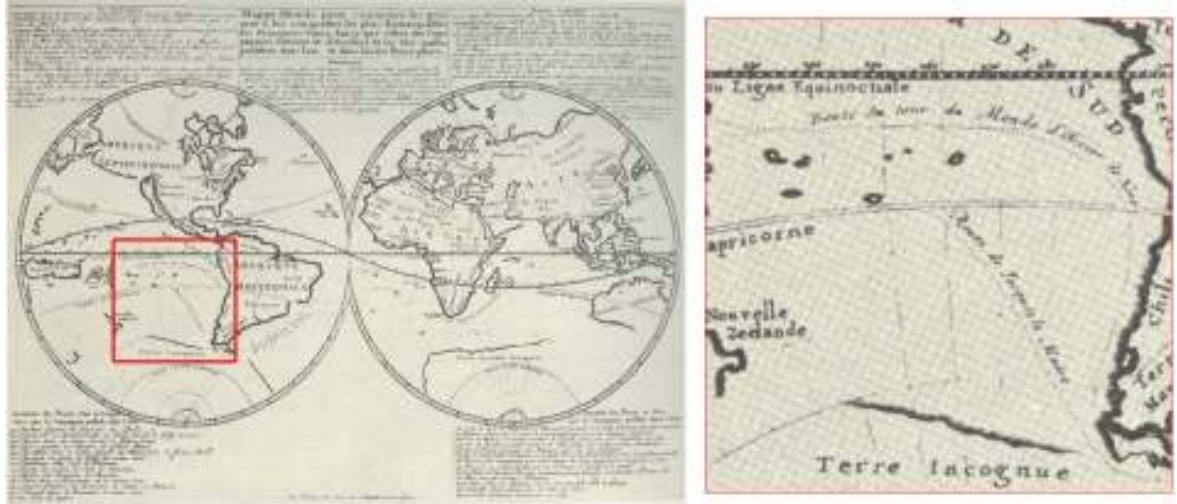


Figure 16. Anonymous map published in Amsterdam or Paris, in c. 1670.
The map shows the expansion of the Dutch colonial empire.

Putting this map in comparison to Notaras’ separate map using the best fitting process and the digital transparency technique, the similarities and the differences between the maps are apparent (Fig. 17). The continents’ coastline of both maps coincide in the biggest part of the maps, though in Notaras’ map the coastline is more detailed. This can be attributed to the different scale of each map (Notaras’ map is almost double in size than the 1670 map), or maybe to each map’s engraver. Also, there are differences in the amount of toponyms and the notes recorded in the maps, which in the case of the earlier map are less than those depicted in Notaras’ map.

Moreover, the routes of Dutch voyages and discoveries, though they do not fit exactly in the two maps, as it is obviously shown in Figure 13, are traced along the same direction, almost parallel, and with the same notes on them, writing among others the name of the discoverer in each map’s language (Fig. 18).

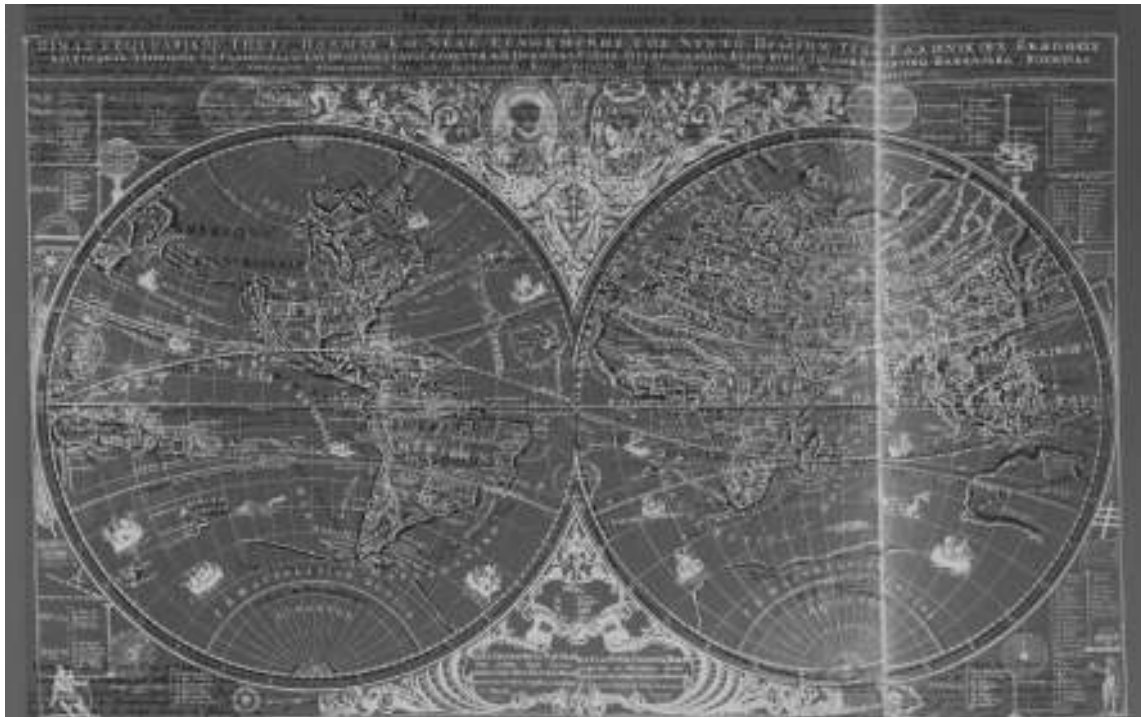


Figure 17. Best fitting Notaras' separate map, 1700 (white lines) to the anonymous' map, 1670 (black lines) using digital transparency.

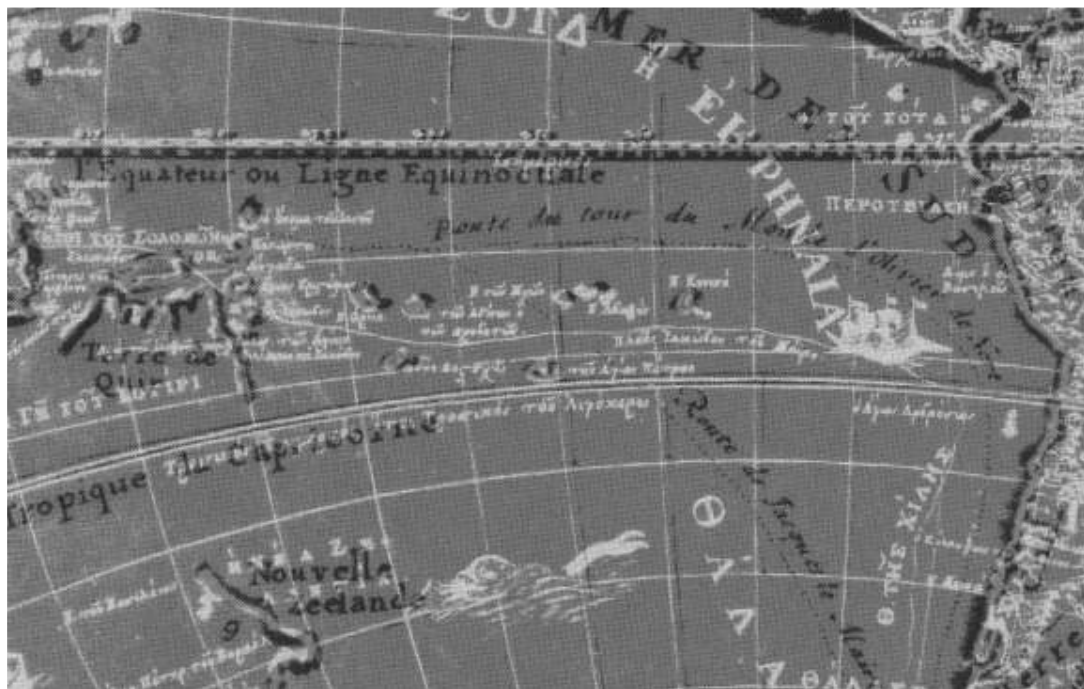


Figure 18. Voyages and discoveries by Dutch traced in 1670 map (black lines) and in Notaras' separate map (white lines). The routes, though traced differently, follow the same direction.

Except for Notaras' separate map and the anonymous map, there are not other maps in Shirley's catalogue, constructed before 1700, where those voyages appear. However, in 1700, there are two more maps constructed by two French cartographers, Guillaume De-

lisle and Jean Baptiste Nolin, which depict among the voyages and the discoveries, those appearing in Notaras map.

Delisle's map (Fig. 19) was published in Paris under the title "*Mappe – Monde Dressé sur les Observations de Mrs. De l' Academie Royale des Scieces et quelques autres et sur les memoires les plus recens...*" and has dimensions 66 x 40 cm. Delisle was tutored by Giovanni Domenico Cassini at the new Observatory of Paris and according to the title, he was based in observations made there by the Academie Royale des Sciences on constructing the world map. This map was revised several times not only by Delisle, but also by other cartographers (Shirley, 1984: 597-598, entry 603).

Several mapmakers draw on these maps observations, including also Nolin's second map depicting the routes of voyages and discoveries. Nolin's map (Shirley, 1984: 598-601, entry 605) is published in 1700 and depicts the world in two hemispheres (Fig. 20). The map (149 cm in longitude by 119 cm in latitude) is decorated with mythological features by Nicolas Bouquet. In this map, tracks of several of the great sea voyages are depicted including those of Columbus, Verazanno, Magellan, Quiros, Medaña, and Schouten and Le Maire, who traverse the vast maritime spaces.¹⁴ Some of these routes were also depicted in Delisle's and Notaras' maps.

Having in mind that Nolin and Delisle worked with Cassini at the Observatory in Paris the same time Notaras was there, working for Cassini as well and also that the three maps, Notaras' separate world map, Delisle's map and Nolin's map, are published in the same year (1700), we can assume that Notaras was based also on these observations in constructing the separate world map. It is possible these observations to be Notaras' sources in recording all the toponyms and the notes in his map, since Delisle and Nolin also record many toponyms and write notes in their maps.

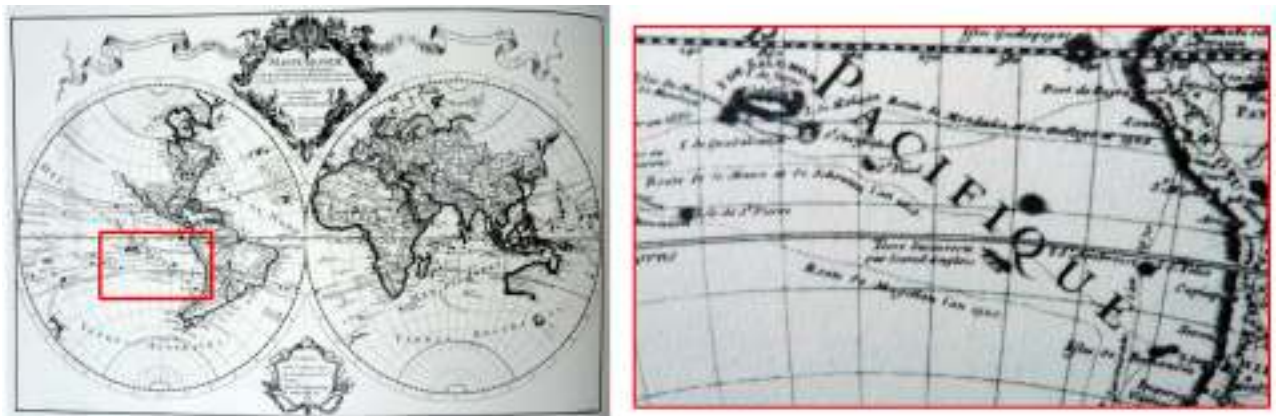


Figure 19. Delisle's world map, Paris, 1700, where the routes of the voyages are traced (right detail).

¹⁴ Shirley (1984: entry 605, p. 598-601) and National Library of Australia (2008: 40-41).

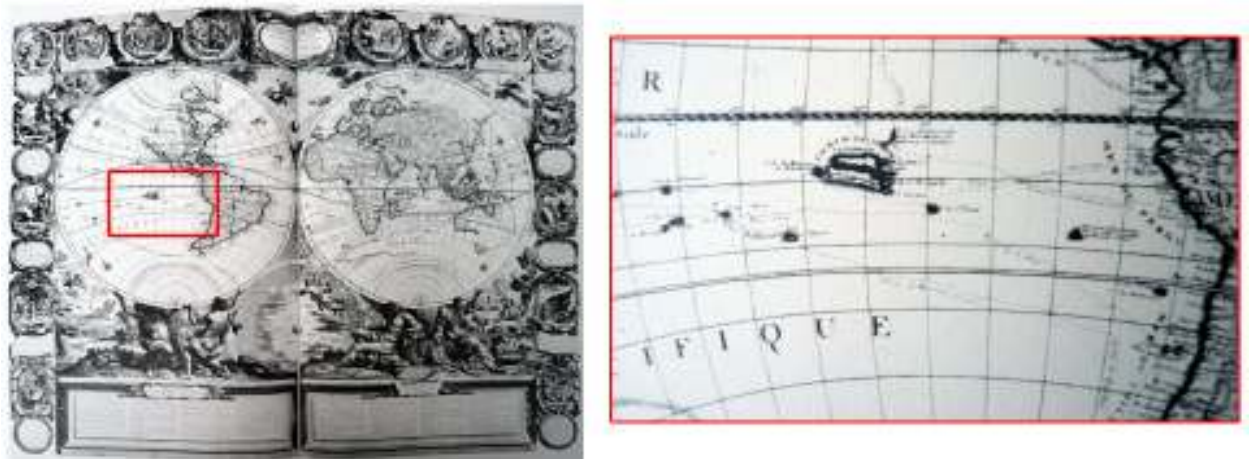


Figure 20. Nolin's world map, Paris, 1700, where the routes of the voyages are traced (right detail).

Concluding remarks

This study is focusing on an important cartographer, Chrysanthos Notaras, a prominent representative of Greek Cartographic Heritage and especially on his two twin hemispherical world maps both constructed in Padua, in 1700. The smaller of these maps was published in his geography book based, as it was proved in this study, on the world map of the same typology and aesthetics included in Jans Luyts' geography book. This map, even if referenced to Nicolas Sanson, it is attributed to Luyts in the Shirley catalogue (Shirley 1984; entry 553). This Luyts-Sanson map is entitled as other Sanson's maps, though it shows differences with those constructed by the Sansons (1651, 1660, 1669).

The two geography books, by Luyts and Notaras, show similarities in other parts as well, such as the same diagram of the seven climates, something that makes us assume that Notaras knows and uses Luyts' book. It's also worth mentioning that these two scholars had common beliefs in scientific areas e.g. they both support the geocentric theory.

Notaras' second map, separately published, shows many differences in coastline and toponyms in comparison with Luyts' map, which means that Notaras used also different sources as basis for its construction. In Notaras' separate map, which is almost double in dimensions, more toponyms and notes are included, among which are the routes followed by Dutch trading companies all over the oceans. These routes are also depicted in Delisle's and Nolin's world maps of the same typology, both printed the same year with Notaras' map in Paris, based on observations made by the Academie Royale des Sciences, under Cassini. Having in mind that Notaras also worked with Cassini in 1700, we assume that Notaras probably uses the same data for the construction of his map.

In this paper it is confirmed, for one more time, that comparative studies of old maps using digital computational and visualization technologies, which are massively available today, play an important role in approaching historic cartography and unveiling interesting features and details which remained obscured in the analogue era of history of cartography and maps. The transformation of the maps into digital form and the processing of their images can be considered today as a standard tool in the promotion of Cartographic Heritage and its international character.

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