

***INTRODUCTIO AD GEOGRAPHIAM ET SPHAERAM,* A LESSER-KNOWN BOOK ON ASTRONOMY**

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Abstract. There are more than 300 years since Hrisant Nottara's book *Introductio ad geographiam et sphaeram* was first published in Paris. The book has already been translated into English by Greek colleagues in order to help contemporary readers get an insight into the scientific knowledge of that time and discover the scientific contributions of a priest who by the end of his career had become the Patriarch of Jerusalem. The authors aim to portray Nottara since he was the private tutor of the Wallachian prince C. Brâncoveanu's sons, then working with Cassini I, until his final years when he became the leader of the church. A number of chapters of the book will be analysed in order to shed more light on the progress of science at the time, particularly in astronomy, trigonometry and geography.

Key words: Astronomy in culture – History of astronomy – Hrisant Nottara.

1. INTRODUCTION

More than three centuries ago Hrisant Nottara published in Paris the book *Introductio ad geographiam et sphaeram*, which he wrote in Greek. The book has already been translated into English by Prof. Eleni Rovithis-Livaniou from University of Athens, which was quite a challenge given that three centuries ago the language was so different from today. At first, I only browsed through it as I was curious to get an idea about the scientific knowledge of that time. Little by little, I began to realize that I was holding an important document about the attitude towards science of one of the most prominent members of the Orthodox clergy. It was fascinating to discover how this exceptional theologian explained and, even more importantly, how he accepted the scientific truth of his time.

2. ASTRONOMY IN EUROPE AT THE END OF THE 17TH CENTURY

It was the age of Louis XIV, king of France (1643 – 1715), who strongly encouraged scientific culture in his country. The recent geographical discoveries of the XV–XVIII centuries turned out to be an important catalyst for Europe's cultural and scientific progress, marking the beginning of the modern globalization age.



Fig. 1 – Hrisant Nottara.

One of the most serious and practical problems they faced was to determine geographical coordinates. Competition with England was another reason for France and especially for its King to fight for priority in these operations. If latitude did not raise special problems, as it was calculated by measuring the height of the North Star above the horizon, the longitude needed a landmark that could be used by any traveler on water or on land: in this case, the first meridian.

The idea of this landmark was not new: Hipparchus [1] himself tried to determine the difference of longitudes between two places, from the island of Rhodes (c. 190 BCE - 120 BCE), where he conducted his observations. But it was Ptolemy [2] who adopted as a prime meridian, or meridian of origin, the Fortunate Islands, now called the Canary Islands (13° to 18° W), which he believed to be the western edge of the world, while the east didn't seem to have such an edge.

In the XV and XVI centuries, when seafaring became more intense, navigators became increasingly eager to work out this problem; in particular, they needed to

determine the longitude and, implicitly, to develop cartographic studies. On 4th May 1493 Pope Alexander VI [3] issued the papal bull *Inter Caetera* that divided the New World between Spain and Portugal, drawing a line between the spheres of influence of the two countries to 100 leagues west of the Azores and Cape Verde Islands (22° to 25° W). Following protests, mainly from Portugal, the line was shifted again, as the Treaty of Tordesillas [4] shows (1494), by a meridian 370 leagues west of the Cape Verde islands. Spain looked again into the problem, and in 1573 King Philip II [5] issued two ordinances on measuring longitudes. The first imposed the town of Toledo as the meridian of origin (about 4° long. W). After the discovery of the Indies it appeared more natural to measure longitudes westwards. Subsequently, other cartographers (Mercator in 1541 and Ortleius⁴ in 1570) took other islands as reference points: the Canary Islands, Madeira, Cape Verde and the Azores.

We should mention that Oradea, a Romanian town located only 13 km from the western border, was also considered, in the Middle Ages, as the origin of longitudes ($21^\circ 55' 16''$ E). This is where the Viennese astronomer and mathematician Georg von Peurbach (1423–1461) set up an observatory. He used Oradea as meridian 0 in his *Tabula Eclipsium or Varadiensis* (i.e. *Tables of Oradea*), which was published in 1459, and used even by Christopher Columbus. All land and sea maps of the world of that time mentioned this fact. Nowadays only very few sea maps still retain this landmark. Let us recall that Oradea, an important cultural hub of the Renaissance, hosted the first astronomical observatory in Europe, set up by Bishop John Vitez (1408–1462).

That was the scientific context in which France was making great efforts to preserve its scientific supremacy. On 22 December 1666 the Academy of Sciences was founded and a few months later, on 21 June, the Observatoire de Paris.

To achieve these ambitious goals, Louis XIV chose Christiaan Huygens (1629–1695), a Dutch mathematician, astronomer and physicist. He was already famous for some remarkable scientific achievements, among which the wave theory of light and the calculation of the centrifugal force. In 1655 Huygens had discovered Titan, Saturn's moon, and the next year he established that Saturn's rings are made up of rocks. He observed the Orion nebula and its structure, as well as the structure of other nebulae and double stars. He also dealt with the calculation of probabilities and the theory of an oscillating pendulum to regulate the movement of the clocks using a pendulum. In 1666 he took into account the effects of centrifugal force caused by the Earth rotation on the weight difference between the poles and the equator. At the same time as Newton, he came to the conclusion that the Earth is flattened at the poles.

These reasons were more than enough to draw the attention of the French, who invited him to Paris and elected him member of the Royal Academy of Sciences, founded in Paris by Colbert [7]. He worked at the Astronomical Observatory of

Paris, which was finished in 1672.

As his health was deteriorating, he was forced to return to the Hague, where he completed his research and refined his ideas about the relationship between science and religion, by seriously taking into account the Copernican system. In his book *Cosmotheoros, sive of coelestibus Terris, earumque ornatu, conjecturae* (Hague, 1698) he made many comments on the Copernican thesis. He went as far as entertaining the possibility of life around other stars in the universe, but not of intelligent life. All this was possible thanks to a freer climate in the Netherlands than in other parts of Europe.

His closest advisor, who prepared him and his successors to a long career as head of the Paris Observatory, was Jean-Dominique Cassini (1625–1712). Cassini was, therefore, another scientist invited by Colbert, at Louis XIV King's suggestion, to support scientific progress in France and the development of the Observatory that had just come into being. He was born in Peinaldo, in northwestern Italy. Between 1648 and 1669 he worked at the Penzano Observatory and the University of Bologna [8], where he taught Euclidean geometry and Ptolemy's astronomy, in line with the precepts of the Catholic Church. He was known for his research on the tilt of the ecliptic [9]. In 1665 he discovered the Great Red Spot [10] on Jupiter and the same year he determined the rotation speeds of Jupiter, Mars and Venus. Cassini arrived in Paris in the spring of 1669 and took up his post at the Observatory in September 1671, as soon as the ground floor and first floor of the building were completed. They had been designed between 1667 and 1672 by the architect Claude Perrault (1613–1688), the brother of the writer Charles Perrault.

He brought to Paris the finest instruments from Italy, which would help him to discover four satellites of Saturn (Japet in 1671, Rhea in 1672, Tethys and Dione in 1684) and the divisions of the Saturn's rings [11], which that bear now his name, in 1675. In 1668 he sent to the Royal Academy the tables with Jupiter's satellites' eclipses, which he dedicated to Adrien Auzout (1622–1691), member of the Academy between 1666 and 1668 [12]. In 1673 Cassini made the first accurate measurement of the distance between the Earth and the Sun based on the parallax [13] of Mars, deduced by Jean Richer [14] at Cayenne, and ten years later he determined the solar parallax. In 1690 he observed for the first time the differential rotation of Jupiter's atmosphere. In 1673 he settled down in France on a permanent basis, became a French national and got married. His descendants appeared to be a real dynasty of scientists, of which the last one, Cassini V, was, however, a botanist. As a result, the Observatory was ruled for 125 years by four representatives of the Cassini family.



Fig. 2 – Constantin Brâncoveanu (1654–1714).

3. AN ENLIGHTENED PRINCE RULED WALLACHIA AT THE END OF THE 17TH CENTURY

On the other side of Europe, another enlightened ruler was governing Wallachia (Țara Românească), and was strongly encouraging cultural progress, during one of the longest reigns of that time (26 years).

This was Prince Constantin Brâncoveanu (1654–1714). He had always been committed to moderate politics. He had to face, on the one hand, the expansion of the Habsburg Catholic Austria, which had annexed Transylvania after the peace of Karlovitz of 1699; on the other hand, that of the Russian Orthodox Empire, the successor of Byzantium, which had come as close as the Dniester, the eastern natural border of Moldova. Towards the end of his reign, Brâncoveanu had no choice but to collaborate with the Austrian army that occupied the country. Although he paid regular taxes to the Turks, Brâncoveanu would transfer other huge amounts of money to the Sultan, which made them call him “altin bey”, *i.e.* “the prince of gold” and sparked suspicions that he owned even bigger hidden treasures. This was perhaps the main reason why the Sultan Ahmed III [15] deposed him in 1714 and brought the whole family to Constantinople, where he was imprisoned in the Yedikule fortress and tortured on 15 August, St. Mary’s feast, which also happened to be his 60th

birthday. He was asked to surrender his entire fortune and, even more seriously, to renounce his faith. He refused to do so. The punishment was horrific: firstly, his son were beheaded in front of him and afterwards he was beheaded himself. For the sacrifice they made in the name of faith, the Romanian Orthodox Church canonized them as the Saint Martyrs Brâncoveni.

Brâncoveanu was not only an unwavering believer but also a man of a distinguished culture, combining influences both from the Western Europe's Enlightenment and from the Greek culture. In Romania, the latter had strongly caught on thanks to the Greek Phanariots, who played an important role in the Ottoman Empire.

Constantin Brâncoveanu's cultural legacy includes the splendid architectural style that bears his name, which flourished during the so-called *Wallachian Renaissance*, and whose unmistakable imprint was even more visible in the eighteenth century buildings.

Thanks to a mix of influences, ranging from Byzantine and Ottoman to late Renaissance and Baroque, to a touch of comfort not seen before, and to the location right in the vicinity of beautiful lakes and of the forests, the palaces and the churches built around that time can be considered real jewels of the Romanian art. Among the most remarkable examples there are the Mogoșoaia and Potlogi palaces, and the Horezu and Antim monasteries.

In fact, the *Brâncovenesc* style was particularly spectacular in architecture. These buildings, which were a sign of the wealthiness of the Prince and were designed to resist over many centuries, as well as his culture, which he was eager to spread around him, suggest that the Prince was undoubtedly a really enlightened mind, perhaps way ahead of his time.

In 1694 he founded the Princely Academy of Bucharest, a high school where the teaching language was Greek, and which in 1707 was reorganized under the leadership of Sevastos Kiminitis [16]. Alongside this "public college for locals and foreigners alike", other schools were also operational, where classes were taught in Romanian or Slavonic.

He encouraged printing by publishing the first edition of the *Holy Scriptures* in Romanian - a huge work for that time (944 pages, large format, two columns, with small size font). Several printing houses were set up, particularly through the efforts of Antim the Iberian (b. in 1640 to 1650, d. 1716), a Romanian theologian, bishop and metropolitan of Georgian origin [17]. He was not only an outstanding printer and engraver, and the author of remarkable theological books, but also the founder of the first public library in Bucharest.

Brâncoveanu attracted many cultural personalities from abroad and from his country. His personal secretary was the Italian scholar Anton Maria Del Chiaro Fiorentino (b. between 1660 and 1680). Del Chiaro was also the tutor of Ștefan Cantacuzino's children, who was going to be Brâncoveanu's successor, being ac-

tually the last local governor before the Phanariots came to power. Del Chiaro's opus, published in Italian in Venice in 1718, *Istoria delle moderne rivoluzioni della Valachia*, gives us important information on the Romanian history.

4. THE MULTIDISCIPLINARY EDUCATION OF HRISANT NOTTARA

One of these Greek was *Hrisant Nottara*. Since his name is found under different spellings, it is convenient to provide here the original Greek, *Χρυσανθος Νοταρας*. Although he was a great cultural and political personality in the late seventeenth - early eighteenth century, and although much was written about him during the celebration in 2014 of three centuries since Brâncoveanu's martyrdom, not much light was shed on his biography, or perhaps his theological and scientific work was more important than some trivial biographical details.

We know that he was born in Arachova [18], Peloponese, around 1663 and died on 7 February, 1731 in Constantinople [19]. He was the grandson of Dositheos II Nottaras of Jerusalem, who was also born in Arachova, on 31 May 1641, and died in Constantinople, on 8 February 1707, as Patriarch of Jerusalem, a position that he held since 1669. He was known for opposing the influences of the Roman Catholic and Protestant Churches. He was the one who convened the Synod of Jerusalem to counteract the Calvinistic testimonies of Cyril Lucaris (1572–1638), the Orthodox patriarch of Alexandria (Cyril III) and the Ecumenical Patriarch of Constantinople.

In 1680 Hrisant Nottara became an archdeacon, in 1695 the archimandrite and Exarch of the Holy Sepulcher, between 1702 and 1707 he was the Metropolitan of Caesarea and Palestine, and Patriarch of Jerusalem since the death of his uncle in 1707. He could not have reached the highest rank in the church without the support of the princes Constantin Cantacuzino and Constantin Brâncoveanu. The High Steward Constantin Cantacuzino was the author of a history of Wallachia and of its map which he completed in 1700 together with the doctor and philosopher John Comnen (Ioannis Komninos) [20]. Unfortunately, Constantin Cantacuzino and his family contributed to the deposal and the murder of Brâncoveanu in 1714. Although his son, Ștefan, ascended to the throne of his enemy, his reign was brief, because both he and his father suffered Brâncoveanu's fate only two years later.

But Nottara continued to receive the support from the Romanian rulers, in particular from Nicolae Mavrocordat (1680–1730), a real Maecenas of his time, who was the first and most significant phanariot prince, alternatively ruler of Moldavia and Wallachia. Nicolae Mavrocordat introduced Greek manners, language and costumes, influenced by the Age of Enlightenment. His library was among the continent's most treasured. The second ruler who strongly supported him was Grigore Ghica II, when he was the prince of Moldavia (1726–1733). The ruling princes of

the two principalities were the main benefactors of the Orthodoxy, and often the only ones, since the fall of Constantinople till mid-XIXth century.

So, Hrisant Nottara was primarily a priest and a theologian, but he also had a vast culture that was built in the most famous universities of the time; apart from the theological culture he had acquired at the great Patriarchal Academy in Constantinople, a solid general education, scientific and philosophical.

Once he joined the Brâncoveanu court, the Prince noticed his outstanding intellectual ability and sent him to study abroad. He intended to prepare Nottara to educate his children and other young people from the principality or even from the south of the Danube, who were already attending the Princely Academy he had just set up.

Adept of the neo-Aristotelian philosophical current, Hrisant Nottara also became an admirer of positive science, being mostly interested in mathematics and astronomy. He started studying astronomy in Germany in 1688. He was there when he learned of the appointment of Brâncoveanu as prince of Wallachia on 28 October. Five years later he left for Moscow where he set up a printing house. In 1696 he pursued his studies at the University of Vienna, one of the oldest Universities in the German speaking world, and from 1697 until 1700 in Venice and Padua, together with Radu Cantacuzino, the second son of Constantin Cantacuzino (1639-1716), a Romanian nobleman of Greek origin, an eminent representative of humanism, passionate about history and geography.

On page 199 of the *Archive antico of the Padua University, Registry Artistic*, register 232, we find under number 376 “Notary Christo of Corinth” in 1697 (counting begins in 1674) [21]. Founded in 1222, the University of Padua is one of the oldest universities in the world. Hrisant Nottara lived in a time when great changes were taking place in the way the universe was imagined. Let’s first recall Galileo Galilei (1564-1642) and Johannes Kepler (1571-1630), but also a scientist contemporary to Nottara, namely Sir Isaac Newton (1642-1727). Galileo held the chair of Mathematics at the University of Padua for 18 years (1592-1610), where he carried out his research on motion experimenting on falling bodies and wrote most of his work.

However, Nottara completed his scientific education at another leading institution, which was about to become the European leading center in astronomy: the Observatoire de Paris, whose director was Jean-Dominique Cassini. There is evidence showing that Cassini’s attitude to Nottara was extremely friendly; in 1700 he even hosted him for one week at the Observatory. Although it is Nottara himself who mentioned this, it seems almost impossible for him to have learned so much from Cassini in such a short time. It must have been just one of his visits to Paris, as in the archives of the Observatory we found a note of observations, signed as Chrysanthos Notarà, *Archimandrita Hierosolymitanus*, i.e. Archimandrite of Jerusalem.

Here is Nottara's testimony as it emerges from his book (p. 92):

"I enjoyed by him (Cassini) exceptional charity; he made me friend and he entertained me for *one entire week* at his residence (that was at the Observatory). With him and with the bigger telescopes I observed the Moon, the Jupiter and its satellites, the Galaxy and some other stellar bodies. He, therefore, taught me that he had discovered with a lot of methods and observations; that a minute (of arc) of the perimeter of the Earth, *i.e.* a medium Italian mile is equal to 5706 Paris legs, with 5818 geometric legs, and with 8300 roman spans. The radius of the Earth contains 20 000 000 geometric legs. [...]. We recounted (talked about) the history of the confrontation (re-measurement of the perimeter) of the Earth, firstly, in order to hear all with how much assiduity it was asked by the mathematicians to solve this problem as important and useful in a lot of questions and, second, (to show) how difficult and complicated it is. And because (the perimeter of the Earth) is found with different ways, we report here the easiest, which are used by most."

It becomes clear, therefore, that the observations were made with the very telescope used by Cassini to observe Jupiter's satellites, hence another privilege offered to his guest. Jupiter's satellites were used to determine the longitudes, which until then were determined mainly by using the eclipses of the Moon. It was the beginning of geodetic astronomy and of cartography, which Nottara was particularly interested in.

In the dedication that Auzout wrote in 1665 to the king on *Ephémérides de la comète de 1664*, he mentioned that "there is no kingdom in Europe whose geographic maps are so inaccurate and the location of places so uncertain" [22]. To gain control and improve the situation, Colbert entrusted the cartography of France to the Academy of Sciences he created in 1666. As a result, in 1693 La Hire published *la Carte de France corrigée par ordre du Roy*, based on astronomical measurements made by Cassini.

5. INTRODUCTIO AD GEOGRAPHIAM ET SPHAERAM

Everything that Hrisant Nottara learned from the institutions he attended, and especially from Cassini, is conveyed in the book "Introductio ad geographiam et sphaeram", published in Paris in 1716. It was dedicated to Scarlat Mavrocordat (1678–1699), son of Alexander Mavrocordat, brother of Nicholas Mavrocordatos:

CHRISANTHI NOTTARA

Presbyteri, et archimandritae sanctissime patriarchalis, et apostolice sedis hierosolymae

INTRODUCTIO AD GEOGRAPHIAM, ET SPHAERAM,

In Gratiam Illustrissimi, ac Spectatissimi Domini

*SCARLAT MAUROCORDATI**Dignissimi Filii Celsissimi, Piissimi, & Sapientissimi Domini Domini**JOANNIS NICOLAI**ALEXANDRI MAUROCORDATI**Principis, ac Domini Totius Vallachiae*

It has 176 pages, 2 charts, 5 parts, each of which contains many individual chapters with a lot of explanatory figures.

Part A contains 18 chapters, covering 32 pages;

Part B contains 10 chapters, covering 36 pages;

Part C contains 10 chapters, covering 45 pages;

Part D contains 18 chapters, covering 36 pages;

Part E contains 4 chapters, covering 9 pages.

As prof. Eleni Rovithis-Livaniou pointed out, the book seems to have originally been written before April 1702. It was completed and revised in Wallachia in 1707–1708, after Nottara became Patriarch of Jerusalem. The dates are drawn from the first page of the book, where the author is mentioned as a priest, a title he had till April 1702. Moreover, Hrisant Nottara himself wrote in the Introduction of this book:

“... *here at Wallachia there is Bucharest . . .*”, (p. 3); or:

“... *we who now live in Wallachia . . .*” (p. 45).

If this book was written, as it seems, before 1702, it means that it was just before preparing, in 1707, the teaching plan of the newly created Princely Academy. This was based on Greek philosophy and classical science. The first teacher, i.e. the head of the academy, taught logic, rhetoric, physics, metaphysics, as well as classes about heaven, about birth and death, and about the soul. The whole neo-cycle of Aristotelian philosophy was taught there.

The school paved the way to positivism and materialism. Priority was given to secular writers, philosophy and natural sciences, which was pretty remarkable for a country having a feudal regime and under the suzerainty of the Ottoman Empire.

Apart from his wide theological and scientific culture, it is worth mentioning that Hrisant Nottara also had a remarkable oratorical talent and great political ability. Although he intended to use a very rigorous approach when dealing with the various scientific problems, as he learnt in the context of his western education and of his personal contacts with well-known scientists, his comments are visibly influenced by his conservative Orthodox theological education and mind-set, and in particular by his position in the Orthodox Church hierarchy.

More than once, when he had to explain, in theological terms, uncontroversial scientific truths or to explain two diametrically opposed views, it is not clear which stance he was taking; this happens for example when he talks about the Ptolemaic as opposed to the Copernican systems. However, his vision about the universe was

beyond any doubt Ptolemaic.

In the portrait shown on the opening pages of his book he was wearing monastic clothing and is resting his left hand on the sphere of the Earth, while holding in the right hand a pair of compasses. The symbolic meaning of this formal depiction is a statement endorsing his support for the ancient idea of Earth being in the centre of the Universe.

On the front page of the same book, we find two images side-by-side, one showing the Earth surrounded by the geographical coordinates of longitude and latitude, and the other showing the Earth in the very middle of the Zodiac.

Here are some telling examples of how he understood to make a compromise between the Church he served and the science he knew according to the standards of his time. Talking about the meridian, he said: “The Egyptians, the Romans and the Persians fixed the beginning of the day the midnight. They were followed by some astronomers too, as Hipparchus firstly, and afterwards Copernicus. And because this was also followed by the church, is said ecclesiastical day”. So here he cited Copernicus as a scientific authority.

On the other hand, he does not hesitate to add “allegorical” comments to old theological concepts, such as:

“Some of the newer Lateens and indeed the theologians, as are Nicolaus Lyranus [23], Thomas Aquinas [24], Giovanni Campano [25] and others, believe that Paradise is found below the equator; meaning this, perhaps with a secret and allegorical way, if we accept that they were absolutely wrong. Because otherwise, as we already mentioned earlier, this area has intensely bad conditions of temperature and abnormalities, as is admitted by the cosmographers, geographers, tradesmen and others traveled in these parts.”

He accepted the theological error, but he interpreted it in an allegorical sense. Let us cite his comment on the sphericity of the Earth:

“It is that the Earth is globular and the heavy bodies are brought towards its center. What is the experience? That after the famous travel made in the XVth century by Amerigo Vespucci [26], Christopher Columbus and many others Spanish, English, and Lusitanians [27], it was showed and confirmed the completely opposite. So, neither Vergilius [28] opinion was wrong. However (Vergilius) was condemned because ignorance, because no precise examination was made at that time for such an affair.”

This is a *sui generis* explanation of the fault found in the holy books. For cartographers, it is interesting to recall his comment regarding the East:

“The theologians, because it is believed that Paradise is towards the East, and that at the final crisis Jesus Christ will come from Eastern, arrange in such a way the parts of World turning the faces to the East.”

His effort to explain the Ptolemaic system is particularly interesting. After

some weird comments, he came to the following conclusion: “Moreover, because all heavy (bodies) are brought to the center, as our experience certifies, and because the Earth is heaviest than all, it is brought to the center. Center being the middle of the Universe, so it follows that the Earth lies in the middle”.

Another controversial issue was the immobility of the Earth. In this regard, there were strong disagreements between the ancient philosophers, as some of them believed that the Earth is motionless, and others that it is moving.

Further he says: “Around the Sun, which has place of center, are moved all the planets and the Earth, which belongs in the class of planets.”

“That (the Earth) is motionless is firstly indicated by the Holy Book, which obviously gives the movement in the Sun and the constant place in the Earth”.

Finally, “As we said, opposite believe the Copernicans, from what is not necessary to be certified which from the two hypotheses is true, for the case of Astronomy and Geography. However, the Ptolemy System, because of its antiquity and because of its acceptance by too many wise men, and because it agrees with the Holy Writing, is judged as more acceptable (as true), as it was proved in the previous chapter, i.e. that the Earth is found in the middle of the Universe. Consequently, it is necessary to be proved that it is also motionless.”

That was a big dilemma for a scientist who became a priest and later reached the top of the ecclesiastic hierarchy. Nottara described in detail many of the methods used, which suggests that he tried them for himself, and presented different astronomical instruments, which he sent to a number of personalities in the Balkans and in Jerusalem. Some of these instruments had been provided by various European cities and some of them had been constructed by him, following Cassini’s suggestions. For the first time in Eastern Europe, he systematically described the composition of the Western Hemisphere by using Cluvier’s [29] Geography.

In 1700 Hrisant Nottara amended the map of Wallachia made by Steward Constantin Cantacuzino in collaboration with the doctor and philosopher Ioan Comnen (1700 in Greek, 1718 in Italian). It is the first map of the globe. Right in the middle there is a portrait of Constantin Brâncoveanu.

Geographic maps were not drawn in accordance to the whole world, but to Jerusalem’s position. Nottara thought that nobody has the right to change the position of the first meridian from the place where Ptolemy had defined it as it would have caused confusion as regards the longitudes of various geographic locations.

On page 55, several possible causes are given to explain why the inclination between the equator and the ecliptic is about 24° , and a connection with the divinity is made.

According to the followers of Ptolemy, the Earth is motionless and only the sky is moving.

Nottara does not hesitate to support in opposition to Copernicus that the Sun

revolves around the Earth.

Nottara supported the geocentric thesis without rejecting, however, the Copernican theory whose discussion is postponed to a later date.

Although he exhibited some tolerance towards Copernicus and discussed his ideas, Nottara, as a staunch follower of religious humanism, pointed out the Copernicus' ideas were nothing more than a reproduction of the cosmological model proposed by Aristarchus of Samos.

On the other hand, the Copernicans:

1. think that the first movement is due to the Earth (daily motion),
2. do not accept the second (motion),
3. put the Sun at the center of the world.

“Independently whom of the two are correct, both accept that center of the first mobile around which the stars are moved in 24 hours is the Earth.

Both Astronomy and Geography are not interested for which of the two hypotheses is correct”.

“... but since Ptolemy system is much older and it is in agreement with the Holy Book, it is judged as more real, *i.e.* that the Earth is on the center of the world”

It is natural for a priest to mention the Bible, and indeed Nottara mentioned it and other ecclesiastic books.

His conclusive argument had to do with the absence of any internal or external cause that could account for the “circular or straightforward movement of the Earth”.

The absence of any possible cause was sufficient proof that the Earth still remained in the centre of the universe.

His conclusion was philosophical-theological: since the Ptolemaic system could describe the celestial phenomena at least as adequately as the Copernican system could, the adoption of the former was needed by its agreement with the Scriptures.

The work includes the original, geometric schematic presentation of the theories of Ptolemy, Copernicus [30], Tycho Brahe [31], and, in an unexpected way, together with these famous astronomers, Descartes was also mentioned.

Hrisant Nottara's later scientific writings reflect a peculiarity that combines the modern approach of the new European scientific thought to the Ptolemaic vision of the world - the only one accepted by the Eastern Church, whom he represented as a member of its high hierarchy.

He believed it was more useful to build and organize schools than monasteries.

He ends with a reference to astrologers, who tell lies as concerns the zodiac signs, claiming that they affect people' lives.

6. CONCLUSION

To conclude, Nottara, a high representative of the Orthodox clergy and a promoter of Enlightenment in the Balkans, was a man of his time who was interested in the new western European politics, science and culture, but was still well aware of his cultural belonging to the ancient spiritual vein of Greece.

APPENDIX

[1] Hipparchus or Hipparchus (about 190 BCE - 120 BCE), the greatest astronomer of antiquity, founder of scientific astronomy. Using his own observations, he determined the length of the seasons, the irregularities of the lunar movements. He classified the stars based on their brightness, calculated the distance between the Earth and the Moon, and its diameter. He remains especially famous for the discovery of the precession of the equinoxes.

[2] Klaudios Ptolemaios or Claudius Ptolemaeus (about 100–160 CE), Greek astronomer, mathematician and geographer. His fundamental work, *Almagest*, was the basis of astronomy until the XVIth century. It contained a catalogue of stars, especially the geocentric system of the universe, already presented in a simpler form in the work of Hipparchus of Nicaea.

[3] Pope Alexander VI, born Roderic Borgia (1431-1503), pope from 11 August until his death.

[4] The Treaty of Tordesillas was ratified by Spain on July 2, 1494 and by Portugal on September 5, 1494.

[5] Philip II (1527–1598), King of Spain (1556–1598), of Naples and Sicily (1554–1598), king of England and Ireland, and during his marriage to Queen Mary I (1554–1558) jure uxoris of England, king of Portugal as Philip I (1581–1598) and king of Chile (1556–1598).

[6] Abraham Ortelius (1527-1598), Flemish cartographer and geographer, creator of the first modern atlas, the *Theatrum Orbis Terrarum* (Theatre of the World). He is considered to be the first person to imagine that the continents were joined together before drifting to their present positions.

[7] Jean-Baptiste Colbert (1619–1683), French politician, under the rule of Louis XIV; Controller-General of Finances between 1665 and 1683, Secretary of State of the Royal Navy and Secretary of State between 1669 and 1683 Jules Mazarin's successor, Prime Minister of France from 1642 until his death in 1661.

[8] University of Bologna is the oldest university in the world, founded in 1088.

[9] Angle between the equatorial plane and the plane of the Earth orbit, described by the Earth during its revolution around the Sun.

[10] Giant anticyclone of the Jupiter's atmosphere, situated at 22° S latitude.

The spot is about 15 000 km long and nearly 12 000 km large. It is now of comparable size to the Earth, although it seems that it was once much larger.

[11] *Cassini division* is the region in Saturn's rings that separates the A and B rings. Cassini's internal divisions limit is 117 500 km from the center of Saturn, and the outer limit is at 122 000 km. Therefore it has a width of nearly 4,500 km.

[12] Cassini published, between 1668 and 1693, *Ephemerides des satellites de Jupiter*.

[13] The *parallax* is the displacement or difference in the apparent position of an object viewed along two different lines of sight.

[14] Jean Richer (1630–1696), astronomer and navigator, named at the Academy of Sciences in 1666.

[15] Ahmed III (1673-1736), Sultan of the Ottoman Empire (1703–1730). In his time, the Turkish army beat at Stănilești, on the Prut (1711), the army of Tsar Peter I and of the Moldavian prince Dimitrie Cantemir (ruler during March-April 1693 and 1710–1711). Having lost the war with Austria, he concluded the peace of Passarowitz (1718), by which Austria annexed Romanian southwestern territories, Banat and Oltenia (Oltenia would return to Wallachia in 1739).

[16] Sebastos Kyminites or Sevastos Kiminitis, Greek scholar, b. in 1630 in a village near Trebizond, Pontus. He was Principal of the Patriarchal Academy between 1671 and 1682, when he Constantinople left to move to Trebizond, where he founded the Greek educational institution, known as the Phrontisterion of Trapezous, which functioned until 1921. By 1689 he moved to Bucharest to become Principal of the Princely Academy of Bucharest. He died there in 1703.

[17] Iberian or Eastern Iberia is the Greek name of the Georgian kingdom Kartli (IV–V centuries BCE), situated where Georgia and Armenia are today. In the past, it was also called Caucasian Iberia or East Iberia, not to be confused with the Iberian Peninsula.

[18] Arachova is a mountain town in western Boeotia.

[19] For the date and place of death there are also other versions.

[20] Ion Comnen or Ioannis Komninos (1668–1719), originally called Johannem Papam, changed his name to Comnen after spending some time in Moscow. As Cantemir wrote in his *Descriptio Moldaviae*, he was the personal physician of Constantin Brâncoveanu, and a professor of “physics and mathematics”; in the Princely Academy he taught “lessons about heaven” and geography, and even medical lessons.

[21] George Ploumidis, *Αἱ πράξεις εγγραφῆς τῶν Ἑλλήνων σπούδαστῶν τῆς Παδοῦης, Μέρος Α΄*. Artisti. Συμπλ *acuteetarωμα* (ἔτη 1674-1701), Venice, 1971.

[22] *Ephémérides de la comète de la fin de l'année 1664 et du commencement de l'année 1665*, dédiée au Roy par M. Auzout, Paris, 1665.

[23] Nicolaus Lyranus (1270–1349), theologian and exegete, influenced all au-

thors of the XIV and XV centuries, as well as the reformer Martin Luther.

[24] Thomas Aquinas (1225–1274), Italian dominican friar, theologian, philosopher, Doctor of the Church.

[25] Campano di Novara or Giovanni Campano (1201–1296), Italian mathematician, astronomer and astrologer.

[26] Amerigo Vespucci (1454–1512), explorer, merchant, cartographer. He is considered to be the first European to understand that the lands discovered by Christopher Columbus are part of a new continent, which is why, in the planisphere, published in 1507, Martin Waldseemüller and Mathias Ringmann call the "new world", in his honour, "America".

[27] The Lusitanians were an Indo-European people living in the west of the Iberian Peninsula, prior to its conquest by the Roman Republic and the subsequent incorporation of the territory into the Roman province of Lusitania (most of modern Portugal, Extremadura and a small part of the province of Salamanca).

[28] Publius Vergilius Maro (70 B.C. – 1 B.C.), usually called Virgil, Latin poet, author of epic *Aeneid*.

[29] Philip Cluver or Clüver, Cluvier, Cluverius (1580–1623), German geographer and historian, founder of historical geography. *Introductio in Universam Geographiam* (the first volume was published, posthumously, in 1624) became a textbook of geography, landmark for many generations.

[30] Nicolaus Copernic(1473–1543), astronomer, lawyer, economist, mathematician, physicist, philosopher, priest and Catholic prelate, developed the heliocentric theory of the solar system in *De Revolutionibus Orbium Coelestium*.

[31] Tycho Brahe (1564–1601), Danish astronomer and mathematician, particularly rigorous in all his measurements.

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