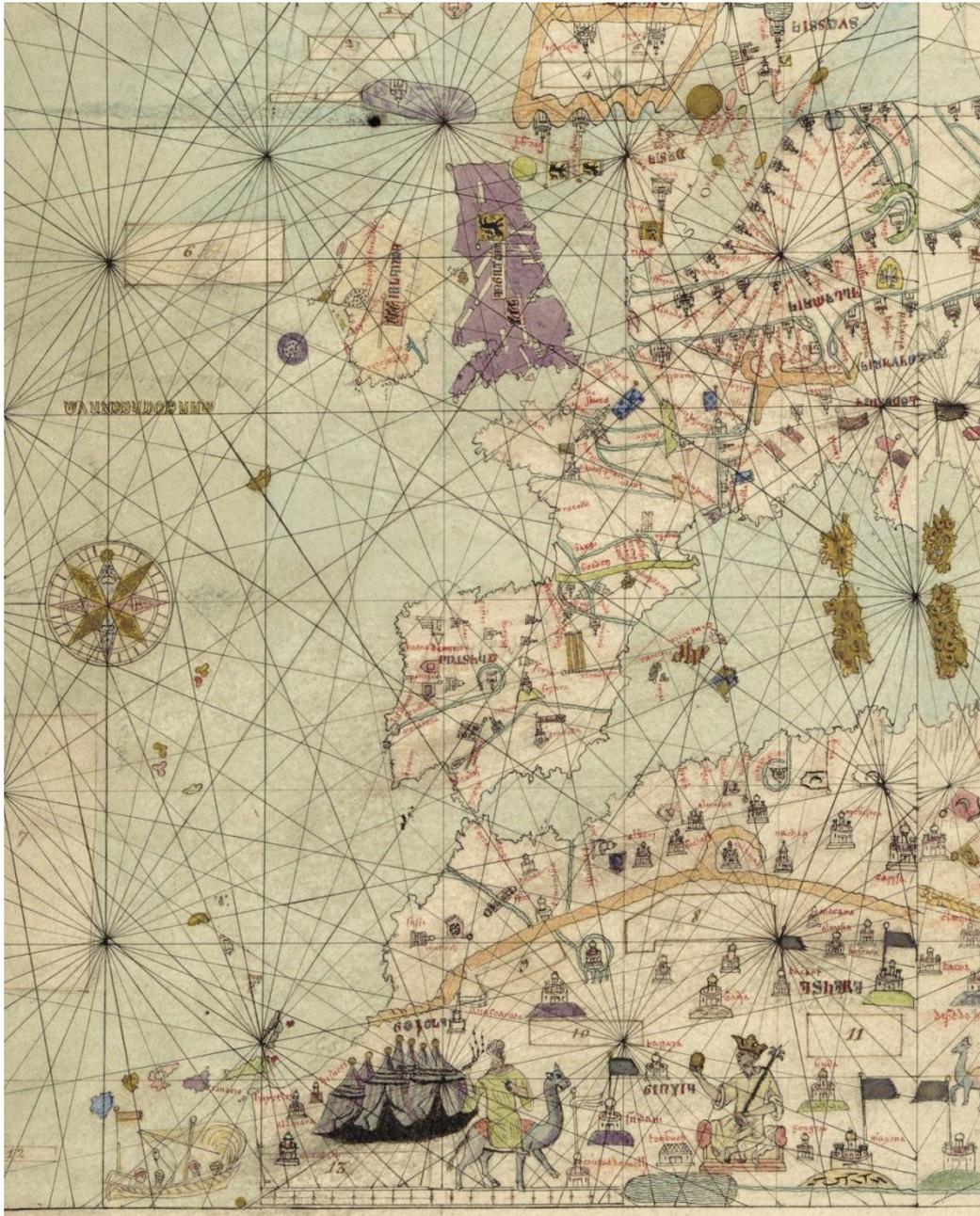


**CENTRO INTERUNIVERSITÁRIO DE HISTÓRIA
DAS CIÊNCIAS E DA TECNOLOGIA (CIUHCT)**

UNIVERSITY OF LISBON

**FIRST INTERNATIONAL WORKSHOP
ON THE ORIGIN AND EVOLUTION OF PORTOLAN CHARTS**



MUSEU DE MARINHA (NAVY MUSEUM)

PRAÇA DO IMPÉRIO – LISBOA

6-7 JUNE 2016

Organization

Centro Interuniversitário de História das Ciências e da Tecnologia: <http://ciuhct.org/en>
Museu de Marinha (Navy Museum): <http://ccm.marinha.pt/pt/museu>

Scientific Committee

Evangelos Livieratos | Joaquim Alves Gaspar | Piero Falchetta | Tony Campbell

Organizing Committee

Joaquim Alves Gaspar: alvesgaspar@netcabo.pt
Tony Campbell: tony@tonycampbell.info
Evangelos Livieratos: livier@topo.auth.gr



FIRST INTERNATIONAL WORKSHOP
ON THE ORIGIN AND EVOLUTION OF PORTOLAN CHARTS

PROGRAMME

6 JUNE | MONDAY

09.00 – 09.30 **Registration**

SESSION 1 09.30 – 11.00

Chair: Joaquim Alves Gaspar

09.30 – 09.50 **Welcome**

09.50 – 10.45 **Opening Talks**

Evangelos Livieratos | *ICA Commission "Cartographic Heritage into the Digital": tasks, tools and working methods*

Tony Campbell | *Recent research: evidence from the texts and charts themselves*

Joaquim Alves Gaspar | *Some historiographical notes on the origin of portolan charts*

10.45 – 11.00 Discussion

11.00 – 11.30 **Coffee break**

SESSION 2 11.30 – 13.00

Chair: Ramon Pujades

11:30 – 12.00 Dmitri Shcheglov | *Ptolemy's map and ancient background of the portolan charts*

12.00 – 12.30 Stefan Schröder | *The Islamic hypothesis revisited: transcultural knowledge and late medieval portolan charts*

12.30 – 13.00 Chet Van Duzer | *Misplaced islands and the meridian of water: an unsuspected case of Islamic influence on nautical charts*

13.00 – 14.30 **Lunch break**

SESSION 3 14.30 – 16.00

- Chair:** Chet Van Duzer
- 14.30 – 15.00 Harald Gropp | *Portolan maps and mappae mundi from Llull to Martellus*
- 15.00 – 15.30 Ramon Pujades | *Genoa and the birth of medieval nautical cartography: the basic features of an exported pattern*
- 15.30 – 16.00 Gregory McIntosh | *After the compass and before the chart: considerations on the origin of the portolan chart*
- 16.00 – 16.30 **Coffee break**

SESSION 4 16.30 – 18.00

- Chair:** Catherine Hofmann
- 16.30 – 17.00 Emmanuelle Vagnon | *Cultural and commercial use of portolan charts: old debate, new evidence*
- 17.00 – 17.30 Gregory McIntosh and Dick Pfloderer | *Proposal for genetic testing of medieval and Renaissance manuscript map parchments*
- 17.30 – 18.00 Corradino Astengo | *Manual of instructions not included*
- 20.00 – 23.00 **Workshop dinner**

7 JUNE | THUESDAY

SESSION 5 09.00 – 10.30

- Chair:** Corradino Astengo
- 09.00 – 09.30 Juan O. Hernández | *Name 'deturpatio' in portolan charts during Atlantic expansion*
- 09.30 – 10.00 Krisztina Irás | *Central Europe on portolan charts*
- 10.00 – 10.30 Jacques Mille | *The French coasts of the Mediterranean Sea on portolan charts*
- 10.30 – 11.00 **Coffee break**

SESSION 6 11.00 – 12.30

Chair: Evangelos Livieratos

11.00 – 11.30 Roel Nicolai | *Geodetic and methodological aspects of the research into the origin of portolan charts*

11.30 – 12.00 Catherine Hofmann, Nathalie Buisson and Pascale Richardin | *Is the Carta Pisana still the oldest known marine chart? The results of laboratory analysis and of radiocarbon dating*

12.00 – 12.30 Tony Campbell | *What do we know historically about the origin of the portolan chart; how can we best fill in the gaps?*

12.30 – 14.00 **Lunch break**

SESSION 7 14.00 – 15.30

Chair: Emmanuelle Vagnon

14.00 – 14.30 Richard Pfloderer | *Portolan charts of the Mediterranean Sea: localized variation in indicated bearings between points*

14.30 – 15.00 Kevin Sheehan | *Construction and reconstruction: investigating how portolan maps were manufactured through experimental reproduction*

15.00 – 15.30 Joaquim Alves Gaspar | *Cartometric and modelling techniques in the study of portolan charts*

15.30 – 16.00 **Coffee break**

SESSION 8 16.00 – 17.30

Chair: Tony Campbell

16.00 – 16.15 Richard Pfloderer | *Comprehensive census of portolan charts: late 13th century to mid-18th century* (short paper)

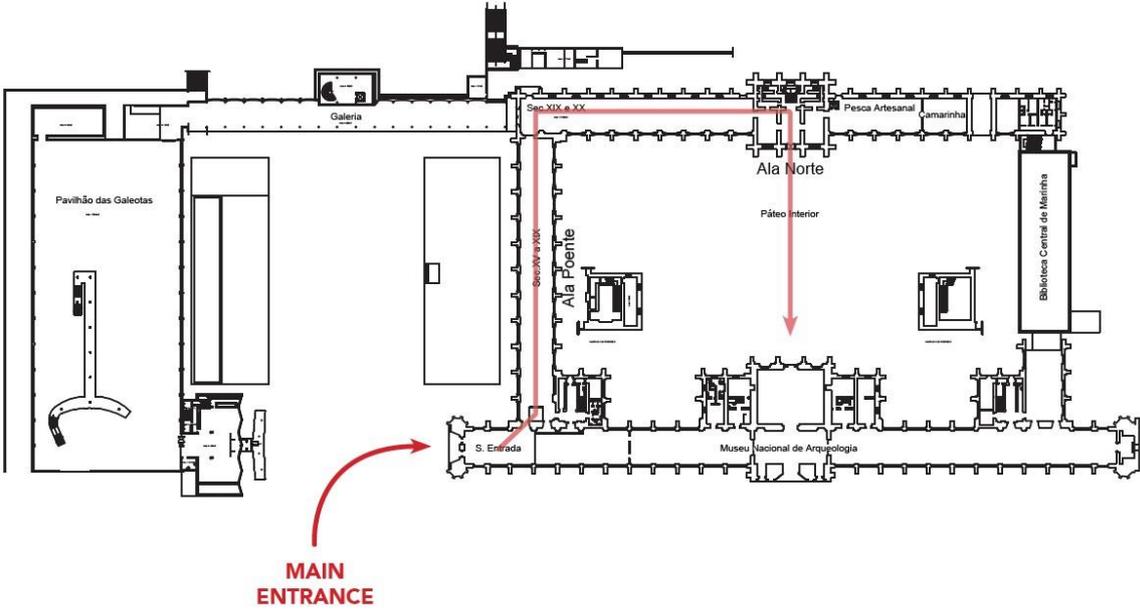
16.15 – 17.30 **Round table discussion**

Evangelos Livieratos | *Analyzing the geometric content of old maps: smooth operational approaches and the Digital Humanities perspective*

17.30 – 18.00 **Closure**

On The Origin and Evolution of Portolan Charts

Directions to the Workshop Venue (Navy Museum)



Catherine Hofmann, Nathalie Buisson

Bibliothèque nationale de France – France

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Pascale Richardin

Centre de Recherche et de Restauration des Musées de France – France

Is the *Carta Pisana* still the oldest known marine chart? The results of laboratory analysis and of radiocarbon dating

The *Carta Pisana*, so called because it was acquired by the Bibliothèque Nationale in 1839 from a family old-established in Pisa, is neither dated nor signed. Since Edme-François Jomard first described it to the scientific community various dates have been proposed ranging from the 12th century to the end of the 14th century. In the early 1980s the consensus of opinion, based on certain archaisms and the restrained toponymy offered, was that the chart dated from the late 13th century, and pre-dated the Venetian production of P. Vesconte. As such it was the oldest marine chart known to be preserved. This consensus, already shaken in 2001 by Patrick Gautier Dalché, was shattered at the Paris conference of 3 December 2012. There Ramon Pujades, on the basis of an analysis at once palæographic, toponymic and philological, proposed an original theory concerning the date, and a complete reinterpretation of the place of the chart in the geo-chronological sequence of medieval marine charts proposed by Tony Campbell in 1986. The *carta pisana*, together with the Cortona chart and the recently discovered Lucca chart, should be part of a group of charts displaying mixed influences produced in central Italy at the beginning of the 15th century. This new hypothesis failing to produce unanimity among specialists, the Bibliothèque Nationale decided to carry out different investigations: on the parchment on which the map is drawn, the ink and the pigments employed, so as to confirm or invalidate the date traditionally ascribed. Samples of the parchment were taken and sent to the Centre de Recherche et de Restauration des Musées de France radiocarbon dating. Other samples: green and red inks were provided to the laboratory of the Bibliothèque Nationale for investigation by scanning electron microscope and X-ray fluorescence analysis. These analyses allowed knowledge of the nature of the inks used to be deepened, and verified the coherence of the chart in terms of the date found from the radiocarbon investigation.

Curriculum vitae

Catherine Hofmann is an archivist-palaeographer and map curator in Map department of the Bibliothèque nationale de France (BNF) since 1993. A board member of *Imago Mundi* journal, she is also the secretary of 'history commission' of the Comité français de cartographie (French Committee of cartography) since 2007. She has published a dozen scientific articles on the history of cartography of the modern time. Joint organiser of the exhibition, 'L'Age d'or des cartes marines : quand l'Europe découvrait le monde' and co-editor of the catalogue of the same name, she edited with E. Vagnon the proceedings of the BNF's Portulan charts symposium (3th of December 2012) : 'Cartes Marines : d'une technique à une culture', *Cartes & Géomatique*, June 2013 (n° 216). She has headed also *Artistes de la carte, de la Renaissance au XXe siècle* (Edition Autrement, 2012), and with Hélène Richard *Les globes de Louis XIV: étude artistique, historique et matérielle* (BnF, 2012).

Chet Van Duzer

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Misplaced Islands and the meridian of water: an unsuspected case of Islamic influence on nautical charts



In this paper I will discuss several charts ranging in date from 1375 to about 1470 that show an island well down the western coast of Africa that is sometimes called Gades, that is, Cádiz. This island is located west of the mouth of the River of Gold, a western branch of the Nile. These charts are: 1. The Catalan Atlas of 1375 (BnF MS Espagnol 30); 2. The 1413 chart by Mecia de Viladestes (BnF Rés. Ge AA 566); 3. An anonymous chart of c. 1420 (Florence, BNCF Portolano 16); 4. Andrea Bianco's chart of 1448 (Milan, Biblioteca Ambrosiana, F. 260 inf. N. 1); 5. The Catalan Estense map of c. 1460 (Modena, Biblioteca Estense, C. G. A. 1.); and 6. A chart in an undated atlas attributed to Grazioso Benincasa (Milan, Biblioteca Trivulziana, Cod. N 2295, ff. 2v-3r). How did the island of Cádiz, which is just outside the Strait of Gibraltar, migrate so far to the south? I will demonstrate that this island was taken from some Islamic zijes or astronomical compendia composed in Andalusia. These works include a list of the latitudes and longitudes of the principal cities of the world, and some of them use as their prime meridian the so-called Meridian of Water, usually located 17°30' west of Ptolemy's prime meridian. They chose this point, which is 29° west of Toledo, because it is 90° west of the mythical city of Arin, which according to Muslim geographers was in the center of the world. In some of these works, the intersection between the equator and the Meridian of Water is designated "Gades Herculis," a re-appropriation and re-location of Cádiz as the location of the Pillars of Hercules, and thus as the western limit of the world. Recognizing that these zijes were the source of this island on these charts not only reveals an intriguing and heretofore unsuspected influence of Islamic geography, and perhaps cartography, on nautical charts, but it also allows us to show that some makers of nautical charts were engaged with questions of latitude earlier than scholars had perceived. Specifically, the cartographers show a preference for having the southern edge of their charts approximately coincide with the equator.

Curriculum vitae

Chet Van Duzer is a board member of the Lazarus Project at the University of Mississippi, which brings multispectral imaging to cultural institutions around the world. He has published extensively on medieval and Renaissance maps in journals such as *Imago Mundi*, *Terrae Incognitae*, *Word & Image*, and *Viator*. He is the author of *Johann Schöner's Globe of 1515: Transcription and Study*, the first detailed analysis of one of the earliest surviving terrestrial globes that includes the New World; and (with John Hessler) *Seeing the World Anew: The Radical Vision of Martin Waldseemüller's 1507 & 1516 World Maps*. His book *Sea Monsters on Medieval and Renaissance Maps* was published in 2013 by the British Library, and in 2015 the same institution published his book *The World for a King: Pierre Desceliers' Map of 1550*. Brill has just published a book he co-authored with Ilya Dines, *Apocalyptic Cartography: Thematic Maps and the End of the World in a Fifteenth-Century Manuscript*. His current book project is a study of Henricus Martellus's world map of c. 1491 at Yale University based on multispectral imagery.

Corradino Astengo

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Manual of instructions not included



It has been pointed out by several scholars, from J.G. Kohl to R. A. Skelton, that early maps and charts belong to the class of historical documents that has undergone the most extensive losses, especially in Middle Ages and Renaissance. Maps and charts were held in great esteem, but, being considered practical instruments, when overcome by new maps and charts more up-to-date, tended to be discarded and destroyed: that explains why very few have survived and why some important links have disappeared. Moreover for the first two centuries of the diffusion of portolan charts there is a total absence of written sources regarding their making and their use: an original “manual of operating instruction” is missing. Some more information can be found for the two following centuries, from the last decades of fifteenth century to the second half of the seventeenth, a period that has left us a much larger number of portolan charts and atlases as well as some written technical texts, where they are clearly described. With that help it is possible to understand how they could have been used in the daily routine on board of ships. The same sources can offer also some clues regarding the making of portolan charts and their updating through the nearly four centuries of their existence. Of special interest are the attempts made in the later period to correct the traditional rotation of the East-West axis of the Mediterranean, attempts that seem strictly connected with the persistence of their effective use at sea. Therefore we can positively state that the making, the use and the improvement of portolan charts are closely linked together and all point to a Medieval origin. Nevertheless, with this scarcity of evidences it is unwise to go further in drawing precise conclusions. As a matter of fact it can always happen that the discovery of a document or of a chart previously unknown, instead of confirming a generally accepted hypothesis, might upset it, generating more doubts, as we have seen recently with the “Lucca chart”. R.A. Skelton wrote about the map historian: *...if he is prudent will concede the imperfect and provisional nature of the construction he builds on all too slender foundations.*

Curriculum vitae

Corradino Astengo graduated in Law and in Geography in the University of Genova and in Political Sciences in the University of Pavia. He has been full professor of Geography in the DiSAM (Dipartimento di Scienze dell’Antichità, del Medioevo e Geografico-Ambientali) of the University of Genova. He has lectured “History of Geographical Discoveries”, “History of Cartography”, “History of Travel and Tourism” for the degree course in Geographical Sciences. He has been Visiting Professor in the University of California Los Angeles (UCLA), where he has kept a “summer institute” for a selected group of lecturers. In 2003 he has been invited to keep the annual “E.G.R. Taylor Lecture” in the Royal Geographical Society of London. He retired in 2009, but continues to collaborate with the University of Genova. He is author of books and of papers and reviews published in Italian and foreign periodicals. He has contributed the chapter “The chart tradition in the Mediterranean” for volume 3 “Cartography in the European Renaissance” of the multi-volume “The History of Cartography Project”. Among his main research fields we mention the history of medieval and Renaissance cartography, the history of the discovery of the new worlds and the history of medieval pilgrimage.

Dmitry Shcheglov

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Ptolemy's map and ancient background of the portolan charts



From the very beginning it has to be stressed that, judging from all that we know about ancient Greek and Roman geography and navigation, the hypothesis of a pre-medieval origin for portolan charts appears highly implausible. Nevertheless, at least two vital elements of the medieval portolan charts had forerunners in ancient tradition, namely “wind roses” (with 8 or 12 bearings) used for orientation and detailed descriptions of the coasts termed “*peripli*” (literally “sailings around”). The aim of my paper is to examine how these two elements were used for the construction of the only “accurate,” or at least scientifically rigorous, map surviving from antiquity, namely the map of Claudius Ptolemy (ca. 150 CE). As to the “wind roses,” there are many examples of the most important coastal points (caples, harbors, mouths, etc.) on Ptolemy’s map being situated so that a direct line between them crosses the meridian at an angle of 15°, 30°, 45° or 60°. Some of these examples are so telling that they can be best explained as traces of a “wind rose” underlying the layout of Ptolemy’s map. In the second part of the paper, I compare Ptolemy’s map with the distance data from extant Greek *peripli* and find a lot of close coincidences between them. These coincidences imply, on the one hand, that the configuration of the coastline on Ptolemy’s map was much more determined by the information from the Greek *peripli* than it has been assumed until now, and on the other hand, that these *peripli* supposedly used by Ptolemy were more detailed and elaborated than the extant samples of *peripli*. The main point of my paper is that ancient cartography, as exemplified by Ptolemy, proves to be more advanced than usually assumed, but still too rough and imperfect in comparison with the portolan charts to assume a direct evolutionary connection between them. This imperfection excludes the possibility that the portolan charts could have been influenced by ancient cartography directly.

Curriculum vitae

Dr. Dmitry A. Shcheglov is a senior research fellow at the Institute for the History of Science and Technology (Saint Petersburg Branch) of the Russian Academy of Sciences. Ph.D. in History of Science (2006), Ph.D. thesis: *The Development of Ancient Scientific Geography from Hipparchus to Ptolemy*, supervisor Prof. Dr. Alexander V. Podossinov. My current research project is devoted to a complex study of Ptolemy’s map, its origins, and influence. Among the key publications on this subjects are, for example:

- ‘Ptolemy’s System of Seven Climata and Eratosthenes’ Geography’, *Geographia Antiqua* 13 (2004), 21–37;
- ‘Ptolemy’s Latitude of Thule and the Map Projection in the Pre-Ptolemaic Geography,’ *Antike Naturwissenschaft und ihre Rezeption* 17 (2007), 121–151;
- ‘Hipparchus’ Table of Climata and Ptolemy’s Geography’, *Orbis Terrarum* IX (2003–2007), 159–192.

These and other papers are downloadable from: <https://nw.academia.edu/DmitryShcheglov>

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Cultural and commercial use of portolan charts: old debate, new evidence



The use and function of portolan charts during the Middle Ages have been subject of much debate during the past decade. Historians have provided sources, both pointing their utility for marine navigation and their use for cultural purpose in private libraries, for example as educational and memorial tools. Ramon Pujades published a sample of documents, but often shortened and summarized, in his book : Ramon J. Pujades i Bataller, *Les cartes portolanes. La representació medieval d'una mar solcada* (Barcelona, 2007).

In this paper, we propose to study at length, in its archival context, the making and use of a portolan chart ordered by an Italian merchant working for the Datini company in Majorca, Luca del Biondo at the end of the Fourteenth century. This document can be better understood in the light of the new study of the Datini archives made by our colleague Ingrid Houssaye Michienzi. We will compare this document with other unpublished documents, showing the wider use of such portolan charts and atlases in private libraries of Western and Northern Europe.

Curriculum Vitae

Doctor in medieval history, Emmanuelle Vagnon is currently researcher, specialized in maps and representation of space, in the French Center of Scientific Research (CNRS). Between 2000 and 2016 she has been associated researcher at the Bibliothèque Nationale de France, Département des Cartes et Plans. She was co-curator of the map exhibition in Paris, *L'Age d'Or des cartes marines* (2012) and co-edited the catalogue with Catherine Hofmann and Hélène Richard.

She is a member of the History commission of the Comité français de Cartographie (CFC) and trustee of the International Society for the History of the Map (ISHMAP). Her current researches deal with maritime cartography, including charts of the Mediterranean, Indian Ocean and Ottoman Empire.

Main publications

- *Cartographie et représentations de l'Orient méditerranéen en Occident*, Turnhout, Brepols, 2013 (Terrarum Orbis 11).
- [with C. Hofmann] editor of the proceedings of the conference : *Cartes marines : d'une technique à une culture. Actes du colloque du 3 décembre 2012*. Cartes et géomatiques (revue du CFC), 216 (juin 2013).
- Chapter of a book : "La représentation cartographique de l'espace maritime", dans P. Gautier Dalché (dir.), *La Terre. Connaissance, représentations, mesure au Moyen Âge*, Turnhout, Brepols, 2013, p. 443-503.
- [with C. Hofmann and H. Richard], co-editor of *L'Age d'or des cartes marines. Quand l'Europe découvrait le monde*, Paris, Seuil-BNF, 2012. Translated : *The Golden Age of Maritime Maps*, Firefly books, 2013.
- [with I. Houssaye-Michienzi], "Cartographie commerciale et circulations marchandes à Majorque au xv^e siècle", dans F. Richer, S. Patin (éd.), *Centre pluriculturels et circulation des savoirs (xv^e-xxi^e siècles)*, Paris, 2015, p. 27-44.

Analyzing the geometric content of old maps: smooth operational approaches and the Digital Humanities perspective

In a paper appeared ten years ago,¹ was presented the analysis of the *geometric* content of early maps of whatever typology, using operational approaches, of minor sophistication, but concrete and standard in geodetic sense. The analysis was based on the *georeference* and the *best fitting* processes as applied on early maps in digital form and the term geometric was emphatically used to imply distinction from the *thematic* map content. The working examples had taken from the Ptolemaean and the portolan chart legacy elaborated with *smooth* analytical methods, avoiding useless exaggeration, due to the level of requirements of the intrinsic quantitative properties of the geometric content of maps constraining the analysis. Here, some relevant issues are revisited and treated, in view of the developments since then, which may help the better understanding of the map-making practice and its final visualization, as are e.g.: (i) the distinction between the *global* and the *local* components of the mapmaking phases of elaboration and representation; (ii) the difference between the discrete *point positioning* and the linear *shapes* acquired in the field, both placed of common framing; (iii) The difference of the map *geometrics* and *thematic* in the cartographic context; (iv) the properties and impact of textual data given in *portolani* including observed and/or computed numerical geometric values; (v) the fact that the knowledge about the construction of portolan charts is sparse, lacking evidence about the generating sources of production, is asking for available alternative methods that may cure this lack; (vi) the importance of analytical process of old maps in terms of georeference and best fitting seen as tools deserving attention in the discussion on old maps. The contribution's final aspiration is not to give definite answers to open, pending or intriguing questions especially about the origin of the portolan charts, their evolution seemed to be an easier task. It is only an attempt to defragment the conception of the old maps as parametrised by geometry, in view of some fruitless controversies appeared in the field of the analysis of the relevant map content. The need to rethink the good reason and the conditions for coexistence between those dealing with the geometry and those with the history of maps, in view of the rapidly evolving Digital Humanities, is the final pragmatic call of the paper.

Curriculum vitae

Professor emeritus, Aristotle University of Thessaloniki (AUTH). Full professor of higher geodesy and cartography (AUTH, 1979-2015). Graduated in surveying engineering, National Technical University of Athens (NTUA, 1970). Dr Eng. (NTUA, 1974); PhD (Uppsala University, 1976). Docent in geodesy, geophysics and cartography (NTUA, 1978). Research and teaching in Cambridge MA (1971, 1972), Uppsala (1975-1976), Trieste (1977-1982), Munich (1977), Stuttgart (1985), Delft (1985), Bologna (1986), Venice (2009, 2016). Alexander von Humboldt fellow (bis). Chair of the IAG Working group on Differential geometry of the gravity field (1984-1986); IAG Fellow (1991). Since 2006 the chair of the ICA Commission on Cartographic heritage into the digital with fourth mandate to 2019. Founder and editor (2006) of the web quarterly "e-Perimetron". Organiser of the annual conferences on Digital approaches to cartographic heritage, the eleventh in Riga (2016). Founder of the Hellenic cartographic Society (1993) and the Centre for maps and cartographic heritage (1997), now Archives of cartographic heritage (2013) by the General State Archives of Greece. Visiting professor at the University IUAV of Venice (2016) and from 2016 member of the Advisory Board for Geodesy of the Bavarian Academy of Sciences.

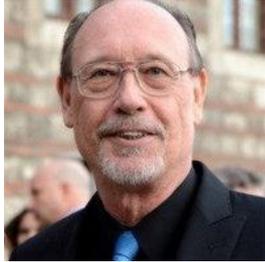
¹ E. Livieratos, *Cartographica*, 41, 2 (2006), 165-175

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After the compass and before the chart: considerations on the origin of the portolan chart



Prior to the introduction of the mariner's magnetic compass, ships sailed to the eight "winds" or directions. In coastal sailing, if the mariner lost his way, he had only to sail in the general direction of land until he espied a familiar landmark. If he was sailing in open water (pelagic sailing) across one of the basins of the Mediterranean and the ship left the intended course by tacking into the wind or because of weather, the mariner could mentally approximate both his position and recovery course using the 45 degrees between each of the eight directions. With the increasing use of the magnetic compass in the 13th century, however, sailors could more confidently sail out of sight of land and sail year-round regardless of cloud cover that obscures the sun and stars. The use of the magnetic compass increased the feasibility and safety of sailing out of sight of land between major ports in the Mediterranean. By the use of the magnetic compass, when a ship left the intended course due to winds or weather, with the greater number of precise sailing directions afforded by the magnetic compass, that is, 16 or 32 directions, the mariner could more accurately plot his actual course sailed against his intended course and, thus, calculate his recovery course. After the introduction of the magnetic compass but before the advent of the portolan chart (and, later, the marteloio), the navigator would have to draw the three sailing courses – intended, actual, recovery – as triangles. Instead of the simple mental "map" of eight triangles with angles of 45 degrees, now there were potentially 16 or 32 triangles with the additional angles of $22\frac{1}{2}$ and $67\frac{1}{2}$ degrees, or $11\frac{1}{4}$, $33\frac{3}{4}$, $56\frac{1}{4}$, and $78\frac{3}{4}$ degrees. The complexity made it difficult to visualize a mental map. The mariner had to draw his triangles. It is suggested that the precursor to the portolan chart was this piece of parchment for drawing the sides of triangles for recovering the course. After numerous pelagic sailings across the basins of the Mediterranean, this framework of repeatedly-drawn lines of pelagic courses and triangles served as the skeleton or backbone of the first chart. The stylistic coastlines of "capes and coves," derived from the portolani books (coastal navigation books), would have subsequently been added to this framework of pelagic courses and triangles to become the first recognizable portolan chart.

Curriculum vitae

Publications: *The Piri Reis Map of 1513* (The University of Georgia Press, 2000).

"The Piri Reis Map of 1513: Art and Literature in the Service of Science." In *Seapower, Technology and Trade: Studies in Turkish Maritime History*, Dejanirah Couto, Feza Gunergin, and Maria Pia Pedani, eds. (Istanbul: Piri Reis University Publications and Denizler Kitabevi, 2014).

"The Piri Reis Map of 1528: A Comparative Study with Other Maps of the Time." *Mediterranea: ricerche storiche* 12 (no. 34, 2015): 303-318.

Conference Presentations: "Some Considerations on the Origin of the Portolan Chart," 56th annual meeting of the Society for the History of Discoveries, University of London, London, 9 July 2015.

"The Medieval Maps of the Levant and the Dawn of Modern Maps," International Association of Maritime Studies, Near East University, Nicosia, Turkish Republic of Northern Cyprus, 13 May 2015.

"The Piri Reis Map of 1513: Art and Literature in the Service of Science," First International Congress of Eurasian Maritime History (Turkish Maritime History), Istanbul, 6 November 2012.

Conference Proceedings: "The Piri Reis Map of 1513 is Important Because...." In *Uluslararası Piri Reis ve Türk Denizcilik Tarihi Sempozyumu: 26-29 Eylül 2013: İstanbul Türk Denizcilik Tarihi Bildiriler*, 6 vols. (Ankara: Türk Tarih Kurumu, 2014).

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Portolan maps and *mappae mundi* from Lull to Martellus

It will be discussed and investigated how in the two centuries between 1300 and 1500 the development of maps and charts was influenced by internal and external factors. On the one hand, the internal influence means the developments within the genre of *mappae mundi* as well as within the genre of portolan charts, and the external influence means the mutual interaction of the two genres. On the other hand, the internal influence is meant to be within a political unity or within the European Christian Mediterranean area while the external influence considers the mutual influences between cultural areas as the Christian region, the Muslim region or even more distant geographical or cultural regions. The considered scholars are, among others, as different as Ramon Llull (ca. 1232– ca. 1316), Pietro Vesconte, worked in Venezia (1310 –1330), Nicolaus Cusanus (1401–1464), Paolo dal Pozzo Toscanelli (1397–1482), and Henricus Martellus Germanus, worked in Firenze (1480 -1500). Finally, the origin problem and its historiographic evolution will be related to the above discussion on the external vs. internal aspects. As the mathematical background of cartographical development the theory of graphs will be related to the above issues, again from an internal and from an external point of view. The internal relation between maps or charts and graphs is described by interpreting this development from the point of view of modern graph theory. The external relation enables us to discuss this development by using graphs as visual and logic tools for a better understanding and a more precise description of the concerned influences.

Curriculum vitae

The author has worked in mathematics and in the history of mathematics and astronomy also touching neighbouring areas such as cultural history in general. In mathematics, the main focus is on combinatorics, finite geometry, graph theory, and operations research. Graphs are mathematical structures consisting of vertices and edges joining the vertices and describing relations. The best example of a graph in the field of cartography is probably the Tabula Peutingeriana. Graph theory was already developed in the 19th century and is much better established than the so-called network theory, its weaker counterpart in many sciences. Historically, the work of Ramon Llull is related to graph theory. Via Kircher, Leibniz, and Euler combinatorics developed into the 18th century and prepared the development of graph theory as such. Concerning the evolution of the four mathematical sciences of the quadrivium it was astronomy and geometry which were closely related to geography and cartography, even before the times of Ptolemy.

Apart from the above described background the author has always been deeply interested in the history of discoveries and the cultural relations of different civilizations in history such as pre-Columbian America or the Celts.

Jacques Mille

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The French coasts of the Mediterranean Sea on portolan charts



Within the context of research on the cartography of Provençal coasts, I developed a keen interest in portolan charts, particularly the oldest, and then was led to write a paper on the mapping of the coasts of Languedoc and Provence from data provided by portolan charts. The current study is conducted, from the reputedly oldest portolan charts to those of the end of 15th century, or even beyond, from the drawing of the coasts and on the toponymy, regardless of any other type of analysis. From the first results of this study it appears: 1/ that clarifications, additions and/or corrections can be made as to the correspondence of toponyms written on portolan charts and the modern place names (using Campbell's Excel list); 2/ that on the sole basis of the delineation of the coasts, their orientation and the islands (not listed by Campbell) it appears that the map of Cortona could be older than the Pisane's map; 3/ that the map of Vesconte (1313), which is very accurate for the drawing of the coasts of Languedoc and Provence, may well be the prototype of a school (in particular for the representation of the "étangs" of the Bas Languedoc, the Rhône Delta and the drawing "in a bottle" of the access to Narbonne) which appears on all later portolan charts until 16th century, with enrichment of toponyms (including the islands) but without improvement of the coast-line, which sometimes even regresses by simplification; 4/ that the Pisane's map cannot be a late copy, as it is sometimes said, and must be therefore considered as "late 13th- early 14th century" and in any case prior to the map of Vesconte (1313), regardless of its reported position relative to the map of Cortona, and other arguments; 5/ that quite all the toponyms on the first portolan charts, up to the Beccari's one of 1403, are listed (with some exceptions) in the Liber and/or the Compasso. In the end it should be noted that these conclusions and unearthed details, if they are only valid for this small part the Mediterranean's coasts, may nevertheless contribute to the discussion of the sequence of development of portolan charts. So it is hoped that these conclusions encourage studies of the same type on other sections of coasts or analyses conducted by other routes that might invalidate or confirm them.

Curriculum vitae

Agrégé de l'Université (Géographie), now retired. Collector of old maps of Provence, Alps, France and, secondarily, rest of the World.

Publications:

- *Les Hautes-Alpes. Cartes géographiques anciennes (XV^e – mi XIX^e siècle)*. Nota Bene, 2011 (with André Chatelon).
- *Le Dauphiné. Une représentation des territoires à partir des cartes géographiques anciennes*. Naturalia, 2013.
- *Les calanques et massifs voisins. Histoire d'une cartographie. 1290- XX^e siècle*. Naturalia, 2015.
- 'Contribution en vue d'une chronologie des travaux de Jean de Beins, Ingénieur-Géographe du Roi en Dauphiné au début du XVII^e siècle'. *Bulletin de la Société d'études des Hautes-Alpes*, 121-155.

Off-prints from various conferences on the representation on old maps of: 1) The mountains in Dauphiné; 2) The city of Gap; 3) Capbreton and surroundings.

On the occasion of my research on the cartography of the Calanques (from Marseilles to La Ciotat), prompted in the study on portolan charts and the extension of my research to the entire French Mediterranean coasts of France

Cartometric and modelling techniques in the study of portolan charts



Cartometry is the field of Cartography dealing with measurements and calculations of numerical values from maps. These operations traditionally consist in the calculation of distances, areas, directions and number of objects, as well as various other derived quantities. When applied to the study of old charts most cartometric techniques require that a previous correspondence with the known physical world is first established. This is accomplished by *georeferencing*, which consists in assigning a geographic coordinate system to the chart, on the basis of a sample of control points of known latitudes and longitudes, positively identified both in the old chart and a modern representation. Once a chart is georeferenced it becomes easy to estimate its implicit mesh of meridians and parallels. The visual inspection of this mesh is a simple yet extremely powerful way of quantitatively assessing the main geometric features of a chart, such as local distortions, spatial variations of scale or the overall effect of magnetic declination. Another powerful technique made possible by georeferencing is the assessment of planimetric accuracy. Although portolan charts were not constructed on the basis of any explicit map projection, comparing the apparent latitudes and longitudes on a chart with the ones in some reference model may reveal important details not easily perceivable otherwise. An important point to stress is that cartometric techniques are exclusively intended to retrieve the information already extant in the charts. No previous assumptions are required and no new data are produced, other than the one resulting from interpolation. That is not the case of *numerical modelling*, where simulations of the geometry of old charts are made on the basis of a number of assumptions and data related to their construction: cartographic techniques, navigational information, magnetic declination, etc. This is no different from the numerical models used to simulate physical phenomena (e.g. in the atmosphere or ocean), where the core of the model typically consists of a set of equations allegedly capable of reproducing their behaviour. Typically a model incorporates various parameters which can be adjusted (tuned) in order to produce results matching as closely as possible the phenomenon being simulated. That is also the case of the models used to simulate the geometry of old charts. Being able to simulate the main geometric features of the old charts using this methodology is a giant step towards actually understanding how they were made and evolved over time.

Curriculum vitae

Joaquim Alves Gaspar is a Captain of the Portuguese Navy (retired), and a specialist in navigation, hydrographic surveying and mathematical cartography. He works presently as a postdoctoral researcher with the Centre for the History of Science and Technology, University of Lisbon. His main research interests are the History of Cartography and Navigation, mostly focused on the cartometric analysis and numerical modelling of medieval and early modern nautical charts. He has published two books on theoretical cartography (*Cartas e Projecções Cartográficas* and *Dicionário de Ciências Cartográficas*) and several articles in international peer reviewed journals. In two of his most recent works, in co-authorship with Henrique Leitão, a century-old historical enigma was solved: 'Squaring the Circle: How Mercator Constructed His Projection in 1569' (*Imago Mundi*, 66, 1, 2013) and 'Globes, Rhumb-Tables and the Pre-History of the Mercator Projection' (*Imago Mundi*, 66, 2, 2014). Other published papers focus on the origin of portolan charts ('Dead reckoning and magnetic declination: unveiling the mystery of portolan charts', *e-Perimetron*, 3, 4, 2008), the Cantino planisphere ('Errors, Blunders and Entanglements: Scrutinizing the Cantino Planisphere with a Cartometric Eye', *Imago Mundi*, 64, 2, 2012) and the early cartography of the Caribbean Sea ('The Representation of the West Indies in Early Iberian Cartography: A Cartometric Approach', *Terrae Incognitae*, 47, 1, 2015).

Name *deturpatio* in portolan charts during Atlantic expansion



Most of the conserved maps are copies of the lost originals. This is the reason for which they are not completely trustworthy and must be read critically. In the Middle Ages there was no typography and manual orthography was unstable in every language. In the badly lit workshops and studios the editing of the toponymy was neglected due to its minute size: it was a source of constant reading and writing errors known as ‘deturpations’ [latin *deturpāre* “deform”]. These deformations are automatically repeated, but they are not chance based. The miniaturist deliberately used the deturpation as a method to assign new names as of the ones he was copying, so that they were not too different from the original. Most of the names of the Atlantic islands can be explained by the orthographical bad habits when making the copies of these maps. The names have not emerged from the data obtained by sailors’ observations, but from the speculative readings which could not be verified due to the distance and insularity. The evolution of the deturpation which gives origin to those names is the most surprising example of the unstable character of the knowledge and graphic representation of the Atlantic islands during the obscure second half of the XIV century. In this paper our purpose is to display a complete and correct reading of these deturpations through deconstruction and decoding, uncovering the real origin, meaning and method employed by miniaturists/cartographers to generate new names. Since some names evolve from previous ones, this advance in the knowledge of portolan charts may have consequences to fix the date of creation of the original ones and its copies. Some surprises have emerged, not only for the history of the Canaries, Azores and Madeira islands, but also for the islands of the North Atlantic, probably source of Southern nesonymy.

Curriculum vitae

Juan Octavio Hernández Cabrera, born in Gran Canaria in 1968, is associate professor in La Laguna University, Tenerife (Canary Islands). He is also Director of the Salón Geográfico de Canarias (SGC), devoted to ancient geography and history of the concept and discovery of the Macaronesia. His research is aimed at developing a paleographic approach to the myth of Blessed/Fortunate Islands in cartography, focusing the concept on word ‘deturpation’. His achievements will be presented for the first time in the First International Workshop On the Origin and Evolution of Portolan Charts.

Kevin Sheehan

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Construction and reconstruction: investigating how portolan maps were manufactured through experimental reproduction



To date, there has been no publication concerning how early manuscript maps were produced using practical evidence: Lanman's monograph 'On the Origin of Portolan Charts' (1987) investigated how the maps might have been compiled from spatial data but did not attempt a reconstruction using contemporaneous materials; Carhart's 2004 article 'How Long Did It Take to Engrave an Early Modern Map?' only theorised the process of early copperplate engraving, with conclusions based on a single experiment conducted without any prior cartographic or artistic experience. This paper will discuss the different methods by which portolan maps may have been produced, the time and cost of their production, and if and how copying led to degradation in their hydrography, as outlined below.

To begin, this paper will explicate six possible copying processes that might have been used by early cartographers to make maps; methods that were discussed in the 1545 manual *Arte de Navegar* by Martín Cortés, and 1602 manual *Nautica Mediterranea* by Bartolomeo Crescentio. Second, I will discuss my scientific testing of two of these methods using period materials in an archaeological reconstruction. The first was a technique Cortés explained, known as *trasflorar*, by which a map-maker would use transparent linen paper and smoked transfer paper to copy the geography from one map to another. The second was a technique Crescentio discussed, in which a frame was used to hold an exemplar map and copy together, backlit by the sun, in order for the littoral to be traced.

The results indicated that making manuscript maps was a considerable investment in time, and importantly, that the methods of copying caused a retrogression and simplification of the coastline over time. I will consider the implications this new practical evidence of manuscript map production has on our understanding of the overall function of portolan maps.

Curriculum vitae

Kevin Sheehan completed his doctorate at the University of Durham in 2014. His PhD investigated portolan charts from the thirteenth through sixteenth centuries, and argued that they were not used specifically for navigation on board ships as commonly thought, but embodied a number of other purposes, including to plan voyages and acquire insurance, for education and administration, and as works of art owned by wealthy elites. Kevin Sheehan won the Washington Map Society's Walter W. Ristow Essay Prize in 2011, and his paper was subsequently published in their journal *The Portolan*. He has given a number of conference papers at Durham and further afield. Most recently Kevin gave a seminar for the Maps and Society Lectures at the Warburg Institute in February 2016, and will be attending Leeds IMC in July 2016.

Krisztina Irás

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Central Europe on portolan charts



As the majority of portolan charts and portolan style atlases were used in navigation, their geographic content is generally limited to coast lines and sea ports. But a group of portolan (style) charts also provides inland features showing rivers, towns and some important data of European kingdoms. The number of these items varies and a slight difference in content is also recognizable but it is clearly seen that Central Europe received remarkable emphasis on these charts. As these pieces were presumably used by sovereigns and rich merchants in decision making, rivers and towns (classified, in some cases)

indicate possible trade routes from the Mediterranean (e.g. from Venice) to the central and Northern markets of the continent. Angelino Dalorto's charts (one known as of Dulcert, prepared in 1325/30 and 1339), are among the earliest known pieces of the kind. They give a relatively detailed representation, among others, of the Hungarian Kingdom of the period. They record dozens of geographical names (mainly towns, rivers and islands) of the Carpathian Basin, so these two charts provide an original, 14th century representation of Hungary. Rivers, an unusual feature type on portolan charts, give a picture of the potential waterways. A detailed comparison of charts' inland toponymy reveals dramatic reduction of information about the country and the region that started in the beginning of the 15th century. This change was presumably caused by wars around the Hungarian Kingdom, especially by the sweeps of the Ottoman troops that blocked economic activities and traffic in the region. Some of the charts examined in this paper are "Cortona" chart, the chart of Mecia de Viladestes (both early 14th century), works by Angelino Dalorto (14th century), an anonymous chart (early 14th century), Atlas Catalan (c. 1375), an anonymous chart attributed to Battista Agnese (mid. 16th century), Petrus Roselli (1468), Diogo Homem, Fernão Vaz Dourado (mid. 16th century).

Curriculum vitae

Krisztina Irás (PhD) is an assistant professor at the Department of Cartography and Geoinformatics of Eötvös Loránd University, Budapest. She made her research on cartographic analysis of portolan charts, determination of projections, inland content and sources. She identified the author of anonymous chart Cod. Lat. Mediaevi no. 353. (in National Széchényi Library, Budapest, Hungary) as Battista Agnese. She presented four posters on this topic in International Conferences on History of Cartography (ICHC, 2003, 2005, 2007, 2009).

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Ramon Pujades

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Genoa and the birth of medieval nautical cartography: the basic features of an exported pattern



Geographic knowledge as reflected in medieval nautical charts is most certainly the result of the contributions of Mediterranean culture as a whole over the course of centuries. Nonetheless, evidence indicates that the task of compiling the necessary information and its subsequent technical transfer into the graphic format of a map was not pan-Mediterranean at all. Systematic analysis and comparison of the surviving works reveals a striking fact: despite the differences that can be ascribed to the manual reproduction technique of the time, the common basis of all extant works is flagrantly homogenous, insofar as both the cartographic design and the toponym content, independently of the partial updates and corrections that were progressively added. The constant, generalised repetition of certain conventional representations (particularly those unrelated to the true geographic shape of an area) and the unaltered reproduction of errors and incoherencies make the theory of a disperse origin entirely improbable. This study presents the methodology and results of a long and complex analysis attempting to distinguish the original genetic features of the mutations progressively added in the various known centres of production. Naturally, the basis of the exercise requires previous attribution of the numerous anonymous works to their respective centres of production; a task which, without the elements contributed by palaeography and philology, can be extremely risky. As the title indicates, the results of this analysis point directly to Genoa as the epicentre, both insofar as the portolan cartographic patterns themselves and the serial reproduction technique developed by professional artisans in ateliers specialising in their reproduction and marketing. This latter aspect mustn't be neglected if we are to understand why portolan charts became a relatively cheap, socially widespread and technically homogenous product in the 14th century.

Curriculum Vitae

Ramon J. Pujades i Bataller was born in Valencia (Spain) in 1972. He is currently the Research Manager of the Museum of History of Barcelona (MUHBA). Previously he was the Head of the Royal Heritage Section of the Crown of Aragon Archives (Barcelona). He has been a member of the Professional Association of State Archivists, Librarians and Archaeologists of Spain since 2001, and has served as Associate Professor in the Department of Ancient History and Written Culture at the University of Valencia and Senior Researcher at the Inter-University Institute of Valencian Philology. Among many other studies on the matter, he is the author of *Les cartes portolanes: la representació medieval d'una mar solcada / Portolan Charts: The Medieval Representation of a Ploughed Sea* (2007, Catalan-English bilingual edition with visual catalogue) and *La carta de Gabriel de Vallseca de 1439 / Gabriel de Vallseca's 1439 Chart* (2009, Catalan-Spanish-English multilingual edition).

Richard Pflederer

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Portolan charts of the Mediterranean Sea: localized variation in indicated bearings between points



The skewing (versus true compass directions) of manuscript sea charts of the Med Sea has been commented on by numerous scholars. The traditional manner of reporting this angular discrepancy is by noting that the true direction of the 36th parallel which passes near to Tarifa in Spain and just to the north of Cyprus is rotated about 9 degrees counterclockwise from East-West rhumb lines of most charts drawn prior to the mid-16th century. The cause of this skewing is assumed to be related to unrecognized magnetic declination in the Med Sea, and in fact some paleomagnetic analyses suggests a figure of about 9 degrees for declination at the Italian peninsula in the year 1300. However, this macro analysis across a distance of more than 2700 kilometers masks the widely divergent angular discrepancies from true bearings that exist on a more localized basis. The methodology of this study involves precise measurement of bearings and distances between pairs of points on several early charts and comparing them to true bearings and distances. As an additional point of reference, distances and bearings for the same pairs of points are extracted from *Lo compasso de navigare*. Geographic / geometric differences between *Lo compasso* and these same early charts are explored. This analysis offers insights on the congruence of the data sets used in the *Lo compasso* relative to the earliest charts.

Curriculum Vitae

Dick Pflederer began his study of portolan charts in the year 2000 when he was invited to produce a detailed digital catalogue of the collection of the British Library. In the years that followed he has completed detailed catalogues of six other important collections, including NMM (Greenwich), Bodleian Library (Oxford), Huntington Library (California), Library of Congress (Washington), the Newberry Library (Chicago) and Archivio di Stato (Florence). In addition, he has extensively studied charts in the collections several other institutions in Italy and France. He has also assembled and published a detailed census of all known portolan charts, including as many in private hands as are known (2009). His book *Finding their Way at Sea* (HES & DE GRAAF 2013) is a heavily illustrated work intended to introduce the subject to a general audience. His work with the charts, which he prefers to call manuscript sea charts, has expanded to cover broader issues in the history of navigational practice in the medieval and renaissance periods. He is a graduate of Northwestern University (Illinois) and has completed programs at Columbia University (New York) and the Thunderbird School of Global Management (Arizona). He is the founder of the Williamsburg (VA) Map Circle and a member of the Steering Committee of the Phillips Society of the Library of Congress and a Fellow of the Royal Geographical Society. He and his wife, Sue, share their time between Williamsburg and Montepulciano in Tuscany.

Roel Nicolai

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Geodetic and methodological aspects of the research into the origin of portolan charts



One of most challenging research elements of medieval Mediterranean portolan charts is the matter of their elusive origin. This does not concern the origin of the surviving physical charts, but the origin of their geometrical information content, consisting primarily of the coastal outlines. Particularly challenging are the charts' evident accuracy and their good agreement with a Mercator(-like) map projection. Key questions are how these charts were constructed and on the basis of what measurement data. While questions regarding the medieval usage of the charts, the economic aspects of chart construction and

their fabrication process clearly fall in the domain of the historian, those concerning the construction technique, accuracy and correspondence with a map projection have a very considerable geodetic component. It is my contention that geodetic aspects have not been given sufficient attention in the research into the origin of portolan charts. The almost complete absence of historical evidence regarding the charts' origin requires the researcher to tread carefully and pay adequate attention to the methodological aspects of his or her research. Geodetic analysis enables the testing of hypotheses related to the geodetic aspects of portolan charts (construction, accuracy and map projection) with more scientific rigour than would be achievable without such techniques. The key questions regarding the origin of the charts can, in my opinion, only be answered with some hope of success by a fruitful synthesis of history, geodesy and cartography. Researchers from the humanities are faced with a particular challenge to get an adequate understanding of geodetic, mathematical and statistical analysis techniques, in order to be able to understand the results such techniques may yield. Part of this challenge is to understand the importance of the selection of the right method or tool. I will illustrate these issues with the choices I made in my research, which resulted in the surprising and, for the (map-) historical community, unorthodox conclusion that portolan charts are not primitive medieval charts, but instead sophisticated, geodetically-constructed cartographic products.

Curriculum vitae

Roel Nicolai obtained an MSc degree in geodesy at Delft Technical University in The Netherlands in 1978. After graduating he served as a conscript junior officer at the Hydrographic Service of the Royal Netherlands Navy, establishing a unified coordinate system in the Dutch economic sector of the North Sea for use in oil and gas industry activities. In 1984 he joined Shell, where he has worked since in a variety of roles and locations. During his first assignment in Oman he introduced the application of new hi-tech geodetic techniques and initiated and supervised the analysis and strengthening of the national geodetic control network. In 2007 he was awarded honorary membership for life of the European Association of Geoscience Engineers for his contributions to the oil and gas industry in the field of geodesy. Since 2006 he is Shell's Principal Geodesist, setting and maintaining geodetic standards in Shell's global upstream business work practices. He began studying the origin of portolan charts in 2003 and obtained a PhD degree for his work on this subject at the University of Utrecht in 2014. In the same year he was awarded the Professor J. M. Tienstra Research Prize for geodesy and geo-information in recognition for his geodetically-inspired work on portolan charts.

Stefan Schröder

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The Islamic hypothesis revisited: transcultural knowledge and late medieval portolan charts



There seems to be no medieval source whose point of origin, ways of producing and functions are more controversial discussed in research than Portolan charts. The reason for the ongoing debate is the lack of sources that could help to clarify inter alia the role of the compass, the availability of projection techniques as well as methods to track thousands of miles of coastlines. The lack of evidence leads sometimes even to diametrical opinions on the question of an Ancient or Medieval origin.

In this context some researchers have pointed to Islamic sciences either as a possible link between Ancient and Medieval knowledge or to promote the idea of a purely Islamic origin. The arguments are based inter alia on the highly advanced theoretical knowledge in Islamic Astronomy and Mathematical Geography, on the Arabic translation of Ptolemy's *Geographica* in the 9th century and on the existence of Portolan Charts with Arabic names. The responses in research have been rather skeptical and only recently has the hybrid character of these charts been taken into account more thoroughly. Yet a full examination of the impact and influence of Islamic knowledge that is also based for example on the newly discovered cartographic representations in the Book of Curiosity is still missing. Moreover, questions of why producers of Portolan charts should have relied on Islamic knowledge and how they adapted this knowledge to Latin spatial conceptions needs to be discussed more in depth.

Based on an analysis of Islamic maps and early Portolan Charts I will examine critically the hypothesis of an Islamic origin. Firstly, I argue that apart of some very minor parallels there is no indication that early European mapmakers derived their knowledge to construct a Portolan Chart from Islamic sciences. However, this does not mean that there is no transcultural knowledge visible at all. Rather there are clear signs that that at some point graphical elements from an 'Idrīsian map' and further Islamic sources were included. I will secondly study the reception and transformation of selected details (Atlas, Western Nile with Mountains of the Moon) within the context of the economic and diplomatic exchange between Europe and North Africa. Discussing the possible functions of the Islamic elements in Portolan Charts I will finally show that Islamic knowledge was used to show erudition and to promote images of a resource-rich Africa that is worth to explore and exploit.

Curriculum vitae

Stefan Schröder holds a PhD in Medieval History from the University of Kassel, Germany. He has worked as a postdoctoral researcher and lecturer at the Universities of Kassel (2007-2011), Erlangen-Nuremberg (2011-2012) and Helsinki, Finland (since 2012). He has published a book on 'Otherness' in late medieval pilgrimage reports to the Holy Land and written several related articles e. g. on medieval travelling or on images of Islam and Judaism. In a forthcoming book he examines the exchange of geographical and cartographical knowledge in medieval Islamic and Latin-Christian maps from the 12th to the 15th century, in which one main chapter is dedicated to Portolan charts. He has further published articles on cultural transfer related to climate maps, on theoretical questions regarding the relation of knowledge and power in maps as well as on the changing spatial concepts in maps of Iberian provenience. He has presented his results on several international conferences including the ICHC of Copenhagen, Helsinki and Antwerp.

Tony Campbell

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What do we know historically about the origin of the portolan chart; how can we best fill in the gaps?



Lacking any direct evidence, the sources for the birth of the portolan chart must be indirect. The earliest surviving portolani, the 'Liber' and 'Lo compasso', may be roughly contemporary with the prototype charts, but they evidently have different origins, both from each other and from the oldest extant charts. Those, in turn, are useful as a springboard for extrapolating backwards on the basis of the steady developments that can be seen up to about 1340. The third source represents what is known about navigational practice in the Mediterranean during the High Middle Ages. This paper will take what evidence there is and attempt to use that to frame answers to important questions. For millennia, sailors had been finding their way round the Mediterranean without the aid of chart or magnetic needle. Behind the 'chicken and egg' question of how and when the portolan chart became an object of commerce, what did it offer an experienced mariner that was worth its price? From that follows the logical question: how was the chart used at sea? The suggested answer will distinguish three main functions: planning a pelagic voyage, following a coastline, and finding a way through an archipelago. As an intended supplement to memory and experience, not a replacement for those, the chart has several similarities with the London Underground map. We also need answers about the source(s) for the charts' three main components: coastal outlines, toponymy, and information about the dangers to navigation presented by rocks and reefs, shoals and sandbanks. By ignoring those hazards, previous historians downplayed what was probably one of the most important benefits offered by the charts and, conceivably, the primary reason for their creation. From their treatment of the less significant toponyms, it is clear that 'Lo compasso' was not based on the 'Liber', and that the earliest charts have an origin distinct from 'Lo compasso'. There must, therefore, have been at least three successful attempts to gather hydrographic and toponymic data about the Mediterranean littoral, on a systematic and complete basis. Conversely, what those show, name or describe is local knowledge, obtained from local informants. Both aurality and orality would have been involved, particularly in relation to the charts' highly dynamic toponymy. Moreover, a portolan chart was incomplete, and effectively unusable, without exegesis, since no key was provided for the hazard symbols, and the scale's value was not stated.

Curriculum vitae

Tony Campbell is a Graduate of Cambridge University (Modern History). He was Map Librarian of the British Library (1987-2001) and, since 1993, chairman of Imago Mundi Ltd. In that capacity he continues to act as co-ordinator for the biennial International Conference on the History of Cartography (ICHC). He has been a co-organiser of the 'Maps & Society' lecture series at the Warburg Institute, London since 1991, and has maintained the gateway website for the history of cartography, 'Map History', since 1997 (<http://www.maphistory.info/index.html>). In 1975 he discovered the first English sea atlas of the East, by Martin Llewellyn (c.1600). Among his publications are *The Earliest Printed Maps, 1472-1500* (1987); *'The Drapers' Company and its school of seventeenth century chart-makers'* (1973); and an extended chapter, 'Portolan charts from the late thirteenth century to 1500', in Volume I of *The History of Cartography*, edited by J B Harley and David Woodward (Chicago University Press, 1987). In 1986 he published the first systematic census of surviving charts up to 1500. Returning to research into portolan charts in 2011, he has published online a continuing series of essays and listings relating, inter alia, to toponymy, island colour and shape, workshops, Benincasa, the charts' functions, as well as a new census of surviving examples. Last year he carried out a detailed analysis of the *Carte Pisane*. These can be found on <http://www.maphistory.info/portolan.html> or via its Bibliography.