NUOVA ANTOLOGIA MILITARE
RIVISTA INTERDISCIPLINARE DELLA SOCIETÀ ITALIANA DI STORIA MILITARE

N. 7
2026

Fascicolo 27. Luglio 2026

Storia Militare Moderna

a cura di
GIAMPIERO BRUNELLI

Società Italiana di Storia Militare

Nuova Antologia Militare

Rivista interdisciplinare della Società Italiana di Storia Militare

Periodico telematico open-access annuale (www.nam-sism.org)

Registrazione del Tribunale Ordinario di Roma n. 06 del 30 Gennaio 2020

Scopus List of Accepted Titles October 2022 (No. 597)

Rivista scientifica ANVUR (5/9/2023) Area 11, Area 10 (21/12/2024)

Direzione, Via Bosco degli Arvali 24, 00148 Roma

Contatti: direzione@nam-sigm.org ; virgilio.ilari@gmail.com

Grafica: Nadir Media Srl - Via Giuseppe Veronese, 22 - 00146 Roma

info@nadirmedia.it

Gruppo Editoriale Tab Srl -Viale Manzoni 24/c - 00185 Roma

www.tabedizioni.it

ISSN: 2704-9795

ISBN Fascicolo 979-12-5669-424-2

NUOVA ANTOLOGIA MILITARE
RIVISTA INTERDISCIPLINARE DELLA SOCIETÀ ITALIANA DI STORIA MILITARE

N. 7
2026

Fascicolo 27. Luglio 2026

Storia Militare Moderna

a cura di
GIAMPIERO BRUNELLI

Società Italiana di Storia Militare

Vienna, Monumento equestre al Principe Eugenio di Savoia, particolare.
Foto Haeferl, CC SA 3.0 Austria Wikimedia Commons

Sir Robert Dudley in the Service of the Medici:
Tuscany in the Theatre of Global Politics and Trade

by Mirela Altić

Abstract. Sir Robert Dudley (1574–1649), the most renowned Englishman in the service of Medici's Tuscany, is best known as the author of the three-volume monumental work *Dell'Arcano del mare*. First published in Florence in 1646–47 and reissued in 1661 (as the second state), it is regarded as a compendium of knowledge on navigation and maritime science, often overlooking the fact that his work is actually a first-class manual for building the Grand Duchy of Tuscany into a naval military power.

Preserved folder with Dudley's manuscript charts, from which most of his printed maps were derived, illustrates the various sources he used and the methods of compiling and updating geographical knowledge and naval information. Comparison of Dudley's manuscript originals with the printed versions of his charts provides insight into the process of knowledge production and the refinement of charts from initial sketches to final products. His atlas, usually hailed as the world's first maritime atlas, demonstrates both his mapmaking skills and Tuscany's ambitions to become a major imperial player in global geopolitics and trade.

Key words: Robert Dudley (1574–1649), Tuscany, the Medici, navigation, global politics, naval power

Sir Robert Dudley: Destined for Naval Affairs and the Art of Navigation

Robert Dudley (1574–1649) is one of the most intriguing historical figures of the late Elizabethan period and the most famous British expatriate in the service of the grand dukes of Tuscany (Fig. 1). He was the illegitimate son of Robert Dudley (1532–1588), 1st Earl of Leicester, a favourite political adviser and confident of the English Queen Elizabeth I (r. 1558–1603). In addition to being closely tied to court affairs, Leicester was engaged in global

NAM, Anno 7 – n. 27
DOI: 10.36158/97912566942427
Luglio 2026

trade and exploration: he was one of the main backers of Francis Drake's 1577–1580 circumnavigation of the globe and Martin Frobisher's 1576 search for the Northwest Passage (*Gristwood, 2007: 198*). His father's involvement in naval affairs and exploration greatly shaped Robert Dudley's passion for the same interests.[1]

Dudley received an excellent education; in 1587, he enrolled at Christ Church College, Oxford. In 1588, when the Spanish Armada threatened England during the Anglo-Spanish War (1686–1604), the 14-year-old Robert stood with his father at Tilbury Camp, witnessing Queen Elizabeth's famous speech in preparation for resisting the Spanish invasion (*Leader, 1895: 29*). At only 17 years old, he married Margaret Cavendish, the sister of Sir Thomas Cavendish (1560–1592), a renowned English explorer and privateer known for his circumnavigation of the globe.[2] His family relations put him not only in touch with Thomas Cavendish but also with Richard Hakluyt (1553–1616), the husband of Margaret's sister, Douglas. Hakluyt was a prolific writer and publisher, best known for his work *The Principal Navigations,* in which he included a world map in Mercator projection, the first such map made in England (*Hakluyt, 1589; Hakluyt, 1598–1600*).[3] Dudley's interest in writing about the art of navigation and the application of the Mercator projection is certainly not coincidental but confirms a clear influence of Hakluyt's work.

1 Self-testimony to his hereditary predisposition to naval affairs Rober Dudley noted in his *Direttorio Marittimo: "*Setting aside many superfluous circumstances which have occasioned the author to turn his attention to the theory and practice of the art of navigation, suffice it to say that he is the nephew of three Grand Admirals of England and that he had from his youth a natural sympathy for the sea, and this in spite of his having in 1588 held the very honourable post of Colonel in the land forces, which he exercised under the command of his father, the General in Chief and Grand Master of England. He determined at any cost to enter the marine army, on which at that time the reputation and greatness of England depended. He also had a great desire to discover new countries; therefore, from the age of 17, he gave himself to the study of navigation, and of marine discipline and war…" (*Leader, 1895: 32*).

2 Margaret Cavendish (1570-1595) died childless of the plague in 1595 while Robert Dudley was on his expedition in Orinoco. Some authors believe that Margaret was a cousin rather than a younger sister of Thomas Cavendish.

3 The map in Mercator projection appeared only in some copies of the second (1598-1600) edition of *The Principal Navigations,* and thus it is considered a great rarity. It was computed by Edward Wright and used to flatten the information on the c. 1592 globe made by Emery Molyneux, and thus generally known as the Wright-Molyneux map.

Fig. 1 Robert Dudley in his 20s, portrait by Nicholas Hilliard, 1590s (Image credit: Cyfarthfa Castle Museum & Art Gallery).

All these circumstances fuelled Dudley's curiosity and passion for voyage and exploration. Spurred by the Anglo-Spanish War, Dudley decided to lead an expedition to the West Indies in search of gold and to privateer against the Spanish ships. In 1594, he recruited 275 sailors, including navigator Abraham Kendal and captains Thomas Jobson, Thomas Wyatt and Benjamin Wood.[4] Dudley's 1594/1595 expedition was a privateering mission with four ships. He explored the interior of Trinidad and sent men up the Orinoco River in search of gold, which was described as the first recorded English attempt to explore this area, thus pre-dating the arrival of Sir Walter Raleigh's famous 1595 El Dorado expedition.[5] His journey also included stops at the Canaries, Gulf of Lagos, Puerto Rico, Bermuda, and the Azores. He encountered an island at the Orinoco delta, which he claimed for the English crown and named *Dudleiana* (Fig. 2).

Upon returning to England in May 1595, Dudley did not rest long. In 1596, he joined Robert Devereux, 2nd Earl of Essex, as a commander in an expedition against Cádiz. He was later knighted for his actions during the Capture of Cádiz, though what exactly he did is not recorded. The following year, Dudley broadened his interests to Asia, sending Captain Wood on a trading voyage to China with three ships from his fleet. This expedition, however, was not heard of again; not one of them ever returned or gave an account (*East India Company, 1897:IV*).[6]

Having already established himself with substantial social and material resources, Dudley believed he could now legally resolve his status as an illegitimate son. Specifically, although he inherited his father's estates through his will, the legitimacy of his title and the associated rights were challenged in court.

4 A few more names are also recorded, chiefly in Wyatt's travelog, such as Captains Wentworth and Vincent, Mr. Lister, Mr. Thomas Comley, Mr. Wright, Mr. Canter, Mr. Phillips, Mr. Crale and Mr. Norris (*Warner, 1899: XX*).

5 They had left Southampton together in February 1694 and had planned to meet at the Point Curiapan (Trinidad). Dudley arrived first and was surprised that Sir Walter Raleigh had not arrived yet. Tired of waiting, Dudley sailed off from Trinidad on 12 March 1595, and Raleigh arrived at Point Curiapan on 22 March - just 10 days later. That triggered the rivalry between Dudley and Raleigh. When *Raleigh (1596)* wrote his overblown account of the expedition, *Dudley (1600)* published his personal, yet short account. Dudley's full account was published only in 1899 by Warner (*Edwards, 1686: II*).

6 It is interesting that the ship *Edward and Dudley* was operated by Captain William Lambert from 1702 to 1706 under the flag of the East India Company in the waters of Borneo and Batavia.

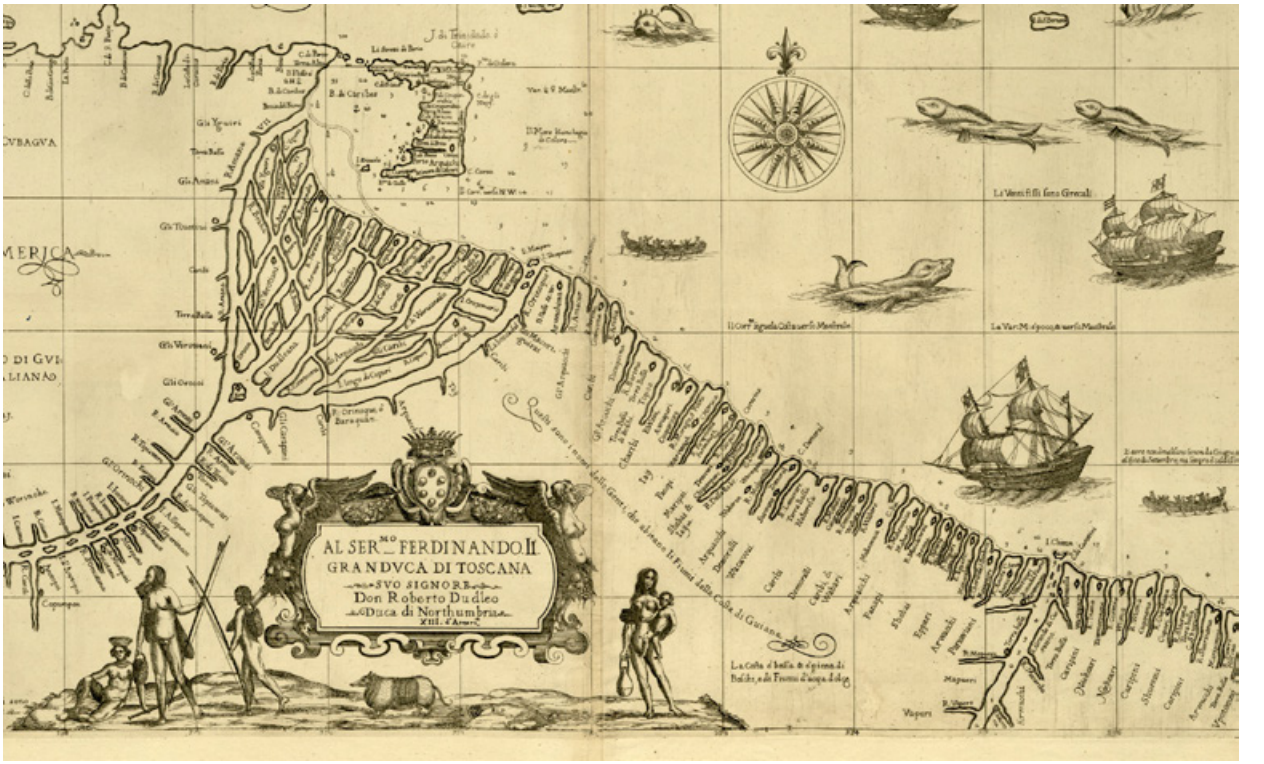


Fig. 2 Detail of Dudley's 1647 chart illustrating Trinidad and the Orinoco Delta, the area of exploration he made under the English flag. Mind the island of Dudleiana in the upper part of the delta that he claimed for the English Crown. Dedication of the map to Ferdinando II de' Medici, with his coat of arms on the top of the cartouche, is a direct reference to the Tuscan ambition to establish a colony in Guiana (National Library of Finland).

However, he overestimated his standing and overlooked the repercussions of a series of misadventures, especially his poorly judged support for the Essex rebellion against the Queen in 1601, which led to him falling out of royal favour. His unsuccessful three-year legal battle for recognition of his titles shaped his future: disappointed and disgraced, he left England forever in 1605 and spent the rest of his life in the service of the Grand Duchy of Tuscany. Dudley never imagined that his exile from England would last forever; ultimately, he lived outside the country for the next forty-four years.

Robert Dudley's New Life in Tuscany

Robert Dudley left England in July 1605, accompanied by his cousin Elizabeth Southwell, thus leaving his second wife, Lady Alice Dudley, and their five children behind. The new couple first settled in Lyon, where they converted to Catholicism and got married in 1606.[7] In the same year, they moved to Florence, a place that reminded a home for the rest of their lives. To accommodate his fast-growing family (Robert and Elizabeth had 12 children), in 1614 Dudley bought a house on Via della Strozzi (today's Via della Vigna Nuova 2), in the very heart of Florence (Fig. 3).[8] Favoured by the Grand Duke, the Dudley family fit well into Tuscan society, with several of their children married into the Italian nobility.

At the time of Dudley's arrival, the Medici had already consolidated their power over Tuscany, so they turned their attention towards the sea, hoping to take part in global trade with the East and West Indies. These ambitions favoured their support for maritime science, turning Livorno (Leghorn) into a major trade and naval centre in the Mediterranean. Dudley served as a naval advisor to Ferdinand I de' Medici, Grand Duke of Tuscany (r.1587–1609), for whom he designed and built warships for the Livorno arsenal. In addition to shipbuilding, Dudley was involved in numerous projects across Tuscany, including draining marshes between Pisa and Livorno, constructing Livorno's breakwater, and rebuilding harbour defences. Despite his many responsibilities, his passion for exploration persisted: he persuaded Ferdinand I to fund the privateer galleon *Santa Lucia Buonaventura*, under Captain Robert Thornton—another Englishman serving the Grand Duke—to explore Guiana and northern Brazil. Known as the 1608 Thornton expedition, the venture was a short-lived colonial effort aimed at preparing for the founding of a Tuscan settlement in Guiana, which would serve as a hub for exporting Brazilian wood to Tuscany.[9]

7 Strangely enough, a couple got married after receiving a papal dispensation because they were blood relatives, yet the fact that Robert was already married in the Church of England went unmentioned. Under English law, this marriage was bigamous since Robert was still married to Lady Alice.

8 Dudley bought the property from the Rucellai family for 4.000 scudi, on which he built a palace for himself (*Leader, 1895: 80*).

9 Once back in Tuscany, Thornton learned that Ferdinando I had died and that his successor, Cosimo II, was not interested in establishing a colony. The area Thornton saw as a potential site for a Tuscan colony is now in modern French Guiana, near Cayenne, which was colonized by France in 1630 (*Sanfilippo, 2008*).

Fig. 3 Florentine home of Robert Dudley, today known as Palazzo Dudley (public domain).

After the death of Ferdinand I, Dudley continued serving his successors, Cosimo II de' Medici (r. 1609–1621) and Ferdinando II de' Medici (r. 1621–1670), remaining a courtier and working on the naval affairs of the Grand Duchy of Tuscany. In 1620, after long service to the Medici, he was recognized as the Duke of Northumberland. Dudley was also a prolific writer, particularly after his wife died in 1631. Dudley spent the last two decades of his life in seclusion, mostly

working on his manuscripts. His works covered various topics, but his interests in naval science overshadowed everything else. He spent the last years of his life on the outskirts of Florence, at Villa Rinieri (now Villa Corsini a Castello).[10] Despite his undoubted contribution to maritime and naval science, the work of Robert Dudley has not been adequately analysed and evaluated.[11]

Master of the Sea – Dudley's Works on the Naval and Maritime Science

One of his major works is *Direttorio Marittimo*, which stayed in manuscript as having been specifically assembled for the instruction of the officers of the Tuscan Navy, the Knights of St. Stefano, rather than for a general audience.[12] It was written in faulty Italian, with a dedication to Grand Duke Ferdinand de' Medici and Dudley's autobiographical preface, all written by his own hand, with his corrections and underlinings.[13] Manuscript includes most of the topics covered in *Dell'Arcano del mare,* including great-circle sailing (orthodromic navigation), the administrative management of a fleet, and its maneuvers in a naval battle. Although some earlier sources stated that this work was created between 1610 and 1620, it was apparently created somewhat later and over a longer period.[14] A clos-

10 Robert Dudley died on 6 September 1649. He was probably buried in the church of San Pancrazio in Florence, along with his wife, whose grave was there. The church was deconsecrated by the Napoleonic government in 1808. During the French occupation, it was repurposed, later serving as a tobacco manufacture and military depot. Today, it is home to the Marino Marini Museum, with only the Rucellai Chapel preserved within the museum. The only remnant of the Dudley's' grave is a small piece of stone bearing the family crest.

11 The only works that directly addressed Dudley's role in maritime science and cartography remain Hale (1874), Guarnieri (1968), Ciano (1987), and a short report by Dilke & Dilke (1982).

12 *Direttorio Marittimo di Don Roberto Dudleo Duca di Northumbria fatto p[er] ordine del Ser[enissimo] Gr: Duca di Toscana suo Sig[no]re e diviso in due Tomi et ogni Tomo in due libri co[n] suoi Capitoli.* 282 pages, foliated in pencil. The original copy was held by John Temple Leader, who purchased it from Florentine librarian, collector, and publisher Pietro Bigazzi.

13 Dedication also extends to the second son of Cosimo II, Gian Carlo de' Medici (1611–1663), who shared Dudley's passion for the sea (*Leader, 1895: 19*).

14 This omission possibly comes from notes of Domenico Maria Manni (1690–1788), director of the Biblioteca Strozzi, polymath, editor, and publisher, who was also a member of the Academia della Crusca. These notes mention the manuscript on naval architecture designed by Dudley at Livorno during the reign of Cosimo II, which was housed in the Biblioteca Magliabechiana (now the Uffizi Library).

er look at *Direttorio* confirms that the text was clearly written by Dudley's hand over time, at least as early as 1643–1644 (as that is the date that appears in the dedication), and is further annotated by him up until 1647 (he died in 1649). Furthermore, the manuscript includes additional annotations from other hands added to the original work until the release of the second edition of the *Dell'Arcano del mare* in 1661, indicating that his work was kept updated. Last but not least, the text of *Direttorio* contains direct references to *Arcano,* suggesting that both his works were probably created simultaneously but aimed at different audiences.[15] Namely, most of their content overlaps, yet with different orders and headings.

The *Direttorio* relies on early versions of the *Arcano.* It is an extensive study of naval theory and practice that addresses navigation based on longitude and latitude and orthodromic course (great-circle navigation); knowledge of the winds, currents, and tides; the use of Tables of Ephemerides for celestial observation; and techniques to ascertain magnetic declination values with a meridian compass across the globe. When discussing cartography, Dudley considers how to determine latitudes and longitudes across the oceans, and explains the errors of "horizontal" or plain (*paskaarten*) charts in navigation. He proposes using mathematical instruments and celestial observation to achieve accurate navigation. In order to calculate the longitude, Dudley proposes the use of a clock "oriuolo mercuriale" (orologio mercuriale), more than one hundred years before John Harrison's invention of the chronometer that enabled the precise determination of the longitude. Moreover, he recommends navigation by longitude and orthodromic navigation by using his tables of "travesali sfericali" and his charts based on Mercator projection. The work is illustrated with numerous small drawings, and a number of larger diagrams.

His most famous work, *Dell'Arcano del mare*, published in Florence in 1646–1647, contains much of the content originally drafted for the *Direttorio*, alongside newer proposals for creating a navy (Dudley, 1646–1647). While the *Direttorio* was a localized manual for the Tuscan fleet, the *Arcano* expanded these notes into the first printed world sea atlas, utilizing the Mercator projection. Its name, *Dell'Arcano del mare*, suggests the secrecy surrounding the routes, necessitated by competition and maritime dangers. This edition is now a rarity, with only a

15 In his preface, Dudley introduced himself saying, "In especial he practiced the science of navigation by grand circles with practical longitude, as explained in the Arcano del Mare".

limited number kept in public libraries[16]. The edition was printed by Florentine printer Francesco Onofri (fl. 1650–1689) (*Novati, 1907: 37*).

To engrave his plates, Dudley employed Florentine engraver Anton Francesco Lucini (1610 – ca 1670). Trained by renowned baroque engravers Jacques Callot and Stefano della Bella, Lucini was known for his engraved views of Pisa and scenes of the Ottoman Wars (*Ticozzi, 1830: II: 356*). Although he had little experience with map engraving, Lucini excelled, significantly contributing to the overall success of the edition: he added calligraphic flourishes and compass roses, as well as exploding volcanoes, sea monsters, and ships under full sail. Some diagrams of the mathematical instruments required for navigation have moving parts known as volvelles (wheel charts), making them a practical tool.[17] The work was published by Francesco Rondinelli (1589 –1665), a Florentine scholar, member of the *Accademia Fiorentina* and of the *Accademia della Crusca* and a Librarian of the Grand Duchy of Tuscany. He is best known as the author of the *Relazione del Contagio Stato in Firenze l'anno 1630 e 1633* (Florence: Gio. Batista Landini, 1634), an account of the plague epidemic that struck Florence in the early 1630s, in which Dudley lost his wife (*Mirto, 2017*).

The project would take twelve years of Dudley's effort. According to a letter Dudley wrote to Benedetto Guerrini, a chamberlain of Medici Grand Duke Ferdinando II on 12 March 1643, there were many obstacles to overcome, such as paper shortages, the slowness of his engraver, and difficulties created by his publisher, who hesitated to allow the text to be proofread and Dudley's mathematics to be checked by his colleague, the famous mathematician Evangelista Torricelli.[18] However, the result justified the investment—a monumental three-volume (in six parts) maritime encyclopaedia that summarized knowledge of naval and maritime science, accompanied by 145 charts; an edition praised as one of the most important atlases ever produced (Fig. 4).

16 Copies of the 1646–1647 edition are identified in the Biblioteca Nazionale Centrale di Firenze (two copies), British Library (two copies), Harvard University Map Collection (two copies), Library of Congress, Bibliothèque Nationale de France, National Library of Finland, Newberry Library (Chicago), Biblioteca Nacional de España, and the copy of the 1st volume in the Österreichische Nationalbibliothek in Vienna.

17 Movable volvelles, or turning dials, which provided information on the position and movement of celestial bodies and could be manipulated by the readers to make calculations, appeared in Peter Apian's *Cosmographia*, 1524.

18 The Newberry Library, Chicago, VAULT folio Case MS 5345.

The first volume (consisting of two parts) is devoted to navigational techniques: longitudinal measurements and astronomical observations that enable the determination of the ship's position and course, as well as a pilot book accompanied by eleven general charts. The second volume (parts three and four) deals with military and maritime science (Fig. 5), followed by construction drawings and instructions for shipbuilding (Fig. 6). The third volume (parts five and six) contains sailing instructions based on the methodology established by Pedro Nunez (Latin: Petrus Nonius, 1502 –1578), who introduced the idea of sailing along the great circle (orthodrome) that was fully applied only after the Mercator projection was accepted. The volume closes with 131 charts, all constructed in Mercator projection.


DELL'ARCANO
DEL MARE,
DI D. RVBERTO DVDLEO DVCA DI NORTVMBRIA,
E CONTE DI VVARVICH,
LIBRI SEI;
Nel primo de' quali si tratta della Longitudine praticabile in diuersi modi, d'inuenzione dell'Autore,
Nel Secondo, delle Carte sue generali, e de' Portolani rettificati in Longitudine, e Latitudine,
Nel Terzo, della Disciplina sua Marittima, e Militare.
Nel Quarto, dell'Architettura sua Nautica di Vascelli da guerra,
Nel Quinto, della nauigazione scientifica, e perfetta, cioè Spirale, ò di gran Circoli,
Nel Sesto, delle Carte sue Geografiche, e Particolari.
AL SERENISSIMO
FERDINANDO SECONDO
GRAN DVCA DI TOSCANA
suo Signore.
In FIRENZE, Nella Stamperia di Francesco Onofri. 1646.
Con licenza de' SS. Superiori.

Fig. 4 Title page of the first volume of Robert Dudley's *Dell'Arcano del mare* (Florence, 1646) with dedication to Ferdinando II de' Medici and illustration of the compass-box. (National Library of Finland)

The edition was a full success. Dudley, then a 73-year-old man, received accolades from his patrons as well as from navy officers, navigators, and shipbuilders. While this monumental work enhanced the reputation of the author and his patrons, it is uncertain whether the commercial market recouped the investment. There is evidence that Lucini developed a simplified, "portable" version to better support sales, but it has never been published (*Woodward, 2007: 794*). However, a preserved loose sheet of a small size (47,5x42 cm) testifies to this attempt.

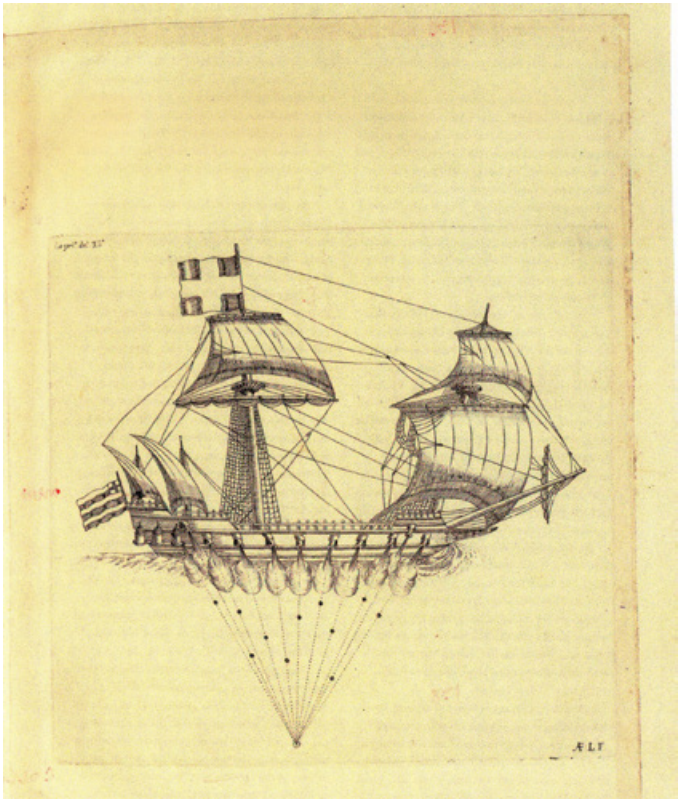
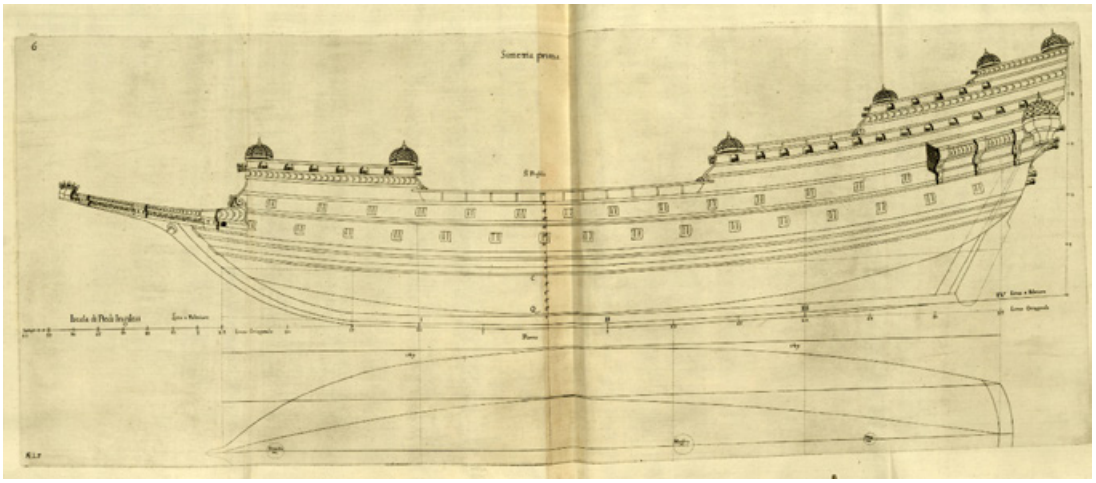


Fig. 5 Demonstration of artillery fire, with recommendation to stay upwind of the enemy. *Dell'Arcano del mare, Libro Terzo: Della disciplina marittima e militare* (Florence, 1646) (National Library of Finland).

Fig. 6 Dudley's original drawing for building a galleon. *Dell'Arcano del mare, Libro Quarto: Della fabrica di Vascelli* (Florence, 1646) (National Library of Finland).



After Dudley's death, his *Dell'Arcano del mare* was continuously updated and corrected by others, possibly by Lucini himself, based on instructions he received from the practitioners. Namely, it appears that Lucini planned a second edition, which came to fruition in 1661 after extensive preparation (*Dudley, 1661*). In the introductory sheet of the copy kept in the British Library, Lucini states that he worked on the plates in seclusion for twelve years in an obscure Tuscan village, using no less than 5,000 lbs of copper. The work, prepared by Anton Francesco Lucini and Jacopo Bagnoni, is advertised as the enlarged and corrected edition (*Impressione seconda corretta & accresciuta*) of the original Dudley's manuscript that was kept in the Convento della Pace by the Bernardine monks of the order of Foligno. The publication was printed by Giuseppe Cocchini, a Florentine printer known for other scholarly editions dedicated to Grand Duke Ferdinand II of Tuscany (Fig. 7). Most of the known copies are dedicated to Ferdinando II de' Medici, yet with some exceptions. One of the copies kept in the British Library has a dedication to the Republic of Venice. This edition had a much larger print run and was more effectively advertised, which led to Dudley's work gaining worldwide fame. While the 1661 edition introduced a uniform folio format for the atlas used in vol. 3, part 2 of the 1646–1647 edition (thereby including the plates without folding), it brought minor cartographic refinements, leaving the geographical content largely unchanged.


ARCANO
DEL MARE
DI D. RVBERTO DVDLEO
DVCA DI NORTVMBRIA.
E CONTE DI VVARVICH.
DIVISO IN LIBRI SEI.
Nel PRIMO, De' quali si tratta della Longitudine praticabile in diuersi modi, d'inuenzione dell'Autore.
Nel SECONDO, Delle Carte sue generali, e de' Portolani emendati in Longitudine, e Latitudine.
Nel TERZO, Della Difesa sua Marittima, e Militare.
Nel QVARTO, Dell'Architettura sua Nautica di Vascelli da guerra.
Nel QVINTO, Della Nauigazione scientifica, e perfetta, cioè Spirale, ò di gran Cerchi.
Nel SESTO, Delle Carte sue Geografiche, e Particolari.
IMPRESSIONE SECONDA.
AL SERENISSIMO
FERDINANDO SECONDO
GRANDVCA DI TOSCANA.
IN FIORENZA. MDCLXI.
NELLA NVOVA STAMPERIA, PER GIVSEPPE COCCHINI, ALL'INSEGNA DELLA STELLA.
CON LICENZA DE' SVPERIORI.

Fig. 7 Title page of the second edition of the *Dell'Arcano del mare* (Florence, 1661) with dedication to Ferdinando II de' Medici. In the lower part, note the image of the instrument for measuring the ebb & flow of tides (Biblioteca Nacional de España).

Robert Dudley as a Mapmaker: Tuscany in the Theatre of Global Politics and Trade

The rise of map production in Tuscany was closely linked to the Medici family. Maps created under their patronage, focusing on territorialization, sovereignty, and defense, were clearly intended for military purposes, making a basis of Tuscan state-sponsored military cartography (*Altić, 2023: 44*). The strengthening of naval power and the overall militarization of the Grand Duchy highlighted the need for more reliable navigational charts as well. At first, the major role in naval and maritime science was played by the Military Order of Santo Stefano (*Sacro Militare Ordine di Santo Stefano Papa e Martire*), founded in 1561, whose pilots were educated in a three-year training that involved lessons in geography and cartography (*Davies, 2009: 33–35*). In order to strengthen the chart production, in 1592 Grand Duke Ferdinando I de' Medici established the School of Nautical Cartography (*Scuola livornese di cartografia nautica*), which collaborated with some of the most well-known contemporary mapmakers (*Guarnieri, 1965: 7–8; Astengo, 2019: 25–36*). However, due to the absence of permanent staff, their output was limited to portolan charts for private patrons, resulting in a gradual decline in production in the early 17th century (*Altić, 2023: 45*).

More advanced charts needed to support the Medici's overseas ambitions only appeared in the 17th century, largely overlapping with Robert Dudley's work. Dudley was well equipped with valuable nautical instruments featuring notable innovations, including tide calculators, theodolites, protractors, star-measuring devices, wind roses, quadrants, and compasses. Many of these were designed by Dudley himself and crafted by his trusted maker, Charles Whitwell; others bear the signatures of renowned English makers such as James Kynvyn, Thomas Gemini, Augustine Ryther, and Humfrey Cole. The Dudley's collection also holds instruments from non-English origins, including a Portuguese mariner's astrolabe, used during exploration voyages, and a fine Flemish astrolabe, likely made by the eminent geographer and cartographer Gerard Mercator.[19]

Combining knowledge of the advanced British cartographic tradition with

19 Dudley's instruments were bequeathed to the Medici by Dudley himself in 1649. They remained the personal property of the Grand Duke until 1654, and were then placed in the *Sala delle Matematiche* of the Uffizi, which housed many of the astronomical and mathematical instruments in the Grand Duke's collection. Today, they are housed at the *Museo Galileo* in Florence.

that of Italian, Dutch, Portuguese, and Spanish sailors, he brought innovation to Tuscan cartography. Although the oft-repeated claim that *Dell'Arcano del mare* was the first maritime world atlas may not be entirely grounded, it is certainly an extremely significant work that introduced many innovations in maritime science.[20] Namely, *Arcano* has complex content that includes not only charts but also a navigation manual as well as instructions for maintenance of the naval installations and shipbuilding, thus combining no less than three genres: a pilot guide (written sailing directions that contain profiles and /or charts), a maritime atlas (collection of charts), and a military manual (instructions for naval combat). While combining pilot guides and charts (but not an atlas) was usual practice in the early 17th century, especially in the Dutch maritime tradition, adding manuals for military operations and ship architecture was not common at all (*Schilder and Van Egmond, 2007:1384*). Namely, most sailing manuals were produced for trading companies rather than naval forces (although trading companies often also engaged in sea combat). Furthermore, while pilot guides, tables, and loose charts were used on board ships, maritime atlases were not part of the regular equipment of a master or pilot. The sole exception is perhaps the armed fleet of St Cyriacus at anchor in the port of Ancona on the Adriatic shore of the Ecclesiastical States of the Church, at least since 1554, in an east-west corridor of counties under the Military Order of Santo Stefano which was at the time enforced by a local knight at Ancona in 1563 (*Licini, 2025: 45*). As a result, the production and use of charts, pilot guides, and maritime atlases were developing as independent branches (*Schilder and Egmond, 2007:1401)*. And yet, Dudley made an exception by combining them all together.

Another advancement he introduced was a full application of the Mercator projection, as corrected by Edward Wright. By omitting all compass lines and introducing lines of latitude and longitude, he broke up with the portolan-style charts, thus announcing the new era of modern maritime charts. Although the Mercator projection was introduced in 1569, its use in long-distance navigation did not begin before the 1630s. Even after Edward Wright's seminal work on the Mercator projection, *Certaine Errors of Navigation* (1599, 1610), which enabled precise mapmaking and provided calculation tables, thereby making the projec-

20 Jan Jansonous's *Water-weereld* or *Atlantis majoris quinta pars, orbem maritimum* (Amsterdam, 1650) fits the definition of the maritime atlas much better than Dudley's work, which is not a typical maritime atlas.

tion practically applicable, its use remained sporadic. Navigation using Mercator charts has apparently caused practical difficulties and misunderstandings for pilots who had relied on compass directions from portolan charts.[21] That particularly referred to a great-circle sailing. To resolve the calculation issues, Dudley provided detailed instructions for determining the ship's position and course using Mercator's projected charts, based on Wright's model.[22]

Dudley was among the first to systematically include magnetic declination on maps to aid navigation. However, he was focused only on how declination changed with spatial location (position on the globe). It seems he was unaware that declination changes over time due to secular variation, rather than being fixed. When Dudley recorded magnetic declination values, the scientific understanding of secular variation was still in its infancy (*Jonkers, 2008)*.[23] In that regard, Dudley's instructions on magnetic declination refer to William *Gilbert*'s work *(1600)*, who published the first extensive study on magnetism, while the work of Henry *Gellibrand (1635)*, who discovered secular variation in 1634, is not reflected in *Arcano*. Consequently, Dudley's charts, as well as his sailing instructions, kept the concept of the agonic prime meridian at the Azores.[24] Although chartmakers in the 16th and early 17th centuries often used the Azores as the starting meridian, Dudley made a specific choice even in this case. While most navigators among the Azores selected islands like Santa Maria, São Miguel, or Corvo as the starting point of the meridian grid (*Jonkers, 2005: 20*), Dudley chose the Island of Pico for his zero meridian.

21 Wright had explained the mathematical principle and provided tables giving the value of the secant for every ten minutes of every degree of latitude from the equator to 80°N, but the graphical difficulty of measuring the distance travelled seems to have remained. The need to compute the distance north or south rather than read it off the scale bar, which was composed of equal-length units, was an added complication (*Tyacke, 2007: 1745*).

22 Great-circle sailings represent the shortest distance between two points on Earth. While a Mercator chart uses straight, parallel longitude lines, a great circle path bows toward the poles. To solve the problem, navigators usually plot a curve on a gnomonic chart first (where great circles are straight lines), then transfer its coordinates to a Mercator chart where a great circle is always a curved line (convex towards the nearest pole).

23 The study of secular variation (the shift of magnetic declination over time) was just beginning in 1634, while figures like English mathematician Henry Bond later popularized the concept in the 1650s.

24 Sixteenth-century chartmakers and navigators chose the Azores, Cape Verde, or Canary Islands as their prime meridian because they believed these islands are aligned along the line with zero magnetic compass variation, making them a suitable reference point.

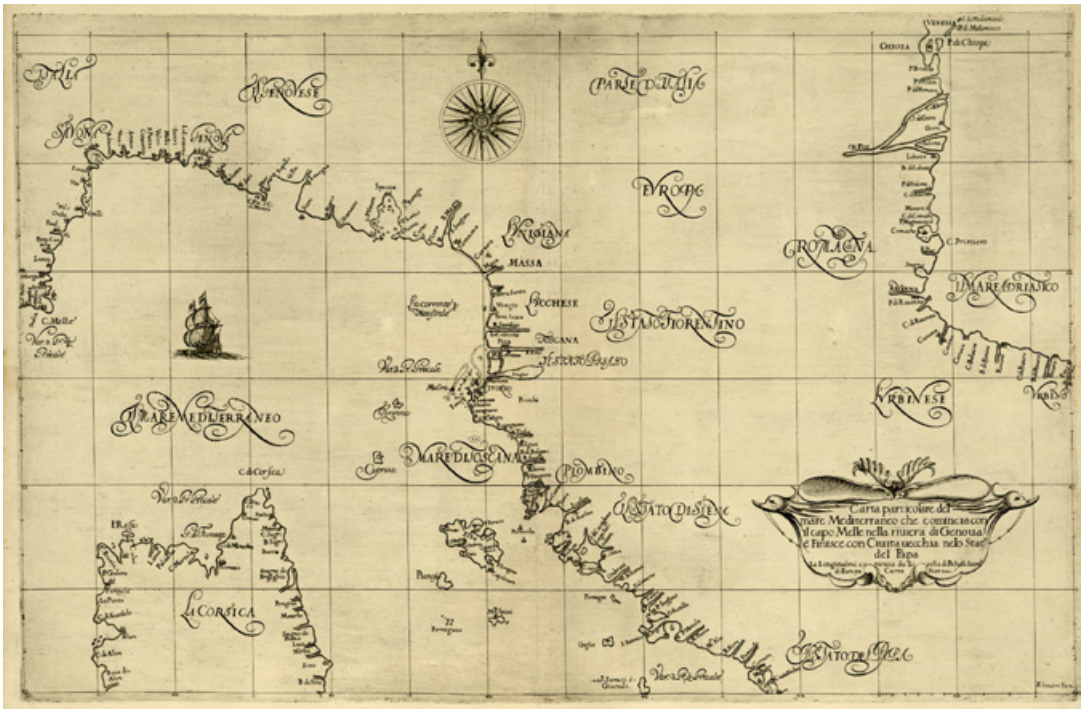


Fig. 8. The Tuscan coast is depicted with minimal detail, featuring very sparse soundings. There is no more detailed chart of the Tyrrhenian Sea in *Arcano*, which confirms its focus on foreign trading hubs and resource-rich regions (Florence, 1647). (National Library of Finland).

The order of the maps in the atlas follows the Ptolemaic Renaissance tradition: it opens with a map of the Mediterranean and its constituent parts, continues with the rest of Europe toward the north, and then moves eastward (in the same direction as longitude values were once calculated, from the zero-meridian eastward for 360°). The most represented are coastal charts, while chart of the open sea are fewer. Europe and North and South America have the most extensive coverage, with Asia following, in contrast to Africa, which is only sufficiently covered to include the sea route around the Cape of Good Hope to Asia. Interestingly, the atlas also includes a chart of New Guinea and northern Australia that the Dutch Jacob le Maire encountered and mapped in 1616, believing them to be a single landmass. *Arcano* did not give special treatment to the Italian coast, possibly due to a policy of secrecy or the assumption that local mariners were familiar with domestic waters (Fig. 8). In contrast, particular attention to overseas territories, primarily in Southeast and East Asia and the Americas, speaks volumes about

Tuscany's overseas ambitions to become a global trader and imperial player. In that regard, the charts featuring Guiana and Brazil (Figs. 2 and 11) are particularly indicative: they are decorated with the Medici coat of arms and by images of indigenous peoples (probably inspired by similar images by Theodore de Bry (1596–1599), thereby justifying European dominion and the Medici's patronage.

Furthermore, there is also an extensive chart coverage of Tuscany's main trading partners, Portugal and England, whose ports are depicted in particular detail. Strong interest in Portuguese ports reflects the presence of Portuguese merchants in Livorno, who served as major intermediaries in Tuscan trade interests in Brazil. Also, the inclusion of detailed charts of Guiana and Brazil served both to highlight Dudley's expedition and to evoke the idea of Tuscan colonization of Guiana (Fig. 2). The same applies to England, which controlled most of the transatlantic trade with its overseas territories in North America, and whose traders were also highly represented in Livorno (*Blake, 2015: 10; D'Angelo, 2004: 67*). Detailed charts of English ports, as well as a focus on the British transatlantic territories, clearly trace Tuscan trading interests (Fig. 9).

However, aside from reflecting Tuscan interests, the *Arcano* also speaks about its English author. Specifically, the preference for Portuguese ports over Spanish ones shows his loyalty to the British crown, whose main rival was Spain. This is also evident from the note on Virginia's chart, which mentions the first English attempt at colonization in 1584, aimed at establishing a base for English privateers to attack Spanish ships sailing from the Caribbean (Fig. 10). Similar notes can be found on other places, regularly referring to British territorial appropriation (e.g. Hudson Bay encountered by Henry Hudson in 1611; John Davis in Greenland in 1585; Martin Frobisher in Greenland in 1576, Pacific America navigated by Drake in 1579, Falklands encountered John Davis in 1592; English Guiana ventures in 1595–1667). At the same time, imperial appropriations of the Iberian Dual Monarchy (1580-1640), the Dutch, or Belgium, were marked without historical notes, clearly highlighting British interests in South America. Furthermore, Dudley's interest in Spanish territories, most evident in the Caribbean, the Strait of Magellan, and the Philippines, intersected with the routes of Spanish galleons that were frequently targeted by British privateers.

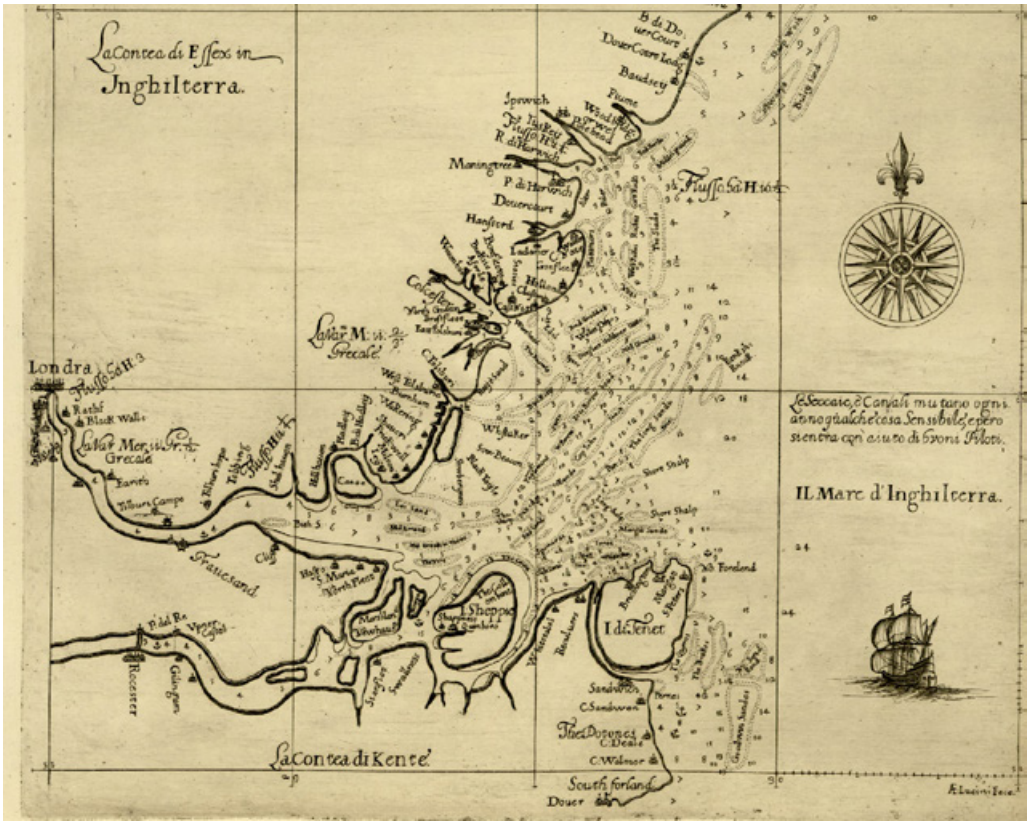


Fig. 9 The mouth of the Thames with detailed soundings and a depiction of the sand-banks and shoals (Florence, 1647). (National Library of Finland).

Origin of Knowledge and the Chart Production Process

With a comprehensive edition such as *Arcano*, the main question is where the knowledge in this work comes from. Since Dudley's empirical knowledge was limited to the Mediterranean, British waters, and trans-Atlantic navigation to Trinidad and Guiana, he had to base his chart-making on geographical and maritime data gathered from multiple sources. Dudley does not cite his sources, and his charts are left unsigned. The only two exceptions are two charts signed by Dudley; the one of the Orinoco delta, dedicated to Ferdinando II de' Medici, and the chart of Guiana (*Imperio di Guiana, o Walliana*), dedicated to Vittoria della Rovere (1622–1694), Princess of Urbino and Pesaro, and Grand Duchess of Tus-

Fig. 10 Chart of the British colony in Virginia with a note on the 1584 colonization effort (Florence, 1647). (National Library of Finland).

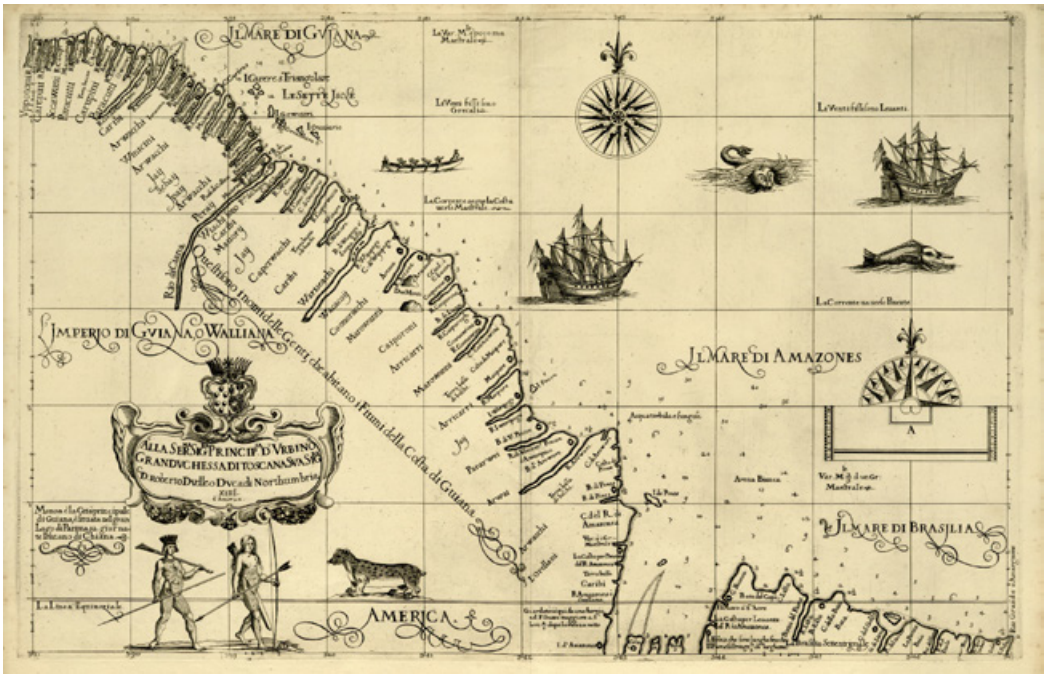


Fig. 11 Chart of Guiana and northern Brazil, dedicated to the Grand Duchess of Tuscany. It is one of only two charts from *Arcano* signed by Dudley (Florence, 1647). The chart's iconography is reinforced by the illustration of indigenous people, inspired by similar images published in Theodore de Bry's *America*. (National Library of Finland).

cany by marriage, which were both based on his own empirical knowledge (Fig. 11). Yet even these charts were more collaborative than his own. Namely, Dudley learned a great deal from the pilots of his Orinoco expedition: Benjamin Wood, Thomas Jobson, Abraham Kendal, and Thomas Wyatt, who had extensive experience on other long-distance voyages, providing Dudley with valuable insights.[25]

25 Captain Benjamin Wood accompanied captains Philip Amadas and Arthur Barlow during the 1584 Virginia expedition and was the master of the *Wild Man*, commanded by John Chudleigh, in a failed attempt to sail around the world in 1589. Captain Thomas Jobson had served under Sir Francis Drake at San Domingo and other locations and was Dudley's main assistant throughout the Orinoco voyage. Abraham Kendall, Dudley's chief pilot or master, after their return to England, joined Drake's last expedition, which sailed in 1595, and he died on board the *Saker* off Porto Bello on the same day as Drake himself, 28 January 1596. Captain Thomas Wyatt was Commissary of Musters at the Dutch port of Bergen op Zoom in 1589 and again in Kent in 1595, and led one hundred men in the Cádiz expedition of 1596, in which Dudley also had a command (*Warner, 1899: XIV–XX*).

Other charts were not derived from his direct experience; however, since they were built on his own research of the sources, they also represent Dudley's original work. To create each chart, he consulted multiple textual and visual sources and drew his own conclusions about the geographical features of the areas he depicted. The mixed place-names in his charts indicate he mainly relied on English and Dutch sources. For depictions of the Atlantic North America (Hudson Strait, Hudson Bay, and the Hudson River), Dudley used Henry Hudson's charts from his 1610–1611 expedition, while the depiction of New Belgium (between Boston and Delaware) is derived from Willem Blaeu's Nova Belgica (ca 1635) (*Hale, 1873: 15*). The presentation of the Patagonian coast and the Strait of Magellan is clearly based on early 17th-century Durch charts and on John Davis's exploration of the same region (including his "discovery" of the Falklands in 1592). His vision of Brazil is influenced by Luis Teixeira's maps, which are found in Dudley's collection. The Pacific coast of South America is based on Cavendish's observations from his 1587 circumnavigation, while the place names along the California coast (Porto di Nueva Albion) are clearly taken from Sir Francis Drake's voyage. The presentation of the Colony of Virginia as a British-chartered settlement is primarily based on the works of John White and John Smith. His depiction of the Carolina coast (1603–1663, part of Virginia) is particularly interesting as it predates the Lords Proprietors' settlements by nearly a decade, underscoring the strategic foresight of Dudley's *Arcano*. Dudley's chart of the Caribbean and Florida shows an understanding of Spanish toponymy, likely derived from seized Spanish charts, which were the most detailed available for the region at the time. This chart reflects an unusually up-to-date English perspective on Atlantic navigation just as England was asserting colonial ambitions in Virginia and the Caribbean, with the depiction of Bermuda, claimed by the English in 1612 (Fig. 12).

Dudley's depiction of Asian waters also relied on British and Dutch charts, as their East India trading companies controlled most of the region. Among the British charts, those by Gabriel Tatton were found in Robert Duley's collection, and he surely used them for his presentation of the Atlantic and the Indian Ocean (*Tyacke, 2008: 42*). Dutch sources also allowed him to depict the New Guinea and the northern part of Australia encountered by the Dutch (without being aware of the Torres Strait that separates them). Furthermore, his pilot book (Volume 1) reveals Dudley utilized knowledge from Spanish and Portuguese mariners as well: for navigation from Lisbon to Goa, he included instructions from "a very

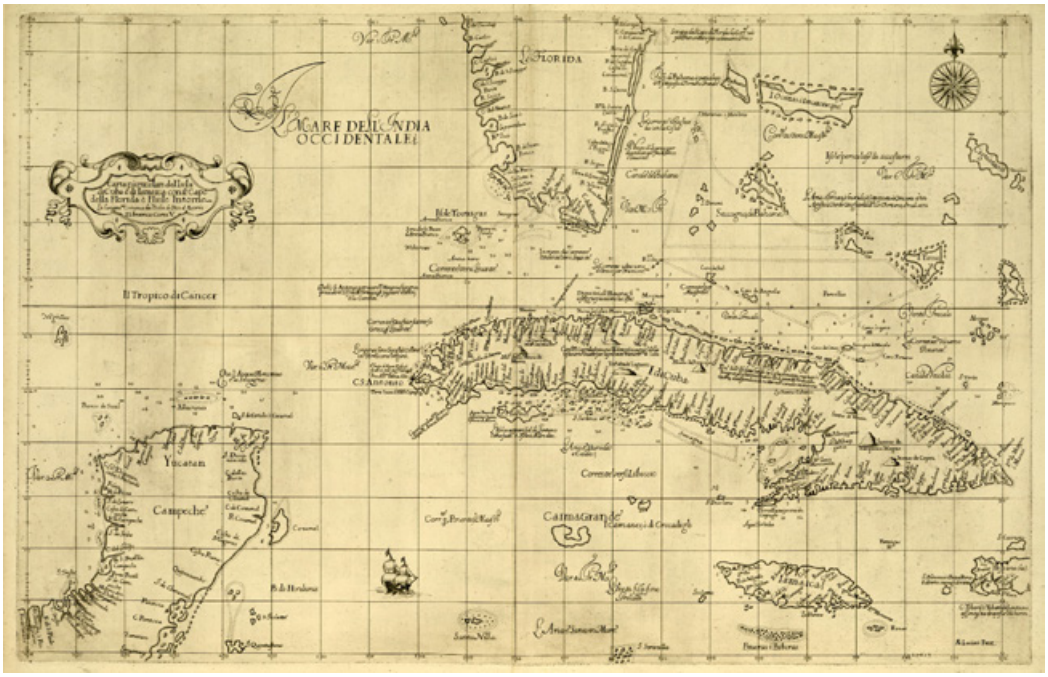


Fig. 12 Dudley's British perspective of the Caribbean and Florida (Florence, 1647). (National Library of Finland).

skilled Portuguese pilot"[26] while knowledge for transatlantic crossing also included a pilot book by a Spanish navigator.[27] No less important, most charts of Asia incorporated indigenous knowledge, particularly that of Javanese and Malayan navigators, renowned for their navigational skills and maritime expertise. The case of the Philippines, which is represented in the atlas with as many as four charts, is particularly interesting. His knowledge of the archipelago certainly reflects Cavendish's transpacific crossing from South America to the Philippines, based on the sailing guide that Cavendish confiscated from the Spanish galleon.

Another of Dudley's special interests in Asia was Japan. He compiled two maps that show the whole of Japan, one in the pilot book (vol. 1) and the other in the atlas (vol. 3), and they are strikingly different. Both of them are based on

26 Portolano nono di un pilota portoghese molto valente, e dotto, da Lisbona in Portugallo, sin a Goa, nell'Indie Orientali (Dudley, 1646, Vol. 1).

27 Portolano secondo di Giovanni Dies Piloto spagnuolo, da S. Lucar in Spagna, alle Indie Occidentali (Dudley, 1646: Vol. 1)

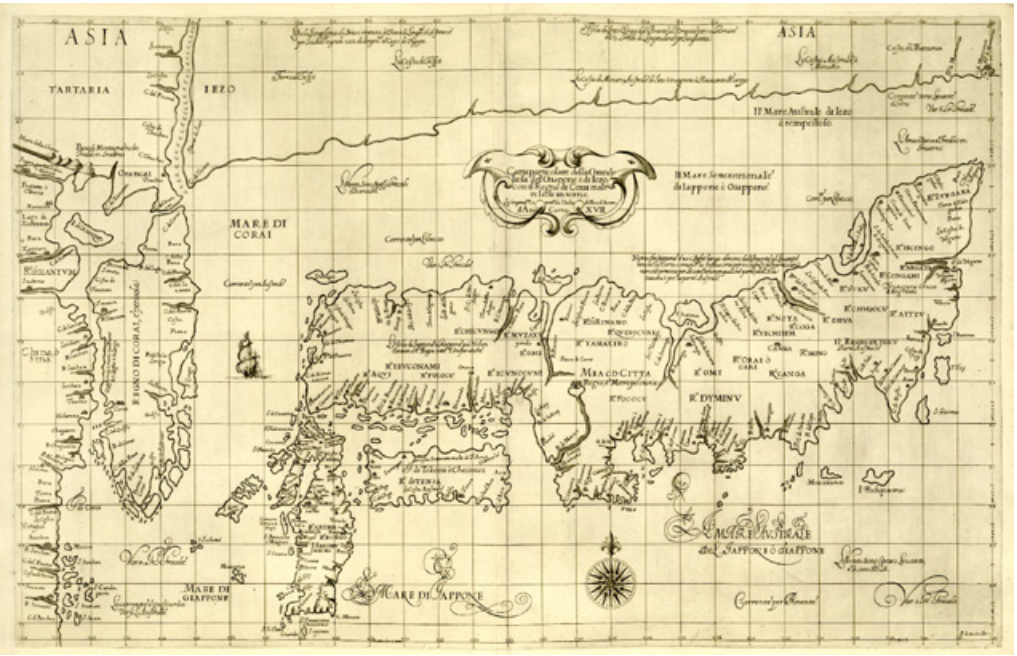


Fig. 13 Dudley's chart of Japan that incorporated multiple sources of knowledge, including those of the Portuguese, Japanese, Jesuit missionaries, and travelers, included in vol. 3 of the *Arcano* (Florence, 1647). (National Library of Finland).

a map by Portuguese Jesuit Luis Teixeira (1564–1604) published in Abraham Ortelius's *Theatrum Orbis Terrarum* in 1595. Since Teixeira's map represents a compilation based on Portuguese and Japanese information (*Simonova-Gudzenko, 2018:132*), Dudley's chart of Japan reflects transcultural exchange that arose at the intersection of Eastern and Western knowledge (Fig. 13). While the chart of Japan included in the atlas reflects knowledge from the late 16th century, the other version of the same chart that he included in the pilot book (Fig. 14) is additionally refined with the geographical knowledge from the letter of Sicilian Jesuit Girolamo de Angelis (1567–1623), written in 1621 (*Schütte, 1969: 43*).[28] To lend further credibility to his update, he included the entire Jesuit relation on

28 Interesting enough, Dudley had only Girolamo de Angelis's letter, not his map of Hokkaido (Yezo). The map which de Angelis drafted is missing the Italian printed version of the relation but was preserved with the Portuguese version of the text (*Schütte, 2008: 42*). See, Girolamo de Angelis, *Relatione del Regno di Iezo.* In *Relatione di alcune cose Cauate dalle lettere scritte ne gli anni 1619.1620. & 1621. dal Giappone ...* (Roma, 1'Erede di Bartolomeo Zannetti, 1624), pp. 217–232.

Fig. 14 Chart of Japan from Dudley's pilot guide updated with Jesuit relations by Girolamo de Angelis and other Dutch and Portuguese sources included in vol. 1 of the *Arcano* (Florence, 1646). (National Library of Finland).

Hokkaido (*Relazione del Gran Regno di Iezo*) in his pilot book (*Dudley, 1646: I: 217–232*). The difference he made between the chart intended for the pilot guide and the one for the atlas clearly confirms that he adapted the content to the audience, prioritizing navigators as those entitled to the most precise, up-to-date information.

Relying on many different sources, both textual and cartographic, and constantly updating with new data, placed Dudley in a difficult position. The production of charts became a long-term process in which already-drafted charts had to be updated and refined again and again. This painstaking process of constant refining of the sketches into the final product can be well traced thanks to the preserved manuscript originals of Dudley's charts. An extensive folder of manuscript charts in three volumes preserved in *Bayerische Staatsbibliothek*, Munich,

contains various states of his charts from which the printed charts included in Volume 3 of *Arcano* were derived.[29] The folder is roughly dated to 1636 based on Dudley's entry on the chart of the Orinoco, but it is certain that he began making his sketches years earlier, and he probably continued to revise them even after 1636.[30] Manuscript charts vary in format and scale, and served as a source material from which Dudley composed his final charts. Coverage and the scale of the manuscript and printed charts don't correspond, meaning that few sketches were sometimes compiled into one final chart.

Comparison of the preliminary manuscript drafts with the final printed versions of the charts testifies that Dudley was not satisfied with them and therefore refined and corrected them incessantly. Almost every folio with manuscript charts contains corrections, often revised multiple times. Corrected coordinate grid, coastlines that have been redrawn and filled with penciled annotations, revealing the author's self-criticism and his effort to improve his work. He was particularly concerned with the accurate determination of the coordinates and distances. Namely, compiling from sources of different provenance required additional effort to reconcile distances given in different units of measurement (e.g., Spanish to Italian leagues). Furthermore, the data were taken from charts of different cartographic projections; therefore, they should all be recalculated and converted to the Mercator projection.

The case of Corsica, Sardinia, and the Tyrrhenian Sea, regions no doubt well familiar to Dudley, illustrates well the production process. The first sketch shows the position of the islands within the broader geographical context (Fig. 15). The author found an error, so he adds the note that Cape Mele (Gulf of Genoa, south of Alassio) needs to be positioned westward of the Cape Rivela on Corsica, marking a circle where Mele needs to be replaced. Furthermore, he moves the position on

29 Bayerische Staatsbibliothek, Cod. Icon. 138, 139, 140, contain 407 sketches altogether. Cod. Icon 221, which refers to warfare architecture, contains no charts. According to the historical catalogue of the Bavarian library, the item originates from the library of the Florentine humanist Petrus Victorius (1499–1585) or his descendants (the family's coat of arms appears in Cod. Icon. 221). A possible previous owner is Alessandro Vettori (1586–1662), a jurist who served Ferdinand II. The manuscript was acquired by Elector Karl Theodor of the Palatinate around 1779 for the court library in Mannheim, and in 1782 was moved to Munich.

30 See Cod. Icon 140, folio 93: "il detto Duca [Dudley] è residente in Fiorenza adesso nel 1636 et è stato già 30 anni sotto la protezione dei Serenissimi Granduchi di Toscana".

Corsica and Sardinia farther north (mind the penciled lines along the north and south coasts of the islands). On the next sketch, he focuses only on the two islands in question, accomplishing their reposition towards east and north (Fig. 16). Finally, on the third sketch, he corrects the direction of the coastline of the Gulf of Genoa all the way to Livorno (Fig. 17). The final result is the chart of southern Corsica and Sardinia included in *Arcano* (Fig. 18) as well as the chart of the Tyrrhenian Sea with a significantly corrected outline of the Tuscan coast (Fig. 8). The same process of refinement can be traced in most of the charts, particularly those of the regions he found of interest to himself or to the Grand Duchy of Tuscany. At the same time, where interest was lacking, the chart was not refined but finalized from a first draft using a relatively outdated template. One such example is the depiction of the Adriatic. Presented on two charts (north and south Adriatic), the depictions rely on Gerhard Mercator's maps, published in the late 16th/early 17th century, which significantly predate the time *Arcano* was published (Fig. 19).[31]

Instead of a conclusion

Robert Dudley's legacy represents a fundamental contribution to the fields of geographical and maritime knowledge, art of navigation, and cartography. His ability to compile numerous sources of different provenance and form made *Dell'Arcano del mare* a monumental compendium of knowledge characterized by numerous innovations. Comparing manuscript charts at different stages with the final printed charts provides unique insight into the complex processes of knowledge production and the transfer of that knowledge into maritime charts with an innovative mathematical basis. The fact that he did not limit his sources to Dutch and British models but consulted a variety of textual and visual documents in his spatial studies, including manuscript maps, correspondence, original expedition maps, travelogues, and Jesuit relations, speaks volumes about his erudition, meticulous methods of refinement, and commitment to accuracy of knowledge. Furthermore, as his European templates also incorporated indigenous knowledge,

31 See, Carta particolare del mare Adriatico che comincia con capo di Ancona e finisce con l'Isola Lesina nello isteso mare; and Carta particolare del mare Mediterraneo che comincia con Civita Vecchia e finisce con il capo S. Maria in Calabria. A notable error on the North Adriatic chart involves confusing the names: Dalmatia is labeled as Slavonia, while Slavonia, located inland, is marked as Dalmatia. On the sketch that served as his template, another error appeared, so the hinterland of central Dalmatia is designated as Albania.

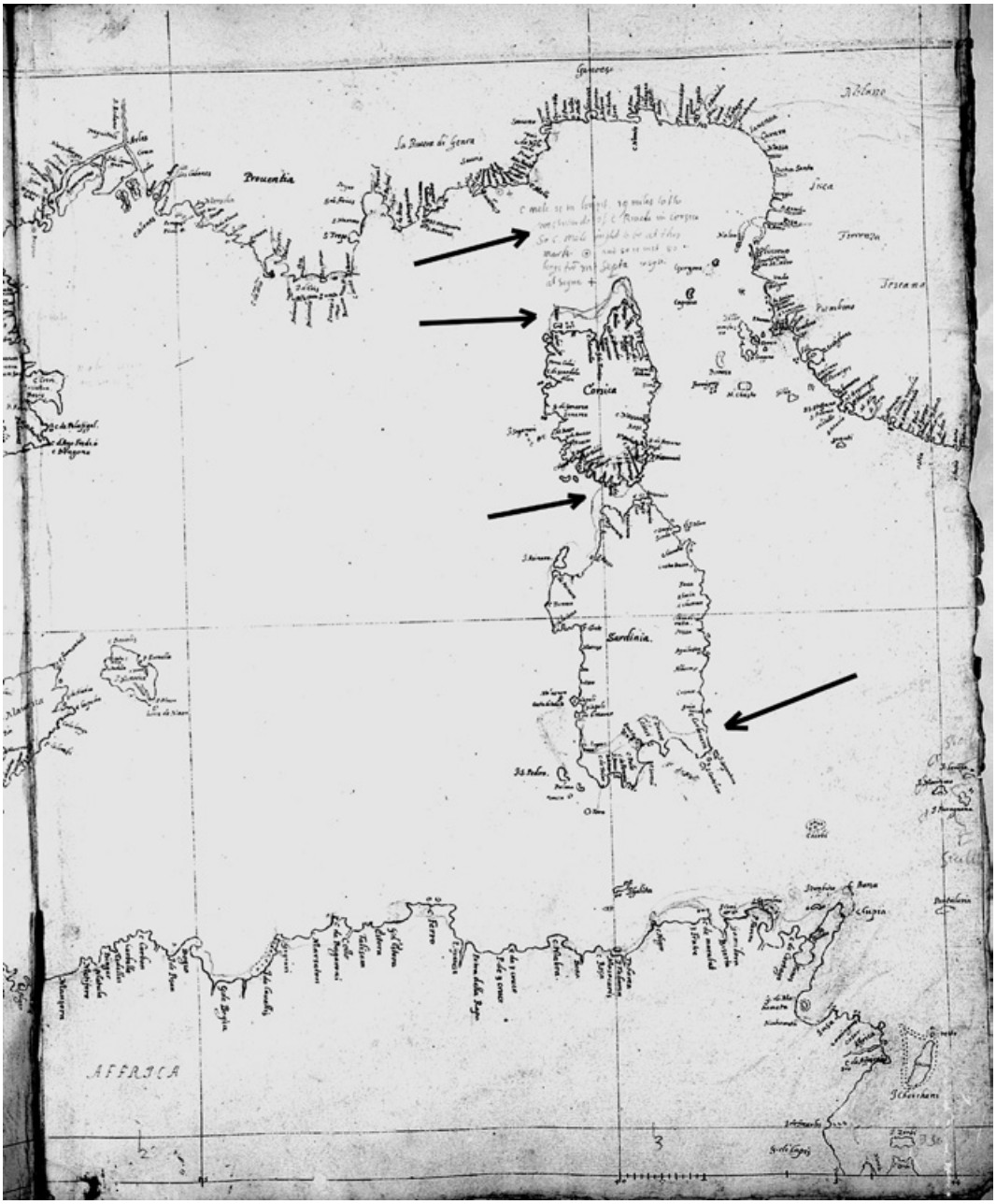


Fig. 15 Draft of the chart with annotations and corrections of the position of Corsica and Sardinia, as well as Cape Mela on the Gulf of Genoa. (Bayerische Staatsbibliothek, Cod. icon. 138, fol. 5r).

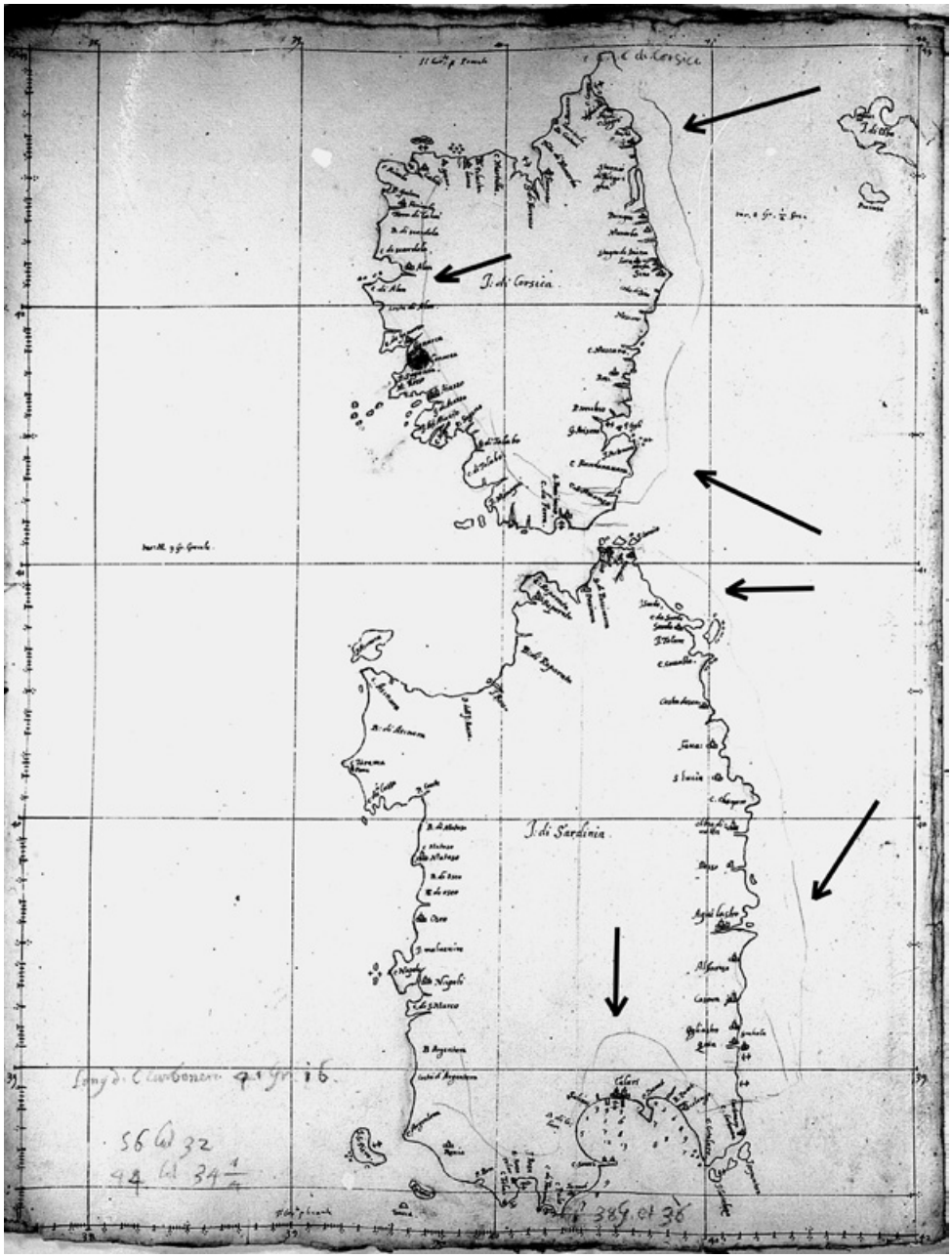


Fig. 16 Second state of the more detailed chart of Corsica and Sardinia with additional corrections by pencilled lines (replacement of the islands eastward and northward). (Bayerische Staatsbibliothek, Cod.icon. 138, fol. 8v).

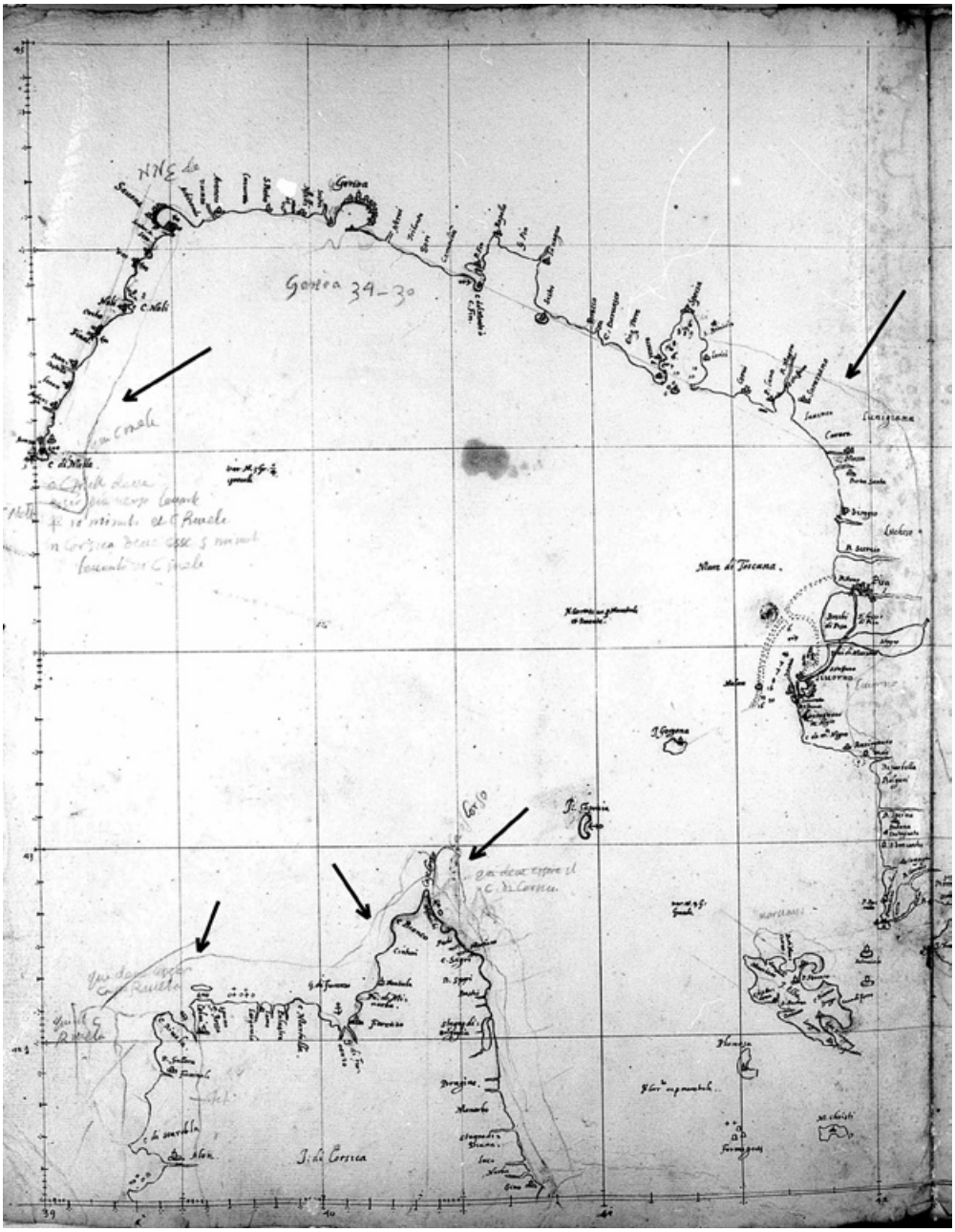


Fig. 17 Chart of northern Corsica and the Tyrrhenian Sea with a significantly corrected outline of the Tuscan and Ligurian coast and of northern Corsica. (Bayerische Staatsbibliothek, Cod.icon. 138, f. 17v).

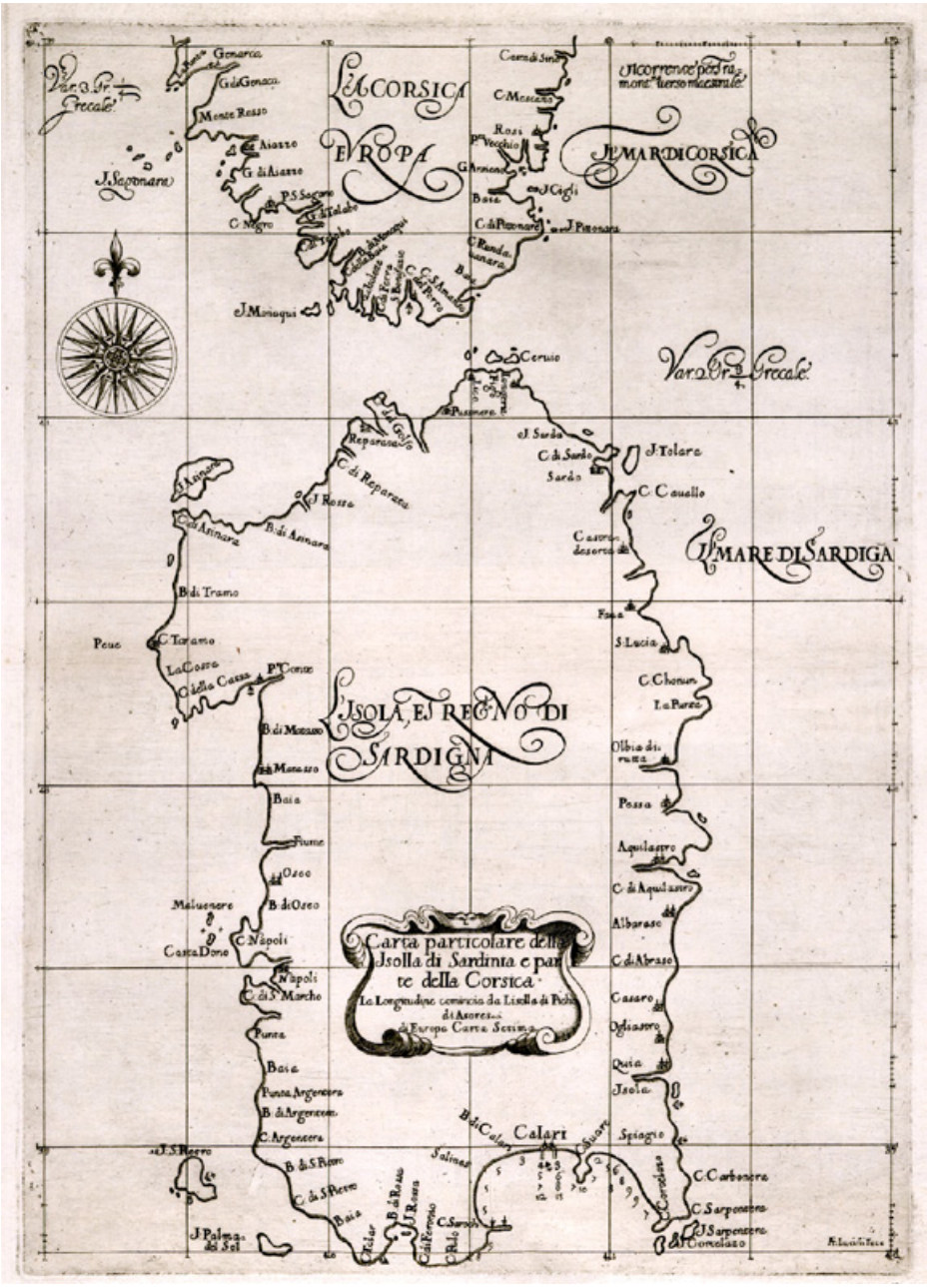


Fig. 18 The final state of the chart of Sardinia and southern Corsica with all the above-mentioned corrections implemented (Florence, 1647). (National Library of Finland).

Fig. 19 Chart of the northern portion of the Atlantic Sea based on Gerhard Mercator's already outdated templates (Florence, 1647). (National Library of Finland).

Dudley's charts reflect early modern transcultural knowledge exchange.

Dell'Arcano del mare, with its three parts covering navigational science, an atlas, and naval warfare and architecture, is organized to prioritize functional maritime knowledge for imperial expansion. Produced under the patronage of the Medici family, it aimed to provide technological and scientific knowledge for navigating and dominating the global sea routes. It also served as a symbolic claim to knowledge and, by extension, to power over distant territories, including those in Southeast Asia and the Americas. Its practical purpose of imperial expansion is most evident in the navigation guides and the instructions for shipbuilding and naval operations, making it a manual for conquering the sea.

Last but not least, it is interesting to look at Dudley's work in the context of the tradition of the Livorno school of cartography. Although the masters in Livorno remained faithful to the production of portolan charts, Robert Dudley's work resonated with his contemporaries in the main Tuscan port. This applies particularly to the work by Giovanni Battista Cavallini, a prominent representative of

the Livorno school.[32] His manuscript atlas *Teatro del Mondo Maritimo*, compiled in 1652, was strongly influenced by Dudley's work and by the appearance of the *Dell'Arcano del mare* in general.[33] His map of the Ligurian and Tyrrhenian Seas, although made as a portolan, strongly relied on Dudley's chart of the same region. The same applies to Pietro Cavallini, and particularly to his chart of the Aegean Sea (Livorno, 1688), which is clearly influenced by Dudley's template, yet with many more misconceptions (*Guarnieri, 1965: 50–52*).[34]

Robert Dudley's work had a profound influence on the Italian and European cartographic tradition by bridging the gap between traditional Mediterranean portolan techniques and modern scientific cartography. It marked a transition from Dutch maritime dominance to the incorporation of advanced English and Italian global knowledge in chartmaking, aligned with the contemporary Galilean climate and the *Academy of Cimento*, founded in Florence in 1657. His work remains a primary historical source for understanding 17th-century naval architecture and maritime science that revolutionized navigation and naval warfare. Its publication in Florence reflects both Tuscan ambitions to become a major imperial player and the continued importance of Italian cities as publishing hubs, even as the maritime trade centre shifted toward the Atlantic.

References:

Altić, Mirela (2023) "Cultural and Knowledge Exchange between Dubrovnik and Livorno at the Time of Ferdinando I de' Medici''. *Nuova Antologia Militare* 4: pp. 41–82.

Astengo, Corradino (2019) "Knowing the Mediterranean: The Cartographic Workshop in the Medicis' Leghorn''. In *Mediterranean Cartographic Stories in Seventeenth- and Eighteenth-Century Masterpieces from the Sylvia Ioannou Foundation*, edited by Panagiotis N. Doukellis. Nicosia: Sylvia Ioannou Foundation, pp. 25–36.

32 Giovanni Battista Cavallini, a Genoese cartographer who inherited the role of chartmaker for the Order of the Knights of Santo Stefano from Joan Oliva, a master of chart drawing, with whom he co-signed a chart in 1636. His earliest extant work dates from 1635 (an atlas with thirteen charts), while until 1656, he produced at least nineteen charts (sometimes co-signed with Pietro Cavallini) (*Vagon, 2019: 37–52*).

33 Teatro del Mondo Maritimo Conforme La Carta da Nauigare. Livorno, 1762. Istituto e Museo di Storia della Scienza, MED G.F 027.

34 Pietro Cavallini, probably a son of Giovanni Battista, with whom he co-signed an atlas in 1654, thus lightly indicating Pietro as a successor of Giovanni Battista. He was active in Livorno from 1654 to 1688. He continued to produce charts of the Order of San Stefano, yet his charts make a sharp decline in the Livorno chart tradition.

Blake, Hugo (2015) "Livorno and the British – some notes". In *Gran Bretagna e Italia tra Mediterraneo e Atlantico: Livorno: 'un porto inglese'/ Italy and Britain between Mediterranean and Atlantic Worlds: Leghorn: 'an English Port'*, edited by Hugo Blake. Archeologia Medievale 19, pp.17–29.

Bry, Theodore de (1596–1599) *America (Parts VI, VII). Collectiones peregrinationum in Indiam orientalem et Indiam occidentalem, XIII partibus comprehenso a Theodoro, Joan-Theodoro de Bry, et a Matheo Merian publicatae.* Francofurti.

Carletti, Francesco (1987) *Ragionamenti del mio viaggio intorno al mondo*, ed. Adele Dei. Milano: Mursia.

Ciano, Cesare (1987) *Roberto Dudley e la scienza del mare in Toscana*. Pisa: ETS Editrice.

Davies, Jonathan (2009) *Culture and Power: Tuscany and Its Universities 1537-1609.* Leiden: Brill.

D'Angelo, Michela (2004*) Mercanti inglesi a Livorno, 1573-1737 : alle origini di una "British Factory"*. Messina: Istituto di Studi Storici Gaetano Salvemini.

De Angelis, Girolamo (1624) "Relatione del Regno di Iezo". In *Relatione di alcune cose Cauate dalle lettere scritte ne gli anni 1619.1620. & 1621. dal Giappone ...* (Roma: 1'Erede di Bartolomeo Zannetti, pp. 217–232.

Dilke, O.A.W and Margaret S. Dilke (1982) "Sir Robert Dudley's Contribution to Cartography". *The Map Collector* 19: pp. 10–14.

Dudley, Robert (1643–1647) *Direttorio Marittimo di Don Roberto Dudleo Duca di Northumbria fatto p[er] ordine del Ser[enissimo]Gr: Duca di Toscana suo Sig[no]re e diviso in due Tomi et ogni Tomo in due libri co[n] suoi Capitoli.* Manuscript, 282 pages, foliated in pencil.

Dudley, Robert (1600) "The voyage of the honourable Gentleman M. Rober Dudley, now Knight to the Isle of Trinidad and the coast of Paria with his return home by the Isles of Granata, Santa Cruz, Sant Juan de Puerto Rico, Mona, Zacheo, the schoalds called Abreojos and the isle of Bermuda. Anno 1594&1595". In *The Principal Navigations, Voyages, Traffiques and Discoveries of the English Nation*, edited by Richard Hakluyt. London: George Bishop, Ralph Newberie and Robert Barker, II: pp. 574–578.

Dudley, Robert (1646–1647) *Dell'Arcano del mare di D. Ruberto Dudleo, Duca di Nortumbria e Conte di Warvich.* Fiorenza nella Stamperia di Francesco Onofri.

Dudley, Robert *(*1661) *Arcano del Mare di D. Ruberto Dudleo Duca di Nortumbria, e Conte di Warvich. Diviso in Libri Sei. Impressione Seconda Corretta & accresciuta, secondo l'Originale del medesimo Eccellentiss. Signor Duca che si conserua nella Libreria del Conuento di Firenze della Pace, de' Monaci di S. Bernardo dell'Ordine Fuliense. Con l'Indice de' Capitoli, e delle Figure, & Istruzione a' Librai per legarle*. In Fiorenza: Nella Nuova Stamperia, per Giuseppe Cocchini, All'Insegna della Stella. Ad istanza di Iacopo Bagnoni, & Antonfrancesco Lucini.

East India Company (1897*) List of factory records of the late East India Company: preserved in the Record Department of the India Office, London*. London: India Office.

Edwards, Edward (1868) *The Life of Sir Walter Ralegh based on Contemporary Doc-*

uments preserved in the Rolls House, Privy Council Office, Hatfield House, The British Museum, and Other Manuscript Repositories, British and Foreign, Vol. II, Letters. London, Macmillan.

Gilbert, William (1600). *De Magnete, Magnetisque Corporoibus, et de Magno Magnete Tellure: Physiologia noua, Plurimis & Argumentis, & Experimentis Demonstrata*. London: Peter Short.

Gristwood, Sarah (2007) *Elizabeth and Leicester: Power, Passion, Politics.* New York: Viking Adult.

Gellibrand, Henry (1635) *A Discourse Mathematical of the Variation of the Magneticall Needle, together with its admirable diminution lately discovered*. London: Printed by William Iones, dwelling in Red-crosse-street.

Guarnieri, Gino (1965) *La Scuola Livornese di Cartografia Nautica*. Pisa: Tipografia Editrice Giardini.

Guarnieri, Gino (1968) *La cartografia nautica dudleiana della scuola livornese: nella tecnica costruttiva e nel suo inquadramento storico: prima metà del sec. 17*. Livorno: Debatte.

Hale, Edward E. (1874) *Early maps of America; and a Note on Robert Dudley and the Arcano del Mare.* Worcester, Mass.: Printed by Charles Hamilton.

Hakluyt, Richard (1589) *The Principall Navigations, Voiages, and Discoveries of the English Nation.* London: Imprinted by George Bishop and Ralph Newberie, deputies to Christopher Barker, printer to the Queen's Most Excellent Majestie.

Hakluyt, Richard (1598–1600) *The Principal Navigations, Voiages, Traffiques and Discoueries of the English Nation*, 3 vols. London: G. Bishop, R. Newberie & R. Barker.

Jonkers, A.R.T. (2005) "Parallel Meridians: Diffusion and Change in Early-Modern Oceanic Reckoning''. In *Noord-Zuid in Oost-Indisch perspectief*, edited by Jan Parmentier. Zutphen: Walburg Pers, pp. 17–42.

Jonkers, A.R.T. (2008) "The Pursuit of Magnetic Shadows: The Formal-Empirical Dipole Field of Early-Modern Geomagnetism''. *Centaurus* 50/3: 254–289.

Leader, John Temple (1895) *Life of Sir Robert Dudley, Earl of Warwick and Duke of Northumberland*. Florence: G. Barbera.

Licini, Patrizia (2025) "Cultural Directions for the Adriatic Sea, or the Gulf of Venice". In *Early Modern Nautical Charts of the Adriatic Sea: Information Sources, Navigation Means, and Communication Media (NACHAS)*, edited by Josip Faričić and Tome Marelić, University of Zadar, Department of Geography, Springer Nature Singapore, Palgrave Macmillan, pp. 37–65.

Mirto, Alfonso (2017) "Rondinelli, Francesco''. In *Dizionario Biografico degli Italiani,* Vol. 88. Rome: Istituto dell'Enciclopedia Italiana.

Novati, Francesco (1930) *La storia e la stampa nella produzione popolare italiana: con un elenco topografico di tipografi e calcografi italiani che dal sec. XV al XVIII impressero storie e stampe popolari.* Bergamo: Istituto d'arti grafiche.

Raleigh, Walter (1596) *The Discovery of the Large, Rich and Beautiful Empire of Gui-*

ana. London: Robert Robinson.

Sanfilippo, Matteo (2008) *Gli Italiani in Brasile.* Viterbo: Edizioni Sette Città.

Schilder, Günter and Marco van EGMOND (2007) "Maritime Cartography in the Low Countries during the Renaissance". In *The History of Cartography, Volume 3: Cartography in the European Renaissance*, edited by David Woodward. Chicago: University of Chicago Press, 1384–1432.

Schutte, J.F. (1969) "Japanese Cartography at the Court of Florence; Robert Dudley's Maps of Japan, 1606-1636. *Imago Mundi* 23: pp. 29–58.

Simonova-Gudzenko, Ekatarina (2018) "Visual Representations of Japan in Early Portuguese Maps: The Case of the [Moreira]– Teixeira Map [Ortelius 1595]". In *History of Mathematical Sciences: Portugal and East Asia, V*, *Visual and Textual Representations in Exchanges Between Europe and East Asia 16th - 18th Centuries,* edited by Luís Saraiva and Catherine Jami. Singapore: World Scientific Publishing Co, pp. 119-136.

Ticozzi, Stefano (1830–1833) *Dizionario degli architetti, scultori, pittori, intagliatori in rame ed in pietra, coniatori di medaglie, musaicisti, niellatori, intarsiatori d'ogni etá e d'ogni nazione, 4 vols.* Milano: Gaetano Schiepatti.

Tyacke, Sarah (2007) "Chartmaking in England and Its Context, 1500–1660." In *History of Cartography, vol. 3, part 2: Cartography in the European Renaissance*, edited by David Woodward. Chicago: University of Chicago Press, pp. 1722–1753.

Tyacke, Sarah (2008) "Gabriel Tatton's Maritime Atlas of the East Indies, 1620-1621: Portsmouth Royal Naval Museum, Admiralty Library Manuscript, MSS 352". *Imago Mundi* 60/1: pp. 39–62.

Vagnon, Emmanuelle (2019) "Giovanni Battista Cavallini and the Tradition of Mediterranean Portolan Altases." In *Mediterranean Cartographic Stories in Seventeenth- and Eighteenth-Century Masterpieces from the in Sylvia Ioannou Foundation*, edited by Panagiotis N. Doukellis. Nicosia: Sylvia Ioannou Foundation, pp. 37–52.

Warner, George F. (ed)(1899) *The Voyage of Robert Dudley to the West Indies, 1594–1595, narrated by Capt. Wyatt, by himself and by Abraham Kendall, master*. London: The Hakluyt Society.

Woodward, David (2007) "The Italian Map Trade, 1480 –1650". In *History of Cartography, vol. 3, part 2: Cartography in the European Renaissance*, edited by David Woodward. Chicago: University of Chicago Press, pp. 773–803.

Wright, Edward (1599) *Certaine Errors in Navigation, arising either of the Ordinarie Erroneous Making or Vsing of the Sea Chart, Compasse, Crosse Staffe, and Tables of Declination of the Sunne, and Fixed Starres Detected and Corrected*. London: Valentine Simmes and W. White.

Wright, Edward (1610) *Certaine Errors in Navigation, Detected and Corrected By Edw: Wright. With many Additions that were not in the Former Edition as appeareth in the next pages.* London: F. Kingsto[n].

Johann Georg Ziesenis (1716-1776). Portrait of Friedrich the Great (1763).
Sans-Souci Palace. Wikimedia Commons

Storia Militare Moderna

Articoli / Articles - Military History

Recensioni