Manuscript peer review - Reviewer #2

Title	Classical Antiquity Origin of Spatial Data Underlying Portolan Charts: How Pietro Vesconte Might Have Assembled the *Carta Riccardiana* Utilising Maps in Marinus of Tyre's projection
Author	Tome Marelić
HGSS Reference	hgss-2026-2
Referee	Roel Nicolai

General comments

a) The article proposes an intriguing idea, as expressed in the title. Marinus of Tyre has been suggested by earlier writers as the source of the precise geographical data on medieval portolan charts, but no researcher ever made any attempt at substantiating this idea. The subject of the article is well within the remit of the Journal (HGSS).

b) The article is too long. The author should consider carefully whether its great length is in the reader's and his own best interest. The article contains an overly lengthy and, with respect to the subject of the article, largely irrelevant introduction with far too much background information: only at page 17 does the author begin to broach the subject proper. The detailed exposé on the origin of the mariner's compass is unneccessary, as is the long section that evaluates cartometric analysis models used by fellow researchers.

c) Apart from the above digressions, the author is neither succinct nor precise in his formulation: use of straightforward language is preferable over the, in places, cumbersome descriptions, with many unnecessary adjectives.

d) A fundamental flaw of a methodological nature persists throughout the article. The author focuses on demonstrating the correctness of his hypothesis. Thus, the article does not follow the hypothetico-deductive approach, which is the norm in science. The author places almost exclusive emphasis on supporting evidence that confirms his hypothesis, after which he concludes that the hypothesis has been "validated", in the sense of: proven to be correct.

e) Another methodological shortcoming of the article lies in its neglect of the historical context of the periods considered: supporting information is cited, but the larger context is ignored. Historical sources should be examined critically, not accepted at face value as evidence.

f) The article uses the term "plausibility" twice and the phrase "it is plausible" five times in relation to the testing of his hypothesis. Plausibility may have a role in science in the formulation of a hypothesis, but not in its testing; plausibility is not a criterion for drawing scientific conclusions.

g) This article lacks scientific rigour.

Specific comments

Nr	Lines	Comment
1	Title	"… How Pietro Vesconte might have assembled the *Carta Riccardiana* …" Attribution of the *Carta Riccardiana* to Pietro Vesconte is speculative, albeit not improbable. However, it is presented with a degree of certainty that is unwarranted, in the title and elsewhere in the article.
2	63	"The hypothesis is demonstrated …". A hypothesis can (and ought to) be tested, as a result of which it is either *corroborated* and retained as a hypothesis or it is *falsified*, after which it is rejected. It is not possible to *demonstrate*, *substantiate or validate* a hypothesis to indicate that it is correct or true. The last three words in italic are all used in the article in the sense of proving the hypothesis. This approach constitutes a logical fallacy, known as the *post hoc, ergo proper hoc* fallacy.
3	72	The author posits here that his lengthy introduction is "crucial for understanding the fundamental findings of this research". Although some introduction certainly will be required to provide the context for the research reported in the article, the detail with which e.g. the history of the compass is spelled out is not required to understand the main subject of the article.
4	91, 92	Petrus Peregrinus did not describe a compass "featuring a floating needle", but a compass, featuring a lodestone in a closed round box that floats in a larger bowl that is partially filled with water. His dry pivot compass did not have "a compass rose affixed to the base of the housing" but the cardinal directions (N, E, S, W) marked on the lid plus a subdivision into 360 degrees. This is sloppy formulation by the author.
5	130-379	This extensive description and review of cartometric methods used up to date goes considerably beyond what is required to understand the author's reasoning in the current article, despite the author's claim to the contrary (see comment 3).
6	249, 334-341, 343-350	The article should avoid negative criticism of fellow researchers' methods (Gaspar and Nicolai), especially when delivered without any supporting evidence. The author should limit himself to explaining the merits of his own analysis method used in this article and not claim shortcomings, whether real or imagined, of the methods used by fellow researchers, particularly as they are not, or only indirectly, linked to the subject of the article.
7	431-450	<u>Explicit testimonies of classic origins.</u> The author provides several 'testimonies' from medieval writers to support his claim of an antique origin of portolan charts, accepting these at face value without critical assessment of the historical context. Medieval man held Antiquity in great reverence, both in the Islamic and the Christian world. The statements by Cotrugli and Qutb al-Din al-Shirazi reveal that they were convinced portolan charts did not have their origin in their own time, which is about all that can be deduced from their statements.
8	447-449	The author cites his earlier work which he reported in a different article (Marelić 2025b), in which he described a novel and interesting interpretation of the portolan mile, placing its origin in Antiquity. However, the author's analysis in that article uses the same flawed reasoning, focused on confirmation, that he uses in the current article (see general comment d). While this does not necessarily invalidate his

		interpretation, the author should not present his idea as if it were a proven fact, which he does in the current article.
9	457	The properties of portolan charts for which the author attempts to provide a novel explanation are: 1. the approximately gradual increase of the counterclockwise tilt angles of the regional subcharts, going from west to east; 2. the approximately gradual increase in scale of the regional subcharts, going from west to east. The author posits that Pietro Vesconte initiated this with the *Carta Riccardiana*. However, the *Carta Riccardiana* is not the first portolan chart. Older charts exist (the Carte Pisane and possibly the Cortona chart) and have probably existed (the chart on which the *Liber de existencia riveriarum* (~1200-1230) was based). The author does not refer to the construction of those mosaic charts; he places undue emphasis on Pietro Vesconte as the originator of the mosaic form of portolan charts, thus ignoring an important timing issue. Other than the fact that the *Carta Riccardiana* was not the first mosaic chart, an issue the author omits to mention is the considerable variation in rotation angles and regional scale variations between portolan charts.
10	465	On Kelley's concept of a trilateration network: "This hypothesis has not undergone quantitative testing until this day". The author overlooks or is unaware of the fact that Kelley's idea was refuted by Nicolai (Nicolai 2014, pp 82-86).
11	489	"… a relative clockwise rotation of the Alboran Sea, positioning the area Gibraltar further north". The author needs to quantify this and explain its significance.
12	553-555 580	"7.2 A better geometrical fit to the projection of Marinus of Tyre" In this section the author claims that the subcharts of the *Carta Riccardiana* exhibit a better fit to a mid-latitude chart (equidistant cylindrical) than to the Mercator projection. This is puzzling. The two projections are nearly indistinguishable for portolan charts, as is expressed in Table 1 of the article (line 580) and was earlier shown by Nicolai (Nicolai 2014, pp 248-254). Nicolai made the same comparison but found the opposite: the RMSE values of all sub-areas of the *Carta Riccardiana* were *larger* for the fit to the equidistant cylindrical projection than for the Mercator projection (Nicolai 2014, 233-237). Whatever the reasons for this discrepancy may be, the categorical conclusion that the author's results "refute the anachronistic hypothesis that conformal cylindrical projection or something akin to it existed previous to the early modern period" is unwarranted.
13	586-587	The author proceeds to claim that his results are: "… critically significant as they tangibly indicate that portolan charts may be mosaics of regional maps or charts, whose geometries were well-established in classical antiquity and attributed to Marinus of Tyre …" It is enormous leap to go from the figures in Table 1 to the above claim; it is even completely unwarranted; many more conditions would need to be satisfied before such a conclusion can be drawn.
14	589-590	The author posits the availability of Ptolemaic maps to 13th and 14th century European cartographers. The reception of Ptolemy's *Geography* in 15th-century Europe is a subject extensively studied in the history of cartography and geography. Nothing in all these studies indicates that Ptolemaic maps might have been available to European

		cartographers in the early 14th century (or even earlier). An extraordinary claim as the author makes requires convincing evidence, but the author does not show any evidence at all. This is evidently unscientific. Science is an evidence-based knowledge-creation process and has no place for speculative claims.
15	605	The author states that Nicolai contends that distance travelled by a medieval sailing ship could not be reliably estimated "due to the absence of preserved records on the subject". This is incorrect. Nicolai's contention is based on an evaluation of the achievable accuracy of the measurement method for distance sailed proposed (even assumed) in many publications. The absence of preserved records is not *the reason* for Nicolai's contention.
16	611-613	Further misquoting, misreading or misunderstanding(?) of (Nicolai 2014) in the sentence indicated. Reconstruction of the hypothetical plane charting technique was *not* the reason for Nicolai's conclusion that the accuracy of portolan charts could not have been achieved with medieval navigation data. Instead, this was based on the accuracy analysis of a (geodetic) network consisting of compass directions and distances between coastal points, using as input optimistic estimates of achievable precision in the observations.
17	641-643	The starting point of the author's hypothesis is the assumption that late-medieval cartographers had access to accurate regional charts on Marinus of Tyre's equidistant cylindrical projection @36°, equipped with graticules. The author's hypothesis assumes that cartographers proceeded to make mid-latitude charts of these regional charts. This required an E-W compression of the region north of 36°N such that the ratio of the intervals of parallels and meridians was equal to their ratio at the mid-latitude of that region. The objections against this idea must begin by stating that latitude and longitude were not used, even unknown, as geographic concepts in the late Middle Ages. It is even the question whether late-medieval cartographers would have understood a graticule, let alone that they would immediately spot the shortcoming that the interval ratio of parallels and meridians at 36°N did not agree with what it had to be at the mid-latitude of the regional chart. The author's hypothesis further assumes that the cartographer somehow determined the mid-latitude of each region (by measurement or by estimating it from the assumed Ptolemaic map?). The next step in the hypothesis would be the cartographer noticing that the meridians of the regional charts no longer lined up. That could hardly have been a surprise to him, because he had just compressed the regional charts in the way described. The cartographer is now supposed to have had the brilliant idea that he should stretch the regional charts *equally in all directions* until the meridians line up again. As a result, he now would have had a set of regional charts that were nearly conformal but varied in scale due to the last scale enlargement. This process, according to the author's hypothesis, explains the regional scale variations on a portolan chart. The author wisely exempted the North-Atlantic region from the described process, because that would have conflicted spectacularly with his hypothesis: the hypothesis would have led to expect a considerable scale enlargement of that region, whereas on portolan charts its scale is much smaller than that of the Mediterranean. The fundamental problem with this part of the hypothesis is that it assumes a level of cartographic and geographic knowledge that a late-medieval cartographer cannot

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<tr><td></td><td></td><td>have possessed. It flies in the face of what we know about knowledge and capabilities in this period, ignoring the medieval context of the whole portolan chart problem.</td></tr>
<tr><td>18</td><td>645</td><td>“Subsections of the Carta Riccardiana exhibit a <u>superior alignment</u> with the cylindrical projection φ_0=36°”. See comment 12 above. This overstates the issue. The alignment is either marginally better or marginally worse than a fit with the Mercator projection.</td></tr>
<tr><td>19</td><td>669</td><td>Figure 7 illustrates the process described in comment 17. The question is: Does this agree with the best-fit figures calculated for the subcharts of the Carta Riccardiana? These figures ought to be listed in the article, but they are not. How can the author’s hypothesis be tested without these numbers?? I am therefore supplying the figures from my own analysis, of which the areas are defined slightly differently; however, it does permit comparison of the figures. I added the Dalorto chart (~1325) to show that other portolan charts may have very different scale differences.
<table>
<tr><th>Subarea</th><th>Article Fig. 7</th><th>Nicolai Carta Riccard.</th><th>Nicolai Dalorto chart</th></tr>
<tr><td>North Atlantic</td><td>0?</td><td>-2%</td><td>-24%</td></tr>
<tr><td>South Atlantic</td><td>0</td><td>-8%</td><td>-13%</td></tr>
<tr><td>Western Med</td><td>0</td><td>0</td><td>0</td></tr>
<tr><td>Upper West Med</td><td>8.9%</td><td>8%</td><td>10%</td></tr>
<tr><td>Central Med</td><td>0</td><td>Not evaluated</td><td>Not evaluated</td></tr>
<tr><td>Adriatic</td><td>10.6%</td><td>8%</td><td>-5%</td></tr>
<tr><td>East Med</td><td>0</td><td>1%</td><td>1%</td></tr>
<tr><td>Aegean</td><td>2.7%</td><td>16%</td><td>5%</td></tr>
<tr><td>Black Sea</td><td>12.5%</td><td>17%</td><td>17%</td></tr>
</table>
The key question is: are these numbers sufficiently similar to conclude with confidence that the author’s hypothesis can explain these scale differences? The author did not specify any objective criteria that would lead to rejection or acceptance of the hypothesis, but feels that “his hypothesis is substantiated” (line 659). I disagree.</td></tr>
<tr><td>20</td><td>676-689</td><td><u>The rotation angles of the subcharts – The Gibraltar meridian</u>
The first issue with this approach is the reorientation of Ptolemy’s world map such that the Gibraltar meridian is vertical. Why would this have been done? What would the special significance of this meridian have been to medieval cartographers and mariners? Would it not rather be expected that Vesconte (a Genoese) would have aligned the vertical with the meridian of Genoa?</td></tr>
<tr><td>21</td><td>676-689</td><td><u>The rotation angles of the subcharts – Agreement with portolan charts tilt</u>
Fortunately, the author does provide the rotation angles resulting from his cartometric analysis, as well as the rotation angles that would result if the subchart meridians were to be aligned with a map on Ptolemy’s first projection, viz. in Figure 8. Figure 8 makes immediately clear that if the rotations of the subcharts of the Carta Riccardiana were caused by aligning the grids of the available regional charts with Ptolemy’s map, the rotation angles would have been much larger than what is seen on portolan charts. Even without objective criteria for acceptance/rejection it is clear that this much too large and the author’s hypothesis would need to be rejected.</td></tr>
<tr><td>22</td><td>731-732</td><td>Clearly, the author is not prepared to give up his hypothesis yet.
He hypothesizes that the medieval cartographers must have concluded that these rotations were too large and deviated too much from the original regional maps with which they had started, so the author assumes that they arbitrarily halved the</td></tr>
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	756-757	rotation angles they obtained from Ptolemy's chart (approximately). This brings them very close to what we see on the *Carta Riccardiana* (and other portolan charts). (figure 10 top and bottom) The impression cannot be avoided that the author uses an *ad-hoc* argument of convenience here to rescue his hypothesis. This smacks of working the data until it fits the hypothesis. The scale and rotation figures that result from his hypothesis ought to have led to its rejection. Nevertheless, the author feels that his results "substantiate the proposed mechanics of the classical antiquity origin hypothesis with outstanding plausibility". It is unclear what it precisely means when a hypothesis is "substantiated with outstanding plausibility". See the general comments on hypothesis testing.
23	806-811 814-816	The author states that the main shortcoming of his proposed model (hypothesis) is the poorer longitudinal accuracy as compared to the latitudinal accuracy of Ptolemy's data and suggests this is caused by Ptolemy's underestimation of the earth's circumference, "resulting in exaggerated longitude values". Whilst the latter statement is correct, the author overlooks a far more important difference between Ptolemy's data and the geographic data on a portolan chart: a portolan chart's accuracy is much higher and its geographic detail much richer than Ptolemy's dataset, even if Ptolemy had used the correct earth dimensions. This is in the reviewer's opinion a much more significant shortcoming; he omits to mention the stark contrast between the accuracy of the geographic data in Ptolemy's dataset and portolan charts. How would the correspondingly accurate source data (or field data) have been measured in Antiquity?? How would Marinus (or a contemporary or earlier geographer) have converted this assumed data correctly to latitudes and longitudes? *"Ptolemy ungrudgingly acknowledges that the collection of geographical data presented in the* Geography *is substantially the work of Marinos of Tyre"* (Berggren and Jones, 2000, p. 23). How did portolan charts then obtain their much greater detail and higher geographic accuracy???
24	854	The author focuses exclusively on map projection issues and glosses over the issue of geographic data accuracy. He ignores the question on what observed field data "regional maps with high planimetric accuracy" in Antiquity might have been based and why the top geographers of the period did not use such valuable data. The exclusive focus on the "simpler" equidistant cylindrical projection is misleading. How would geographers (or whoever) in Antiquity have converted high-accuracy field data to a map on this projection? A direct conversion would be impossible, so the antique geographers would have to have computed a very dense dataset in latitudes and longitudes from the field data and then committed those to parchment using the equidistant cylindrical projection. This seems an unlikely scenario, but not mentioning it at all is an omission in the article.