

Evidence of Portolan Chart Loxodromic Geometry (the Example of the Adriatic Sea Basin)

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Abstract

The accuracy of portolan charts is incomparably superior to that of their closest medieval predecessors, known as *mappae mundi*. It has triggered several research projects, including this one, to determine their geometric properties compared to modern maps based on surveys and map projections. Cartometric analysis was conducted on a sample of 12 portolan charts from the late 13th to late 16th centuries. The spatial extent was limited to the Adriatic Sea basin. The selected portolan charts were treated as 'identical values', and each chart was compared to a modern map of the Adriatic Sea projected in 6 map projections, treated as 'referent values'. Geometric comparisons were based on calculations of errors (displacements) between triangulated irregular networks (TINs) superimposed over each referent map (6 referent TINs) and over each portolan chart (12 identical TINs). Superimposing TINs over maps and charts allowed not only calculations of positional errors between referent–identical point pairs, but also distance error and bearing error calculations between referent–identical line pairs. Additionally, both referent and identical TINs (representing a simplified geometry of the Adriatic Sea basin on maps and charts) were divided regionally using two criteria: a) north/central/south division, and b) coastal/cross-basin/mainland-island division.

The research results showed that mapping of the Adriatic Sea basin on portolan charts, in geometric terms, is most similar to modern maps projected using the Mercator projection. If, hypothetically, graticules were to be drawn on portolan charts, the convergence of meridians would not be shown, that is, the meridians would be drawn as straight parallel lines. Also, this analysis showed that cross-basin lines on portolan charts show relatively low and very standardized bearing error values for the entire Adriatic Sea basin, while distance errors increase incrementally in a south–north direction. This pattern of distortions is similar to that of the Mercator projection and implies that the geometry of portolan charts is, most probably, primarily loxodromic.

The research results presented here are part of the author's broader ongoing doctoral thesis research, entitled: *The Accuracy of Depictions of the Adriatic Sea on Portolan Charts*.

Keywords: portolan charts, loxodromic geometry, Adriatic Sea, cartometric analysis