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**Charting Newly Created Statehood: A Maritime Survey of the Adriatic by the  
Joint Forces of the Austro-Hungarian and Italian Hydrographic Offices**

P. 13-28

Mirela Altić

**Abstract**

The process of political and territorial unification of the Kingdom of Italy (1860) and Austria-Hungary (1867) highlighted the issues of territoriality both on land and at sea. As a part of that effort, a need of maritime survey of the Adriatic conducted by the joint forces of the Austro-Hungarian and Italian hydrographic offices appeared. The purpose of this endeavour was to enable the production of modern charts based on a comprehensive survey covering the whole sea surface area, from coast to coast. Under the supervision of Commander Tobias Ritter von Oesterreicher and Counter-Admiral Duke Antonio Imbert, the survey started in 1866 and, by the end of 1873, resulted in a general chart of the Adriatic, 4 course charts of the Adriatic Sea, 55 coastal charts as well as number of harbour plans. This paper presents an analysis of the course of the survey, its products as well as its impact on the subsequent cartography of the Adriatic Sea.

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**'I Will Open a Path into the Interior (of Africa), or Perish': David Livingstone and  
the Mapping of Africa**

P. 29-49

Elri Liebenberg

**Abstract**

Although David Livingstone came to southern Africa in 1840 as a medical missionary, he soon succumbed to the lure of geographical discovery. Between 1849 and his death in 1873 he travelled widely in south-central Africa and managed to irreversibly change the map of this part of the continent. Although much has been written about his character, adventures and travels, little has been said about the maps he compiled and even less about how he made those maps. This article is an attempt to elucidate this rather unknown facet of his legacy by referring to the instruments, methods and techniques he used to collect his data and the high premium he put on the accuracy of his observations. Attention is also given to his life-long friendship with HM Astronomer at the Cape, Sir Thomas Maclear to whom he regularly sent his observations to be checked and his occasionally tempestuous relationship with the official cartographer of the Royal Geographical Society, John Arrowsmith.

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**Detection of Pictorial Map Objects with Convolutional Neural Networks**

P. 50-68

Raimund Schnürer, René Sieber, Jost Schmid-Lanter, A. Cengiz Öztireli & Lorenz Hurni

**Abstract**

In this work, realistically drawn objects are identified on digital maps by convolutional neural networks. For the first two experiments, 6200 images were retrieved from Pinterest. While alternating image input options, two binary classifiers based on Xception and InceptionResNetV2 were trained to separate maps and pictorial maps. Results showed that the accuracy is 95–97% to distinguish maps from other images, whereas maps with pictorial objects are correctly classified at rates of 87–92%. For a third experiment, bounding boxes of 3200 sailing ships were annotated in historic maps from

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different digital libraries. Faster R-CNN and RetinaNet were compared to determine the box coordinates, while adjusting anchor scales and examining configurations for small objects. A resulting average precision of 32% was obtained for Faster R-CNN and of 36% for RetinaNet. Research outcomes are relevant for trawling map images on the Internet and for enhancing the advanced search of digital map catalogues.

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**Assessing Damage – Can the Crowd Interpret Colour and 3D Information?**

P. 69-82

Gaëlle Seffers, Julia Åhlén, Stefan Seipel & Kristien Ooms

**Abstract**

The goal of this study is to investigate how efficiently and effectively collapsed buildings – due to the occurrence of a disaster – can be localized by a general crowd. Two types of visualization parameters are evaluated in an online user study: (1) greyscale images (indicating height information) versus true colours; (2) variation in the vertical viewing angle (0°, 30° and 60°). Additionally, the influence of map use expertise on how the visualizations are interpreted, is investigated. The results indicate that the use of the greyscale image helps to locate collapsed buildings in an efficient and effective manner. The use of the viewing angle of 60° is the least appropriate. A person with a map use expertise will prefer the greyscale image over the colour image. To confirm the benefits of the use of three-dimensional visualizations and the use of the colour image, more research is needed.

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**Cartographic Design as Visual Storytelling: Synthesis and Review of Map-Based Narratives, Genres, and Tropes**

P. 83-114

Robert E. Roth

**Abstract**

In this article, I review considerations and techniques for approaching cartographic design as visual storytelling. Stories, like maps, are a method for documenting and explaining, for meaningfully abstracting our experiences, for communicating and sharing, and for asserting a particular worldview. I argue that visual storytelling offers an entry point for *hybridization* in cartography, uniting technology with praxis, product with process, and design with critique while opening rich new avenues for transdisciplinary research and design. I begin by introducing influences on map-based visual storytelling and review ten recurring themes that make visual storytelling different from traditional perspectives on cartographic design. I then offer three of potentially many ways to articulate and organize the design space for map-based visual storytelling: foundational *narrative* elements and their adaptation to geographic phenomena and processes, visual storytelling *genres* delineating different story experiences, and visual storytelling *tropes* used to advance narratives across text, maps, images, and other multimedia. I conclude with a call for future research on visual storytelling in cartography, including visual design, visual ethics, and visual literacy.

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