

William Christens-Barry, Equipose Imaging; Michael Toth, RB Toth Associates & Viðar Hreinsson, Icelandic Museum of Natural History.

Preliminary spectral imaging of an Early Icelandic map supports: Conservation & scholarship

As part of the Care and Conservation 16 Conference (C&C16), Bill Christens-Barry and Michael B. Toth arranged to demonstrate narrowband multispectral imaging techniques used to investigate cultural heritage materials. Matthew Driscoll provided textual materials for the conference demonstration. These were augmented by a bound manuscript from the 18th century Fabricius collection (Fabr. 150 kvart) in the Royal Danish Archives, which was transported to C&C16 by Erik Petersen to demonstrate spectral image capture and processing as used to support conservation and scholarship. The animal hide of the manuscript cover had become very dark, giving little indication of its original content.

This simplified demonstration of the technique took place in a lecture hall that could be adequately darkened. Numerous conference attendees viewed the image capture and subsequent processing used to extract data and information beyond that of standard photographic techniques. This multidisciplinary demonstration supported both conservation and scholarly interests. In addition to identifying the impact of environmental, handling and other issues related to the preservation of the object, the multispectral imaging also provided information about the original content for scholarly research.

Methods:

The book cover was imaged with the latest-generation narrowband multispectral imaging system used for studies of parchment, paints, inks and dyes. This system includes commercial-off-the-shelf hardware and software for digital image capture of high spectral and spatial resolution image sets. It is designed to simplify and automate much of the workflow involved in multispectral imaging of cultural heritage materials to support conservators and scholars.

The camera was mounted at nadir above the book cover on a fixed copy stand. Illumination was provided by LED light panels placed approximately 1 meter to the right and left of the camera lens axis, at approximately 45° from the horizontal. The LED's produced narrowband ultraviolet illumination at 370 nm and visible wavelengths at less than 700 nm, as well as infrared from 700 to 940 nm.

Multiple images of a single scene were sequentially captured using each of the 12 illumination wavelengths. Additional exposures using short wavelength UV and Blue LED illumination with camera filters allowed the capture of fluorescence emission images. Images were converted to TIFF format for image processing and archiving. This system has provided image data of use not only to scholars, but also to conservators and conservation scientists to assess an object's production techniques, storage and treatments, and the impact of environmental conditions.

Processing used ImageJ and associated Paleo Toolbox software. A series of processing operations known to be effective for the analysis of cultural heritage materials was implemented via this software and used to display existing images and newly generated processed images. These were stored with associated metadata using a standard archival structure.

Results and Discussion:

Initial processing of the images made clear that the cover was a map of great historical importance regarding the early history and culture of Iceland. The map was preserved as a cover for a manuscript in the Fabricius collection from the 18th century. The cover itself seems to be from the 17th century, the latest period of the vellum manuscript production in Iceland.

Based on scholarly inspection of captured and processed images, the following can already be stated: the map contains outlines of the Westfjords peninsula that resemble the bulk of the 17th century maps derived from a lost original believed to have been drawn by Bishop Guðbrandur Þorláksson, the oldest being that made by Ortelius in a supplement to his collection of maps from 1590. This initial assessment of the origins of this map and its content can now support conservation assessments of the current condition of the map and similar book covers to guide conservation care and preservation.

This is however not a copy of those maps since it is quite different in a number of details. The outlines of the Westfjords are similar, yet the Northern coastline is more “flat” - stretching almost east-west. Many details are much more accurate, there are additional place-names, and many of the now legible place-names are not on other 17th century maps.

Rev. Jón Halldórsson, who had lived a few years in Copenhagen, later wrote of Jón lærði (the Learned, 1574-1658), a well-known autodidact, poet, writer and healer, that: "Iceland sketched by him was at the Academy-library in Copenhagen". It is quite possible that this is the same map cited by Halldórsson. Jón the Learned had the skills, the opportunity, and had precedent in his prior work to be considered as a possible creator of the map.

This hypothesis is supported by previously-unseen text, drawings, and physical features made visible in images of the map. This map is thus a great find of extreme interest and a ground-breaking addition to the cartographic history of Iceland. Whether it is possible to underpin authorship or not, it is important to conduct a thorough investigation of the map in the context of 17th century mapping supported by codicological and historical research by conservators.

This paper discusses methods and procedures that can optimize the utility of images and data captured using multispectral imaging techniques in the context of preliminary findings from Fabr. 150 kvart. How these can advance scholarly and conservation goals is described in conjunction with this and related work pertaining to overall contextualization of the piece. This includes: clearer definition of geographic features; increased legibility and identification of place-names; handwriting analysis and identification of features linking this map to other contemporaneous maps and manuscripts; and analysis of the edges of the vellum sheet to assess whether it may have been part of a larger map and its relationship to other maps, accounts, and writings. Numerous conservation questions central to this study - condition, materials, fabrication and repair techniques, animal type, ink – are of interest in studies of a broad range of materials. The use of

multispectral imaging in supporting the goals of this specific project and those of broader conservation goals are discussed.