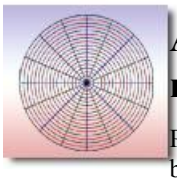
Spotlight on Optics

| HIGHLIGHTED ARTICLES FROM OSA JOURNALS



Accuracy of sun localization in the second step of sky-polarimetric Viking navigation for north determination: a planetarium experiment

Published in JOSA A, Vol. 31 Issue 7, pp.1645-1656 (2014)
by Alexandra Farkas, Dénes Száz, Ádám Egri, Miklós Blahó, András Barta, Dóra Nehéz, Balázs Bernáth, and Gábor Horváth

Source article Abstract | Full Text: XHTML | Full Text: PDF

Spotlight summary: Turn back the clock a millennium. Imagine you're a Viking at sea. You are sailing under a daytime sky so thick that the position of the sun cannot be seen by the naked eye. You are so far from any visible landmarks that the surrounds are homogeneous. How is navigation possible under such conditions, without a compass?

Viking optics may have been the answer. The hypothesis has been advanced that so-called "sunstones", made for example from a birefringent medium such as calcite, may have been used by the Vikings to determine the location of the sun in cloud-occluded conditions. The idea is that the sunstone, which is sensitive to the position-dependent polarization of sunlight across the sky, can be used to determine a pair of "celestial great circles" which both pass through the sun. The intersection of these circles then gives the position of the occluded sun, according to a theory of sky polarization developed by the ever-present Lord Rayleigh. Knowing the position of the sun, the Vikings could then determine the direction of the points of the compass, and hence get on with the business of navigation.

The accuracy of such a method for Viking navigation has not been previously investigated, a gap that is filled in the present paper. Farkas et al. study the accuracy of the hypothesized method for sun location, as a function of the season of the year and the position of the sun relative to the horizon. This is done using an experiment conducted by a number of volunteers, in a planetarium. The authors demonstrate that the errors, of the "intersecting great circles" step of the hypothesized method for Viking navigation, are sufficiently small for this method of navigation to have been feasible.
This paper is a lovely fusion of optics with history, adding an important finding to an extremely interesting historical debate regarding Viking navigation. I warmly recommend this paper to your attention.

--David Paganin

Technical Division: Vision and Color
ToC Category: Vision, Color, and Visual Optics
OCIS Codes: (000.4930) General : Other topics of general interest
(010.1290) Atmospheric and oceanic optics : Atmospheric optics
(260.1180) Physical optics : Crystal optics
(260.5430) Physical optics : Polarization
(330.5510) Vision, color, and visual optics : Psychophysics
(330.7321) Vision, color, and visual optics : Vision coupled optical systems

Posted on August 26, 2014

Add Comment
You must log in to add comments.
© Copyright 2014 The Optical Society
All Rights Reserved | Privacy Statement | Terms of Use
RSS