Interactive map projections and distortion.

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Abstract

We introduce several new methods for visualizing map projections and their associated distortions. These methods are embodied in the Interactive Map Projections system which allows users to view a representation of the Earth simultaneously as a sphere and as a projection with the ability to interact with both images. The relationship between the globe and the projection is enhanced by the use of explicit visualization of the intermediate developable geometric shapes used in the projection. A tool is built on top of the Interactive Map Projections system that provides a new method of visualizing map projection distortion. The central idea is one or more floating rings on the globe that can be interactively positioned and scaled. As the rings are manipulated on the globe, the corresponding projection of the rings are distorted using the same map projection parameters. This method is applied to study areal and angular distortion and is particularly useful when analyzing large geographical extents (such as in global climate studies) where distortions are significant, as well as visualizations for which information is geo-referenced and perhaps scaled to the underlying map. The floating ring tool is further enhanced to study 3D data sets placed over or under map projections. Examples

include atmospheric and oceanographic data, respectively. Here, the ring is extended into a cone with apex at the center of the sphere and emanating beyond the surface into the atmosphere. It serves as a reminder that distortion exists in maps and data overlayed over maps, and provides information about the degree, location, and type of distortion.

Keywords

Interactive cartography; Animated cartography; Map projections; Distortion; Visualization

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â˜†   Code and colour images available at http://www.cse.ucsc.edu/research/avis/map.html.

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