Conformal map projections are no longer essential for surveying, engineering, and mapping.

I have attempted to keep readers informed as to what I see coming up in the future. I am not attempting to persuade you to my point of view, but you deserve to be aware of same.

With regard to continued use of map projections, I remained convinced that the broader spatial data user community will benefit from using a common 3-D global spatial data model (GSDM). In my opinion, surveyors are best equipped to provide leadership to society in the use of 3-D digital spatial data. Yes, you are undoubtedly aware of past articles (even books) I've written on same, but here is the latest.

I have been a fan and user of conformal projections since my exposure to them by Ralph Moore Berry at the University of Michigan. And, as you probably know, the Michigan elevated system was the focus of my MS thesis at Purdue in 1980. The conclusion in the thesis was that, with enhanced computational capacity, greater professional awareness, and advantages of "standard" procedures, the benefits of using that elevated system were diminished. For NAD 83, NGS returned the reference surface in Michigan to the ellipsoid.

Subsequently, the elevated reference surface projections have become known as low-distortion projections (LDPs). I remain convinced of the benefits of LDPs if used properly by knowledgeable professionals. In the past 15 years NGS and others (e.g., Wisconsin) have done an outstanding job of coaching the user community in proper use of LDPs.

But, as you know, I have become less enamored with LDPs for the following reasons. . .

1. Map projections are strictly 2-D mathematical models while the user community routinely works with 3-D digital spatial data.
2. Map projections were designed to accommodate conditions no longer critical.
    a. The Mercator projection enabled a ship captain to sail constant bearing to a distant port.
    b. Given the impossibility of portraying a curved surface on a flat map without distortion, a conformal projection ensures that distance distortion at a given point is azimuth independent.
3. Although the geometrical integrity of an LDP is assured by using impressive algorithms, the mathematical complexity of equations (e.g., Cauchy-Reimann equations) is an obstacle to some.
4. If a better model was not available, I would happily continue to support and use LDPs.
5. The 3-D global spatial data model (GSDM) offers many benefits attractive to the user community because computations are performed in 3-D space – there is no distance distortion! The GSDM is global, the algorithms are less complex, and geometrical integrity is preserved by using a 3-D model for 3-D data.

More recently I've been introduced to voxels and digital twins. I was delighted to learn, in each case, that they are compatible with the geometry of and use with the GSDM.

Particularly, I'm happy to share the following links for whatever benefit you may get from them.

www.globalcogo.com/Ball-Game.pdf.
www.globalcogo.com/GSDM-and-DT.pdf.

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