An Alternative to Conformal Mapping

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Published in 1569, Mercator's World Map contained parallel spacing that permitted a ship captain to sail port-to-port on a constant bearing. Some 450 years later, that feature is the basis of a conformal map projection and was formalized mathematically by the Cauchy-Riemann differential equations. Conformal map projections are used extensively to meet the challenge of mapping a curved Earth on a flat map. The angles on the ground are unchanged on the map and the unavoidable distance distortions are controlled by limiting the aerial extent of a projection – now popularly known as low-distortion projections (LDPs). The National Geodetic Survey (NGS), in conjunction with users throughout the United States has designed a series of map projections (including LDPs) to be used with the State Plane Coordinate System of 2022 - https://beta.ngs.noaa.gov/SPCS/. The NGS is to be commended for engaging the user community and for responding to preferences developed since the state plane coordinate systems were first designed in 1933. Many will use the SPSC2022 beneficially in numerous applications.

However, the convergence of abstraction/technology/policy/practice as driven by the digital revolution leads to an alternative that, for whatever reason, may be attractive to many users. Details of the abstraction process are discussed in the first article below. Issues of policy are covered in the second article and practice is covered in the third article.

Abstraction:	http://www.globalcogo.com/3D-Model.pdf
Policy:	http://www.globalcogo.com/GIS-Evolution.pdf
Practice:	http://www.globalcogo.com/GIS-Directly.pdf

In short, the Global Spatial Data Model (GSDM), http://www.globalcogo.com/gsdmdefn.pdf, provides many advantages to the user, including:

- Less complicated than conformal mapping, the GSDM equations are all in the public domain.
- Because computations are performed in 3D space, there is no horizontal distance distortion.
- Bearings on a plat will be different if different Points-of-Beginning (P.O.B.s) are used but the angles on the map are the same as the angles on the ground – even when using rigorous geodetic inverse computations – both forward and reverse.

The practice paper above deals primarily with 2D horizontal. A subsequent article will focus on the third dimension. Various benefits are available there as well – stay tuned.