Re-projecting Raster Data of Global Extent

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ABSTRACT

Scientists routinely accomplish small-scale geospatial modeling using raster datasets of global extent. These data are often cast on different projections and need to be reprojected to a common map base to accomplish a given study. The distortion characteristics of the map projection transformations can have significant effects on modeling results, as can the resampling operations applied to the data. Some global raster datasets are not continuous data, but are categorical data that don't resample cleanly – resulting in the common use of Nearest Neighbor resampling. Furthermore, distortions in reprojection of global data can be much greater than those in larger-scale, localized areas. This can result in errors in the reprojected data, but also can exceed the limits of traditional algorithms causing software that was designed for large-scale, local-area data to malfunction when used with datasets of global extent. Previous studies have tabulated the accuracy of categorical areas in projected raster datasets of global extent and showed a dependence on resolution with errors among equal-area projections ranging between 2 and 20 percent. These studies also demonstrated a new method for resampling categorical datasets designed to reduce these errors. The procedures used to reproject raster data of global extent are similar to those used in large-scale, local-area mapping with some notable exceptions. Methods for framing of the transformation space, direct point-to-point transformations rather than gridded transformation spaces, a solution to the wrap-around problem, and an approach to alternative resampling methods are presented here. These concepts are implemented in a freely available set of software called MapImg, which handles the reprojection of global datasets on a variety of computer architectures.

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