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Final Abstract

Minimizing Data-Loss Using Alternative Hillshading Techniques

Hillshading, or shaded relief, is a cartographic visualization technique used to display the illumination and shadows of a digital elevation or surface model based on the azimuth (angular direction of light source) and altitude (angle of illumination) of a hypothetical source of light. Industry standard GIS software such as ArcGIS can render hillshades on-the-fly as well as being able to render and save hillshades to share. In newer versions of ArcGIS, the developers added the ability to model shadows when rendering hillshades. Unfortunately, the user is not given fine control of lighting and surface material properties in ArcGIS. As a result, the rendered hillshades often appear glossy and, depending on the surface, detail in heavily shaded areas is almost completely lost. For this project I have chosen to explore an alternative route generating hillshades in Blender, a free and open-source 3D rendering software. Through this method the user has much finer control over the lighting and surface material properties. Using a subdivided plane, a 3D surface can be displaced using the brightness levels of a digital elevation or surface model, its surface can be made diffuse (as opposed to glossy), and the scene can be lit using one or more light sources. For this project I have focused on two areas: Downtown Portland, Oregon, and Whistler's Bend Park outside of Glide, Oregon. For each scene I have used two light sources: one with an azimuth of 315° and altitude of 45° (facing diagonally down), and another weaker light with an altitude of 0° (facing straight down). The added light and additional options allow for a scene with a more realistically diffuse surface and less loss of data in especially dark/shaded areas.