

ShadedReliefArchive.com — a digital repository for cartographic relief art

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Introduction

ShadedReliefArchive.com is a non-profit website dedicated to preserving shaded relief—the familiar map art that depicts terrain with varying light and dark tones. The focus is on handcrafted shaded relief created in the twentieth century before the advent of the digital era. Many of these artistic works are beautiful and worth saving for future generations.

Our project is in a race against time. As cartographic organizations turn to digital production, move to smaller facilities, or go out of business, they are discarding or destroying manually produced shaded reliefs. For example, the idea for the Shaded Relief Archive website began with a phone call from Herwig G. Schutzler, the retired manager of a mapmaking firm in the U.S. Schutzler was in possession of a large collection of shaded relief art produced by his former employer, now out of business, which he intercepted before they went to the dump. His art was scanned and placed online on what was to become ShadedReliefArchive.com.

The website has since grown to include more than 200 shaded reliefs created by more than a dozen artists in a wide variety of styles. Visitors to the site can peruse high-resolution scans of the relief art and their metadata. The website goes one step further, however, by offering production-ready hand-drawn reliefs that today's cartographers can use in a digital workflow for creating their own maps (Fig. 1).

ShadedReliefArchive.com differs in this respect from other mapping websites in that it offers vintage maps for purposes other than general viewing or historical research. Like a venerable old building retrofitted as a modern office, one way to preserve a hand-drawn shaded relief is to keep using it for making maps. Digital technology, which hastened the demise of handcrafted relief art, can also help preserve it.

Digitizing shaded reliefs is only part of the preservation effort. At Shaded Relief Archive we encourage those who donate shaded relief scans to also preserve the originals. In the case of Herwig G. Schutzler, who worked for Cartographic Services, the defunct mapmaking division of R.R. Donnelley & Sons, the originals were donated to the U.S. Library of Congress for permanent safekeeping. Not all mapmaking firms are so generous and farsighted, as we will discuss later in the paper.



Figure 1. A manual shaded relief of Europe painted by Kenneth Townsend, USA, circa 1985. The coastlines and rivers derive from modern digital data.

What is shaded relief?

Readers of this magazine have no doubt used maps containing shaded relief. One often sees shaded relief on maps showing a variety of thematic information—from airline routes to climate data to the extent

of ancient empires. What is less well known, however, is its purpose on maps and how cartographers produced it by hand.

Shaded relief is a graphical technique for representing terrain on maps with smoothly modulated light and shadows. When skillfully drawn, it gives readers a realistic, quasi-three dimensional impression of the landscape as viewed from directly above. Most shaded relief depicts mountain regions with upward projecting terrain (Fig. 2), but the technique also applies to plateau and canyon regions with “inverted” terrain (Fig. 3).



Figure 2. The Jura and Lake Neuchâtel, Switzerland, by Regula Spiess, 2001. Note the presence of blue shaded relief in the lakes.



Figure 3. Shaded relief of Grand Canyon, Arizona, by Bill von Allmen, 1983.

Shaded relief has advantages over other traditional types of relief depiction, such as hachures and contours. General audiences who may lack map reading ability can easily understand it. When printed lightly, shaded relief still depicts topography vividly without interfering much with other map elements.

Most shaded relief uses an assumed illumination source in the upper left, or northwest on north-oriented maps. Light from this direction places shadows on southeast facing slopes. It is a mapmaking convention that ignores the fact that the sun rarely shines from the northwest in the northern hemisphere except for briefly around the time of summer solstice. Graphical considerations are the reason for this decision. Light from the opposite direction (lower right) often results in relief inversion, a problem where the up and downs of the terrain are inverted by the human eye, resulting in mountains that look like valleys, and vice versa (Imhof, 1982).

Cartographers working manually used a variety of techniques to apply tones to shaded relief, including airbrush, paint, graphite pencil, and smudge sticks (Tóth, 2010; Jenny and Räber, 2002). They drew on dimensionally stable media, such as drafting film, art board, and paper mounted on aluminum plates, to ensure that the shaded relief would

precisely align with drainages and mountain peak symbols on the map. References for drawing large-scale reliefs were typically topographic maps with contour lines. At smaller scales, such as a map of an entire continent, base maps with drainages, spot elevations, and elevation tints were preferred. For example, at the National Geographic Society, the primary reference for small-scale relief shading was the meticulously detailed *Atlas Mira*, published in Russian.

Perhaps the most impressive manual shaded reliefs were created in the mid-to-late twentieth century just before digital production exploded in popularity, a revolution that almost extinguished this craft. Notable relief artists from this era include Tibor Tóth at National Geographic Society in the US (Tóth, 2010); Eduard Imhof at ETH Zurich, Switzerland (Turconi and Imhof, n.d.); and Pyotr Alekseyevich Skvortsov at Moscow State University, Russia (Losyakov and Kovalyova, 2009). These artists and their talented contemporaries created relief depictions that were more than just mechanical elements for making maps. Their best work is suitable for display on art gallery walls. The impressionistic forms and softly blended colors of shaded relief attract the attention of readers. Depending on the landscape and the artist, the light and shadows of a shaded relief can have a mesmerizing effect. The reader's eyes can't help but dance from place to place over the art as it reveals tantalizing secrets about the land. The most successful reliefs are those that manage to pictorially represent a geographic place in our minds. For example, many of us envision the Urals not as pleasant forest-covered mountains, but as an embossed ridge on a map separating Europe and Asia (Fig. 1).

Digital vs. Manual Relief

Few cartographers today create shaded relief by hand because of the ease in which it can now be produced digitally (Patterson, 2002). For example, a shaded relief that might have taken one month to draw by hand now requires only minutes to produce on a computer using digital terrain models and specialized software.

Given how easy and inexpensive digital relief is to make, and its high accuracy, why then should we care about preserving manual relief art? The first reason has been touched on already: they are often beautiful

and an important part of our recent cartographic history. Museums see fit to preserve everything from antiquated manufacturing equipment to prehistoric villages, so why not relief art? The second reason will appeal to the more practical minded: hand-drawn shaded relief still has production value for contemporary cartographers. Scans of these reliefs apply well to digital mapmaking after they are georeferenced—a technique that assigns cartographic projection and location information.

Compared to digital shaded relief with its high accuracy and great detail, manual relief is more generalized. That is, major landforms are accentuated, characteristic terrain features are emphasized, and only a selection of important small forms is represented. As counterintuitive as it first may seem, generalization has an advantage for small-scale relief presentation as it avoids the problem of too much detail, which can confuse the reader. The sparser detail of a handmade relief depicts large landforms more clearly (Fig. 4).

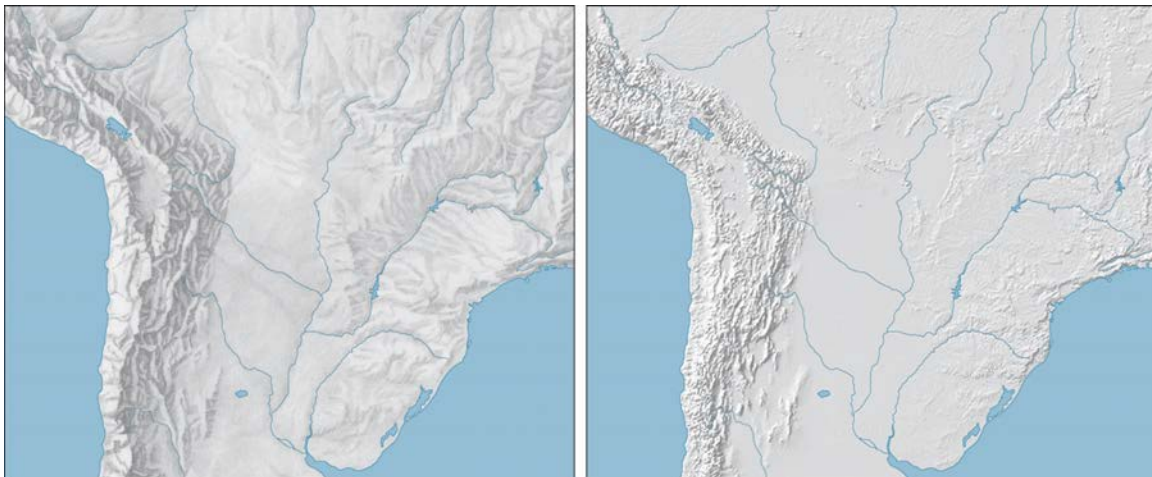


Figure 4. The central Andes depicted with manual shaded relief by Herwig G. Schutzler (left) and digital shaded relief (right). The geophysical structure of the terrain is more clearly shown in the manual relief.

It is the human touch that makes the difference. Artists continually evaluate where to draw light and shadows when depicting landforms in order to create a relief that they can easily visualize, which also benefits readers. Because adding terrain detail by hand is laborious, the tendency is to draw generalized shaded relief. This is in contrast with digital shaded relief where removing excess detail is a time-consuming task. The cartographic research undertaken to solve the problem of

digital relief generalization has yielded only partially satisfactory results. Achieving results that look similar to the best hand-drawn shaded relief is the goal of this effort (Leonowicz, et al. 2010).

Style is another differentiating factor between digital and manual shaded relief. Commercial relief shading software without exception yields products with a monotonously homogenized appearance. Today, a shaded relief created by a Russian cartographer will look no different than a relief created by someone, say, in Indonesia. In complete contrast, manual relief art exhibits a wide diversity of styles reflecting on the artist who created it (Fig 5). No two people draw shaded relief the same way. Consequently, cartographic organizations wanting to maintain a house style would have apprentices train under experienced artists for many years. Nevertheless, those with a trained eye can differentiate between the works of relief artists within an organization.

Creating shaded relief with manual tools requires a unique combination of skills, including the ability to read and interpret contour maps, artistic talent, a penchant for detail, and patience. Only a small minority of cartographers during the manual era could draw a shaded relief worthy of praise. It also must be said that producing fine art was not the intent of all shaded reliefs. Some are no more than crude smudges to serve as a lightly printing background on maps where the terrain was of tertiary importance, such as many road maps.

Some of the most admired shaded reliefs are those that combine hill shading with natural colors representing vegetation or land cover (Patterson and Kelso, 2004) (Fig. 1 and 6). More typically shaded relief was drawn with monochromatic pigments and reproduced photo mechanically, sometimes in elaborate color combinations such as those found on Swiss topographic maps (Imhof, 1982; Jenny and Hurni, 2006). More commonly, shaded relief was printed with light gray or brown inks. Combining shaded relief with elevation tints was another popular use.

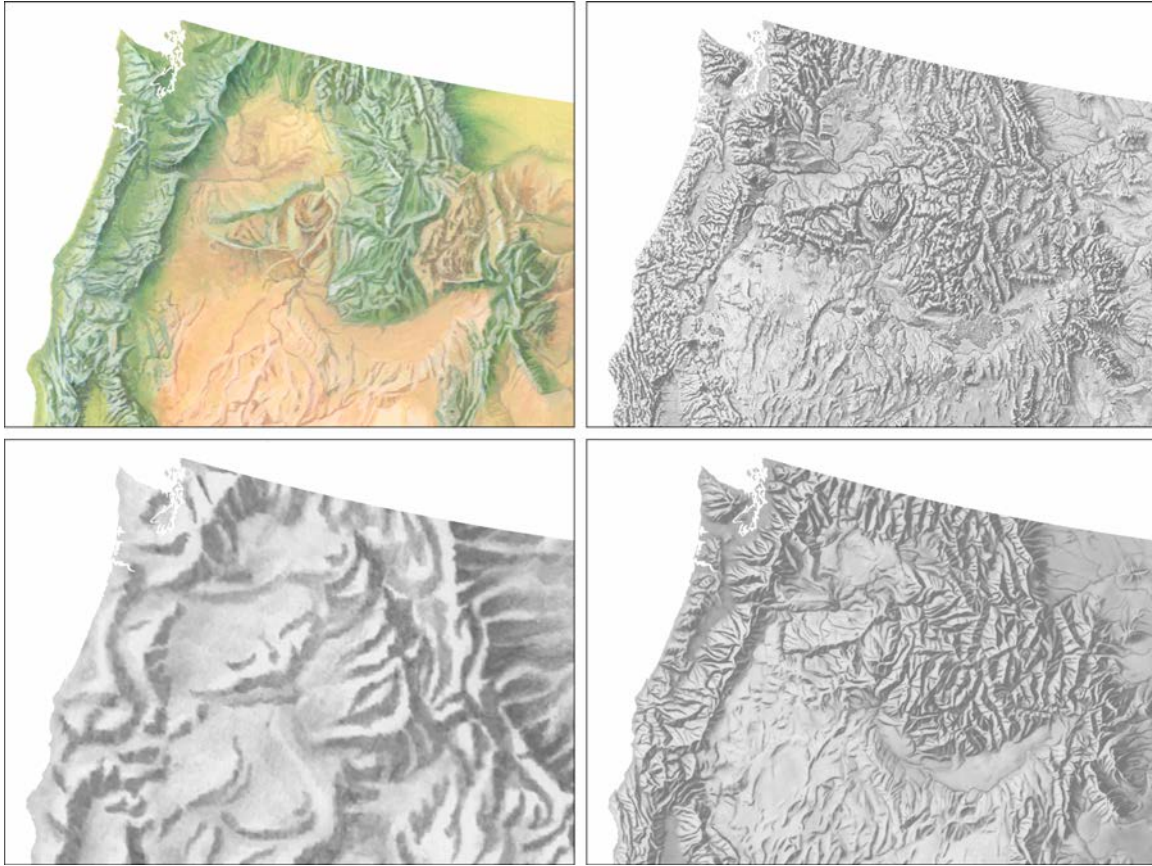


Figure 5. Shaded relief art of the northwestern US reflects the styles of different artists. Clockwise from upper left: Kenneth Townsend, Richard Edes Harrison, Herwig G. Schutzler, and Ellen Kuzdro.

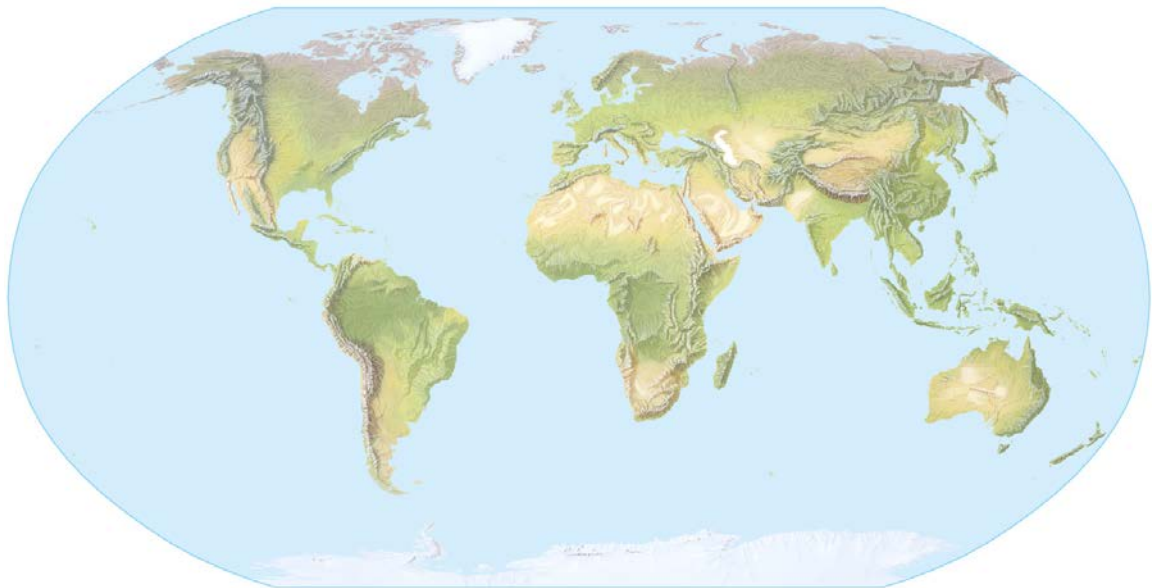


Figure 6. The world painted in color by Kenneth Townsend, USA, date not known.

The Shaded Relief Archive website

Since the initial donation of R.R. Donnelley shaded reliefs by Schutzler, the Shaded Relief Archive website has grown in popularity and size. The site in a typical month has 1,000 to 2,000 visitors who download up to 10 GBytes of data. The most numerous holdings are the 131 U.S. National Park Service reliefs and 75 pieces obtained from R.R. Donnelley. Most of the artists are from Switzerland and the U.S., which is largely a reflection of the nationality of the authors (Fig. 7).

The reliefs are scanned at high-resolution (200 to 400 DPI) and saved in TIF file format. Many are also georeferenced and saved in the Geospatial TIF format for compatibility with mapping and GIS software. That the geospatial Tiffs are also adjusted to fit the vector river and coastline data available at NaturalEarthData.com makes them even easier to use by contemporary mapmakers. These adjustments are a compromise, however, in that the scanned relief art is no longer identical to the originals. The original physical art is still available at various institutions that the website documents.

Scanning shaded relief art that is often heavy and over a meter in length can present logistical challenges. Often the relief is one place and a suitable scanner in another, which necessitates transport. Testing the scanners is necessary to determine if they can scan large reliefs with minimal dimensional skewing, true colors, and adequate tonal balance. Before scanning occurs, the relief is detached from its protective cover and back mounting material, often thick cardboard secured with a resinous tape that requires cleaning. And afterwards the entire relief package is put back together again.



Figure 7. Switzerland by Heinz Leuzinger. This piece typifies the relief shading style practiced in that country.

Before accessioning a relief to the Shaded Relief Archive website, the owner must agree to liberal terms of use. For example, shaded relief produced by the U.S. government is considered in the public domain and is free for anyone to use any way they want. Private individuals and companies prefer to grant permission for others to use their art provided that appropriate credit is given. The Shaded Relief Archive website documents the provenance of all shaded reliefs and their terms of use.

Copyright and ownership issues have prevented numerous shaded reliefs by famous artists from coming to Shaded Relief Archive. Companies for obvious reasons are not keen to donate reliefs that others might benefit from financially, even when they have no use for it themselves. In one extreme case a company that will remain unnamed decided to abandon their entire collection of manual shaded reliefs instead of having them saved for posterity. As disappointing as this

decision was, the legal owners of the art were entitled to do whatever they wanted with it.

The Shaded Relief Archive website continues to grow, being mindful to only accept high-quality reliefs of value to future generations. Negotiations to accession several dozen shaded relief scans from various sources are currently underway. Another goal is to represent a greater diversity of relief artists worldwide. For example, the superb shaded reliefs produced by Pyotr Alekseyevich Skvortsov of the Moscow State University of Geodesy and Cartography (MIIGAiK), featured in this magazine in 2009 (Losyakov, N. and Kovalyova, 2009), would surely delight readers everywhere. The authors of this article invite you to contact us about other shaded relief treasures that deserve public attention and protection.

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