

# Accidental cARTographer

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## **Abstract**

*Professor Eduard Imhof once said that, “To create beauty, a purely technical, practical arrangement of things is not sufficient. Beauty is, to a large extent, irrational”. With that in mind, this will be a non-technical presentation of my experiences during the more than forty years of pencil, airbrush, acrylic, and digital relief production. Space limitations will allow us to touch on only the most significant samples within these four categories.*

## **1. Background**

At age eighteen, as a nationally recognized gymnast in Hungary, my intention was to go to college to become a physical education teacher. Had that plan come through, today – at age seventy-one – I would be long retired and reminiscing of the days of somersaults and handstands. Instead – through one of life’s happy accidents – I learned about an eighteen-month cartographic training program that made me miss out on college education, but gave me a great profession with the possibility to continue learning and growing in it, even at my age.

## **2. Pencil Relief**

The cartographic training program gave me a minimal exposure to “Schummerung” – or relief shading – by using a smudge stick dipped into graphite powder to create rather crude looking relief images. For the first ten years I worked as a cartographic draftsman at Freytag-Berndt und Artaria, American Geographical Society, and the National Geographic Society, and only there did I finally have a chance to put that very limited training to use by producing a few pencil relief originals. Then came the map of Mount Kennedy region, which turned out to be the pinnacle of my pencil relief phase. To produce it in the Swiss topographic relief style was a significant challenge for us at NGS. In order to acquire the necessary capabilities, the Society engaged the services of a retired Swiss cartographer, Mr. Paul Ulmer. During his stay in Washington, D.C., in addition to scribing the rocks for the map, he instructed a number of us in the Imhof relief shading style. At the end of the training program, Mr. Ulmer selected me to draw the relief for the map published in August 1968 (Fig. 1a).

The production method may be boiled down to the following: 1) contrary to the prevailing practice of drawing relief at 150% size, for the first time at NGS the relief was produced at reproduction scale; 2) I drew the relief on Cronaflex, using KOH-I-NOOR leads ranging from 4H to 6B; and 3) I applied the “higher the more contrasty” aerial perspective principle learned from Paul Ulmer and Professor Imhof’s “Kartographische Geländedarstellung”.

## **3. Airbrush Relief**

Our next major project was a map of the Moon. First, using the pencil technique, I produced a prototype but it had a rigid, chiseled look, so – as the result of a one week training at the Lowell Observatory in Flagstaff, Arizona – I ended up painting the Moon relief with the Paasche Type AB airbrush (Fig. 1b).

To produce high quality relief, there were certain important requirements: 1) pressure gauge controlled clean and dry compressed air; 2) ability to taper and sharpen the less than ideal quality factory produced needles; 3) create the right ink mixture, using black Pelikan T ink, distilled water, and a drop of ammonia to further break down the ink particles; and 4) small hand-held, adjustable speed electric eraser to eliminate any slight overspray and sharpen highlights.

As terrain source, I depended on the 1966-67 U.S. Lunar Orbiter photographs that covered 99.5% of the Moon’s surface.

## **4. Full Color Relief**

After producing numerous additional black-and-white airbrush relief originals, eventually there came the time when we felt the need to do relief in full color. Rather than try to develop a technique on our own, the Cartographic Division contacted Mr. Hal Shelton, the American master of relief paintings, and arranged that I pay him a two-day visit at his Golden, Colorado studio.

To simply say that the visit was useful would be a gross understatement. There was only one negative that I could think of – I did not have the opportunity to see any of his relief originals because they were stored in a vault at some other location. Yet, the technique that he verbally shared with me was priceless, and immediately upon my return to

Washington I was able to start work on our new set of Continental Physical Maps (Fig. 2a).

The land cover was broken down into eight categories: tundra, evergreen forest, mixed forest, deciduous forest, grass, shrub, desert, and ice. Following Hal's palette as general guide, I used Cadmium Red Medium, Pthalo Blue, Cadmium Yellow Medium, and Titanium White Liquitex acrylic paints in creating the NGS Physical Map Palette that we used for several years thereafter.

The "potential vegetation" zones were compiled from a wide variety of sources – A.W. Küchler being the most prominently used. For land features I depended on another Hungarian's, Erwin Raisz' landform maps along with Jet Navigation Charts, and the 1954 Edition of Atlas Mira maps, which I found to have very good small scale contour information.

As it was Hal Shelton's practice, initially I painted the relief originals on so-called "deep-etched" offset press plates where base lines appeared as shallow cuts in the metal. With a low angle top left illumination these lines were visible, but disappeared when illuminated from the front.

After two or three maps, the use of the metal plates was dropped in favor of blue-line on Bainbridge 80 Illustration Board.

People frequently asked me, "How do you paint color relief?" but I found it difficult to give a satisfactory answer because it all boiled down not as much to technique as to "visualizing and feeling" the terrain. When pressed, I would give the following non-technical answer: "As step one, the flat vegetation tints are lightly airbrushed over the blue-line base. Then comes the detail work: after carefully studying the terrain characteristics – and imagining that I am viewing the area to be painted from high up in space – I start sketching in the relief using modeling and highlight colors. Always referring to the contour and other relief sources, I continue building that image until I am satisfied with the result. Then, sometimes after hundreds of hours of effort, comes the last step: using bleach, I remove the still visible blue-line base in preparation for color-separation."

In the early 1970s, the Austrian artist, Heinrich Berann made a short visit to National Geographic. His beautiful, brilliantly colored panoramas were and still are unmatched by anyone's work, and his ocean floor paintings brought to life a yet unexplored part of our world. That meeting, and extensive studying of his work eventually enabled me to start the production of the Society's new set of ocean floor maps (Fig. 2b).

With the obvious difference of a limited blue palette, the process basically was the same as that of the physical continental maps. As source for relief detail, I used the GEBCO Charts along with the Berann maps, and the earlier charts produced by Marie Tharp and Bruce Heezen.

"The Heart of the Grand Canyon" was the largest (36 x 36 inches) and most time consuming (1,075 hours)

acrylic relief that I painted during my twenty-two years at the National Geographic. I like to think of it as my "relief thesis" because it effectively incorporated all that I have learned about relief shading up to that point (Fig. 3). It was produced approximately half-half with airbrush and brush. The contour base was the result of a 1972 aerial photography and field survey, so I am confident that the relief is the most accurate and detailed acrylic painting even to this day.

## 5. Digital Relief

In 1986 I left the employ of National Geographic, and moved on to doing free-lance work, but the positive professional working relationship with NGS continued on without missing a beat.

My digital era started in 1993 when, during a visit to National Geographic, I saw someone airbrushing grayscale relief on a Macintosh computer. I was eager to find out more about this new technique. Since I had no prior computer training, it was through the courtesy of the Cartographic Division that I learned the computer basics, the use of the WACOM tablet and the Adobe Photoshop airbrush tool. I immediately purchased my first Apple Macintosh, and on the day when that computer was up and running I "retired" my airbrushes, brushes, and paints. Since then all my work is done digitally.

At the occasion of another visit to NGS I learned about DEMs and Bryce, and that using them one could produce computer generated relief images. So, the learning curve started all over again, but this time it was with the invaluable assistance from my mentor friend Tom Patterson at the U.S. National Park Service. Tom has been there for me since my very first stumbling attempts at digital relief rendering, and I can still count on his advice and guidance, for which I am truly grateful.

My favorite application for rendering relief is Natural Scene Designer Pro. In order to start out with the best possible base relief image, I use resolution-bumped DEMs. As good as these images may appear at first glance, there are always some data-related image challenges, requiring retouching or more extensive corrective re-painting, making me very grateful for all those years of conventional relief experience. The oblique relief of Hispaniola (Fig. 4a) may be a good example because here I spent more than half of my production time on re-painting the relief with the Adobe Photoshop airbrush tool. As a result of the lower level data quality of the 30 pixels per degree ETOPO2 (or even CleanTOPO2), this is especially true with ocean floor relief that generally receives disproportionately more of my attention than the land (Fig. 4b).

I hope that I was able to express how much I love what I do. To me relief portrayal is not only a job but also an enjoyable and challenging artistic activity. The more projects I work on the more I realize that there is no definite work routine to this wonderful madness of digital relief production. Each project presents a different set of challenges, and will require their own solutions. Be it an illustration depicting the sun-

rise over the Mediterranean (Fig. 5), the oblique view map of the Alps for the National Geographic Magazine (Fig. 6), a physical map of Europe produced for COLUMBUS Verlag in Germany (Fig. 7), or getting hold of the WACOM stylus simply to airbrush relief reminiscent of the old hand painted styles (Fig. 8), this “Accidental cARTographer” is always happy and ready to face the challenge.

## 6. Conclusion

I can state with confidence that through the years every professional challenge that I encountered became a growth opportunity, and that my development in relief shading paralleled that of NGS’s growth in the field. I consider myself extremely fortunate to have met and learned from two of

the world’s greatest cARTographer artists, Hal Shelton and Heinrich Berann. Both of them came from a fine art background, and merged their wonderful talents and visions with their love of cartography.

Hal Shelton clearly recognized, and was not hesitant to politely point out the lack of art in my work, and specifically suggested that I get some training. On the strength of his advice I took the Famous Artist correspondence course, hoping to gain exposure to and experience in landscape painting. Instead, the course led me to the love of portraiture, and to the realization that every time I create a relief, I am not only making a map but also am painting a portrait of our Earth’s old, wrinkled, beautiful face.

## Illustrations

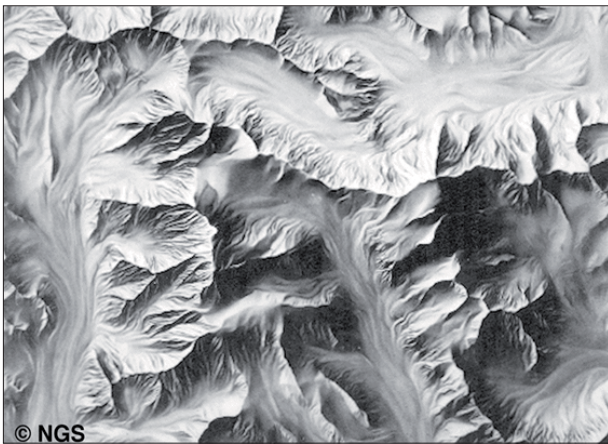


Fig. 1a: Mount Kennedy – pencil relief.

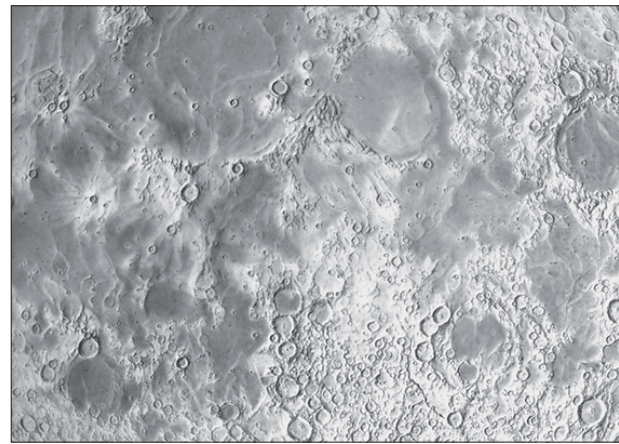


Fig. 1b: Moon relief – airbrush. (© NGS)



Fig. 2a: Painting acrylic physical relief.

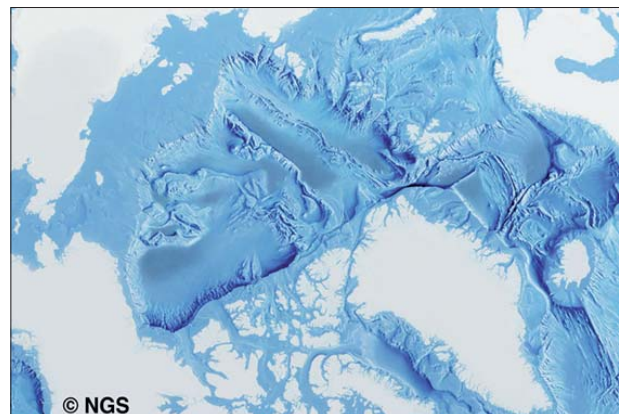


Fig. 2b: Arctic Ocean relief – acrylic.



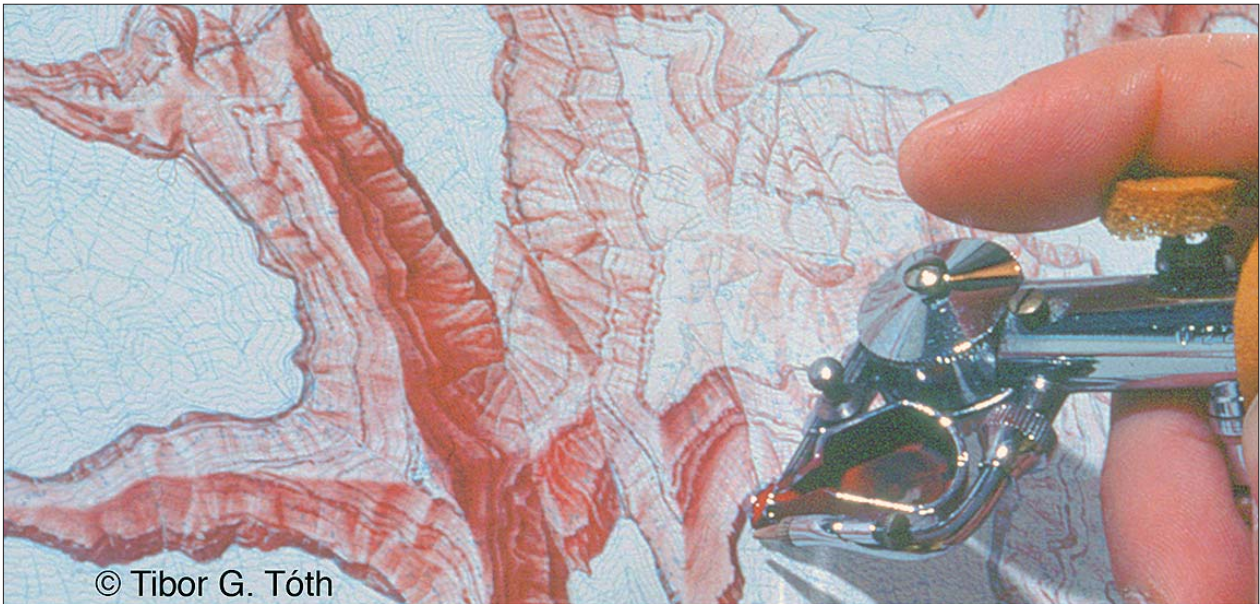


Fig. 3: Airbrushing Grand Canyon relief.



Fig. 4a: Hispaniola – digital.



Fig. 4b: Caribbean – digital. (© Tibor G. Tóth)

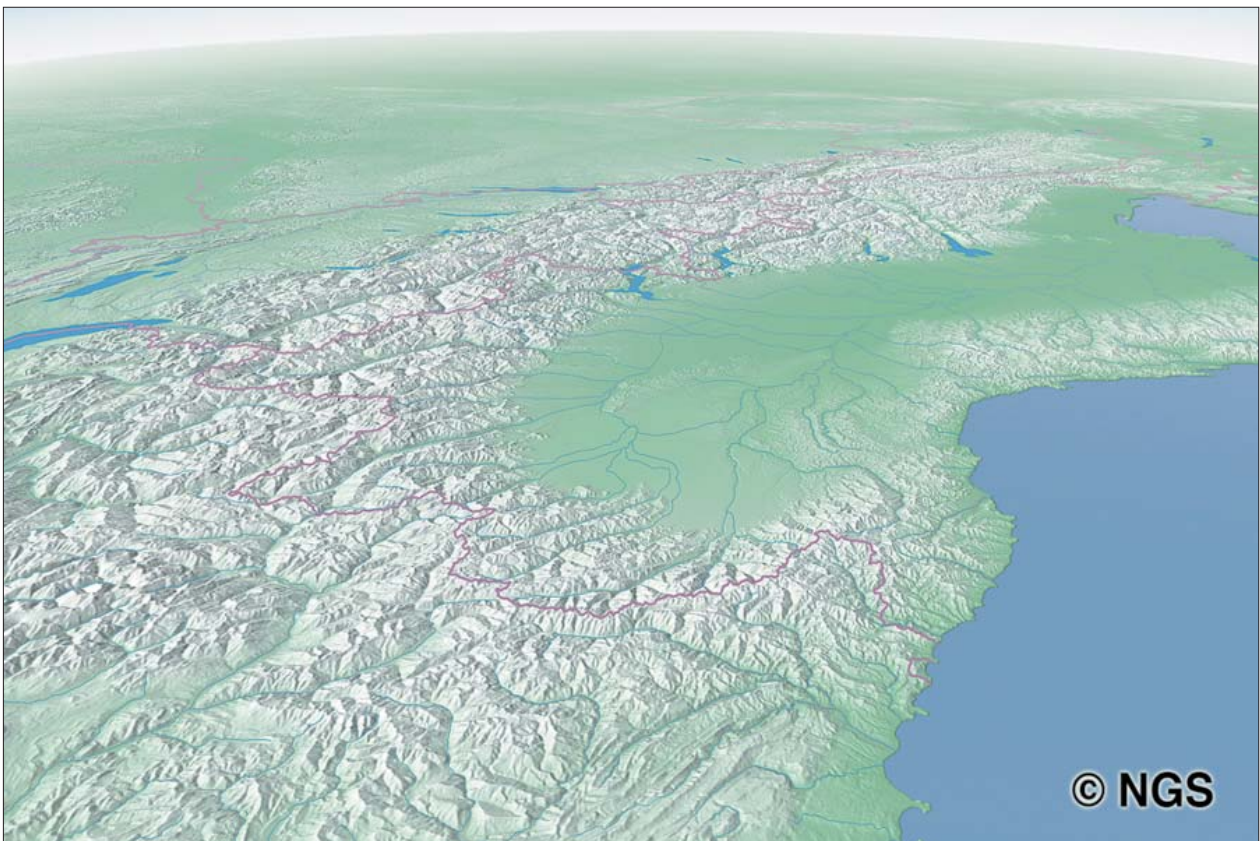
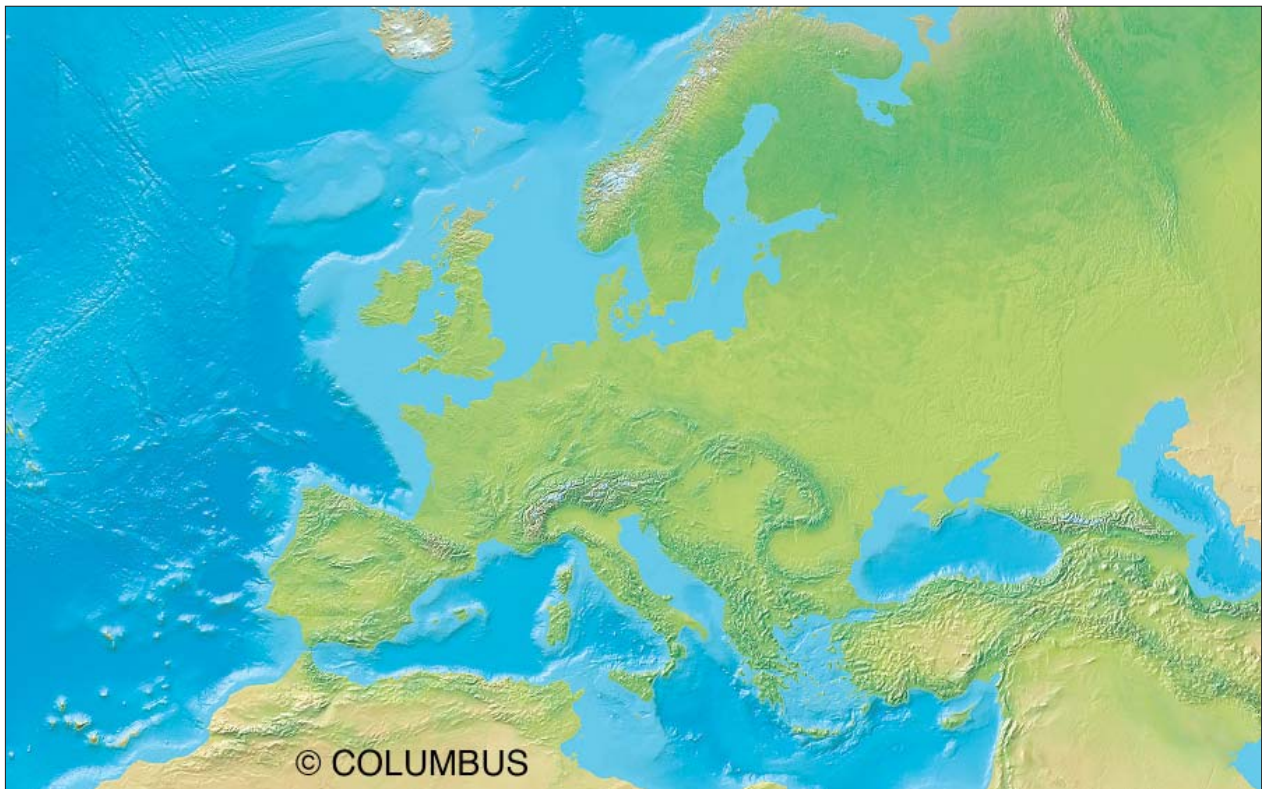


Fig. 6: Alps page map for National Geographic Magazine – digital.





*Fig. 5: Mediterranean Sunrise – digital. (© Tibor G. Tóth)*



*Fig. 7: Europe Physical for COLUMBUS Verlag, Germany – digital, NSD and Adobe Photoshop airbrush.*



*Fig. 8: Airbrush, hypothetical land relief sample – digital.*

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