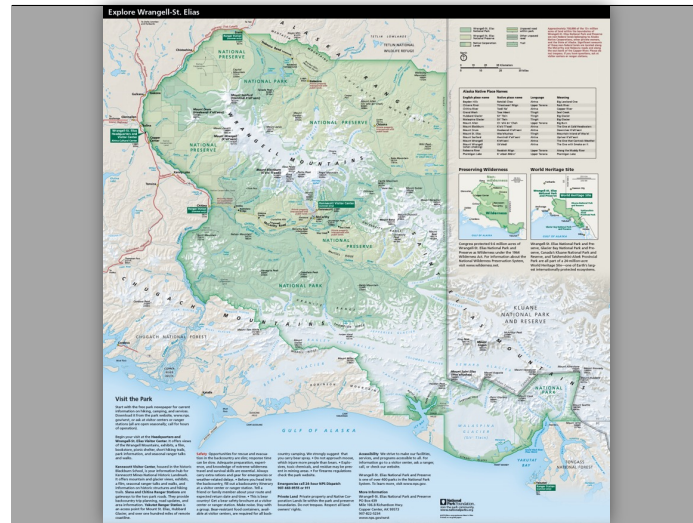


## Malaspina Glacier Panorama

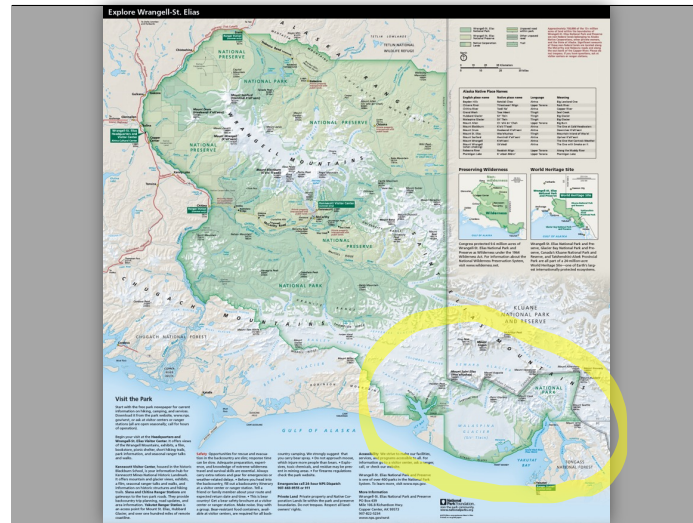


Tom Patterson  
US National Park Service (retired)

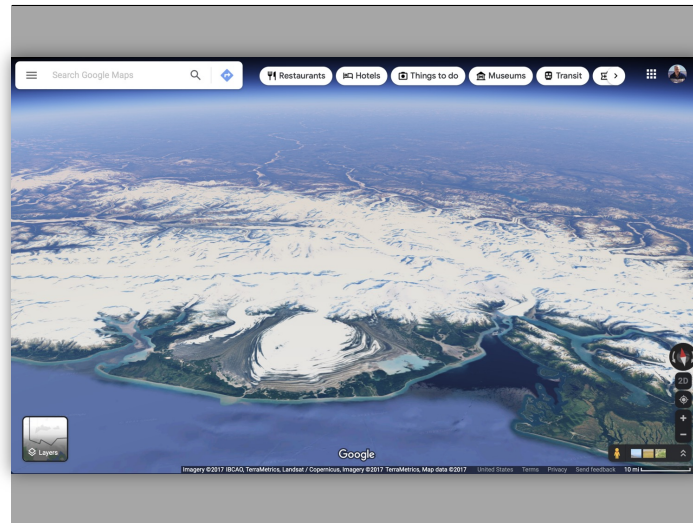
Hello. Today I'm going to talk about a panorama that I made of the amazing Malaspina Glacier and St. Elias Mountains on the US/Canadian border.



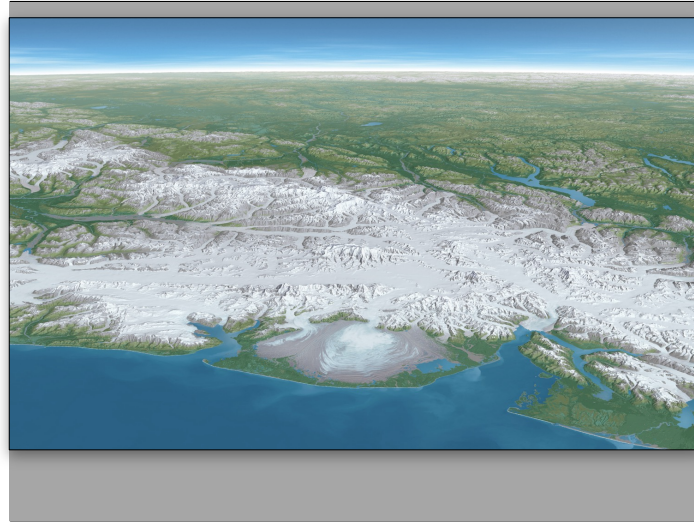
My introduction to the area began in 2017 when I made this NPS map of Wrangell-St. Elias NP, the largest US national park that is 25% larger than Switzerland. The map I made is a typical NP map that focuses on administrative boundaries as much as the physical landscape.



The remote and most spectacular part of the park in the southeast, plus adjacent lands in Alaska and Canada, did not receive the cartographic attention that it deserved on the NPS map, nor elsewhere. This bugged me.

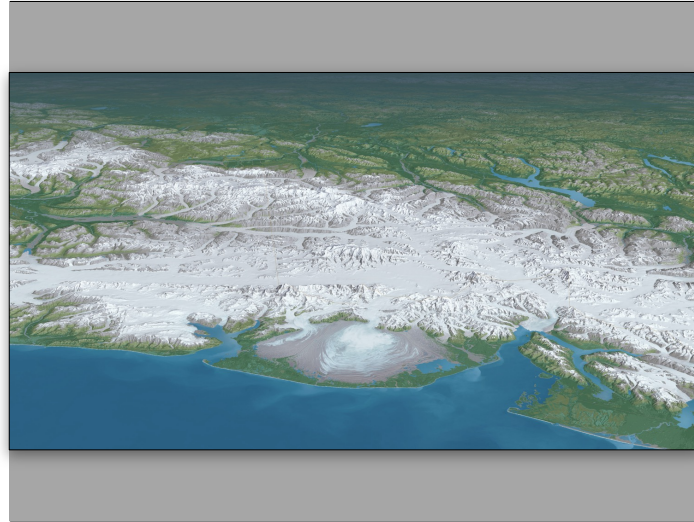


So ... I starting thinking how cool it would be to make a panorama centered on Malaspina Glacier—that large pancake-shaped blob shown here in Google Earth. Although the Google Earth 3D oblique view is terrible, I saw the potential to make something much better ... a pet project that I put on hold until 2021 when I was retired and had more free time.



This the view that I created. It spans a huge area—the coast in the foreground spans 140 miles (225 km). It consists of US and Canadian elevation data at 22.5m resolution draped with the 2015 30m North American Land Cover Dataset and enhanced with Sentinel imagery in the foreground. I built the 3D scene in NSD Pro using spherical rendering, which generated the curved horizon. Finally, I composited many separate NSD renders in Photoshop and applied a huge number of adjustments and touchups. The result: A classic panorama with horizon and sky.

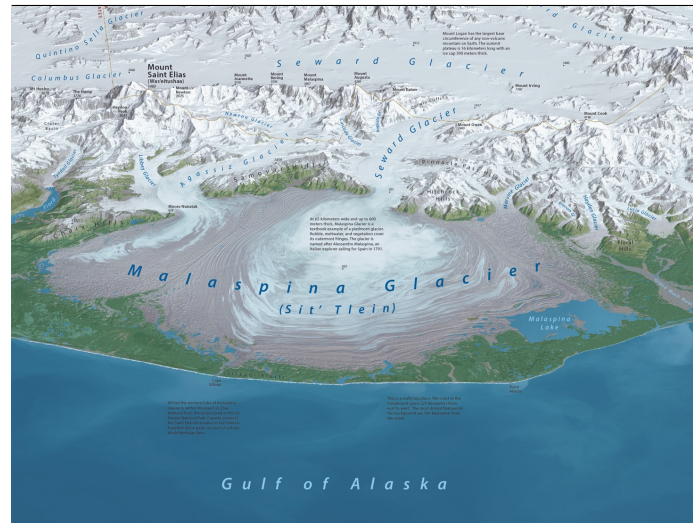
But I was dissatisfied with how map real-estate was taken up by sky and highly compressed background land.



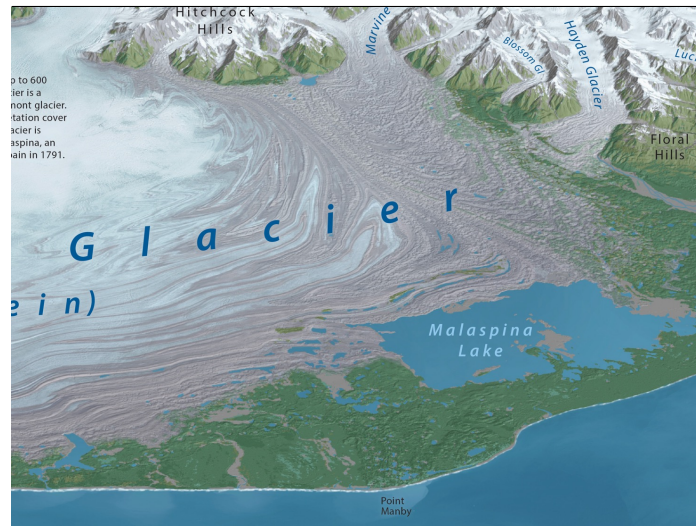
So, on a whim, I cropped out the sky and background land. I then added a dark gradient to the background using the first color available in my PS palette and liked the results. A happy accident, as Bob Ross would say. The focus was now on the snow-capped St. Elias Mountains in the middle ground sandwiched between the darker background and ocean foreground.



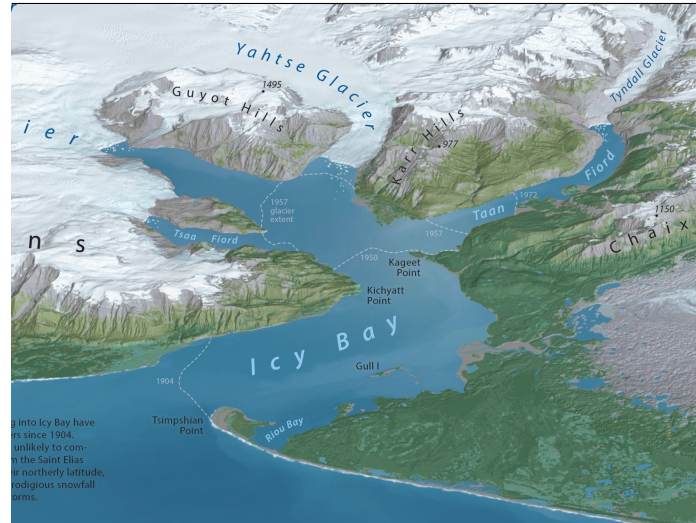
The dark background and ocean were perfect places for positioning the white title and legend elements, balancing the layout. Now, let's take a close-up tour of the scenery ...



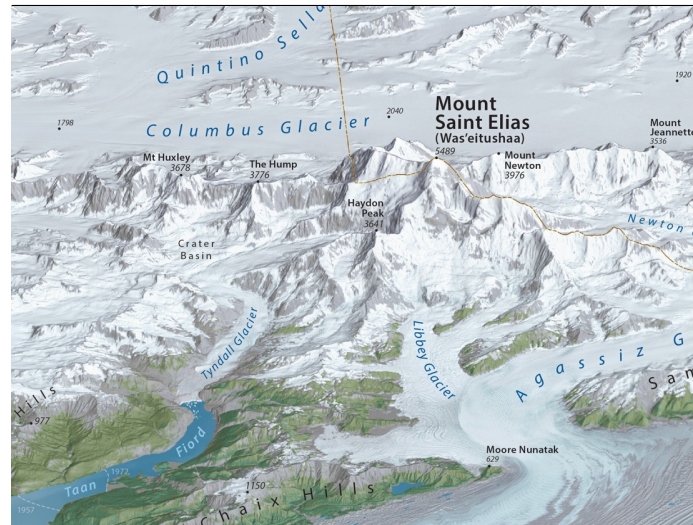
At 40 miles (65km) wide and up to 2,000 feet (600m) thick, Malaspina Glacier is a textbook example of a piedmont glacier. Rubble, meltwater, and vegetation cover its outermost fringes. In the Sentinel images, I lightened the fringing rubble rings that contrasted too much with exposed ice.



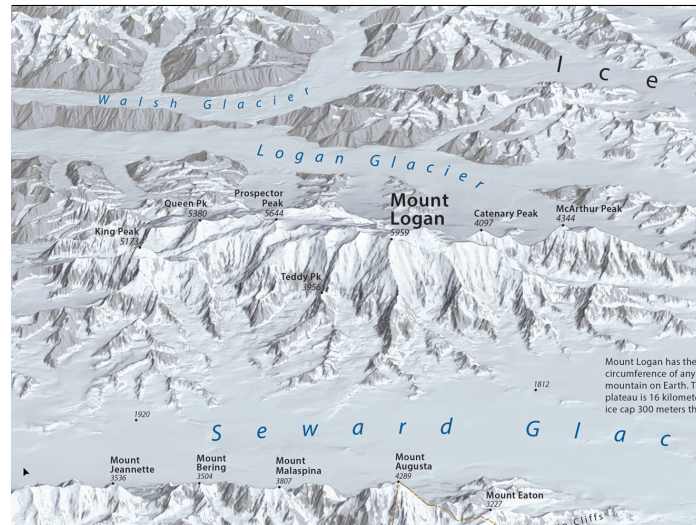
Zooming in, here we can see textures in the rubble added with a light application of a bump mapping effect in NSD. The outermost glacier fringes are covered with soil and vegetation, which insulates the slowly melting ice underneath.



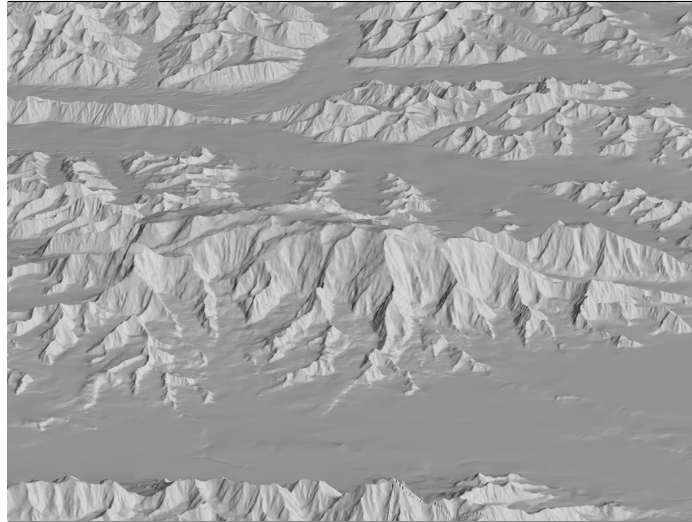
Moving to the west (left), here we see Ice Bay that has undergone 31 miles (50km) of glacier retreat since 1904. I used a Photoshop brush to dab in breaking surf on shorelines fully exposed to the Pacific. Calving icebergs were produced similarly. The water surface reveals sediment plumes extracted from Sentinel images combined with sun glints that I painted manually in Photoshop. Take note of Taan Fjord in the upper right.



Uppermost Taan Fjord is only 11 miles (18km) from the 18,008-foot (5,489m) summit of Mount Saint Elias, the highest coastal mountain on Earth. The international boundary bisects the mountain. Gaps between US and Canadian elevation data sources are found here, necessitating manual touchups. It is the part of the panorama that I am least satisfied with.



Moving further inland, Mount Logan is the highest mountain in Canada and second highest in North America. Depicting this ice-clad mountain that rises above icefields proved difficult due to the lack of contrast of white-on-white. I had to employ a couple of tricks ...



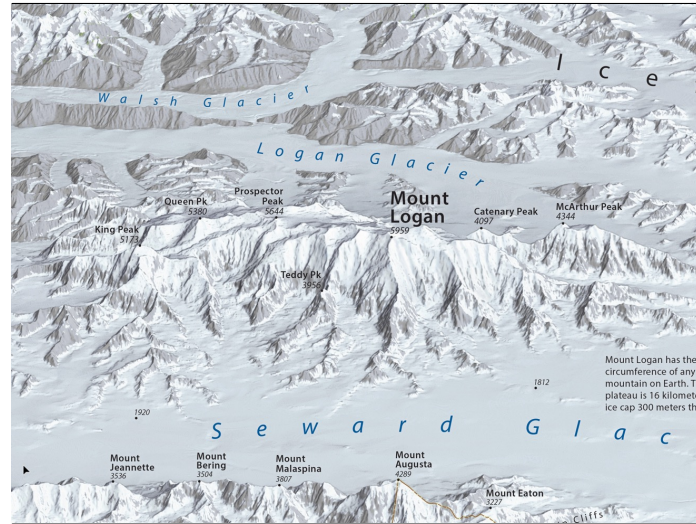
I started with a grayscale rendering of the terrain created in NSD Pro ...



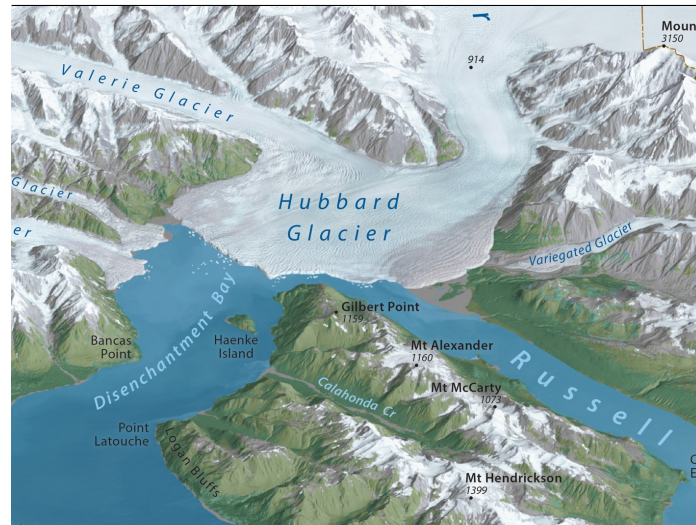
I then borrowed a technique that I borrowed from Eric Knight by applying the poster edges filter in Photoshop. The edges provided definition to Mt. Logan's summit ridges.



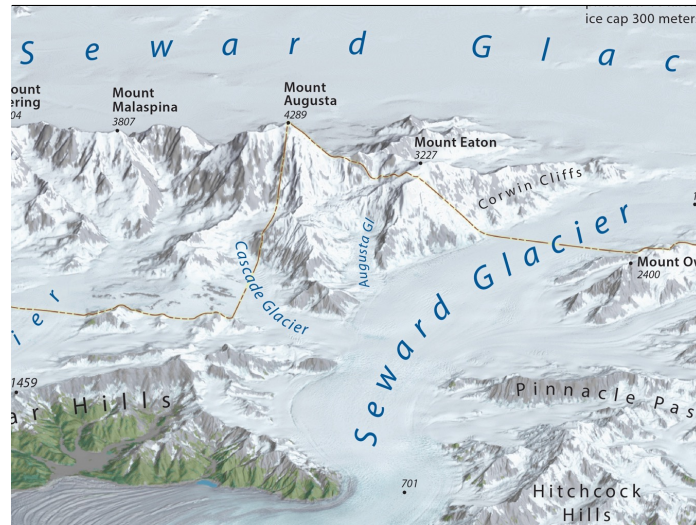
In Photoshop, also airbrushed shadows tones on the slopes and in areas behind the summit, to enhance contrast.



These enhancements gave Mount Logan more visual prominence.



Jumping to the east (right), we arrive at Hubbard Glacier. The glacier surges every few years choking off Russel Fjord. This turns the salt water to fresh, which imperils marine mammals trapped in the fjord. Where glacier meets sea, note the ice face and calving icebergs that I painted in Photoshop. I also lightened the rubble covering the lower right glacier surface.



The panorama shows generalized national and provincial boundaries. The boundaries are shown as continuous lines even though they are obscured in places by the jutting terrain.



Finally, the Malaspina Glacier Panorama includes one small coastal village, a few roads, and even an airport. Yakutat is the only populated place on the coast for 660 kilometers (430 miles) between Cordova and Gustavus. Note the surf line that I hand-painted along the outer coast exposed to full force of the Pacific. Yakutat is a mecca for Alaskan surfers who must contend with cold weather and large predators—orcas in the water and brown bears on land.



Bye bye