

Geologic Site of the Month
June, 2012

***A Trick of the Light:
Seeing (or Not Seeing) Geologic Features
Under Different Lighting Conditions***



Text by
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Introduction

When geologists carry out field work, variable lighting and vegetation conditions can have a dramatic effect on being able to see certain features clearly. We all know about the influence of vegetation during different seasons of the year. We can see through the woods much more easily when deciduous trees have shed their leaves in the fall. The leaf-off times of the year are a favorite with Maine geologists. Besides having fewer biting insects to contend with, it becomes much easier to spot bedrock outcrops and glacial features that are not apparent on topographic maps.

It is probably less obvious to most people that a bedrock surface or glacial landscape can look very different on a sunny day than it does when the sky is cloudy. Even if we always visit a site during sunny weather, it may vary in appearance with the sunlight coming from different directions with the changing seasons or time of day. As the sun angle changes, so do the shadows that reveal shapes of everything from large landforms to small subtle details of a rock surface. The following photos show the importance of lighting in examining some glacial features in southern Maine.



Glacial Grooves

These photos show the site that inspired this article. They were taken in November, 2011, at a bedrock outcrop on Clarry Hill in Union and show glacial grooves under differing light conditions.



Photos by Woodrow B. Thompson



Figure 1. These photos show the site that inspired this article. They were taken in November, 2011, at a bedrock outcrop on Clarry Hill in Union. Figure 1 (left) was taken late in the afternoon, with the sun low in the western sky. It shows weathered but clearly visible glacial grooves carved by ice flow to the south-southeast (158-166 , toward the foreground). I revisited this site two days later, under cloudy conditions, and found the grooves were indistinct and almost invisible (Figure 1 (right)).



Glacial Grooves - Closeup

Closeups of the same glacial grooves at Clarry Hill in Union under differing light conditions. Here the contrast between sunlit and sunless views is even more striking.



Photos by Woodrow B. Thompson



Figure 2. Close-ups showing identical parts of the same outcrop on Clarry Hill, taken on the same two days as the Figure 1. Here the contrast between sunlit and sunless views is even more striking. The glacial grooves seen here easily could have been overlooked on a cloudy day!



Larger Glacial Features

Low-angle sunlight also helps to accentuate much larger glacial features. This photo is a late-fall view showing part of the Androskoggin Moraine complex on the ME-NH border (Thompson and Fowler, 1989).



From Thompson & Fowler, 1989

Figure 3. Low-angle sunlight also helps to accentuate much larger glacial features. This photo is a late-fall view looking SW across the Androskoggin Valley and shows part of the Androskoggin Moraine complex on the ME-NH border (Thompson and Fowler, 1989). The moraine ridge seen in the left-center part of the photo (just below and parallel to the line) is about 100 feet high, but would not have shown up as clearly without the contrast between its sunlit crest and shaded north side. The arcuate moraine cluster crosses the Androskoggin Valley. It was deposited in late-glacial time by a tongue of the Laurentide Ice Sheet flowing down the valley from the northern White Mountains to the present Maine border.



Wet Bedrock Surfaces

Bedrock surfaces not only look different with varying illumination, but show certain details more clearly when they are wet. This photo shows a ledge in Warren that has been smoothed by glacial abrasion.



Photo by Woodrow B. Thompson

Maine Geological Survey

Figure 4. Bedrock surfaces not only look different with varying illumination, but show certain details more clearly when they are wet. This photo shows a ledge in Warren that has been smoothed by glacial abrasion. The dry (light colored) part of the outcrop shows compositional layering within the metamorphic rock, but glacial markings are not obvious. The darker part of the rock surface is wet, and light reflection from this area reveals two sets of glacial striations of differing age. The younger and dominant set (parallel to red pencil) indicates ice flow to the east-southeast (115°), while shallow swales preserve older striations produced by regional ice flow to the south-southeast (154°; marked by blue pen).



Wet Glacial Grooves

This photo shows an example of glacial grooves at the south end of the beach at Birch Point State Park in Owl's Head. The grooves on this ledge show much better when the rock surface is wet.



Figure 5. Shallow glacial grooves on granite ledges can be especially difficult to see when the ledges are dry and the sun is overhead. This photo shows an example at the south end of the beach at Birch Point State Park in Owl's Head. The grooves on this ledge show much better when the rock surface is wet, as seen here. They indicate ice flow to the south-southeast (156).

References and Additional Information

Thompson, W. B., and Fowler, B. K., 1989, Deglaciation of the upper Androscoggin River valley and northwestern White Mountains, Maine and New Hampshire, in Tucker, R. D., and Marvinney, R. G. (editors), Studies in Maine geology, Volume 6, Quaternary geology: Maine Geological Survey, p. 71-88.

