

“The World’s Worst Weather”

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MOUNT WASHINGTON, in New Hampshire, is said by many to have “the worst weather in the world.” The point is arguable—Fitz Roy in Argentina and Mount McKinley come to mind—but it is true that clouds, high winds and icing prevail at Mount Washington during most seasons of the year, despite its relatively low elevation of only 6288 feet (1917 meters) above sea level.

One of the major rewards of climbing is surely the view from the summit, or along the route. Yet, the summit of Mount Washington is in the clouds about 55% of the time, year round. That obviously affects the tourists who visit the top by trails, the Auto Road or the Cog Railway, but it also frustrates technical climbers in the mountain’s ravines and gullies, where many an alpinist has gotten his first training.

There are good meteorological reasons for such bad weather at the Mount Washington Observatory on the summit, and we summarize them below. But first, to show that the perverse climate is not merely a matter of localized Observatory pride, we quote three respected alpinists.

—Brad Washburn, as reported in the *New York Times* for January 13, 1981:
“With the exception of some isolated peaks in the Arctic and Antarctic, Mount Washington has the most severe weather in the world.”

—Chris Jones, in *Climbing in North America* (published for the American Alpine Club by the University of California Press, Berkeley, 1976):
“. . . in the winter, Mount Washington has weather as bad as any in Alaska . . . Snow-and-ice climbing on Mount Washington can be a survival exercise . . .”

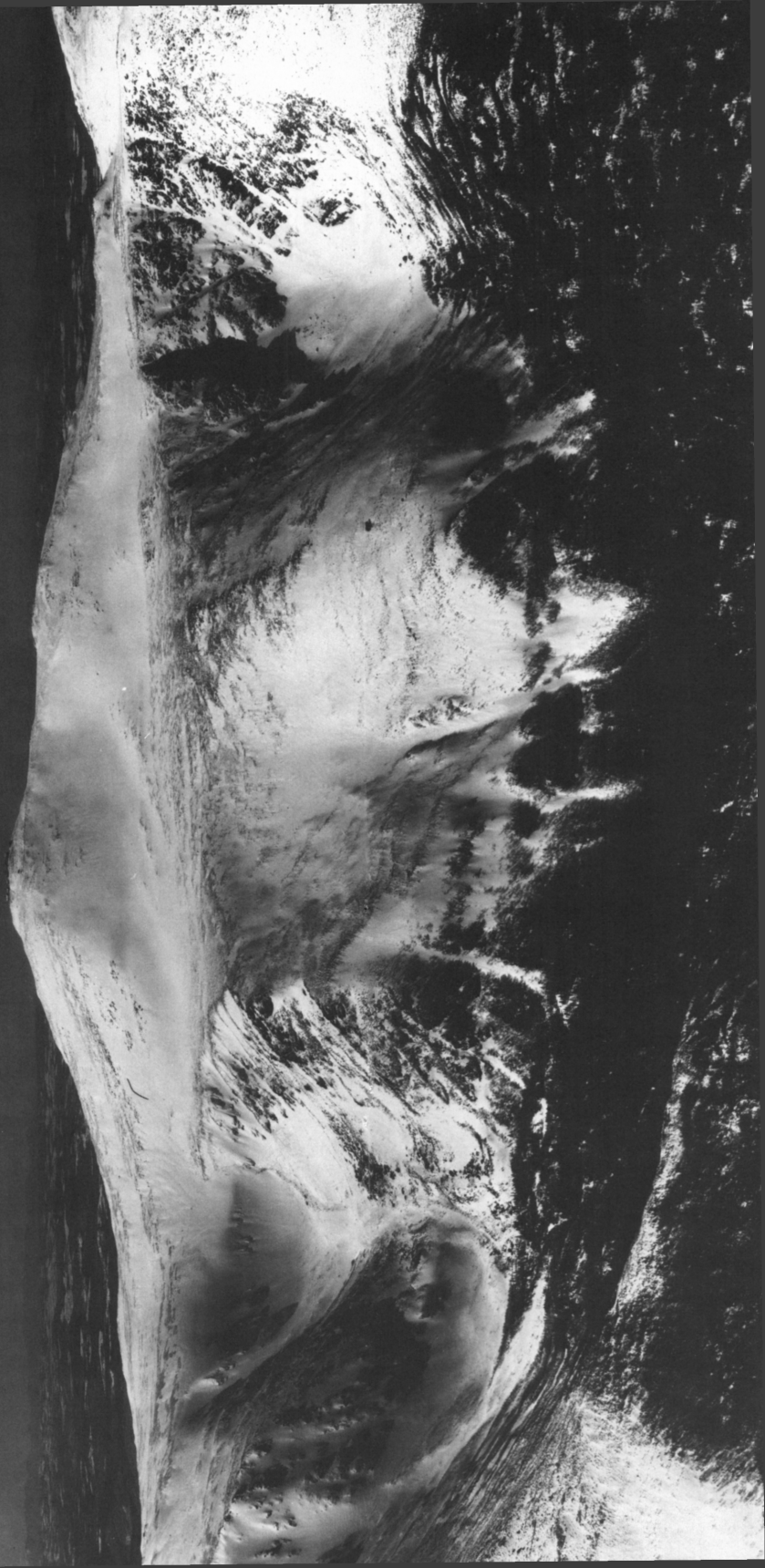
—Noel Odell of Mount Everest fame, private communication: “I made several winter ascents of Mount Washington and, during one of these, accompanied by Dr. Terris Moore, we experienced as fierce conditions of strong wind and low temperature as I can remember on any high mountain.”

*The new (1980) Observatory tower, where wind speed measurements are made, reaches

PLATE 44

Photo by Bradford Washburn

**MOUNT WASHINGTON from the
southeast.**



The Facts

Weather conditions at Mount Washington (lat. 44° 16'N) approximate those encountered at much higher latitudes.⁽¹⁾ Prevailing winds are from the west and west-northwest, although the most severe storms are usually from the southeast. Temperature extremes are not excessive; the maximum ever recorded was 72°F (22°C) in August 1975 and the minimum was -47°F (-44°C) in January 1934. The yearly average, however, is only 27°F (-3°C)—the lowest annual normal temperature for the lower 48 contiguous states.

The wind regime at the summit is severe; wind speeds measured at the Observatory are higher than at the same elevation at some distance from the mountain. The world's wind speed record was established on Mount Washington on April 12, 1934, when a peak gust reached 231 mph (372 kph). So-called "century days," when peak gusts exceed 100 mph (161 kph), are most frequent in winter, but occur in every month of the year. The annual average wind speed for 1981 was 34.9 mph (56.2 kph).

Two other data points contribute to the overall picture: Over the last 43 years, the percentage of possible sunshine was only 33%, and the summit was in cloud or fog (visibility ¼ mile or c. 400 meters or less) for part of 313 days out of each of the last 49 years. And finally, freezing fog is an important part of the local climate; deposits of rime ice—"frost feathers", pointing into the wind—often grow up to several feet in length on exposed structures.

Comparisons are always of interest. To place Mount Washington data in perspective, Dr. Charles F. Brooks, first President of the Observatory, compared his information with that available from other stations some years ago.⁽²⁾ Specific reports were available to him from Pike's Peak, Mount Rose (central Sierra Nevada), Sonnblick Observatory (Austria) and Mount Nordenskjöld (Spitsbergen). In no case could Brooks match Mount Washington's overall performance but, considering the limitations of his data base, he came up with the following modest conclusion: "It is probable that there are worse mountains than Mount Washington, but observations do not seem to have been made upon them."

The Causes

Wind-speed figures indicate the horizontal motion of air; vertical motions are referred to as ascending or descending currents, updrafts or downdrafts. According to Ludlum,⁽³⁾ a recent survey of surface winds at the standard 33-foot height for anemometer exposure showed that 130 mph (209 kph) would be the maximum speed expected at United States locations—but, he continues, "It apparently requires an ascending or descending flow on a mountain slope for extreme speeds."

"Uplift" is one reason why wind speeds are so high on Mount Washington; the mountain presents an extended upslope to the prevailing winds from the west. And it is the same uplift—referred to by Schaefer and Day⁽⁴⁾ as "oro



PLATE 45

Photo by Mount Washington Observatory

**Mount Washington Observatory
covered with rime.**

graphic lift"—which accounts for the prevalence of clouds at the summit; moisture-laden air will reach its condensation level as it travels up the slope toward lower temperatures, and cloud droplets will form at an elevation just below or immediately above the summit.

The second reason for high winds is the Bernoulli effect, according to which an air mass speeds up as it passes over an obstacle, just as water in a stream speeds up when it must pass through a constriction between two rocks. The air masses that traverse Mount Washington may have proceeded at a leisurely fashion when they could extend downward to the valleys at 2000 feet, but must accelerate to pass over the mountain at more than 6000 feet.*

Air mass movement on the national scale is probably the most important factor in determining Mount Washington's bad weather. In general, weather systems travel from west to east across the United States and Canada, but there is another broad-scale path up the Atlantic coast. Further, there are smaller-scale and quite specific storm tracks across the country; they vary from season to season (see Ludlum), but many of them converge upon, or traverse, the northeastern United States, bringing their mixed blessing of precipitation and wind to the highest peak in the Presidentials.

Accidents

One aspect of Mount Washington's bad weather is of particular interest and concern to climbers—it "produces" accidents. Granted, some of the victims are inexperienced and ill-equipped summer "goofers" who fail to heed the White Mountain National Forest weather-warning signs at timberline. But not all—even the veteran driver of the snow vehicle most often used for rescue on the mountain found himself bewildered in a whiteout of high wind and blowing snow in December 16, 1981; it took him over five hours to walk out, and he spent four days in the hospital, recovering.

Is the lure of "mountaineering" on the northeast's most accessible peak a contributing factor? Perhaps it is and, to close, we quote a paragraph from the Mount Washington Observatory News Bulletin for Summer, 1982, prepared by Charles B. Fobes, with information supplied by the Appalachian Mountain Club:

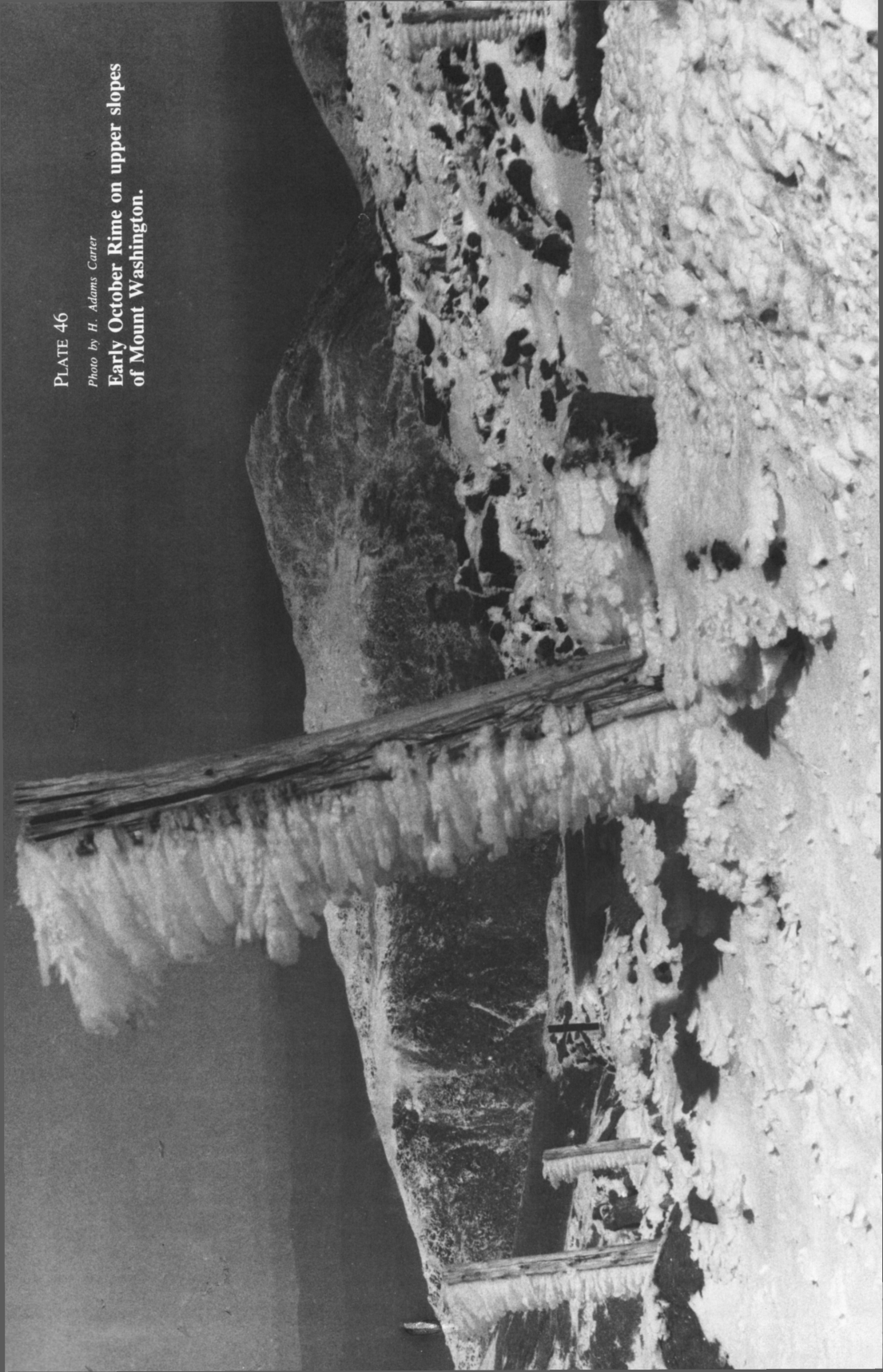
There have been 27 fatal accidents in Tuckerman Ravine (a glacial cirque on the east side of Mount Washington) since 1849. The total number of lives lost on the Mount Washington Range is ninety-one. This number includes all types of accidents. If we consider mountaineering to include those persons who hiking, skiing, rock, snow-and-ice climbing, then 61 fatalities may be attributed to "mountaineering."

*The new (1980) Observatory tower, where wind speed measurements are made, reaches 6309 feet above sea level, about 30 feet higher than the old tower, and it is in a much more exposed location, some neighboring buildings having been removed. Peak wind gusts at the new location average 8-10% higher than at the old one.

PLATE 46

Photo by H. Adams Carter

**Early October Rime on upper slopes
of Mount Washington.**



Information for this article was drawn from Kenneth Rancourt, Staff Meteorologist for the Mount Washington Observatory, and from the following sources:

- (1) *Local Climatological Data, Annual Summary with Comparative Data, 1981, Mount Washington Observatory, Gorham, New Hampshire*, pub. by National Oceanic and Atmospheric Administration/Environmental Data and Information Service/National Climatic Center, Asheville, N.C.
- (2) "The Worst Weather in the World," by Charles F. Brooks, in *Appalachia*, December, 1940, pp. 194 ff.
- (3) *The American Weather Book*, by David M. Ludlum, Houghton Mifflin Company, Boston, 1982.
- (4) *A Field Guide to the Atmosphere*, by Vincent J. Schaefer and John A. Day, Houghton Mifflin Company, Boston, 1981.



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