

HISTORIC ROOTS

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ABOVE THE SURFACE: SMALL STATE, BIG WEATHER

BY STEVE MALESKI

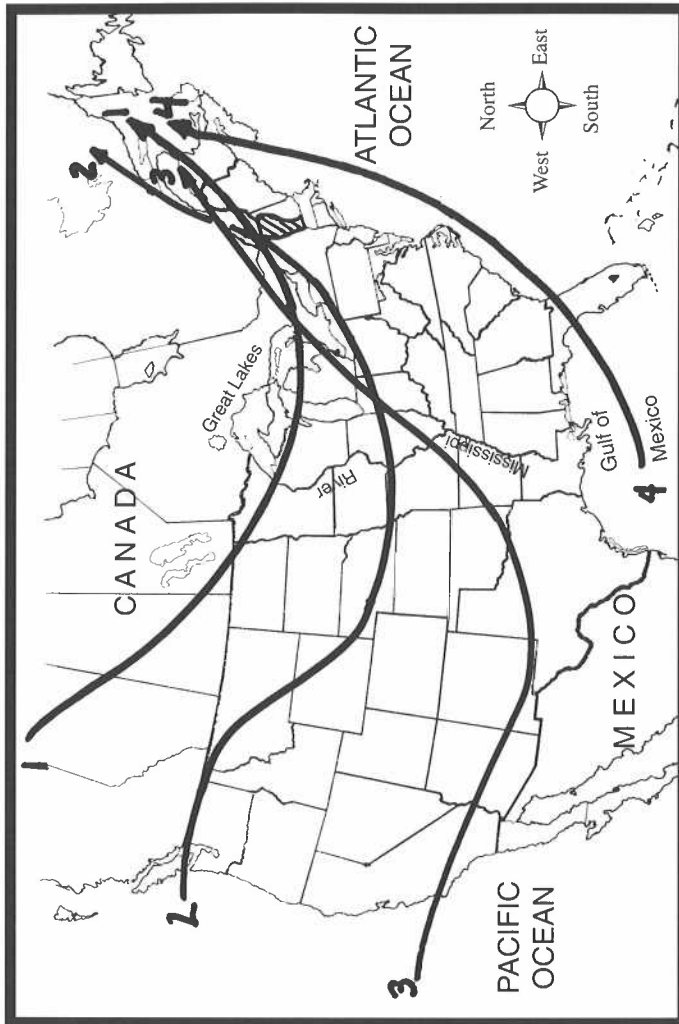
METEOROLOGIST, FAIRBANKS MUSEUM

Vermont is one of the smallest states in the US, but it stands out in terms of weather. It has one of the driest counties east of the Mississippi River and one of the snowiest mountains in the Northeast. The lowest temperature officially recorded in New England was in Vermont. All this is because of Vermont's location and its landscape.

Vermont is on the eastern edge of North America, about halfway between the equator and the North Pole. To the northwest lie the forests and frozen lands of Canada. Farther north is the ice cap that covers the area around the North Pole. Dry air from there, which is cool in the summer and frigid¹ in the winter, moves southeast across Vermont. To Vermont's southeast, only 150 miles away, is the Atlantic Ocean. Warm, moist air above the ocean flows northward. Sometimes it crosses Vermont, but it is always nearby.

A place where such different kinds of air come together is like a magnet for storms. The

¹ Frigid means extremely cold.

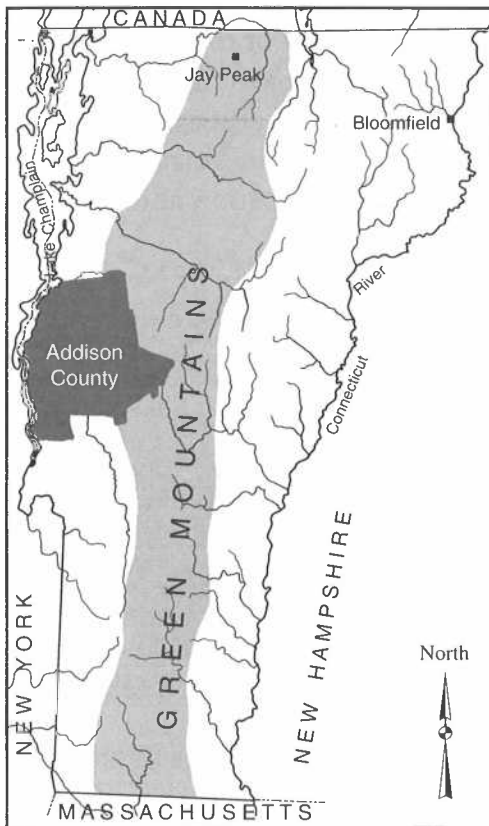


This map shows four storm tracks across North America. Notice how close they all come to Vermont (the striped area).

Steve Maleski

map on page 2 shows some storm tracks across North America. They start in different areas and come together close to Vermont, where cool, dry air and warm, moist air are almost always pushing against each other. No wonder our weather changes so often and we have so many storms!

Mountains are also important in making Vermont's weather. The Green Mountains run



Interesting weather sites in Vermont.

north and south down the middle of the state. To their west are Lake Champlain and the Adirondack Mountains of New York. Along Vermont's eastern border is the Connecticut River. Farther east, in New Hampshire, rise the White Mountains.

The winds, from either east or west, blow across these mountains.

Three things about the way air behaves help explain why our land of mountains and valleys has so many kinds of weather and so many extremes.

◆ **First:** when air is squeezed into a smaller space it gets warmer. If it expands into a larger space it cools off.

◆ **Second:** cooler air will always sink unless it is forced higher across mountains. Warmer air always rises.

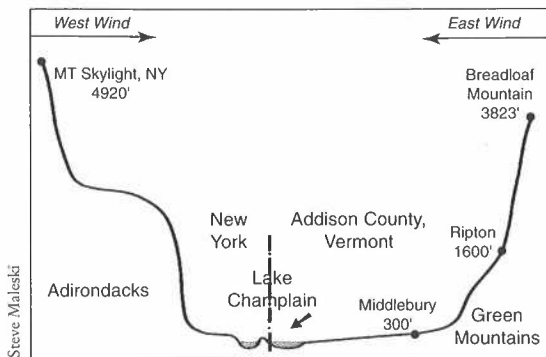
◆ **Third:** colder air can hold less moisture than warmer air. When warm air rises it expands and cools and has to get rid of some of its moisture. So it rains—and snows—more on mountain tops than it does on valley floors.

These three facts, Vermont's wrinkled landscape, and the fact that most of the air crossing Vermont comes from the west help explain why Vermont's weather is so interesting.

A VERY DRY COUNTY

Addison County is in the Champlain Valley, west of the Green Mountains and east of the Adirondacks. It is one of the driest counties east of the Mississippi River. Only about 34 inches of rain fall there each year. Chittenden County to the north gets about 36 inches of rain. Rutland County to the south gets more than 40 inches. Why? Because of the mountains.

Winds from the west have to cross the



This profile of the land through the Champlain Valley, from the Adirondacks in the west to the Green Mountains in the east, helps show how low Addison County is and why it is so dry.

Adirondacks before they get to this area of Vermont. We know that as the air goes over the mountains it gets cooler and loses its moisture. By the time west winds get to

Addison County they are pretty dry.

When wet winds come into Vermont from the Atlantic Ocean to the east, most of the rain or snow falls on the Green Mountains. By the time the air reaches the Champlain Valley most of its moisture is gone.

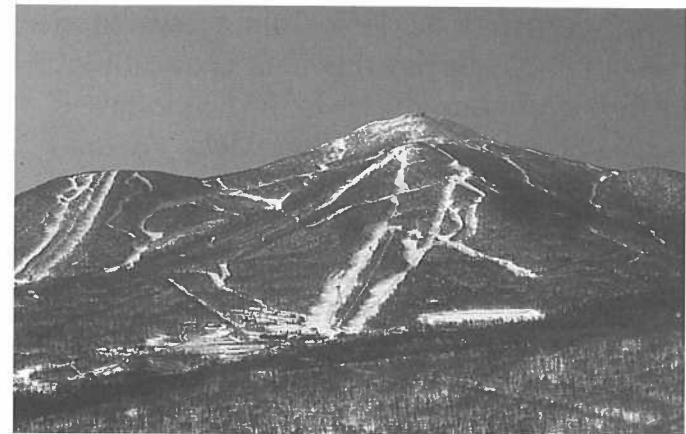
The dry area on the leeward² side of mountains is called a rain shadow. Addison County is so dry because it is shadowed from two directions.

A SNOWY MOUNTAIN

Jay Peak, in Vermont's northwest, near the Canadian border, is one of the snowiest mountains in the Northeast. Between 200 and 300 inches of snow fall there each year. This is two to three times the amount of snow that falls in nearby towns.

² The leeward side is the side away from the wind.

Jay Peak is so snowy for the same reason that Addison County is so dry. Winds lose their moisture when they flow over mountains. When air blows south from Canada, Jay Peak is the first mountain it crosses. In winter its moisture comes down as snow. Jay Peak is too far north to be in the rain shadow of the Adirondacks. So air flowing east from the



Jay Peak Ski Resort

Because of its location and the direction of the winds passing over it, Jay Peak gets 200-300 inches of snow a year.

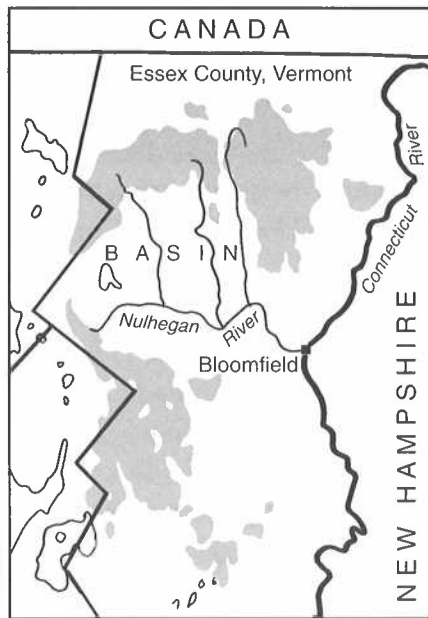
Great Lakes also loses its moisture there. Air from the Connecticut River, from Lake Champlain, and from the Atlantic Ocean has to rise to get over this mountain. Air that goes over the Adirondacks or the White Mountains first is dry when it gets there, but this doesn't happen very often. It is no surprise that Jay Peak is a big ski area.

**THE LOWEST TEMPERATURE
IN NEW ENGLAND**

Warmer air rises. Colder air settles in low places. One low place in Vermont is Bloomfield, in the Northeast Kingdom, where the Nulhegan River meets the Connecticut River. It is in at the edge of a basin, a bowl-shaped area ringed by hills.

The night of December 30, 1933 was very cold. There were several inches of snow on the ground. Frigid air just above the snow flowed down the hills into the basin. It then followed the Nulhegan River into Bloomfield. Most of the air kept moving down the Connecticut River Valley, but some settled in the low,

swampy area around the town. There it sat, getting colder and



Cold air from the high hills (in gray) above the Nulhegan River flowed down to Bloomfield. There it became even colder, cold enough to set a record for low temperature in New England.

colder. It got down to a temperature of 50 degrees below zero Fahrenheit.

It may actually have been colder somewhere else. But the National Weather Service instruments that measure temperature were located right there in the swamp at Bloomfield, so 50 degrees below zero became the official temperature. It is the lowest temperature ever officially recorded in New England. Although there have been some lower unofficial readings, after 63 years Bloomfield still holds the record.

“If you don’t like the weather wait five minutes,” Vermonters have been heard to say. There’s a lot of weather here. It changes all the time and is often very different from place to place. Being a weatherman in Vermont is a challenge. Some might say it is too much of a challenge. But for me this little state is a weatherman’s dream.

Rooting Around

You can hear Steve Maleski and Mark Breen put their weather knowledge to use several times a day in their “Eye on the Sky” forecasts on Vermont Public Radio, 107.9 FM Burlington, 89.5 Windsor, 88.7 Rutland.