

Vermont winters are changing rapidly

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In early February temperatures in Pittsford reached 50 degrees at my home in Pittsford. Several times this winter it has rained hard, leaving the ground bare. Some of my lawn is still green. Vermont seems to be moving from a winter climate with permanent snow cover to milder winters typical of southern New England. The three-month period, November to January, was the 2nd warmest on record. I have been finding mosquitoes sluggish but alive in mid-winter both inside and outside – a reminder that more pests can over-winter as the climate gets milder.

Mean winter temperatures in Vermont are increasing almost 1 degree per decade, and twice as fast as in summer. The US Department of Agriculture just released new plant hardiness zone maps, which tell us what plants and shrubs will likely survive the winter. Since the 1990 map, much of the United States, including Vermont, has become warmer by about half a zone, meaning a 5-degree increase in average extreme minimum winter temperatures.

Most of Vermont, except for the Northeast Kingdom, is classified as Zone 4b corresponding to mean minimum winter temperatures between -20 and -25 degrees, and Zone 5a which corresponds to the range -15 to -20 degrees. Where I live in Pittsford, minimum temperatures have not fallen below -10 degrees this year, corresponding to Zone 6 – more like winters in Connecticut in decades past.

Minimum temperatures are determined mostly by the amount of water vapor and clouds in the atmosphere at night. Under cloudy conditions, nighttime temperatures do not fall much. When the sky is clear, air temperature drops quickly at night. The extent of cooling depends on how much water vapor is in the air, because water vapor is a powerful greenhouse gas that reduces the cooling of the earth to space. Temperatures drop the most when the sky is clear, cold and dry. At warmer temperatures when we get rain rather than snow across the northeast, water continues to evaporate from the soil – and the extra moisture in the atmosphere slows the cooling at night.

The Earth's climate will continue to warm, driven by the burning of so much fossil fuel by the global economy. What can we expect in the future? We will see a slow acceleration of the same trends that have become clear in recent decades. The winter frozen season when the ground and lakes are frozen will shrink by about 7 days per decade, winters will get less severe and the summer frost-free growing season will lengthen.

You may have noticed that more vegetable crops are available at the winter farmers' markets. As winters warm with more greenhouse gases in the atmosphere, more plants can survive even in unheated greenhouses and under poly-tunnels. My kale under glass is healthy. The sun is now climbing rapidly in the sky at noon as we approach the spring equinox, and farmers with greenhouses can put out seedlings for early crops.

So far this winter and last winter have been very different. Last year there was less westerly flow and a rapid exchange of air between the north and the eastern US, giving cold temperatures in Florida, record warm temperatures in Canada, while Vermont had average temperatures with more snow. This year the flow has been more westerly over North America with fewer bursts of arctic air from Canada, and the winter has been warmer with less precipitation. We cannot yet predict this type of shift in the climate system. In the short term, we can only adapt and be grateful, whatever the climate brings. But in view of the long-term consequences of climate warming, our society would be wise to change direction.

USDA hardiness zones: <http://planthardiness.ars.usda.gov/PHZMWeb/>