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## **A glimpse into the future of our Vermont climate**

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What a remarkably mild winter it was! West of the Green Mountains we had no permanent snow cover this winter to reflect sunlight and keep temperatures cold. In Pittsford I was able to turn over my rye cover crop until the ground froze on January 3, and I was able to start digging again on March 11. So the period when the ground was frozen was only 67 days, rather than the historic 150 days. This is a true measure of how short the winter really was.

Actually it was the only the second warmest winter — December to February — on record in Vermont, and across New England; the record is still held by the winter of 2001-2002. When we include March, which has been exceptionally warm, a new record will be set.

The climate is changing, but not exactly in ways we expected. Last winter a deep trough in the jet stream over the eastern United States and Western Europe brought snowy winters. But this year a quasi-stationary ridge in the jet stream over the eastern United States brought us a mild winter with little snow. Meanwhile over Europe the jet stream plunged south in February and brought very unusual arctic cold and snow. As with the wet weather in 2011, we are seeing an increase in climate extremes because the large-scale waves in the atmosphere seem to be slowing down while their amplitude is increasing.

Researchers are beginning to think it is the warming of the Arctic that is driving this change in climate towards more stationary weather patterns, but the research will take a few years to complete. The more basic challenge we face is that the burning of fossil fuels on such an immense scale is moving the rather unstable climate of our planet into unexpected directions — and we are not prepared because we cannot rely on the past as a guide.

So I am adapting on the fly. My kale wintered over under glass for the first time, and we have been eating the best fresh tender kale I have ever tasted. As an experiment, I then planted lettuce, arugula and spinach on March 1, which came up in time for the warmth of mid-March. Then I planted sugar snap peas on March 14, weeks before I usually plant, and they too have sprouted as temperatures rose into the 80s by the first day of spring.

This was by far the warmest Vermont weather we have seen in March. Daffodils came up in profusion – three weeks early – and our forsythia was glorious. I remember only 20 years ago being concerned, when we planted the first forsythia, whether it would flourish given our cold winters!

From a climate perspective, the combination of a warm stationary ridge over the northeastern part of the country with early snow and ground melt gave us this exceptionally early transition from a mild winter into an early spring. Typically this transition comes three days earlier for every degree increase in monthly mean temperature, and it has been advancing by about three days each decade as winters get warmer.

I did cover my lettuce, spinach and peas for the frosts in late March as a precaution, and I will wait till April to plant more. The resilience and adaptability of the natural world to a changing climate offers some reassurance. The dry, warm winter has simplified the recovery from the floods of tropical storm Irene and reduced spring flooding, but it has meant a very short ski season. It also means we move into warmer weather with less soil moisture than usual in spring.

This winter and early spring give us a glimpse into the future of our Vermont climate. The warming trend will slowly accelerate as we continue to burn fossil fuels, with increasing extremes of precipitation that will be less predictable.