

Arctic Matters: How a Warming Arctic May Bring More Extreme Weather

SYNOPSIS / SPRING 2019 / BY JENNIFER H. SHAKUN

Many CSLN members report being affected by persistent weather patterns. In this bulletin we examine the role of a warming Arctic in changing atmospheric dynamics and mid-latitude weather.

The Dynamics of Extreme Weather

In [a previous bulletin](#), we discussed extremes like record heat, heavy rains, and drought, which are related to the physics (i.e. thermodynamics) of climate change. It is relatively straightforward to measure these and there is a high degree of confidence regarding how they will change in the future. But warming can also affect the mechanics (i.e. dynamics) of the climate, including wind and pressure systems. Dynamics are key to understanding and predicting regional weather (including changes in mid-latitude regions where most CSLN members own and manage land), but changes in atmospheric circulation are more difficult to consistently and accurately measure or model. Nonetheless, this is a topic worth watching because it sheds light on factors that create extreme weather, counterintuitive impacts, and surprises for society.

It's all about Persistence

The persistence of slow moving or semi-stationary weather systems can quickly elevate moderate events to something more extreme (e.g. from rain to saturated soils and flooding). A big question in atmospheric research is whether climate change is contributing to more persistent weather patterns.

The Arctic Connection

Recently, it has been suggested that accelerated Arctic warming is leading to unusual weather in mid-latitude regions. This includes “polar vortex” events where Arctic air drifts south causing a deep freeze over parts of the northern U.S. The [polar vortex is nothing new](#), but there has been vigorous debate among scientists about whether the kind of jet

stream activity that leads to these incursions of Arctic air is becoming more likely. The jet streams are fast-moving “rivers” of air flowing around the planet that drive our weather at the surface. There has been an incredible volume of new science aimed at understanding how the path of the jet stream may be changing and what the implications are for mid-latitude weather, including extreme weather in winter and summer.

Researchers are assessing whether a warming Arctic *can* influence the jet stream, whether it *has* already had a discernable effect, and whether it *will* be a significant factor as warming continues. The current consensus is that it *can* affect our weather (via a number of pathways), but it's difficult to see statistically robust trends (yet). However, a rapidly warming Arctic *will* probably be a significant factor driving extreme regional weather in the future.

Consequences for Working Forests

Stagnant weather patterns that bring prolonged rain or drought are affecting [forestry operations](#), especially the number of good operating days. Managers are planning for less predictability by developing alternative harvest plans and schedules. The ability to take a more nimble approach and “make hay while the sun shines” has become a real advantage in some circumstances (see bulletin for [examples](#)). Extreme weather will also drive [forest change](#), especially when extremes intensify other types of forest stress.

Conclusion

The impact of a warming climate is not as simple as rising temperatures, and some counterintuitive impacts and surprises should be expected. This highlights the importance of having a robust forest monitoring system in place to track local change.

Click on the sub-headings to go directly to the corresponding section of the full bulletin, or read the complete bulletin online at: <http://climatesmartnetwork.org/2019/03/arctic-matters-how-a-warming-arctic-may-bring-more-extreme-weather/>