



January 16, 2001

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Pennsylvania Floods

Looking For Triggers

Wary of Winter Flooding, Meteorologists Are Honing Ways to Predict Rain

By Amanda Onion



Jan. 17 — Tom Cunningham of Hyndman, Pa., remembers what January rains can do.

Aerial view of flooded houses and businesses in West Nanticoke, Pa., Jan. 20, 1996. Forecasters say residents in the northeast could face more winter flooding. (George P. Widman/AP Photo)

STORY HIGHLIGHTS

[Primed For Floods](#) [Fingerprinting Floods](#) [Siberian Signals](#) [Expanding Prediction Tools](#)

Five years ago winter rainfall melted snow that had wrapped the nearby Appalachian Mountains. The snowmelt cascaded off the mountains and burst the banks of the local Will's Creek which then flooded the town.

"Three-quarters of the town was underwater," remembers Cunningham, who was mayor of Hyndman at the time. When he drove to work that day, Jan. 19, 1996, Cunningham recalls "a wall of water came up over the hood of my car and swept over the whole road."

Primed for Floods

Now forecasters at the National Weather Service warn residents in the Northeast should be alert for another season of possible winter flooding. For the first time in three years, fairly heavy snowfall and below-normal temperatures in the past two months have made waterside communities in the northeast vulnerable to sudden and severe flooding.

And since predicting rain is key for predicting floods, many meteorologists are working on finding new ways to search the skies for moisture so residents like Cunningham might have more warning in the future.

"We're putting up a red flag," says Bob Chartuk of the National Weather Service in New York. "What we need to watch for now is a catalyst of heavy rain."

How can snow and cold lead to floods?

The equation goes like this: After the "Millennium" Nor'Easter that swept up the northeast coast in late December, large masses of snow remain in many states, particularly in mountainous regions. Meanwhile, a cold trend that has gripped the same region for the past two months has frozen much of the ground and choked up rivers and streams with large chunks of ice.

Melt that snow with rain and it has nowhere to go since the waterways are stopped up by ice and frozen ground makes a poor sponge.

"A dry earth absorbs water well," says Chartuk. "But a wet, soggy Earth won't and a frozen Earth won't absorb anything."

Fingerprinting Floods

With conditions ripe for a flood, forecasters are keeping a close watch for rain. Chartuk says the weather service is well-equipped to predict wet weather after recently completing a \$4.5 billion modernization effort that added new tools including 123 new weather radar systems, 800 automated observing systems and rows and rows of sleek new, powerful computers designed to crunch weather data from multiple sources.

Still, since weather is triggered by an endless array of factors, Chartuk admits there is always room for improvement in weather tracking. Paul Knight, a Pennsylvania state climatologist at Penn State University, believes one way to improve flood prediction is to identify the fingerprints of previous floods.

"It's like mapping our own little genome here with flashflooding," says Knight, referring to the ongoing project to identify all the genes of the human body and their functions. "If we know certain conditions have led to certain storms, then we can look for those particular fingerprints."

Knight and his colleagues at Penn State have been sifting through 33 years of weather data to trying and pinpoint factors that preceded heavy floods. The signs aren't always simple.

For example, one fingerprint Knight has zeroed in on is that approaching, but weakening tropical storm systems, accompanied by strong winds below 5,000 feet from the southeast tend to produce flash flooding in Pennsylvania. By plugging that and scores of other factors into a computer modeling system, Knight hopes the computers will be alert to possible flash flood triggers within incoming data.

"We look at the forecast and see how it differs from average conditions," Knight explains. "Then we see if any flood fingerprints are evident."

Two weather factors that have been well researched and identified for computer modeling systems are the infamous El Niño and La Niña. These respective warm and cool patches of water in the tropical Pacific are known to trigger their own signature climate patterns and weather events. But this season, the most recent La Niña has mostly faded and without either system in sight, there is less data to guide forecasts.

Siberian Signals

It's for seasons like this one that Judah Cohen, a meteorologist at Atmospheric Environmental Research Inc., has been studying the effects of snow in Siberia. Cohen first began searching for ways that snow cover in the U.S. might affect climate systems. When he found none, he turned to a region that receives much more snow, much earlier in the season.

"When I looked at Eurasia snow cover, there was a strong signal coming out," Cohen says. "It turned out that the strongest correlations between climate and Eurasia snow cover were in the U.S. and Europe."

By tracking Siberia snow cover from satellite data dating to 1972, Cohen found that when snow falls early and heavily in Siberia, the U.S. and Europe experience cold winters with many storms. The equation becomes especially reliable in years when there is no active El Niño or La Niña.

So what did Siberian snows reveal this fall? Cohen found that snow cover registered above normal in Siberia this fall. By September, satellite data showed that about 2 million square kilometers had been covered by snow. Two months later, over 20 million square kilometers were draped in snow. This fall those figures told Cohen something that many have realized by now: it's been a cold, stormy winter.

It may seem arbitrary to attribute cold weather in a place like Toledo, Ohio, to how much snow falls in Siberia in October, but, as Cohen explains, snow has a direct effect on the atmosphere. Snow cools the atmosphere by reflecting heat away from the Earth and by absorbing the sun's rays for melting before the heat can reach the land.

In a large mass of land like Siberia, widespread cooling from widespread snow cover can create a high pressure mass that grows and spreads out to surrounding regions.

So far Cohen hasn't managed to prove that Siberian snow affects winters across the globe. But he has demonstrated that Eurasian snow cover in the fall can at least serve as an indicator of what's to come further west.

Expanding Prediction Tools

Martyn Clark a meteorologist at the Comprehensive Institute for Research and Environmental Sciences at the University of Colorado says finding new signaling factors like Eurasian snow cover is vital for expanding weather predicting tools.

"It's important to move beyond the El Niño/La Niña oscillation for predictability," he says.

Better predictability is just what residents in Hyndman, Pa., are eager for, says Cunningham. The town has secured funding to construct flood levies around nearby Will's Creek to prevent sudden floods like the one in 1996. But so far, no building has begun. That means keeping a keen eye on the weather could mean saving homes and lives.

"We have just a skiff of snow now, but there's more up in the mountains. Once that starts to melt we've learned how fast the creek can run," Cunningham says. "So we're all a little itchy any time it looks like rain." ■



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