

Dust, snow make for problematic mix for skiers

Whitewater fans, fishermen also impacted

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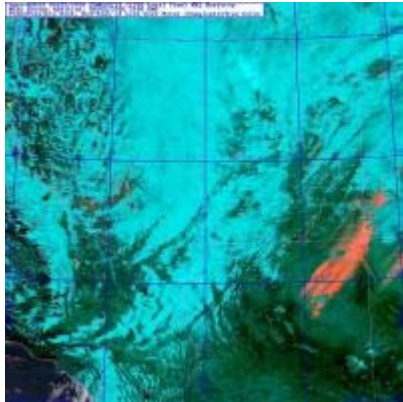
Dust on top of snowpack, such as in the Red Mountain Pass area, increases the solar radiation on the surface, which results in faster melting. That has myriad effects on outdoor activities. The problem this year is worse than usual. (Chris Landry/Center for Snow and Avalanche Studies)

As a skier, Auden Schendler sums it up with pragmatic simplicity.

"You can't wax for dirt," he says.

As the Aspen/Snowmass director of community and environmental responsibility, Schendler's concerns for the disconcerting dust and dirt layers that have blanketed the slopes of his local ski areas along with mountains throughout the state this spring are considerably more comprehensive. And like so many observers of the reddish-brown dust layers that seem to be playing a more prominent — if not permanent — role in Colorado's precious spring snowpack, he has more questions than answers.

"There's no question that it's happening. But there's always been dust out there, so has this always happened? Is it



Dust clouds that form over the Colorado Plateau at the Four Corners region are being studied with satellite images. (Steve Miller at CIRA/Colorado State University)
getting worse? All we know for sure is that it's really bad," Schendler said. "Our CEO has come into my office after these storms very agitated and said, 'Auden, climate change may put us out of business eventually, but this is right now and this is a serious problem.' Essentially your product is damaged."

Along with its spectacular mountain scenery, Colorado's most prized commodity arguably is its snow. Skiers and snowboarders are drawn by the millions annually to sample the celebrated snows of the Colorado Rockies, followed in spring and summer months by whitewater rafters, kayakers and fishermen savoring the snowmelt-fed rivers and streams. That's not to mention the millions who depend upon the fresh water supply simply for survival.

But just as the stained snowfields have tarnished the pristine imagery of the mountains in recent years, the dark tinting of naturally white snow has introduced the potential to severely curtail all those activities associated with it.

Thanks to scientific studies conducted by former Coloradan Tom Painter at the Snow Optics Laboratory at the University of Utah, this much is known: In 2005 and 2006, dust-covered snow melted up to 35 days earlier than a purely clean snowpack would have in Colorado's San Juan Mountains. Last year — which included 12 measurable winter/spring dust storms — snow melted 48 days earlier in the same area.

It's not a global warming issue, per se, although warming is likely to exacerbate the problem. The immediate problem comes from the dark tint of dust-covered snow, which negates its natural reflective qualities and absorbs more sunlight. Compare it to wearing a black shirt on a sunny day. By putting a dark shirt on the snowpack, scientists say it's melting more than a month faster.

Less time for skiing

"That's a pretty strong impact," said Painter's research collaborator, Jeff Deems, a research scientist at the NOAA Western Water Assessment and the National Snow and Ice Data Center at

the University of Colorado in Boulder. "From the skiing perspective, that's a month less snow in spring. But the biggest impact is hydrologic. We're seeing earlier and faster runoff, which makes it harder to manage resources. In the West, we depend on the snowpack as a reservoir. We can store a lot more water in the snowpack than in our surface reservoirs. If you melt everything off a month early and melt it off faster, that's a big challenge for water managers."

It's also a big challenge for Colorado's whitewater boating community and the industry credited with contributing \$140 million annually to the state economy. A month earlier on the calendar, cold weather diminishes the appeal of river running. And stretching the season into warm summer months can become problematic after an early peak. Fishermen face similar problems as rivers warm and wane ahead of schedule.

"One of the impacts of advancing snowmelt timing is reduced late-season flows," Deems said. "For rafters and kayakers, things get even bonier in the late season. And if reservoirs are substantially drawn down, it can have a big impact on boaters and fisherman."

As for the origin of the dust episodes impacting the Colorado snowpack, the scientists have that one figured out. Collaborating with Chris Landry at the Center for Snow and Avalanche Studies in Silverton, Painter and Deems examine the effects of the dust events on the snowpack. Using satellite observations and weather modeling tools, they have traced the origin of the dust to the Colorado Plateau in the Four Corners region, where impacts of years of disturbance of the fragile desert topsoil have created large quantities of dust just waiting for a strong wind to carry it away.

"Basically any activity that disturbs the soil crust and vegetation in the desert causes dust," Deems said. "When we go out and disturb it — whether by drilling, plowing, driving, cow's hooves, mountain bikes or feet — then all of the sudden the dust is ready to be blown away by the next wind storm."

Lake sediment core sampling done in the San Juan Mountains by the University of Colorado's Jason Neff has shown an increase in dust storms in the region corresponding with human settlement in the 1800s.

The weather pattern known as El Niño increased the amount of moisture in the Southwest for much of the winter, contributing to the reduction of dust episodes this winter relative to last year, Deems said. But a northerly shift in weather patterns this spring led to four measurable dust events as the desert had a chance to dry out.

Not enough data yet

"We've only been studying this since 2003, so we don't have the data set to know if it's getting worse," Deems said. "But over that period we've seen several more intense years more recently, so the perception is that the dust has gotten worse more recently. And with climate projected impacts, we have reason to expect this phenomenon to intensify."

For Schendler and those who depend on snow, the ultimate question remains: What can be done to stop it?

"Recognizing the driving mechanism, that topsoil disturbance, is the key. Looking for solutions that minimize and reduce the disturbance to desert dust-emitting regions, that's the overarching goal," Deems said. "As recreationists enjoying the desert, it's a matter of awareness, paying attention to public land use issues, as well as being careful about where we camp and how we travel, minimizing our impact on the land. Just some common sense."