Missoulian

In century ahead, glaciers may 'cling to the landscape' or vanish

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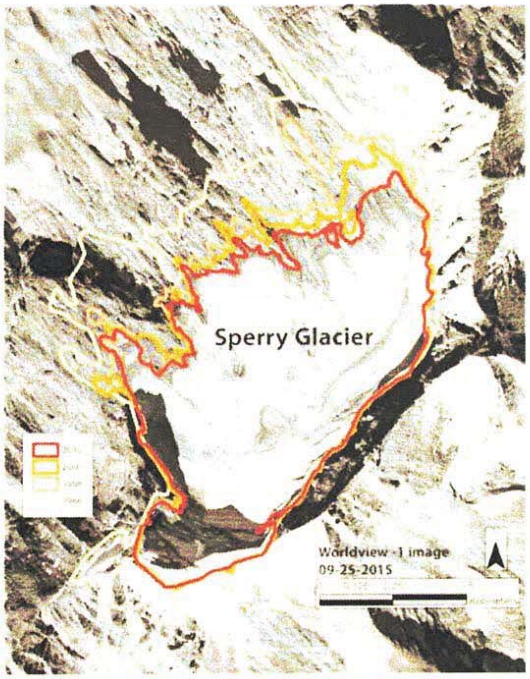

This satellite image of Glacier National Park's Sperry Glacier shows how its ice field has shrunk from roughly 300 acres in 1966 to 215 acres in 2015. U.S. Geological Survey, provided

WHITEFISH — The inaugural Montana Lakes Conference began here Wednesday night with a mix of good news and bad news.

The good: It may still be possible to preserve half of the world's remaining glacial ice.

The bad: If humanity remains on its current path of high carbon dioxide emissions, it can expect "large-scale deglaciation" in coming decades, and a thicket of accompanying environmental and economic problems.

Jim Elser, director of the University of Montana's Flathead Lake Biological Station, and Erich Peitzsch, a physical scientist with the U.S. Geological Survey, presented on this topic early in this three-day conference, which is hosted by the Whitefish Lake Institute and addresses a wide range of scientific and policy issues facing Montana's lakes.

"Here in the Flathead, our waters start in ice and snow. ... It's good to know what's going on up there at the top of the watershed," Elser said.

He proceeded to scroll through photos of Glacier National Park's namesake ice sheets, which form in bowl-shaped valleys known as cirques. Some of the images date to the 1920s. Pictures taken from the same vantage points in the 2000s and 2010s showed the glaciers reduced to tiny fragments of their former selves.

These then-and-now photos have been widely cited as evidence of Earth's fast-changing climate, driven by human greenhouse gas emissions. Peitzsch explained that in recent years, the volume of ice lost to melting has exceeded that replenished by snowfall. While climate change is the main cause of the glaciers' retreat, he said, other factors are also at work.

Peitszch and his colleagues keep tabs on the park's glaciers, using tools ranging from satellite imagery to PVC stakes sunk into the ice. "The problem that we're trying to answer now," he said, is "how much a driver is climate to these cirque glaciers now?"

To answer that question, they've scrutinized the relationship between Sperry Glacier's ice loss and changes in temperature and precipitation, publishing their findings last March in The Cryosphere Discussions.

"What we found is that as the glacier retreats into its cirque, so as it gets higher in elevation, there are more local processes that are becoming more influential than climate," Peitzsch said.

"I'm not saying that climate is not a driver anymore," he stressed, "but I'm saying that these local processes are playing a bigger role than they have in the past."

He explained that as Sperry shrinks into its cirque, "the shading that occurs because of the mountains behind it is causing less solar radiation to reach the glacier at this point." Avalanches from the steep slopes above it, he continued, are also adding snow that will eventually get compacted into new ice.

"Climate is still driving" the glaciers' retreat, "but these local processes still might allow these glaciers to cling to the landscape in their basins for a little bit longer."

In 2010, he continued, University of Montana scientists modeled how Sperry might respond to a range of emissions and warming scenarios. If emissions hold to their 2005 levels, their projections show a slightly smaller Sperry persisting through the end of this century. Warming of 1 degree Celsius shows a much smaller glacier.