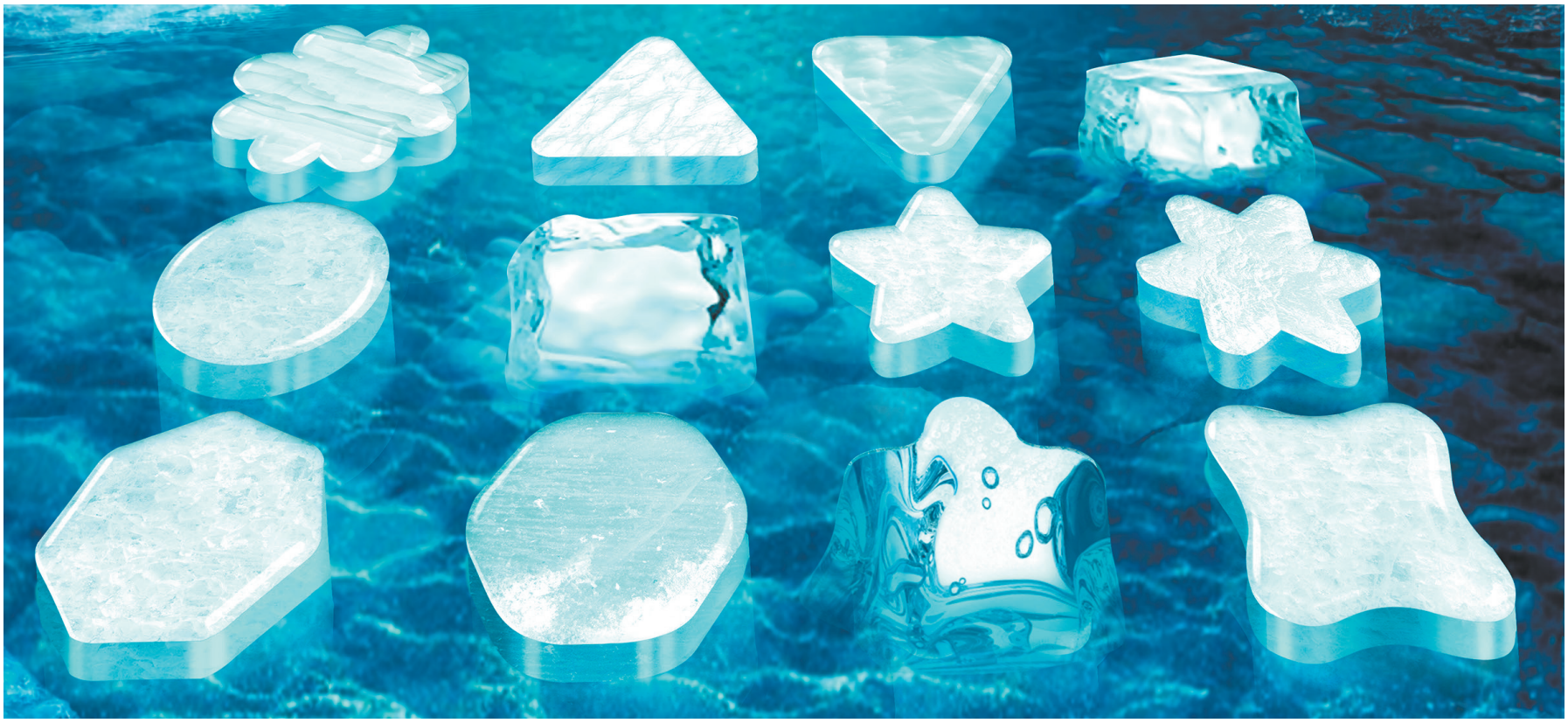

SHAPE OF THINGS TO COME

A University of Idaho researcher is among scientists studying Greenland glaciers to figure out just how fast the world's sea levels might rise

BY SAMANTHA WOHLFEIL

In the next 85 years or so, scientists think sea levels will likely rise by another foot to 6 feet, says University of Idaho researcher Tim Bartholomaus.

"That is a *huge* range," he says. "If you tell the mayor of Seattle or the mayor of Miami that you've got to look forward to 1 foot or 6 feet of sea level rise, they're going to laugh. 'What am I supposed to do with that information?' It's too uncertain."

To knock down those uncertainties, we need to understand basically two things, Bartholomaus says. The first is how much carbon dioxide and other gases people are going to keep pumping into the atmosphere contribute to climate change, which will largely interconnect with political decision making.

The other is, given those changes, how and why do glaciers and ice sheets melt and move in the ways they do, and how can people predict those changes with any certainty?

He and an international team of scientists are working to pin down the second part.

They've been studying some of the many glaciers on Greenland's ice sheet, the second largest in the world behind Antarctica, and this year announced that some glaciers melt and recede a lot more than others in part because of their shape.

"We've known for some time now that the Greenland ice sheet is losing ice," Bartholomaus says. "But what we're seeing is not all glaciers contribute in the same way."

He describes the sheet as a big pancake of ice covering the island of Greenland, which then drains out into 200 to 300 individual glaciers that "kind of poke out like fingers from the palm of the ice sheet."

Tim Bartholomaus
UNIVERSITY OF IDAHO

Interestingly, even when glaciers are right next to each other, they don't act the same.

Of the 16 glaciers they studied on the west coast of Greenland, a single one, Jakobshavn Isbræ, accounted for more than 81 percent of the ice lost between 1985 and 2015. The research relied on highly detailed aerial images from those time periods that the researchers used to create topographic maps and observe what each glacier looked like over time.

The study found that it's a good thing to have thin, steep portions of a glacier closer to where it meets the ocean, Bartholomaus says.

Where they meet open water, glaciers can have a pattern of ice splitting (also called calving) off into icebergs, stretching, thinning, more calving, and on in a loop. Once that loop gets going, changes to the glacier can happen incredibly fast, he says.

But where the ice is thin (which could still be hundreds of feet thick) and has a steep slope, the loop goes so quickly that the action is sort of stuck there, and can't move farther into the ice sheet, Bartholomaus says.

The steep part acts as sort of a backstop or shield point, protecting the inner parts of the ice sheet.

"A couple of them have that critical shield point well into the interior of the ice sheet … Because of their shape, they are allowed to see big changes," Bartholomaus says. "Whereas other glaciers have that critical point much closer to the ocean, and are therefore insulated from big changes."

Knowing that, researchers can identify glaciers that haven't seen the feedback loop start yet, and anticipate which would be more likely to see the most movement and change.

The research was funded by NASA and the University of Texas Aerospace Engineering and Engineering Mechanics Department, and was published in the journal *Nature Geoscience* in April.

Moving forward, keeping an eye on the hundreds of glaciers wouldn't be practical, but if scientists can identify those whose shield points are farther inland than others, more attention can be given to those glaciers, as they'll be more likely to contribute significant amounts of water, he says.

"If we understand how those glaciers and ice sheets work better, we can make better forecasts," Bartholomaus says.

That forecast could make a menu of sorts: "How bad do you want it? These are the choices you get to make. You can say we're OK with 5 feet of sea-level rise," Bartholomaus says. "Or you can say, 'No, that's not OK; that's too much sea-level rise too fast. We need to give our cities a little more time to prepare for these changes.'" ■

samanthaw@inlander.com