One of the world’s fastest melting glaciers may have just lost its biggest chunk of ice on record

By Chelsea Harvey


While examining satellite images of Greenland’s massive Jakobshavn glacier over the weekend, members of the Arctic Sea Ice Forum noticed something odd: Between August 14 and August 16, it appeared as though a huge chunk of ice — which some guessed might be the largest ever observed — broke away from the glacier’s face.

Members of the forum estimate that the total area of ice lost from the edge of the glacier (that is, the area lost when looking at the top surface of the glacier from above, using the satellite images) was around 12.5 square kilometers, or nearly five square miles, according to a post on the Arctic Sea Ice Blog, which is operated by ice enthusiast Neven Curlin. If correct, this would be one of the largest such chunks of ice ever to split from the glacier.

“Calving,” which is when ice breaks away from the edge of a glacier or ice sheet and tumbles into the water, is not unusual for this area in Greenland. A combination of rising air and sea temperatures in the Arctic have made calving events more severe in recent decades, and in fact, the Jakobshavn glacier is one of the fastest flowing glaciers in the world, meaning it bleeds ice into the ocean at one of the highest rates of any ice sheet on Earth. As of 2012, the glacier was pouring out ice at a speed of 150 feet per day, nearly three times its flow rate in the 1990s.

But last weekend’s event was big enough to turn heads, and the Arctic Sea Ice Blog post suggested that this incident might be the biggest calving event on record. However, some scientists aren’t so sure — and their doubt highlights some key uncertainties in human interpretations of ice calving events.

“Overall, I don’t think that they really can nail the ‘largest’ [calving event] or not,” wrote Richard Alley, a glaciologist at Pennsylvania State University, in an email to the Post. According to Alley, the time resolution on the satellite images, which are spaced by a full day, is poor enough that the ice loss could have occurred in several smaller events rather than one large one. Alley adds, “I wouldn’t get too excited on this, even though it is not good news.” However, Jason Box, a glaciologist with the Geological Survey of Denmark and Greenland, says he wouldn’t rule out the possibility that this calving event is the largest to occur. And Eric Rignot, a principal scientist and ice expert at NASA’s Jet Propulsion Laboratory, says that whether or not the event is the largest on record, he’s “struck by the sheer size of this calving event,” which he says is evidence that the glacier is continuing to retreat at “galloping speed.” Rignot also agrees that the calving may well have occurred in a series of smaller events — it’s hard to say for sure in this case.

The uncertainty highlights that even though Greenland is a huge contributor to sea level rise right now — adding about a millimeter per year, even more than Antarctica — and contains a potential 20 feet of total sea level rise, scientists aren’t always able to monitor all of its losses with high precision. Granted, it would have been possible to make more precise observations
“in those places that scientists have set up the right monitoring equipment that takes measurements frequently,” Alley writes. In fact, as Alley points out, there is some such monitoring equipment on the other side of the glacier operated by David Holland, a professor of mathematics at New York University — but in this case, it looks as though the satellite images present the most detailed information so far.

As a consequence, scientists have a little less to work with when making calculations about processes related to ice loss — sea level rise, for instance, which is exacerbated by large volumes of ice falling into the ocean and raising the water level. Gaps in our knowledge about glacier activity can also translate to uncertainties in the scientific models we use to predict their future behavior — and there’s already a fair amount of debate about how polar ice will continue to respond to a warming world.

Another scary point is the fact that the lost ice appears to have moved the face of the Jakobshavn glacier back to a new record limit — and experts say the further the glacier withdraws, the faster it is likely to lose ice in the future.

As more ice breaks away, the edge of a glacier moves further and further back, a process known as “retreating.” A calving event moves the retreat line back, but as ice additional ice slides forward to take its place, retreat lines can shift around from one year to the next. But it looks as though this new calving event, whether it was the largest documented or not, may have moved the retreat line back to a new record limit.

However, there’s some disagreement about how important this is, too. “It looks like the ice has retreated still farther upstream, but not hugely, and mostly continuing a long-term trend,” Alley wrote in his email.

But Box contends, “It’s impressive to see the Jakobshavn glacier retreat further, to a new record position upstream.” He also adds that the glacier bed tends to be deeper upstream, so the face of the glacier is starting to retreat into areas of deeper ice. These areas can be unstable, as warming temperatures can cause the glacier to start melting from the bottom up, effectively dislodging the ice from the glacier bed and making it easier for pieces to break off.

Rignot agrees that “this is probably the kind of event that we’re going to see more happening on this big ice stream as it retreats further into the deep ice.” And, in fact, it looks as though the glacier’s retreat has continued into the new week. As of Monday, the most recent satellite images showed an even further retreat upstream, evidence that more ice has been lost in the past few days.

Debates aside about the size and mechanisms of these events, Rignot says events like this one are significant because they give scientists a glimpse into the future of the world’s ice sheets. “Jakobshavn, right now, is kind of showing us what it looks like,” he says.