SNAPSHOT

Taking a glacier's pulse

Ulyana Horodyskyj rappels down a ridge on the Ngozumpa Glacier in the Himalaya mountain range. Working at about 5,000 m above sea level — Tibet to the north and Nepal to the south — her stunning view of snow-capped peaks is breathtaking. But Horodyskyj, a PhD student at the University of Colorado, Boulder, is not there just for the scenery. Rather — drill in hand — she is installing a solar-powered surveillance camera to document hourly changes in the size of the bright blue supraglacial lake below.

Such lakes — ephemeral pools on the surface of glaciers that form as meltwater from higher up trickles down through crevasses — are increasing in number and size as glaciers melt with climate change (D. I. Benn, S. Wiseman & K. A. Hands *J. Glaciol.* **47,** 626–638; 2001). Their formation can also accelerate melting: the lake water causes chunks to collapse from the surrounding ice walls.

In June 2011, Horodyskyj selected three lakes from the few hundred that dot the approximately 18-km glacier, and installed cameras to monitor them. She captured one draining and refilling in real time, presenting her time-lapse video in December at the annual American Geophysical Union meeting in San Francisco.

Time-lapse retreat of glaciers' ends has been documented before — most famously by photographer James Balog's Extreme Ice Survey (www.extremeicesurvey.org) — but Horodyskyj believes she is the first to use the technique to target the lakes, which result from vertical rather than horizontal glacier shrinkage. "I liken it to taking the pulse of the glacier," she says. "Documenting in real time how things are changing on the hour, through the days, through the seasons offers an unprecedented view into how the glacial system works."

The technique is important because changes happen so fast, she says. Monitoring over seven days, Horodyskyj, who also used an inflatable dingy to measure water depths, saw one lake lose about 105,000 cubic metres in two days — before refilling. "If I came the week before and the week after it would have looked as though nothing had changed. We would not have known unless we saw the footage that the equivalent volume of 42 Olympic-size swimming pools got sent down the glacier," she says.

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Indeed, she calculates the rate of drainage from this particular lake — which has quadrupled in surface area from about 3,800 to 15,000 square metres since 2008 — was more than double the typical run-off from the glacier. The lakes are like "cancers that are consuming the glacier," she says.

Horodyskyj now intends to apply the technique over longer time periods to work out how the changes correlate with precipitation and whether the melt season is beginning any earlier. She also wants to extend her camera network further up the glacier: a higher vantage point will enable her to monitor multiple lakes and track which lake feeds which. "It is a connected network. If one lake drains I would like to see where that water goes," she says.

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