Dr. Anna Liljedahl

Anna Liljedahl has worked at IARC and INE as a research assistant professor in permafrost hydrology since 2011. Her research integrates computer simulations and field measurements with a focus on how glaciers, permafrost, and/or tundra landforms affect the storage and flow of water at the watershed scale.

IARC’s Publications team interviewed Dr. Liljedahl to discuss her background, interests, and ongoing work.

What would people be interested to know about your current projects?

While I was modeling the hydrology of tundra lowlands during my PhD work, I stumbled on the importance of ice wedge polygons to hydrology when I couldn’t get modeled runoff and surface ponding to mimic the observations I had made in the field. I discovered the problem: I wasn’t including in the modeling certain differences caused by ice wedge polygons. I then realized that these microtopographical features—whether they are mounds with surrounding troughs (high-center polygons) or the inverse (low-center polygons)—have a dramatic impact on the flow and storage of water at the landscape scale. Now, we have circum–Arctic lowland observations showing recent ice–wedge degradation, resulting in low–centered polygons evolving into high–centered polygons. This is due to melting of the underlying ice wedges. These morphological changes can have major implications for other portions of Arctic ecosystems that depend on surface water and runoff.

In interior Alaska, others have observed an increase in late–winter runoff from the Tanana River, as well as large reductions in glacier coverage since the 1950s. We have a research project assessing whether this additional glacier runoff may have increased recharge to the groundwater system, which would therefore increase winter baseflow of rivers draining the northern slopes of the Alaska Range. Climate is expected to continue to warm and, at least initially, melt more of the glaciers. So any increases in glacier runoff can result in streams continuing to flow throughout the summer, or once the glaciers retreated so high that their melt decreases, streams may dry up for long periods in summer.

How have your background and other interests contributed to your scientific career?

I’ve been fascinated by hydrology for most of my life, since long before I knew to call it that. I’ve always enjoyed playing with and around water, and have long understood its importance to life and every aspect of our world. So I’m happy to be able to make a career of it. Growing up in Sweden, I had a special eye for Canada or Alaska. I just wanted to go and live in North America somehow. I enjoy Fairbanks and Alaska through my interest in the outdoors, which I satisfy year–round by cross–country skiing, hiking, dip–netting, and gardening, among other activities. Where else can you eat your own moose and wild salmon?

What advice do you have for other young scientists?

If students find a topic that holds their interest and excites them, I’d recommend they read a lot and seek out experts to talk to—both mentors and peers. Talking and listening can lead to all kinds of opportunities that you’d never imagined. Then it’s up to the students to make the best out of it!