Meltzone 2011: CCNY expedition to track life and death of supraglacial lake

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How do you observe signs of climate change in real time? Dr. Marco Tedesco, associate professor of earth and atmospheric sciences at The City College of New York, plans to be the first to catch sight of one dramatic indicator of a warming world on the Greenland ice sheet this summer, and through social media, people will be able to track his progress.

Professor Tedesco arrived in Greenland earlier this month to attempt to witness – for the first time – the entire lifecycle of a supra-glacial lake – from earliest formation to its catastrophic draining. These huge bodies of water form each year atop melting glaciers. They commonly measure a kilometer or more across, but can drain suddenly within a matter of hours.

Professor Tedesco plans to use data he gathers on his expedition to answer lingering questions about these mysterious pools, including: What causes them to drain? Where does the water go? How does this affect the glaciers' inevitable flow toward the sea?

"This rapid draining is roughly equivalent to emptying a thousand Olympic-sized swimming pools at a rate of a dozen pools per minute," notes Nick Steiner, a graduate student in Professor Tedesco's Cryospheric Processes Lab. Mr. Steiner conducted research with Professor Tedesco in Greenland last year.

Professor Tedesco and his team will hike across the Jakobshavn Isbræ

glacier in search of a lake to monitor and eventually make camp on the ice in the midst of an unstable landscape of embryonic lakes, streams and sub-glacier drainage.

Rounding out the expedition party are graduate student Patrick Alexander of the CUNY Graduate Center, biologist Christine Foreman of Montana State University, glaciologist Ian Willis and graduate student Alison Banwell of the Scott Polar Research Institute at the University of Cambridge, UK.

With such a large volume of water flowing out of the lakes – at the surface, under the glacier or thundering into deep holes called "moulins" – the surrounding ice is subject to movements that can cause ground-shaking 'ice quakes'. The team will drill an array of monitoring equipment into the ice to track ice movement as the lakes drain and better understand the drainage. The monitors use DGPS, a high-precision global positioning system that uses satellite and ground stations to give greater positioning accuracy than a car or cellphone GPS.

A radio-controlled mini helicopter fitted with a camera will help the expedition party estimate the size and depth of the lake. Professor Tedesco used a similar craft on a past expedition in Antarctica.

The team will also study the scattered, dark deposits of "cryoconite," extremely fine wind-borne particles carried to Greenland from around the world. Cryoconite begins life as soot, dust, soil and pollution and collects in depressions on the glacier. It absorbs more solar energy than the surrounding snow and ice, in turn, causing the snow to heat, melt and form small water-filled holes in the ice. Bacteria appear in these microhabitats, a phenomenon Dr. Foreman will study.

Meanwhile, Dr. Tedesco will measure the albedo, or reflected light, of the cryoconite versus clean snow and ice. Getting a baseline albedo for

each type of ground coverage will allow them to calibrate satellite data and map coverage types on wide swaths of glacier.

Professor Tedesco will tweet his progress throughout the expedition for an interactive experience, updating his followers and Facebook page with photos, observations and their locations across the glacier. In addition, he will be reachable via satellite phone, and followers will have the chance to name a newborn lake on the glacier. Links to Twitter and Facebook feeds appear below.

Provided by City College of New York