Laboratory avalanches reveal behaviour of ice flows

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(PhysOrg.com) -- Avalanches created in controlled laboratory environments are helping us to understand the potentially lethal processes that these natural disasters unleash.

In September 2002, one hundred million cubic metres of rock and ice separated from the northern slope of the Kazbek massif in North Ossetia, Russia. The resulting avalanche killed 125 people and caused widespread damage. Ice avalanches can travel great distances at speeds of up to 150 miles per hour, but it is not fully understood how they travel so far or so fast. The difficulty lies in observing the processes within avalanches closely. But by creating a laboratory avalanche one researcher at The University of Nottingham has helped us to understand how melting effects flows of ice — even at temperatures below freezing.

Dr Barbara Turnbull, a member of the Fluid and Particle Processes Group in the University's Faculty of Engineering, has found that the same layer of liquid water at an ice particle's surface that helps skaters to

skate across an ice rink also enhances ice avalanche speeds. The water lubricates particle contacts, resulting in more collisions and melting, which in turn leads to a snowball effect of ever-faster speeds.

To measure this effect Dr Turnbull half filled a narrow Perspex drum with flash-frozen water droplets, rotating it so that the droplets formed a slope down which the ice granules bounced and slipped — simulating ice avalanches.

“Ice avalanches from collapsing glaciers are not common in populated areas, but that may change as global temperatures rise. The Ossetia avalanche alerted researchers to the urgency of gaining a better understanding of the processes that control such flows,” Dr Turnbull said.

“This is a simple experiment, but it tests the theory that surface melting in ice particles as they collide plays a role in the speed at which avalanches travel — and therefore the amount of damage they can potentially inflict on the local environment and populations.”

Provided by University of Nottingham

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