# New diagnostic tool for climate change research enables better understanding of global patterns

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(Phys.org) -- Scientists have developed a new diagnostic tool that will enable better understanding of global climate patterns.

The development, by researchers from The University of Queensland, University of Canterbury (New Zealand) and Monash University, distinguishes between the causes of particles in glacial deposits – whether climactic or caused by rock avalanche – allowing for more accurate data to inform climate models.

Co-author of the study, UQ Professor James Shulmeister, says the development represents a breakthrough in the way climate change research is approached.

He says that while glaciers have been used as an early indicator of the extent and rate of global warming, there was previously an assumption that they always reflected climatic change.

“But there has been some debate on how much of the mountain glacier record represents climate change and how much relates to changes in glaciers resulting from rock avalanches onto the glaciers,” he said.

“Being able to determine whether a glacial advance is caused by a rock avalanche or by purely climatic factors enables us to ensure the climatic record from glacial deposits is accurate.

“Using this information we will be able to better understand our changing climate and inform the creation of climate models.”

The research, published in the April issue of the prestigious journal *Geology*, represents a major breakthrough in the fields of both landslide (rock avalanche) research and climate change from glaciers.

Lead researcher Dr Natalya Reznichenko says the cause of glacial deposits is more complex than originally thought and that some deposits that were previously identified as being of climatic origin are in fact the products of readvances triggered by the deposition of rock avalanche debris on glaciers.

“We discovered that during rock avalanches, intense fragmentation of rock generates extremely fine particles – much less than a thousandth of a millimetre across - that cluster together to form agglomerates,” she said.

“These agglomerates are completely absent from glacial deposits known to lack rock avalanche material.
“This discovery comes from long-term research on rock avalanches by my colleague Professor Tim Davies, a co-author of the paper.

“Using these particles as indicators we are able to determine whether a glacial advance is driven by climatic factors or is a result of rock avalanches.”

The results provide a diagnostic tool to identify glacial deposits that might be caused by rock avalanches from those clearly caused by climate.

“It is important to note that the presence of rock avalanche debris does not prove that a glacial deposit was the result of a rock avalanche-driven

advance, but that this possibility cannot be ignored if rock avalanche material is present," Dr Reznichenko said.

The new diagnostic tool has been tested on glacial deposits at Mt Cook in New Zealand, that have been used previously to infer past climate changes.

At least two of these have been proven to contain rock-avalanche material, and their dates are similar to those of past Alpine fault earthquakes – leading to the possibility that the rock avalanches might have been earthquake-triggered.

Provided by University of Queensland

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