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Surprising spread of volcanic ash key to solving Earth's mysteries: U of A grad

Britta Jensen is a researcher who has discovered volcanic ash from an eruption in the west about 1,200 years ago traveled much farther than expected, drifting across Greenland and into Europe. The ash is valuable to scientists because it shows a snapshot in time of the Earth's history since each eruption has ash with a unique chemical composition.
Photograph by: Greg Southam , Edmonton Journal

EDMONTON - Volcanic ash, which can provide valuable snapshots of Earth's history, appears to drift much farther than previously thought, says a University of Alberta graduate who is part of a team that made the important discovery.

And that could help scientists tie information and events in Earth's past together that they could not previously connect, potentially unlocking a wealth of new information about the Earth's climate, plant life, archaeological records, animal fossils, and anything else preserved in the geological record, said Britta Jensen, an expert in Quarternary geology, the most recent period in Earth's history, which stretches back about two million years.

Jensen specializes in tephrochronology, an area of science that uses layers of "tephra," or ash, to link and date events in Earth's history.

When a volcano erupts, it spews ash that has its own unique chemical composition, or its own so-called "fingerprint," Jensen said. Because ash blankets the ground within two weeks of an eruption, it's a great tool to tell scientists that paleo-environmental records connected to that ash must have happened at the same moment in history, she said.

"Sometimes, because we know how old these things are, we can date the section (of land researchers) are working in. So I can go there and say, 'You know that bison bone you've found? Well, there's this ash right above it that we know is 25,000 years old, so your bone is older than that. That's one thing we can do," Jensen said. "And the other is, because we can identify (ash beds) uniquely, and they're often spread over quite a big region, we can take different sites where they're found and essentially tie them together."

By dating the ash, scientists can essentially predict the age of anything that's found around that ash.

In a paper published this week in the journal Geology, Jensen and her team revealed that a large volcano that erupted just west of the Alaska-Yukon border, about 1,200 years ago, spread ash much farther than initially believed. The study confirms that White River ash from the eruption of Mount Churchill was also found in Greenland ice cores and across western Europe into Germany.

The European samples, known simply as AD860B, had been previously unidentified; scientists assumed they came from a past eruption in Iceland, said Jensen, who is now based at Queen's University in Belfast.

The work Jensen's team did tied Canadian and European samples together, proving ash found in Canada, Germany, Ireland and the Greenland ice sheet was all White River ash. Although the White River eruption was large, it wasn't a rare "super-eruption," the only kind of massive blast previously known to send ash to other continents.

"We were completely surprised. It's caused us to rethink how big an eruption actually has to be to move ash this far," she said. "What we can start to do now is take the paleo-environmental records that exist in those different locations and start comparing them to one another. It really allows us to do a big swath of comparison across the Northern hemisphere."

Jensen hopes the startling finding prompts researchers around the world to start comparing volcano data, to see if unidentified ash samples found far apart actually came from the same volcanic eruption. Then researchers will be able connect different geological records that couldn't be linked before, Jensen said.

"When we're trying to date things in geology, there's big errors. It's really hard to tell if things in different regions happened at the same time, or they happened at different times. So these ash beds, because they represent an instant in time, allow you to compare things very accurately, so that's why people like using them."

The findings also have implications for researchers studying hazards from volcanic eruptions, such as the dangers ash causes to the airline industry. Because ash travels so much farther than expected, moderate-sized eruptions could be more hazardous to air travel than previously believed, Jensen said.

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