

New study analyzes causes of 2010 landslide in Saint-Jude, Quebec

September 26 2017

In May 2010, a landslide devastated the municipality of Saint-Jude, Quebec, and was responsible for four fatalities when a house was destroyed by sediment movement. Building on investigations that took place immediately after the landslide, a new study published today in the *Canadian Geotechnical Journal* discusses triggers of the Saint-Jude landslide that occurred in nearly 10,000-year-old sensitive clay sediment that "liquefies" when disturbed.

The triggers of the [landslide](#) were concluded to be of natural origin. Sediment erosion by the Salvail River, which runs along the base of the slope of land where the landslide occurred, and high groundwater pressure under the river bed decreased stability of the clay sediments at the bottom of the slope.

The landslide, which happened around 50 km northeast of Montréal, was determined to have occurred in two successive phases, with two failure surfaces at two different elevations in the ground that caused dislocation of the sensitive clays. "Such features have never been clearly identified before in spreads in sensitive clays," says Dr. Ariane Locat, lead author of the paper and Professor in the Department of Civil Engineering and Water Engineering at Université Laval.

By studying the properties of the soil involved in the landslide and the shape and positions of the [clay](#) debris using field and laboratory tests, the team of researchers from Université Laval, Sherbrooke University, and the Ministère des Transports, de la Mobilité durable et de

L'Électrification des transports reconstructed the landslide and classified it a "large" and "complex spread," a typical landslide type occurring in sensitive clays. The landslide had a width of 275 m and a volume of debris of $\sim 520,000 \text{ m}^3$, which could fill over 200 Olympic-sized swimming pools. The debris included blocks of land that protruded upward and blocks of land that had lowered—the alternating peaks and valleys are known as horst and graben formations and are characteristic of spreads in sensitive clays.

"Scientific knowledge on spreads in sensitive clays is limited. Investigations of case studies, like the one presented in this study of the Saint-Jude landslide, give us new information and insights on characteristics of spreads and on conditions in which they occur," Locat says. "These studies are essential to the development of tools allowing for better identification of zones potentially exposed to spreads and to protect the population from this natural hazard."

Landslides occurring in sensitive clays are the most threatening natural hazard in Quebec due to the unstable nature of the [clay sediments](#) and because 90% of the province's population resides within areas where these sensitive clays, remnants of the Champlain Sea, are located.

More information: Ariane Locat et al, The Saint-Jude landslide of 10 May 2010, Quebec, Canada: Investigation and characterization of the landslide and its failure mechanism, *Canadian Geotechnical Journal* (2017). [DOI: 10.1139/cgj-2017-0085](https://doi.org/10.1139/cgj-2017-0085)

Provided by Canadian Science Publishing (NRC Research Press)

Citation: New study analyzes causes of 2010 landslide in Saint-Jude, Quebec (2017, September 26) retrieved 25 April 2024 from <https://phys.org/news/2017-09-landslide-saint-jude->

[quebec.html](#)

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.