

Are submarine landslides an underestimated hazard on the eastern Canadian margin?

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Landslides and turbidity currents are known to present major risks to submarine infrastructure and to break fiber-optic submarine cables. Understanding the triggers, knowledge of the recurrence, and timing of these events is important in order to mitigate their impact. Here, we assess the recurrence of turbidity currents and landslides at the offshore feature known as The Gully during the Holocene. Most turbidity currents affecting the eastern Canadian North Atlantic slope occurred between the Late Glacial Maximum (LGM) and 17 ka BP when glaciers were delivering sediment directly on the slope. Turbidite occurrence diminished greatly until ceasing completely at 13 ka BP. However, new multibeam bathymetry mapping and sediment core acquisition off eastern Canada indicate that three previously unidentified, large, submarine landslides and turbidity currents occurred during the Late Holocene, between 4 and 1.5 ka BP. The discovery of these three new gravitational events, in addition to the well-known 1929 Grand Banks earthquake-induced landslide, indicates that one major landslide per 1000 years has occurred offshore of eastern Canada within the past 4000 years, a much shorter recurrence interval than hitherto reported. This Late Holocene recurrence rate is also similar to active margins around the world. One of the newly-recognized landslides, located on the western levee of the Laurentian Fan, is among the largest Late Holocene landslides described for the western North Atlantic. The discovery of these new Late Holocene landslides was made possible through the detailed examination of Holocene cores in deep-water settings and demonstrates that the risk posed by submarine landslides has been underestimated on the North Atlantic margin, where a large coastal population resides and significant submarine infrastructure exists.