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Submarine landslides triggered by the 1663 earthquake ($M > 7$) in the St. Lawrence Estuary, Quebec, Canada

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In eastern Canada, the Charlevoix-Kamouraska/Bas-Saint-Laurent (CKBSL) seismic zone presents a seismic hazard almost as high as the active Pacific zone. The major event of February 5, 1663, with a magnitude estimated at > 7 highlights this important seismic hazard. The numerous submarine landslides mapped in the St. Lawrence Estuary in the CKBSL seismic zone suggest that earthquakes have acted as a trigger for submarine slope failures. In this context, the SLIDE-2020 expedition on board the RV Coriolis II in the St. Lawrence Estuary aimed to map, image and sample more than 12 zones of submarine instabilities and their associated deposits. The analysis of sediment cores sampled in the distal sedimentary deposits from these landslides reveals the presence of rapidly deposited layers (turbidites and debrites) directly linked to the submarine landslides. Dating of these landslides with ^{210}Pb and ^{14}C techniques led to the identification of four periods of synchronous emplacement corresponding to the strongest historical earthquakes: 1663 AD, 1860/1870 AD, 1925 AD and 1988 AD. This synchronicity over a distance reaching 220 km of several landslides supports a relationship between their triggering in the St. Lawrence Estuary and regional seismicity. The fact that as many as 9 submarine landslides appear to have been triggered by the 1663 AD earthquake indicates that this event is the strongest recorded in the last two millennia.

Keywords: 1663 earthquake, Canada, Geohazards, Geophysics, Holocene, Quebec, Paleoseismicity, Sedimentology, Submarine landslides.