Geophysical Research Abstracts
Vol. 13, EGU2011-3452, 2011
EGU General Assembly 2011

Comparative quantitative geomorphology of Holocene mass-transport deposits, St. Lawrence River Estuary, Canada.

Nicolas Pinet (1), Virginia Brake (1), Gabriel Huot-Vézina (1), Calvin Campbell (2), and Mathieu J. Duchesne (1)
(1) Geological Survey of Canada, GSC, Québec, Canada (npinet@nrcan.gc.ca), (2) Geological Survey of Canada, Dartmouth, Canada

Recently acquired multibeam bathymetry data provide a unique opportunity to investigate seafloor instability features along a 310 km-long segment of the St. Lawrence River Estuary, one of the largest estuaries in the world and the most seismically active area in eastern Canada. The analysis of this dataset indicates that submarine slides occur over a much larger area than previously recognized and that Holocene sediments are reworked by mass-transport along significant portions of both the northwest and southeast margins of the lower and middle St. Lawrence River Estuary. In the surveyed area, 111 individual mass-transport complexes were identified representing 13 % of the seabed. In many cases, mass transport events appear to initiate in the vicinity of steep bedrock walls located along some segments of the estuary. The timing of mass-transport events was not constrained during this study. However, the observations that submarine slides have geomorphological signatures ranging from fresh to subdued, that failures occur at multiple stratigraphic levels in high resolution seismic data, and that a large portion of the seabed is reworked by mass wasting suggest the occurrence of multiple catastrophic events, several of them likely triggered by earthquakes.
Mass-transport deposits vary in area from less than 1 km2 to more than 40 km2. They exhibit various geomorphological signatures, including: 1) blocky morphology indicating significant internal disruption; 2) smooth morphology with less internal disruption except close to the headwall scar and in the frontal area; 3) morphology characterized by sub-parallel ridges formed by folding. For all mass-transport deposits, size, average slope and roughness, the variation of these parameters within the slide body as well as the height and geometry of the headwall scar were quantified. This quantitative analysis provides a unique opportunity to study these parameters in a statistically significant and homogeneous dataset located in a relatively small area that experienced a similar Quaternary history. The search for objective classification criteria using these parameters is in progress. Additionally, the derivation of relationships between the various parameters may offer valuable insight into fundamental dynamics of submarine landslides.