Geophysical Research Abstracts,
Vol. 10, EGU2008-A-04306, 2008
SRef-ID: 1607-7962/gra/EGU2008-A-04306
EGU General Assembly 2008

Quaternary fault(s) in southern Québec (Canada): first evidence from the St. Lawrence Gulf and Estuary

N. Pinet (1), M. Duchesne (1), A. Bolduc (1), C. Campbell (2) and D. Lavoie (1)

(1) Geological Survey of Canada, Québec, Canada, (2) GSC-Atlantic, Dartmouth, Canada (npinet@nrcan.gc.ca / Fax: 418-654-2614 / Phone: 418-654-3722)

Despite its intra-continental setting, the St. Lawrence Estuary and Gulf (Canada) is characterized by one of the largest concentrations of historical earthquakes in eastern North America. With such a high seismic activity, tens of earthquakes should have had a magnitude high enough to produce a surface rupture since the area was deglaciated ($\sim$12 000 yrs B.P.). However, no such rupture has been properly documented. New multibeam bathymetry and high resolution seismic reflection datasets allow the extension of the search for surface ruptures to the offshore part of this region. To date, the most convincing evidence for Quaternary fault movement is found in a relatively-flat zone of the St. Lawrence Gulf. There, two E-W trending "en echelon" scarps define a $\sim$ 3 km long feature. Three high-resolution seismic reflection profiles acquired perpendicular to the scarps show that the Paleozoic bedrock below the scarps is offset by $\sim$ 10.5 m along a south-dipping fault. The base of the Quaternary succession is also offset by the fault, whereas the overlying units drape the scarp. The timing of the last seismic event on this fault thus predate the deposition of the first draping unit which is correlated to a regional seismic unit recently dated at $\sim$ 12 000 yrs. In the St. Lawrence Estuary, the top of the bedrock is offset by other probable fault-controlled scarps. Here, the lack of morphological expression on the sea-floor and the continuity of seismic reflections in the upper Quaternary succession indicate that no significant motion took place recently. The likelihood of Quaternary movements remains but cannot be demonstrated because of the lack of well-defined reflector in the basal Quaternary seismic unit. Therefore, the new offshore data contributes to the characterization of Pleistocene structures but does not resolve the discrepancy between historical high

seismic activity and the lack of known post-glacial surface ruptures.