Coastal Erosion from Space

In-situ information for validation – Canada

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1 Introduction

The St-Lawrence coastline is characterized by a great diversity of geographical morphology, dynamics and ecosystems. About 50 % of the eastern coast of Quebec are vulnerable to erosion, this degradation of coastal environment can lead to the submersion of important infrastructure such as Road, houses ect … 4 sites have been selected to validate CE products.

Below are listed some dynamics and behaviours known regarding Canadian study sites, those information will compared to CE products and to the changes shown by a time series analysis of those products.

2 Coastal area around the St-Jean River at longue pointe de Mingan

The 27 km of coast in this area of interest have an average historical erosion rate of -1.97m/y between 1948 and 2005, and -1.39 m/y between 2000 and 2017.

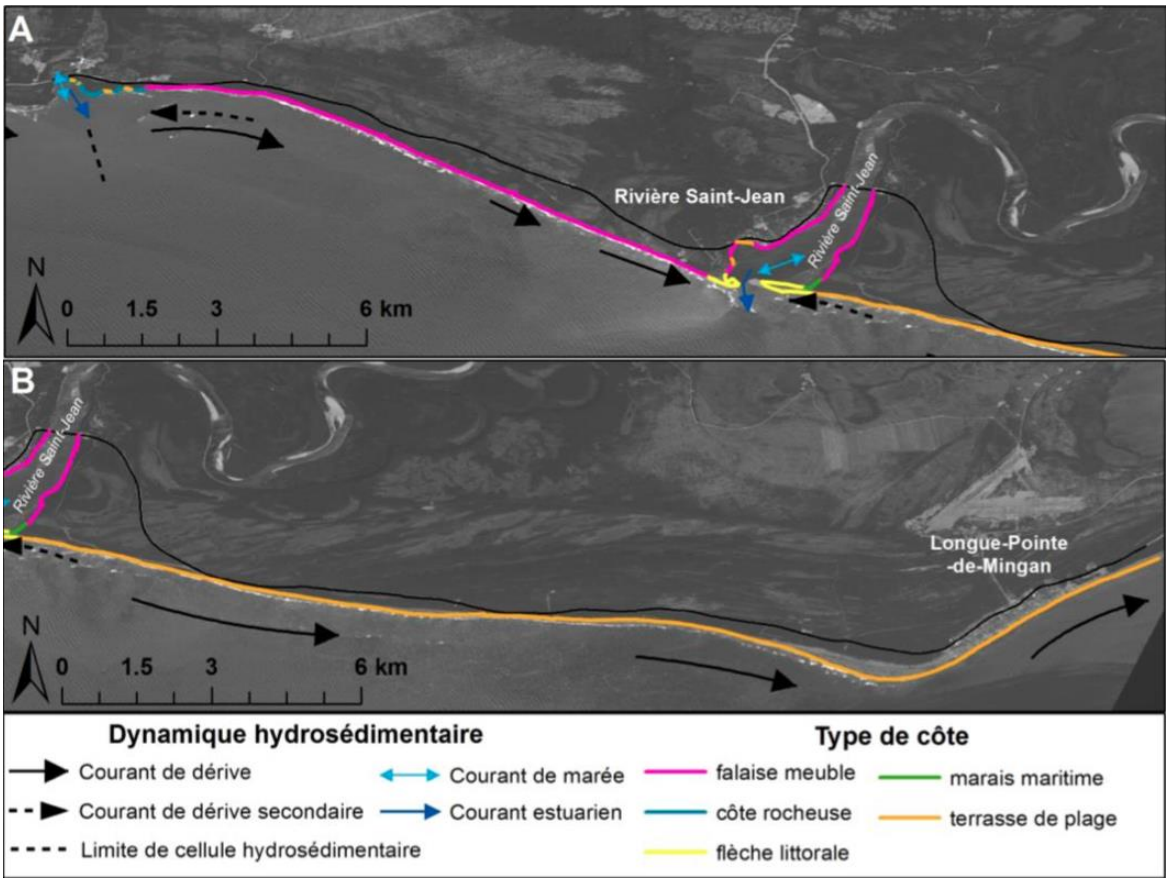
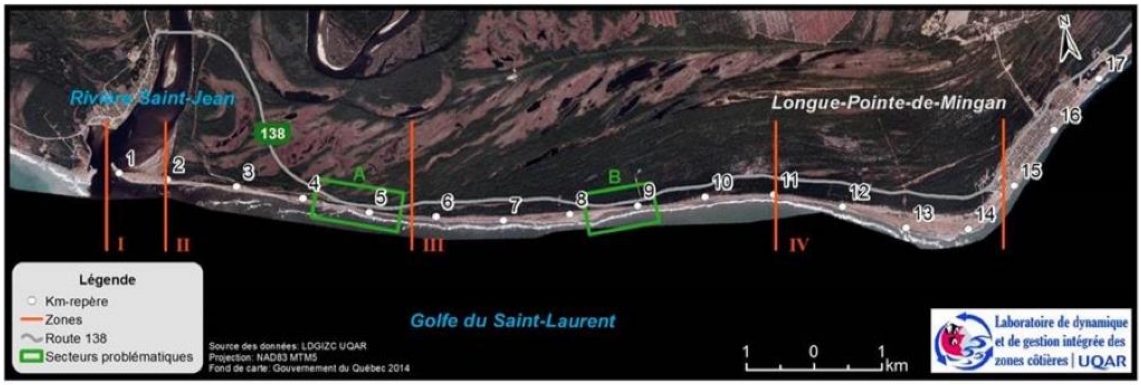
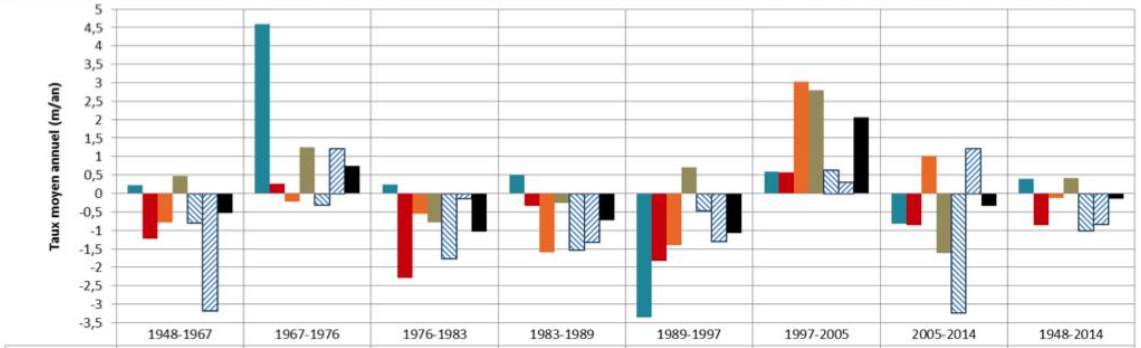


Figure 2.1: Coast types of the Rivière-Saint-Jean and Longue-Pointe-de-Mingan sites (Adapted from Drejza et al. 2014)

Since 1948, sector A is characterized by an average rate of decline of -1.0 m/year (Figure 0.3). Sector B also has a high average erosion rate of -0.82 m/year, but mainly due to strong erosion between 1948 and 1967.





	1948-1967	1967-1976	1976-1983	1983-1989	1989-1997	1997-2005	2005-2014	1948-2014
Zone 1	0,23	4,6	0,25	0,5	-3,35	0,59	-0,82	0,39
Zone 2	-1,23	0,26	-2,29	-0,33	-1,82	0,57	-0,86	-0,86
Zone 3	-0,78	-0,22	-0,56	-1,59	-1,41	3,03	1,01	-0,13
Zone 4	0,48	1,25	-0,79	-0,26	0,71	2,8	-1,62	0,41
secteur A	-0,78	-0,3	-1,75	-1,52	-0,45	0,65	-3,22	-1
Secteur B	-3,16	1,22	-0,12	-1,3	-1,29	0,31	1,22	-0,82
Zone complète	-0,53	0,74	-1,04	-0,73	-1,07	2,06	-0,33	-0,15

Figure 2.2: Coastal Evolution for 4 sub-coastal area (see transects), only for areas A and B and for the whole area (adapted from Corriveau et al., 2016)

3 Peninsula between the Manicouagan river estuary and the Aux-Outardes river

Figure 3.1: Operational site extends from Pointe-aux Outardes to Pointe Lebel.

The coast selected is 28 km long essentially made off movable cliffs. Erosion rates ranging from -0.1 to -3.6 m/year for about 70 years with an increase to -7m/y on the sandy beach for the last decade. This site has experienced major declines in its shoreline due to erosion and gravitational soil.

4 Pointe au Loup / Cap aux Meules - Îles-de-la-Madeleine - Gulf of St Lawrence

Coastal infrastructure on the Îles de la Madeleine is threatened by shoreline retreat.

4.1 AOI 1

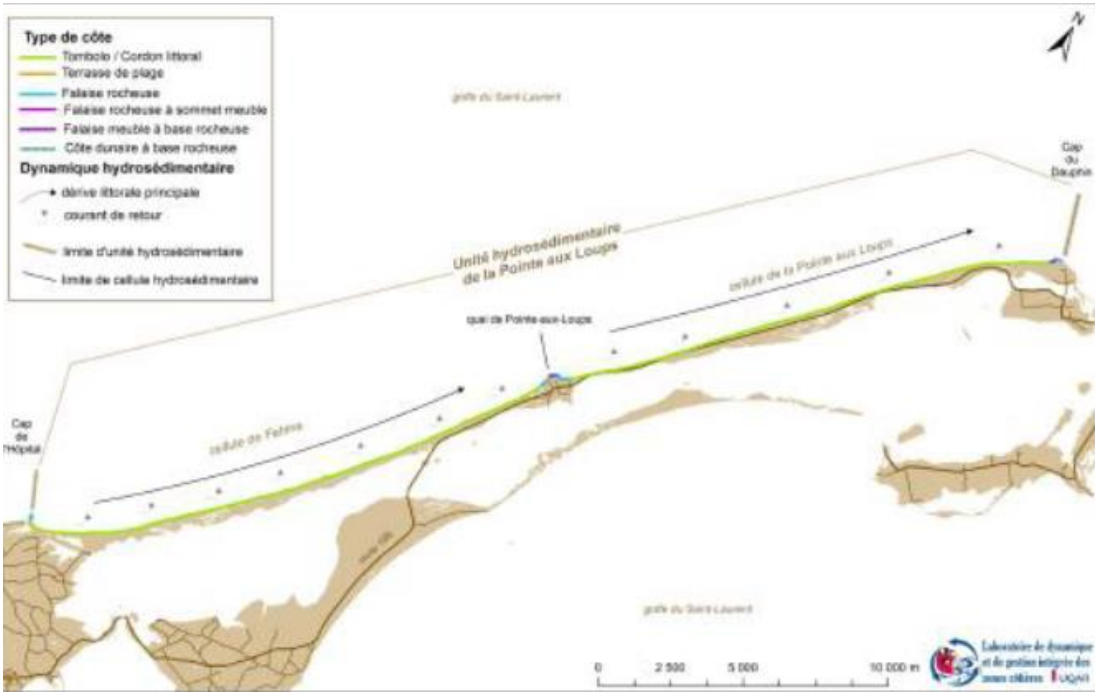


Figure 4.1. Cp au Loup sector, Magdalen Island (QC)

The site extends around Pointe-aux-Loup to Cap de l'Hopital in the south to Cap au Dauphin in the north with a length of 39 km. Historical migration rate is -0.70 m/year (1963 to 2008) and the expected rate to 2060 is -1.5 m/year.

4.2 AOI 2

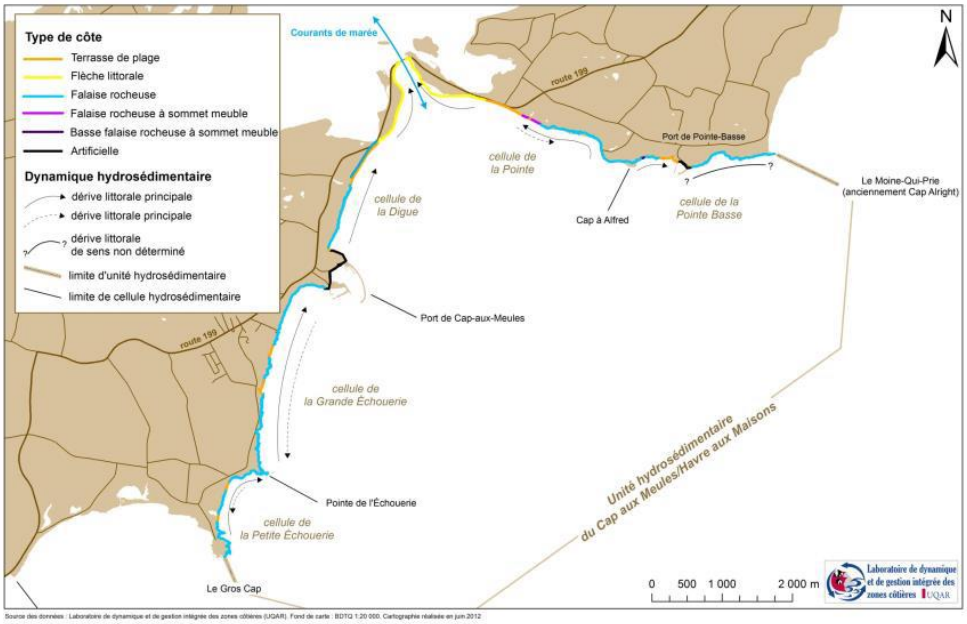


Figure 4.2: Cap aux Meules sector, Magdalen Island (QC)

The coast length of this sector is 18.67 km with multiple hydro-sedimentary units (artificial, movable cliffs and sand beaches). the historical migration rate is -0.03 m/year (1963 to 2008) and the expected migration rate to 2060 is -0.26 m/year.

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