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Analysis of landslide development using aerial photographs and DEMs comparison, along part of the Chacoura River valley, Quebec, Canada.

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The large plains of Eastern Canada sensitive clays are cut by numerous rivers, in a way that their slopes have been and are still affected by landslides. They play an important role in the modelling of the landscape of these regions. Hence, the role of erosion as a trigger of landslides is important.
On the Chacoura River, north of Louiseville (Quebec), several large landslides scars, more or less recent, are visible. A first inventory of areas of erosion, slides and landslides clay was carried out by Locat et al. (1984) on some series of aerial photographs covering a period from 1948 to 1979.
This study is based on a detailed analysis of aerial photographs, dating from 1948 to 1997 and an airborne LiDAR digital elevation model (DEM-LiDAR), dating from 2007, in a GIS environment, using two different approaches: (1) a map of the phenomena was drawn by identifying various elements such as land movements, limits of the slope, position of the river, the area covered by forest and agricultural drainage structures, e.g., and (2) the comparison of DEMs was performed to estimate slipped and eroded volumes, the rate of erosion on a section of the river (about 6 km) and the spatial distribution of movements.
The results show that the location of landslides is directly linked to the presence of some characteristic topographical features, such as (1) the shape of the meandering river, (2) the flow of agricultural drainage, or (3) the erosion at the toe of the slope. Finally, the study of landslides over a period of 60 years shows that the major landslide scars in this area could be in fact the sum of several events of lesser importance. For example, a large landslide (around 13'000 m2) occurred in 1976 at the same place where a first landslide of 1500 m2 in 1964.

Locat, J., Demers, D., Lebuis, J. and Rissmann, P. (1984), Prédiction des Glissements de Terrain; Application aux Argiles Sensibles, Rivière Chacoura, Québec, Canada, the IV International Symposium on Landslides Toronto 1984 Proceedings, Volume II, pp 549-555.