

Quebec Shale Gas Geology – Multidisciplinary Approach, Methodology and Preliminary Results

Jean-Yves Chatellier*
Talisman Energy Inc., Calgary
jchatellier@talisman-energy.com

and

Marianne Molgat and Scott McLellan
Talisman Energy Inc., Calgary

Summary

The advent of shale gas has given a new breath of life to the exploration for hydrocarbons in Quebec. Two main prospective shale units are present in the St Lawrence Lowlands: the carbonate rich Utica shale about 200m thick and the overlying clastic Lorraine shale locally more than 1500m thick.

Two faults define structural domains with varying geological and “reservoir” characteristics such as thickness and structural complexity; these are the Yamaska Normal Fault to the North and the Logan line, a thrust feature to the south is mapable at surface (Fig.1) . Talisman has a large acreage in the area and focus its attention on the Utica shale which is more laterally uniform, easier to understand and possibly easier to complete (Fig.2) than the Lorraine.

A large amount of data collected from conventional cores and geochemical samples has been integrated with seismic, drilling and completion data. The approach taken to understand the play will be described and preliminary results will be discussed.

Among the interesting or surprising findings are a basin tilt revealed by sequence stratigraphy using TOC (Fig.3) and other geochemical parameters, vertical beds and complex geometries shown by image log in association with X-ray fluorescence data (XRF) and data from cores (Fig.4), all at a fractal scale. The XRF combined with isotope and vitrinite data has allowed to subdivide the Lorraine thick shale package into preliminary stratigraphic units.

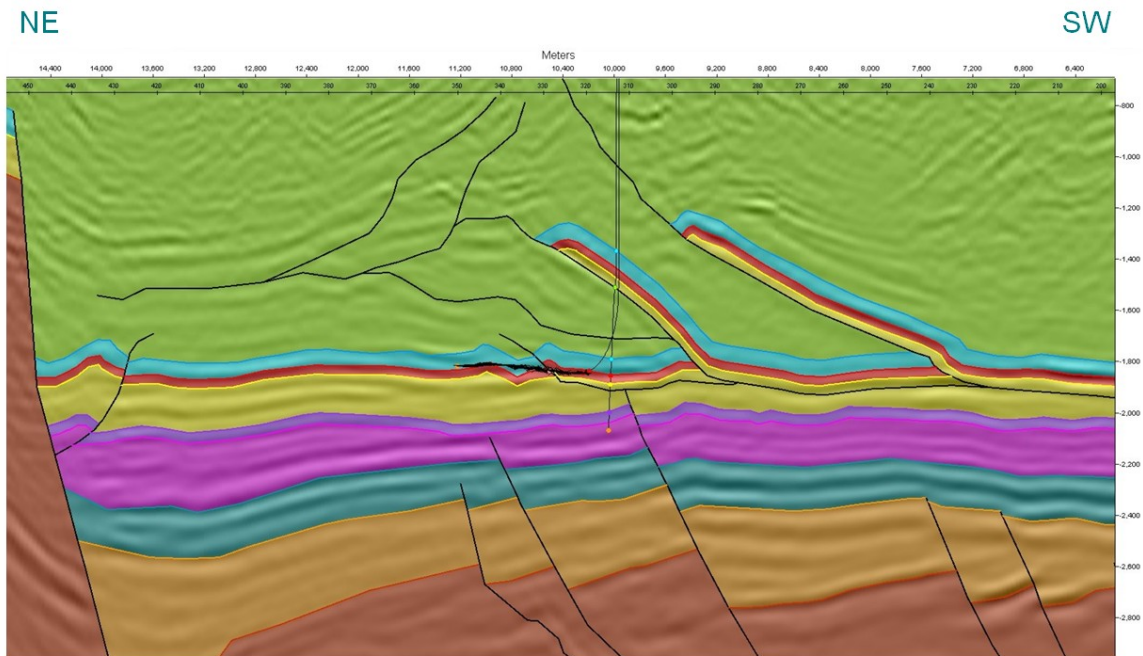


Fig.1 Variable structural complexity of the area south of the Yamaska Fault

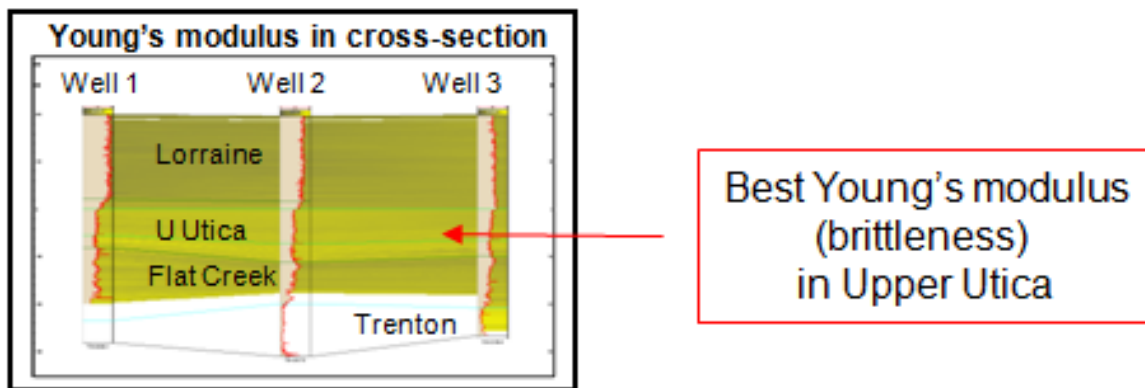


Fig.2 Brittleness associated with Ordovician stratigraphy in the Quebec Lowlands

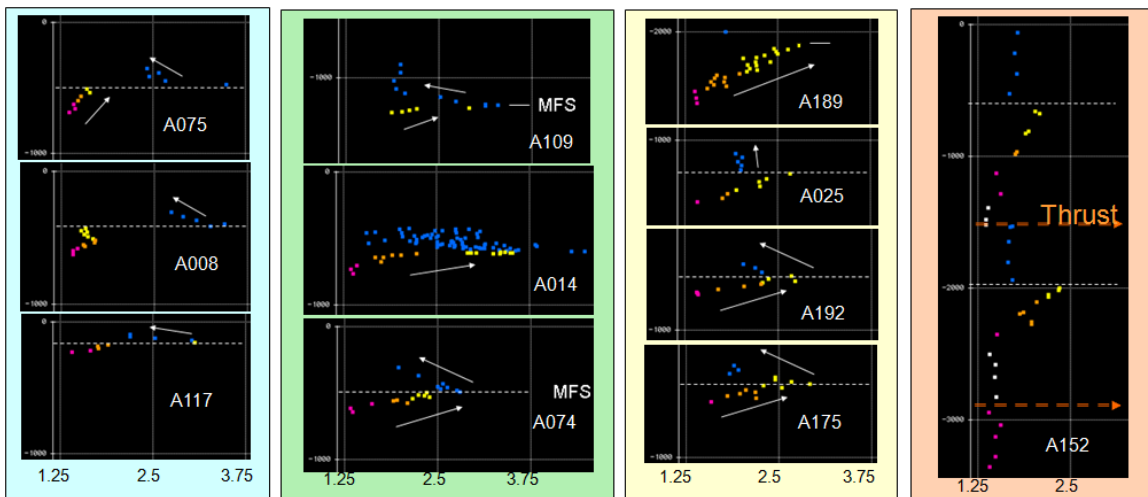
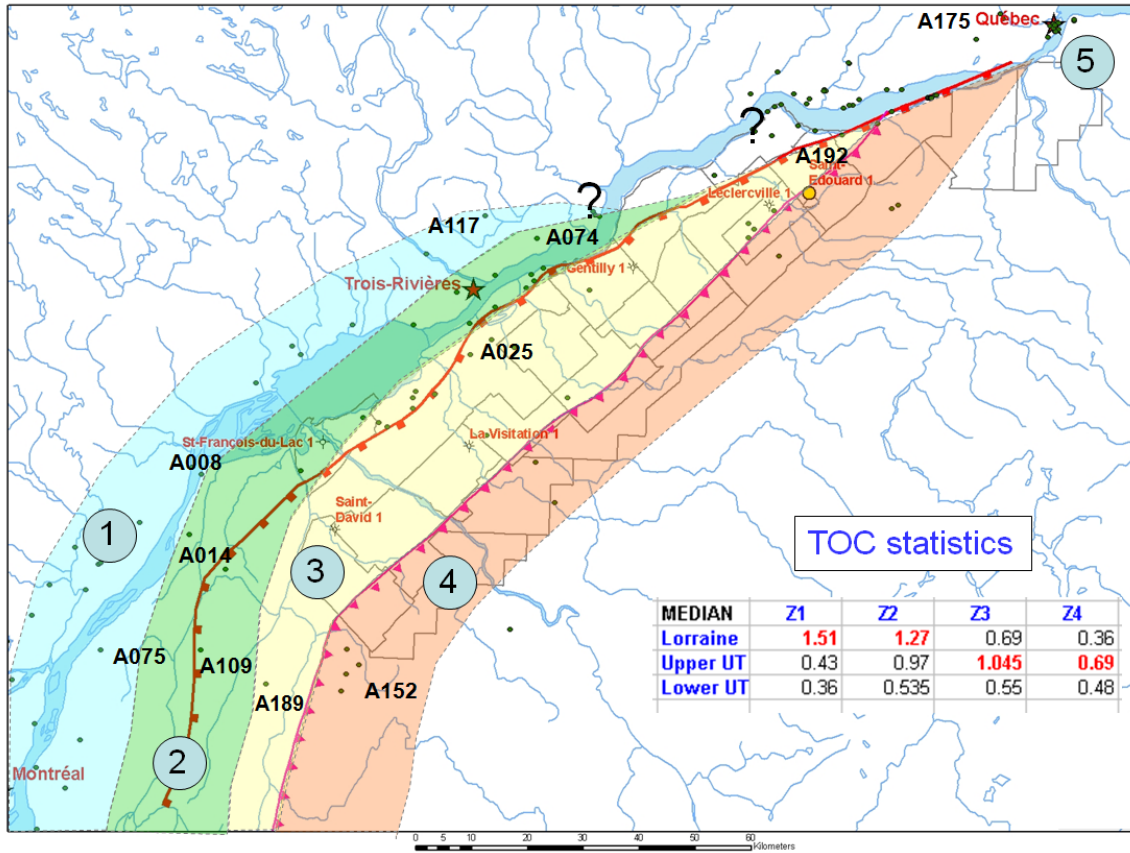


Fig.3 Four domains expressed by TOC trends and indicating a syn-sedimentary basin tilt
 Colors correspond to rock units (Lorraine in blue, Upper Utica in yellow, Lower Utica in orange and Trenton in magenta)

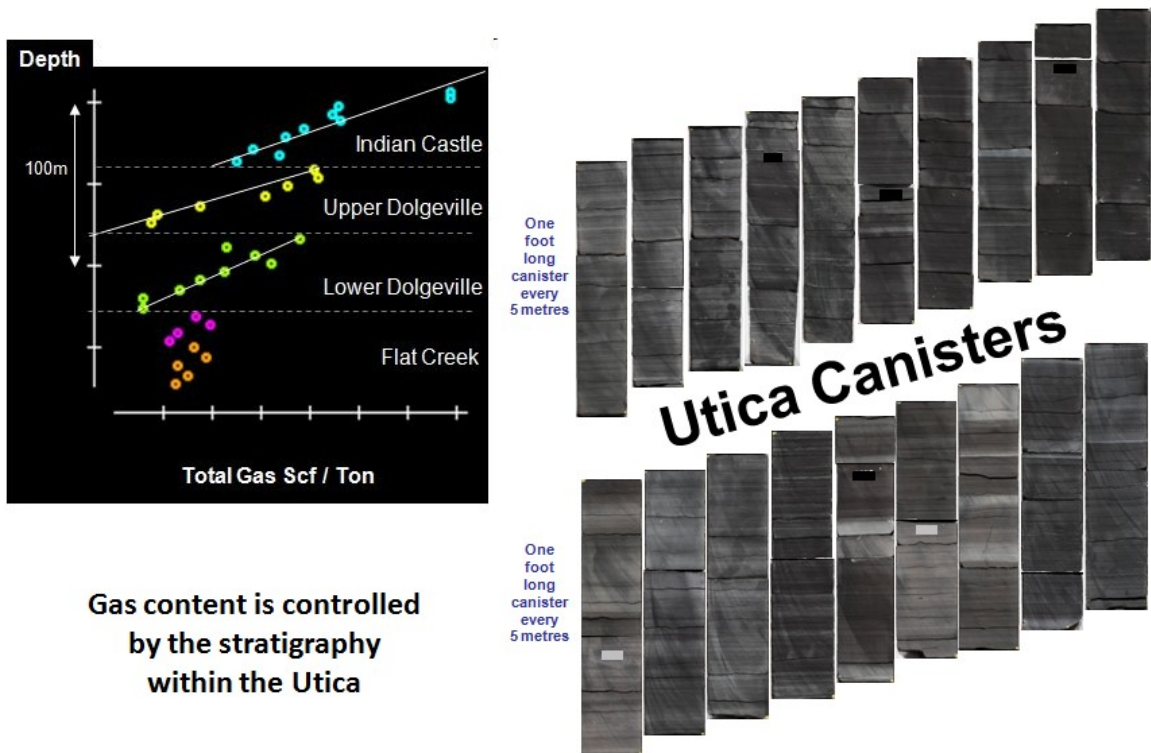


Fig.4 Gas content directly linked to stratigraphical trends within the Utica shale
 The Upper Utica is informally divided into of the Indian Castle, Upper Dolgeville and Lower Dolgeville; the Flat Creek is the Lower Utica shale