The calcareous Algae of the Middle Ordovician sequence of the St. Lawrence lowlands show a lateral and regional constancy which reflects the stability of the shelf at that time. In addition, the algal groups, when considered separately, suggest aptitudes to adapt themselves to various habitats and conditions.

Chazy rocks in the Lake Champlain area, New York, Trenton deposits outcropping in the Trenton region, New York, Black River section in its type section at Black River, New York, and the Simcoe Group in Lake Simcoe, Ontario, are studied and sampled for the examination of their algal contents.

Thirty-four taxa are identified in these various deposits. Petrographic evidences and the interpretation of the algal microfacies in the four regions studied reveal the presence of as many as 22 types of lithological units distinguishable on their algal content and their relation to specific paleoecological environments.

The abundance of Algae and algal components in the Middle Ordovician sequence, underlines the importance of their role in relation to sedimentation on the shelf in the regions studied. The diversity and the specificity of the Algae in the units and in the environments reflect a pattern of distribution which follows certain environmental controls similar to those prevailing in the modern seas.

The algal assemblages show responses to physical, biological, and chemical variations of the environments. These assemblages play in the sedimentation the same role assumed by recent Algae, production of carbonates, trapping and stabilization of the sediments, algal mats, formation of oncolites and algal encrustations, and edification of bindstones-framestones.

Although the Algae are not always useful as chronostratigraphic indices, they remain in the Ordovician successful paleoenvironmental indicators.

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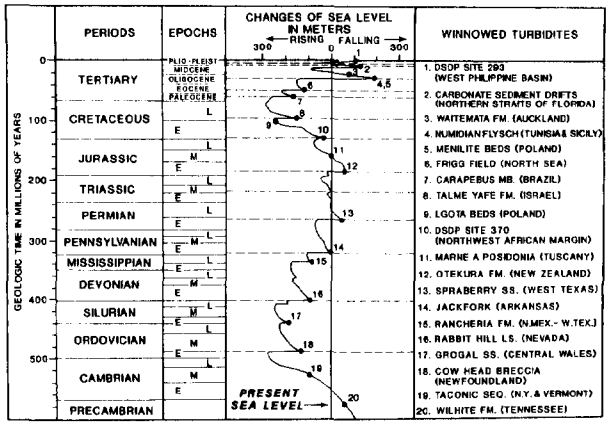
Eustatic Control of Deep-Sea Reservoir Facies

Global changes in sea level, primarily the results of tectonism and glaciation, control deep-sea sedimentation. During periods of low sea level the frequency of turbidity currents is greatly increased. Episodes of low sea level also cause vigorous bottom currents (i.e., contour currents) which winnow away the fine-grained material of turbidites. In the rock record, the occurrence of most



turbidites and winnowed turbidites closely corresponds to lowstands of paleo-sea level. For example, plotting of all known winnowed turbidites on the global sea level curve indicates that 19 of 20 examples fall on or near lowstands.

An important exploration attribute of these observations is the possibility of predicting the occurrence of potential deep-sea reservoir facies in the geologic record by using seismic data in conjunction with information on global sea-level changes, basin geometry, and paleo-oceanography.

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Geology of Gulf Canada's Pelican Oil Sands Pilot Project, Alberta, Canada

Gulf Canada Resources Inc. is operating an experimental oil sands pilot project (Pelican Lake Project) in the Wabasca deposit in northeastern Alberta intended to recover bitumen by steam stimulation followed by combustion. The geology of the pilot site is actively being studied through an extensive logging and coring program aimed at defining the detailed vertical and lateral variability of the Wabiskaw A sand reservoir, particularly with a view to defining such parameters as porosity, permeability, oil saturation, and isopach, net pay, and structure.

The Wabiskaw A sand at the pilot site is a thin (averaging about 5 m), glauconitic, coarsening-upward sheet sand interpreted as part of an offshore (shelf) bar system. The major part of the sand body at the pilot site consists of a northeast-southwest-trending bar. This grades into an interbar facies at the southeast corner where the sand thickness and net pay decrease and the clay content of the reservoir increases.

Structures due to burrowing (predominantly *Asterosoma*) are common throughout the Wabiskaw A, giving the sand a dirty appearance. However, bioturbation did not completely homogenize the sand and mud, and much of the clay fraction remains as pods. Thus, the effective porosity and permeability of most of the reservoir remain high (average 28% and 800 md, respectively). These characteristics, combined with a relatively low-viscosity oil in place, make the Wabiskaw A sand an attractive target for an enhanced-recovery tar sands pilot project.

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Non-Oolitic, High-Energy Carbonate Sand Accumulation: the Quicksands, Southwest Florida Keys

Approximately 162 km of high-resolution subbottom seismic reflection profiles, collected in the Quicksands area west of the Marquesas Keys off south Florida, indicate extensive westward transport of *Halimeda* sand. The east-west-oriented, carbonate-sand accumulation is up to 12 m thick and encompasses an area 13 by 29 km. The Quicksands area is ornamented by east-west-trending submarine sand dunes 2 to 3 m high, which are shaped by strong, reversing north-south tidal currents. Many dunes break the surface at low tide. Submarine dunes lie directly on Pleistocene bedrock at the eastern end of the study area, but at the western end, dunes lie on 7 to 10 m of Holocene carbonate sand. Near the western terminus, the sands have accreted over carbonate muds.

Westward drift, probably caused by prevailing east and southeast winds superimposed on the tidal currents, is indicated by (1) thickening of the Holocene accumulation to the west and (2) large-scale, westward-dipping, accretionary bedding. Seismic reflection profiles show spitlike accretionary bedding in a package up to 1 km long at the western end, where carbonate sands spill onto deeper water muddy carbonates.

The submarine sand body is surrounded on the south, west, and north by equivalent-age, topographically lower lime muds