Late Cenozoic seismic stratigraphy of the Mohican Channel area, Scotian Slope

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The Mohican Channel area of the continental slope, offshore Nova Scotia, is an ideal site to study the Late Cenozoic seismic stratigraphy of the Scotian Slope. High-resolution, two-dimensional seismic surveys across the Scotian Slope are used to identify seismic reflectors and to construct a general stratigraphic framework. The objectives of the study are to understand deepwater sedimentologic processes by investigating the dynamics of the stratigraphy and interpreting seismic reflection profiles based on seismic facies analysis.

Within the study area, an experimental seismic system known as the digital deep-towed hydrophone (DDH) was tested. The DDH consists of a source towed at the sea surface and a receiver towed at depth. This unconventional geometry provides less attenuation of the signal through the water column, better horizontal resolution and reduces the effect of side-echoing. Additionally, it provides for a far-field recorded seismic source signature for each shot. This wavelet is then used to deconvolve the corresponding seismic trace in the reflection profile. The predicted result is greatly improved vertical and horizontal resolution compared with its conventional seismic equivalent. Trial seismic lines have proven to significantly increase near surface resolution; however, imaging at depth within the section is lost in comparison to standard surface seismics.

The Pleistocene Scotian Slope is a glacially influenced continental margin demonstrating classic downslope thinning wedges of reflectors interpreted as turbidites deposited from glacial outwash. Six major reflectors are regionally correlated within this segment of the slope. These have shown stratigraphy gradually thinning both downslope and westward of the study area, approaching the Mohican Channel. The channel erodes nearly all of the Pleistocene section of the slope suggesting a late Pleistocene age. Within the basal Pleistocene, a regionally extensive debris flow deposit, originating from the mid-upper slope, is present and truncates several underlying reflectors. The age, frequency and magnitude of mass transport deposits on the slope, such as this, suggest a possible linkage with glacial epochs, although other factors are likely responsible as well.