

***Sand or gravel waves and mass failures generated by the 1929 Grand Banks earthquakes: a SeaMARC I survey***

*D.J.W. Piper\*, A. Shor and J. Farre*

*\*Atlantic Geoscience Centre, Geological Survey of Canada, Dartmouth, N.S. B2Y 4A2  
Lamont-Doherty Geological Observatory of Columbia University, Palisades, N.Y. 10964*

A SeaMARC I side-scan sonar survey, covering 90% of the upper 5000 km<sup>2</sup> of the Laurentian Fan (CSS HUDSON, June 1983), shows dramatic evidence of the 1929 Grand Banks Earthquake. The survey includes ten swaths, from the slope break to a water depth of 3000 m, across the Eastern Valley of the Laurentian Fan. The valley floor in water depths of 400 to 2000 m is a chaotic deposit of coalesced sediment slides. Individual slide scars at the slope break are 5 to 10 m deep and several hundred metres across. East of the valley, slides and debris flows in surficial sediments are widespread down to water depths of at least 3000 m. West of the valley, an erosional ridge-valley terrain (300-400m relief) shows little evidence of catastrophic mass wasting.

A field of asymmetric sand or gravel waves in the axis of the Eastern Valley broadens from the first wave appearance

near 1500m water depth to more than 10 km wide at 3000m. These sand/gravel waves are clearest on the deepest lines. Although variable, bedform wavelengths are typically 50-100m and heights are 2-5m. The crest line continuity is variable, and the steep (lee) slopes face down-valley. Sand and gravel were recovered in the region of the sand/gravel wave field in 1953 (VEMA 2-2). Within the wave field are "streaks" with low acoustic reflectivity that are 100-500m wide and up to 25 km long and parallel the valley trend. The streaks lack relief and may overlie the sand/gravel waves. We believe that most of the surface features of the valley floor and eastern valley wall originate from the 1929 earthquake, with sand/gravel waves formed by turbidity current flow. We are unaware of analogous bed forms elsewhere in the deep sea.