

**Discordant Blocks of Prince Edward Island:  
Evidence for Seismic Activity in the Lower Permian?**

*C. Place and H.W. van de Poll, Geology Department  
University of New Brunswick, Fredericton, New Brunswick E3B 5A3*

At Wood Islands, Prince Edward Island, disrupted bedding containing intraformational discordant blocks of sandstone and mudstone were encountered in the Permo-carboniferous redbeds. Similar discordant blocks were already known to be present at Prim Point in southeastern Prince Edward Island, and their common presence in the redbeds of this part of the island poses an interesting problem as to their origin, facies and tectonic significance.

At Wood Islands a zone of chaotic bedding is laterally exposed over a distance of approximately 175 m. It ranges in thickness from a single surface to an interval of up to 1.5 m. This zone has a locally erosive lower contact and an upper contact that is conformable to the bedding above. The matrix of the bed is mudstone, a mixture of mudstone and sandstone, and/or pebbly sandstone. Well developed internal bedding is absent. Within the limits of exposure a total of ten discordant blocks are seen.

These discordant blocks can be readily identified in outcrop by their angular discordant relationships with the enclosing strata. Their maximum dimensions range from 0.5 m to 4 m, and the grain size within the blocks ranges from mudstone to medium grained sandstone.

The majority of discordant blocks have the following features in common:

- 1) Internal bedding and sedimentary

structures including graded beds, ripple cross beds, porting lineation, load casts, and bioturbation features can be present.

- 2) Internal bedding of the blocks appears undistorted indicating that they represent blocks of sediment unaffected by disruption.
- 3) Smooth to irregularly shaped "flow markings" are common over the entire outer surfaces of the blocks.
- 4) Commonly present also on the bounding outer surfaces are thin "films" of mudstone.
- 5) A rounded convex surface suggesting a rotational slump origin commonly characterize these blocks.
- 6) The blocks appear confined to a single stratigraphic interval which may extend at least 20 km from Prim Point to Wood Islands, and possibly beyond.

Internal bedding of discordant blocks may be upright, inclined or even overturned with respect to the enclosing strata.

Features not necessarily associated directly with the discordant blocks but always found in close proximity to them are a variety of dewatering, sediment filtration and sediment intrusion structures.

Present hypotheses for the origin of these discordant blocks include:

- 1) mass flow transport
- 2) intrastratal disruption
- 3) local slumps into fluvial channels

from bank undercutting, and  
4) "sand boulders" deposited in the  
fluvial regime during flood.

Based on the available evidence, a  
mass flow origin related to slumping is  
favoured here. The slumping may have  
been induced by earthquakes, tectonic

or erosional oversteepening or a combi-  
nation of these and other factors.  
Their presence in the redbeds of Prince  
Edward Island could have an important  
bearing on the understanding of the  
tectonic evolution of the basin during  
Early Permian times.