

---

**Nares Strait expedition:  
collaborative research to solve  
a geological controversy**

---

H. RUTH JACKSON AND GORDON N. OAKEY  
FOR THE SHIPBOARD PARTY  
*Geological Survey of Canada (Atlantic),  
P.O. Box 1006, Dartmouth, NS B2Y 4A2, Canada*

A multi-disciplinary experiment in Nares Strait, the waterway between North Greenland and Ellesmere Island, was organized under the auspices of the Canadian-German Bilateral Agreement in Science and Technology and run in August and early September of 2001. The German Federal Institute for Geosciences and Natural Resources (BGR) and the Geological Survey of Canada (GSC) were the principal participants with critical support from Danish and other Canadian agencies. Heavy ice conditions in Nares Strait necessitated the use of Canada's most powerful ice-breaker, the CCGS Louis S. St-Laurent.

The primary rationale for the experiment was to collect information to solve a long-standing controversy on the origins of the Nares Strait. The debate revolves around three hypotheses: 1) the strait is a major strike-slip fault; 2) plate motion has been taken up first by strike-slip along the strait followed by compression in a broad zone on Ellesmere Island; and 3) the strait is not a tectonic boundary and the geology can be correlated across it. This controversy has resulted from an apparent incompatibility between the onshore geology surrounding Nares Strait and plate tectonic models describing the opening of the North Atlantic and resulting motions of Greenland. The strength of this expedition was the ability to integrate targeted onshore geological fieldwork with regional geophysical measurements to extend interpretations offshore.

The major marine geophysical component of the cruise was the acquisition of three types of seismic data: 1) high resolution reflection for imaging 100 m below the seafloor, 2) multi-channel reflection for penetration to 5 km, and 3) refraction to map large-scale structures from 0–40 km in depth. Aeromagnetic data were acquired by towing a sensor from a helicopter. This style of surveying allows for direct correlation of magnetic rock samples collected onshore with offshore areas. A total of 9000 km of aeromagnetic data were collected.

Nares Strait is a unique laboratory for studying continental translation and compression because the amount and timing of the deformation are quantitatively constrained by plate reconstructions. The preliminary analyses of the data are consistent with the hypothesis that strike-slip motion was followed by compression.