

Nares Strait and the drift of Greenland: a conflict in plate tectonics

edited by

P. R. Dawes & J. W. Kerr



Frontispiece 1

The Kennedy Channel, the central part of Nares Strait. View is approximately north from Washington Land, Greenland, towards Judge Daly Promontory, Ellesmere Island, Canada. Hans Ø, at the territorial boundary between Canada and Greenland, is to the right of the large island (Franklin Ø). Greenland: Silurian limestones, carbonate buildups and shales of the Arctic Platform; Ellesmere Island: folded and faulted strata of the Ellesmere–Greenland fold belt. Photograph 545 H–N, no. 11803, July 1953; copyright Geodætisk Institut, Denmark.

Frontispiece 2

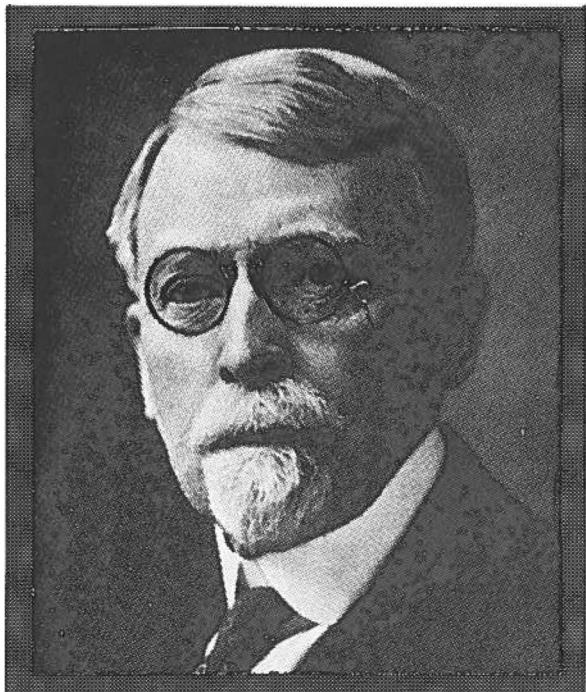
Personalities of Nares Strait. Admiral Sir George Strong Nares commanded the first successful return navigation of the narrow Strait in 1875–6 in H. M. Ships *Alert* and *Discovery*; Captain Henry Wemyss Feilden was the first to compile a geological map of the Strait from own observations (published in 1878); Frank Bursley Taylor initially drew attention to Nares Strait as an important strike-slip lineament separating the continent of North America from Greenland; and Alfred Lothar Wegener, who through his widely published writings on continental drift, focused attention on Nares Strait as a horizontal large-scale dislocation along which Greenland had drifted past Ellesmere Island, such that in geological discussion, Nares Strait has become synonymous with the ‘Wegener Fault’.



Sir George S. Nares
1831–1915



Henry W. Feilden
1838–1921



Frank B. Taylor
1860–1937



Alfred L. Wegener
1880–1930

List of Contributors

R. L. Christie
Geological Survey of Canada

J. D. Collinson
University of Keele, U.K.

P. R. Dawes
Geological Survey of Greenland, Denmark

C. D. S. de Vries
Deceased

K. Ellitsgaard-Rasmussen
Geological Survey of Greenland, Denmark

J. England
University of Alberta, Canada

R. K. H. Falconer
Geological Survey of Canada

D. A. Forsyth
Earth Physics Branch, Canada

T. Frisch
Geological Survey of Canada

J. G. Fyles
Geological Survey of Canada

A. C. Grant
Geological Survey of Canada

A. K. Higgins
Geological Survey of Greenland, Denmark

J. M. Hurst
Geological Survey of Greenland, Denmark

H. F. Jepsen
Geological Survey of Greenland, Denmark

G. L. Johnson
Office of Naval Research, U.S.A.

C. E. Keen
Geological Survey of Canada

J. W. Kerr
Geological Survey of Canada

L. C. Kovacs
Naval Research Laboratory, U.S.A.

R. A. Langel
National Aeronautics and Space Administration, U.S.A.

N. J. McMillan
Canterra Energy Ltd., Canada

U. Mayr
Geological Survey of Canada

A. W. Menzies
Esso Resources Canada Ltd.

D. Monahan
Canadian Hydrographic Service

P. H. Newman
Dalhousie University, Canada

J. S. Peel
Geological Survey of Greenland, Denmark

J. W. Peirce
Petro-Canada Exploration Inc.

L. W. Sobczak
Earth Physics Branch, Canada

N. J. Soper
University of Sheffield, U.K.

S. P. Srivastava
Geological Survey of Canada

F. Surlyk
Geological Survey of Greenland, Denmark

L. Thorning
Geological Survey of Greenland, Denmark

R. J. Wetmiller
Earth Physics Branch, Canada

J. T. Wilson
Ontario Science Centre, Canada

Contents

Foreword	11
J. Tuzo Wilson	
Preface	13
K. Ellitsgaard-Rasmussen and J. G. Fyles	
Introduction	15
P. R. Dawes and J. W. Kerr	
HISTORY	
History of exploration and geology in the Nares Strait region	19
P. R. Dawes and R. L. Christie	
History and implications of the Nares Strait conflict	37
J. W. Kerr	
PHYSIOGRAPHY	
Physiography of Nares Strait: importance to the origin of the Wegener Fault	53
D. Monahan and G. L. Johnson	
Postglacial emergence along northern Nares Strait	65
J. England	
STRATIGRAPHY	
The Precambrian Shield of northernmost Baffin Bay: correlation across Nares Strait	79
T. Frisch and P. R. Dawes	
The Proterozoic Thule Basin of Greenland and Ellesmere Island: importance to the Nares Strait debate	89
P. R. Dawes, T. Frisch and R. L. Christie	
Proterozoic – basal Cambrian stratigraphy across Nares Strait: correlation between Inglefield Land and Bache Peninsula	105
J. S. Peel, P. R. Dawes, J. D. Collinson and R. L. Christie	
Cambrian–Ordovician platform stratigraphy: correlations around Kane Basin	117
J. S. Peel and R. L. Christie	
Upper Ordovician to Silurian facies patterns in eastern Ellesmere Island and western North Greenland and their bearing on the Nares Strait lineament	137
J. M. Hurst and J. W. Kerr	
Nares Strait and the down-current termination of the Silurian turbidite basin of North Greenland	147
F. Surlyk	
The Bjørnehiet Formation: a faulted preglacial conglomerate, Washington Land, North Greenland	151
H. F. Jepsen	

STRUCTURE

Fold belts and metamorphic zones of northern Ellesmere Island and North Greenland	159
A. K. Higgins, U. Mayr and N. J. Soper	
Reconnaissance of Tertiary structures along Nares Strait, Ellesmere Island, Canadian Arctic Archipelago	167
U. Mayr and C. D. S. de Vries	
The Nyeboe Land fault zone: a major dislocation on the Greenland coast along northern Nares Strait	177
P. R. Dawes	
Brecciated lineaments in Washington Land, North Greenland, and their relation to Nares Strait	193
J. M. Hurst and J. W. Kerr	
A geological case for movement between Canada and Greenland along Nares Strait	199
P. H. Newman	
Cretaceous-Tertiary magmatic and tectonic events in North Greenland and the history of adjacent ocean basins	205
N. J. Soper, P. R. Dawes and A. K. Higgins	
Fragmentation of the Canadian Arctic Archipelago, Greenland and surrounding oceans	221
L. W. Sobczak	
The evolution of the Nares Strait lineament and its relation to the Eurekan orogeny	237
J. W. Peirce	

GEOPHYSICS

Marine geophysical study of southern Nares Strait	255
P. H. Newman	
Review of seismicity and other geophysical data near Nares Strait	261
R. J. Wetmiller and D. A. Forsyth	
Motion along Nares Strait recorded in the Lincoln Sea: aeromagnetic evidence	275
L. C. Kovacs	
Satellite magnetic field over the Nares Strait region	291
R. A. Langel and L. Thorning	
Crustal history and basin development of Baffin Bay	295
A. W. Menzies	
Problems with plate tectonic models for Baffin Bay – Nares Strait: evidence from the Labrador Sea	313
A. C. Grant	
The geophysical implications of minimal Tertiary motion along Nares Strait	327
C. E. Keen and J. W. Peirce	
Nares Strait: a conflict between plate tectonic predictions and geological interpretation	339
S. P. Srivastava and R. K. H. Falconer	

ECONOMIC GEOLOGY

Nares Strait and the petroleum explorer	355
N. J. McMillan	

SUMMARY

The case for major displacement along Nares Strait	365
G. L. Johnson and S. P. Srivastava	

The case against major displacement along Nares Strait	369
P. R. Dawes and J. W. Kerr	

APPENDIX

Note on the magnetic polarity time scales used in the Nares Strait volume	389
P. R. Dawes	