

TECTONIC STRESS IN THE LITHOSPHERE

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Tectonic stress in the Earth's lithosphere not only reflects the forces acting on the lithospheric plates, some of which are responsible for plate motion, but also controls the locations and magnitudes of natural phenomena which have a substantial impact on humankind's activities and well-being. This book covers observational techniques, whereby stress can be directly measured or inferred, as well as a variety of theoretical approaches which help to explain or predict observations. Contributors were asked by the organizers of the Discussion Meeting, held in April 1991, to write articles which review their chosen field; thus it is intended that this volume will be of use to those with a general interest in lithospheric stress as well as to specialists in the subject.

Lithospheric stress is discussed at a variety of scales. At the largest scale are the forces acting on whole plates and at their edges and the global balance of these forces. At least seven different forces have been identified which either drive the individual plates (slab pull, ridge push) or resist their motion (plate drag, etc.). The ridge-push force has a particularly important effect on intraplate tectonic stress, especially beneath oceanic areas. Special problems arise in explaining stress at transform plate boundaries and in some major mountain ranges. On the other hand observations at the Earth's surface, in boreholes or at greater depths (from earthquake focal mechanisms) detect the resultant of these numerous forces and their interpretation and resolution into component parts is also discussed in several papers. In some cases it is possible to make observations from which deductions about past tectonic stress can be made.

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CONTENTS

	<i>pages</i>
<i>Editorial</i>	1
B. J. MASON Growth habits and growth rates of snow crystals	3-16
A. FOWLER & J. WALDER Creep closure of channels in deforming subglacial till	17-31
S. J. MAYBANK A filter with guaranteed asymptotic performance	33-57
Y. BENVENISTE Exact results in the micromechanics of fibrous piezoelectric composites exhibiting pyroelectricity	59-81
P. R. PRENTICE Energy transport in rotating sound fields	83-96
A. F. BOWER, N. A. FLECK, A. NEEDLEMAN & N. OGBONNA Indentation of a power law creeping solid	97-124
T. E. ALLIBONE, J. E. JONES, J. C. SAUNDERSON, M. C. TAPLAMACIOGLU & R. T. WATERS Spatial characteristics of electric current and field in large direct-current coronas	125-146
A. BERSHADSKII, E. KIT & A. TSINOBER Spontaneous breaking of reflexional symmetry in real quasi-two-dimensional turbulence: stochastic travelling waves and helical solitons in atmosphere and laboratory	147-155
R. J. NAGEM, H. E. MOSES & G. V. H. SANDRI The general and asymptotic solution of the elastic wave equation in an unbounded medium	157-167
S. SEN Dimensionality dependence of dynamical correlations: exact results from a quantum many body system	169-179
A. R. BATCHELOR Steady-state heat sink analysis for two-terminal microwave oscillator devices with temperature dependent thermal conductivity	181-189
B. D. BRAMSON Massless fields on Minkowski space-time with quantized, Kerr sources†	191-200
<i>Rapid communication</i>	
M. R. DHANAK On the instability of flow in a streamwise corner	201-210

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