

PREFACE

AN INTERNATIONAL conference on "Applications of Strain: From Microstructures to Orogenic Belts" was held near Halifax, Canada, from 9 to 13 of September 1992. This conference was organized under the Penrose Conference program of the Geological Society of America. There were 71 participants, including five from Canada and 15 from Europe and Japan. Fifteen of the participants were students. The participants represented a broad range of backgrounds, from academic to industry, and spanning such disciplines as structural geology, geodynamical modeling, seismology and petrology.

The objective of the conference was to focus on the application of strain analysis to the interpretation of real geologic structures. Three days were devoted to oral and poster presentations, organized around the following theme sessions: (1) new methods, computer-aided analysis and primary fabrics; (2) strain, vorticity and microfabrics; (3) volume strain, fluid flow and mass transfer; (4) macroscale structures; (5) orogen-scale structures; (6) brittle strain associated with faulting; and (7) use of strain in computational models. Each session was lead off by a keynote speaker (Declan De Paor, Win Means, Ron Vernon, Cees Passchier, John Ramsay, Randall Marrett and Sean Willett), which was followed by a few shorter oral presentations.

The conveners wanted to ensure that a significant amount of time was devoted to informal presentations and discussions. As such, we limited the number of oral presentations to three or four per session. The rest of the time was devoted to a discussion period and poster presentations. Each discussion period included unscheduled 'comment' presentations, where an idea was briefly described using no more than two or three slides and 5 minutes. About 20 people made comment presentations. This format provided an important degree of flexibility that helped to ensure that discussions were not too highly structured or influenced by the oral presentations. About 2 hours of each session were devoted to poster sessions, which provided another format for informal discussion and exchange.

The conference program included 2 days of field trips (lead by Jack Henderson, Mariette Henderson and Tom Wright) which focused on the deformational history of the Lower Paleozoic Meguma Group, which is beautifully exposed along the Atlantic coast of Nova Scotia. The Meguma contains a variety of mesoscale structures, but even more important are the presence of useful strain markers, such as worm burrows, sand volcanoes,

dewatering tubes, quartz veins, fiber overgrowths and bedding-cleavage geometry. The field trip leaders defended their interpretation that deformation of the Meguma Group and the formation of a well-developed pressure-solution cleavage was associated with large volume strains. They argued that the volume strain reflected both a loss of porosity and also a loss of mass. This interpretation, that low temperature deformation might be attended by wholesale loss of mass at a regional scale, remained a contentious and controversial issue throughout the conference.

The conference provided an important opportunity to assess the current state of strain-analysis research. There were four topics that generated considerable interest and debate: (1) the concept of general shear and the use of the kinematic vorticity number as a generalized descriptor of internal vorticity in deforming rocks; (2) the magnitude of volume strain and, in particular, mass loss in deformed rocks; (3) the determination of brittle strain, that is the bulk strain due to faulting, and how it compares with strain accumulated by ductile processes; and (4) the potential to incorporate strain data in geodynamical models. We view these developments as an indication that strain analysis is taking on a greater importance, both in structural geology and also in other fields such as petrology (mass transfer and volume strain), geodynamical modeling and seismology.

The success of the conference was due, to a large degree, to the conference participants, who maintained considerable enthusiasm and stamina through a very tightly scheduled meeting. Special thanks are also due to Geological Society of America for its sponsorship and to Lois Elms for her assistance in organizing the conference. The National Science Foundation is gratefully acknowledged for providing partial support for student participants and foreign keynote speakers.

This special issue *Applications of Strain: From Microstructures to Orogenic Belts* contains 11 papers that stemmed from topics presented at the conference. They serve to illustrate some of the highlights of the conference. We thank the reviewers for their contribution to this issue, in providing critical feedback to the authors and ensuring the overall high quality of the papers.

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