Available online at www.sciencedirect.com
SCIENCE DIRECT®
PERGAMON
International Journal of Rock Mechanics & Mining Sciences 40 (2003) 955
International Journal of Rock Mechanics and Mining Sciences
www.elsevier.com/locate/ijrmms

Preface

Special Issue on rock stress estimation

This Special Issue contains the four new International Society for Rock Mechanics (ISRM) Suggested Methods (SMs) on rock stress estimation, together with a suite of supporting papers on various aspects of establishing the rock stress state. The emphasis in dictionary definitions of the word 'determination' is on 'exact ascertainment of amount', whereas the word 'estimation' includes a component of 'judgement or opinion'. In line with these meanings, we have chosen the title "Rock Stress Estimation" for the title of the Special Issue, rather than "Rock Stress Determination" or "Rock Stress Measurement"—to reflect the fact that it is not always easy to establish precise values for the components of the in situ rock stress state.

Understanding and estimating the rock stress state has become increasingly important over the last two decades as numerical models have become the main rock engineering design tool. This stimulated the ISRM Commission on Testing Methods to produce new SMs for rock stress, and thus to update the 1987 SMs coordinated by Drs. Kim and Franklin. The new SMs in this Special Issue are

Part 1: Strategy for rock stress estimation.
Part 2: Overcoring methods.
Part 3: Hydraulic fracturing and/or hydraulic testing of pre-existing fractures (HTPF) methods.
Part 4: Quality control of rock stress estimation.

The inclusion of the Part 1 SM on the strategy for rock stress estimation reflects the need to consider the nature of in situ stress, the purpose of a stress measurement campaign, and the many factors that can affect both the stress field and the measurements. A similar reasoning supports the inclusion of the Part 4 SM on quality control: during the measurement of rock stress, it is crucial to have adequate quality control—because many an untoward occurrence can befall an unwary measurer. Thus, in Parts 1 and 4 of the SMs, the principles of the strategy and quality control are presented; these Parts can be used as checklists which will cover the majority of the problems likely to be encountered. Parts 3 and 4 of the SMs directly describe the two main methods of stress measurement used in civil and mining engineering: overcoring and hydraulic fracturing. Thus, these four ISRMs provide guidance on the many facets of rock stress and the two main measurement methods for rock engineering applications.

Following this Preface, the first paper by C. Fairhurst contains a brief history of stress measurement. We are particularly pleased to be able to include this introductory paper because Charles Fairhurst is one of the pioneers in the rock stress subject and has promoted enhanced understanding and measurement techniques from the 1960s to the present day. The next paper by C. Ljunggren et al. sets the scene for the SMs by providing an overview of rock stress measurement methods. Then, following the SMs themselves, we include a suite of further supporting papers, all of which describe methods and case studies relating to the understanding and estimation of in situ rock stress.

It is a sobering process to read all these supporting papers. On the one hand, we feel that we do understand rock stress and the factors that can affect the orientations and magnitudes of the in situ principal stresses. We also feel that the measurement methods should work well. On the other hand, a running theme in many of the papers is that of trying to make sense of individual measurements, of combined measurements, and of the local and overall in situ stress states and their comparison with numerical modeling predictions. However, we consider that we have achieved our Special Issue objective: anyone requiring guidance on in situ stress estimation will definitely find it in the ISRM SMs and the associated supporting papers published here.

J.A. Hudson
Imperial College and Rock Engineering Consultants,
7 The Quadrangle, Welwyn Garden City,
Herts AL8 6SG, UK
E-mail address: jah@rockeng.co.uk

F.H. Cornet
Institut de Physique du Globe,
Université Pierre et Marie Curie,
4 Place Jussieu, 75320 Paris Cedex 05, France
E-mail address: cornet@ipgp.jussieu.fr

1365-1609/$ - see front matter
doi:10.1016/j.ijrmms.2003.08.001