GEOLOGICAL SURVEY OF CANADA
COMMISSION GEOLOGIQUE DU CANADA

Open File 2726

THE GLOBAL SEDIMENTARY BASIN STRESS PROJECT OF THE INTERNATIONAL LITHOSPHERE PROGRAM

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OCTOBER 1993

INTERNATIONAL LITHOSPHERE PROGRAM

GLOBAL SEDIMENTARY BASIN STRESS PROJECT

BACKGROUND AND PURPOSE

The Global Sedimentary Basin Stress Project is an international cooperative scientific initiative that operates under the umbrella of the International Lithosphere Program, as a project within Theme III-2, Origin of Sedimentary Basins (S. Cloetingh, Chairman). It is conceived as a successor activity to the World Stress Map Project and it will focus future efforts on the documentation of stress regimes in sedimentary basins around the globe. The term "basin" is used here in a loose sense, and is intended to encompass sediment bodies in all major geological settings from accretionary wedges to inliers on stable cratons.

OBJECTIVES

1). The primary objective of the Global Sedimentary Basin Stress Project is to document the stress regimes of sedimentary basins in as much detail as possible, so that these data can enhance ongoing and future research in Earth Science. To this end, particular efforts are being made to generate and compile information on the present day state of stress in selected examples of the principal types of sedimentary basins. "Case history" basins are selected on the basis of the availablity, or potential availability, of significant amounts of stress orientation and stress magnitude data, and the present level of understanding of their structure and evolution. Ideally, good three dimensional documentation of the variations of in-situ stress tensors within a basin will be possible. All the stress magnitude and orientation data will be placed in a database, where they will be readily accessible to researchers.

2). Secondary objectives follow naturally from the first. They involve using the stress data gathered on sedimentary basins to best advantage. The following list is open-ended, as indeed it should be, since many novel applications can be anticipated!

(a) Investigate the relationship(s) between the state of stress within basins, the regional intraplate stress field and the stress state in the underlying basement.

(b) Study the evolution of stress regimes within basins.

(c) Investigate the roles of fluids and pore pressure in basins where control (data abundance) permits. This information will be important in understanding intra-basin deformation and phenomena such as induced seismicity.

(d) Study of the relationship between in-situ stresses and the geomechanical behaviour of sediments.

(e) Update the existing World Stress database and produce a new global stress map in a 3-5 year time frame.

(f) Harness and develop new methods for obtaining stress data in sedimentary basins (e.g. shear wave splitting, use of drilling induced fractures, fracture configurations).

(g) Identify sources of local stress perturbations in sedimentary basins.

(h) Collaborate with and support (with data) ongoing efforts to model global crustal stress regimes, at all scales from global to intra-basinal.

(i) Promote an awareness of the economic applications of in-situ stress data and interpretations in sedimentary basins.

IMPLEMENTATION

The Global Sedimentary Basin Stress Project places major emphasis on activating contributions from oil companies, because large quantities of data are to be found on well logs and in drilling records. In addition, it is anticipated that significant amounts of relevant stress information will be supplied through ongoing university, government and private sector research activities, as well as from international scientific endeavours such as the Ocean Drilling Project. Like its predecessor, the World Stress Map Project, the Global Sedimentary Basin Stress Project attempts to catalyse and focus the research of an international cadre of contributing scientists and engineers. These individuals will be responsible for the

detailed documentation of their areas of study, and for bringing their results to publication. The contributing scientists are also expected to exploit the data constructively in following up on many of the secondary objectives. It is hoped that such efforts will outlast the initial data gathering stage of the project.

An accessible database containing the basic information will be set up to assist the intererested research workers in academic and industrial organisations. Optimum interpretations of basinal in-situ stress information will require reference to present and past geological settings, so it is planned to develop summaries of basin structure and evolution to accompany the stress data. The World Stress Map Project amply demonstrated the importance of applying rigorous quality control to the data that were collected. Continued careful monitoring of data quality is essential and will be implemented in the proposed Global Sedimentary Basin Stress Project.

ADMINISTRATION

The Global Sedimentary Basin Stress Project will be administered within Theme III-2, Origin of Sedimentary Basins, in the International Lithosphere Program of the Inter-Union Commission on the Lithosphere. The latter organisation is part of the International Council of Scientific Unions. The Global Sedimentary Basin Stress Project is led by J. S. Bell of the Geological Survey of Canada, who will assist in setting up informal working groups, and will coordinate communications between/within them. He will provide advisory direction as needed, organise meetings, and edit conference proceedings and group publications.

COSTS

It is hoped to achieve most of the objectives of the project without drawing significantly on the International Lithosphere Program budget. Small contributions for such items as travel expenses for specified scientists will be welcomed. The main cost item will probably be database maintenance, for which industrial funding will be sought, if required.

SCHEDULE

The project, as proposed, is planned to run for three years starting in June 1993, and terminating in 1996. Local symposia may be organised,

beginning in 1994. Wrap-up meetings and symposia are planned for Europe and North America in 1996, with subsequent publication of research results. Since the project can be expected to accumulate data that will enhance the World Stress Map which was published in July 1992, a second edition is planned for c.1996.

INFORMATION

The Global Sedimentary Basin Stress Project was launched at the European Association of Exploration Geophysicists Meeting in Stavanger, Norway, during the week of June 7-11, 1993. A poster was presented and distributed to interested parties. Since then, further copies of this poster have been distributed and one is included in this open file report.

Enquiries about the project, especially from would-be participants, should be addressed to:

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