

INTERNATIONAL SOCIETY FOR SOIL MECHANICS AND GEOTECHNICAL ENGINEERING



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ISSMGE TC 33 Geotechnics of Soil Erosion Report for the period 2001-2005

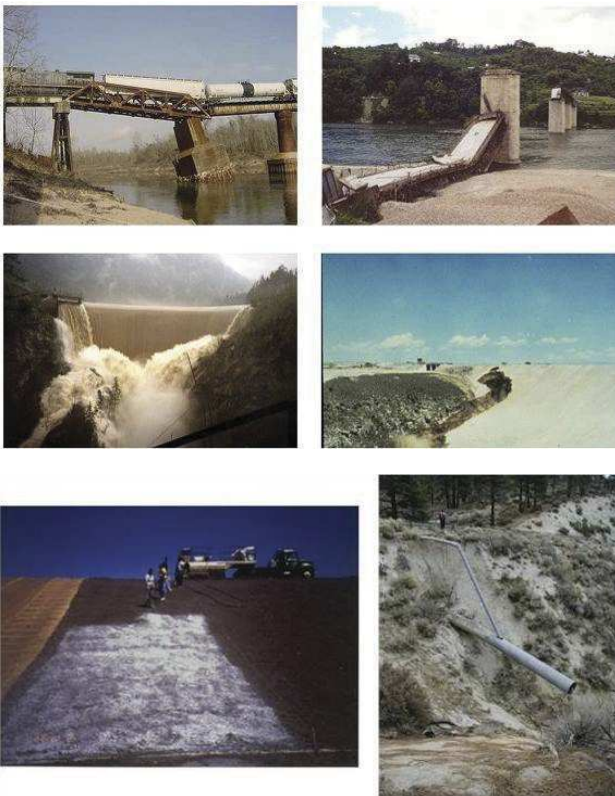
Jean-Louis Briaud
on behalf of the committee
May 31, 2005

ABSTRACT

Report on Technical Committee TC33 Activities: 2001-2005

RÉSUMÉ

Rapport des Activités du Comité Technique TC33 : 2001 - 2005



1 INTRODUCTORY INFORMATION

As shown in the above photos, the topic covered by the committee includes

- Scour of Foundations (for example scour at bridges or offshore platforms)
- Dam Erosion (for example internal piping and external erosion at spillways)
- Surface Erosion (for example embankment erosion and construction site erosion)

1.1 Title of Technical Committee:

Geotechnics of Soil Erosion

1.2 Membership

Chair: Prof. Jean-Louis BRIAUD, Texas A&M Univ., USA
Secretary: Prof. Bruce MELVILLE, Univ. of Auckland, New-Zealand
Core Members: Dr. Michael HEIBAUM, BAW, Germany
Dr. Kaare HOEG, NGI, Norway
Dr. David CARRIER, Argila Enterprises, USA
Sub Com. Chairs: Dr. Yee-Meng CHIEW, Nanyang Tech. Univ., Singapore
Dr. George ANNANDALE, Engrg & Hydrosystems, USA

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S. Africa	Professor Geoffrey Blight
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1.3 Terms of Reference

1. The erosion-advanced organizations (academia, government, private firms) in selected countries share their knowledge on Geotechnics of Soil Erosion including practice and applied engineering research with other countries interested in the topic.
 Deliverable = regional workshops, web pages.
 Schedule = yearly
2. Exchanges take place on the international research progress.
 Deliverables = conferences and proceedings.
 Schedule = every 2 to 3 years
3. Global guidelines are developed
 Deliverables = reports, web based documents.
 Schedule = about 3 years (Osaka)
4. A new web site is developed
 Deliverables = a web site.
 Schedule = as soon as the new members are identified

2 EXECUTIVE SUMMARY

Prior to 2001-2005, an International Symposium on Scour of Foundations was organized by Professor Jean-Louis Briaud on behalf of TC33 in Melbourne, Australia on November 19, 2000. The table of content is reproduced in Appendix A including how to obtain the proceedings.

The activities of our committee over the last four years has included the following

- **2001 Istanbul Workshop on Scour of Foundations at ICSMGE.** This took place at the ICSMGE in Istanbul. Dr. Michael Heibaum from Germany chaired that event. A summary volume is available. This contributes to term of reference no.1, 2, and 3. The content of this workshop is described in Appendix B including how to get a copy of the proceedings.
- **2002 First International Conference on Scour of Foundations** at Texas A&M University, USA. Professor Jean-Louis Briaud chaired the conference. Three volume Proceedings are available for purchase on the web site. This

contributes to term of reference no.1, 2, and 3. The table of content is reproduced in Appendix C including how to obtain the proceedings.

- **Meeting of the committee at Texas A&M University** Minutes of this November 2002 meeting can be found on the web site. This contributes to all terms of reference.
- **2004 Second International Conference on Scour and Erosion** in Singapore. Professor Yee-Meng Chiew of Singapore chaired the conference. Two volume proceedings are available for purchase on the web site. This contributes to term of reference no.1, 2, and 3. The table of content is reproduced in Appendix D including how to obtain the proceedings.
- **2006 Third International Conference on Scour and Erosion** planned for Amsterdam. Dr. Gijs Hoffmans of Netherlands will chair the conference helped by Dr. Heibaum and Dr. Witte of Germany. Dr. Hoffmans can be reached at: g.j.c.m.hoffmans@dww.rws.minvenw.nl. The committee will meet in Amsterdam if TC33 is renewed by the new President. This will contribute to term of reference no.1, 2, and 3.
- **Update of the web site** at <http://www.civil.tamu.edu/Research/Scour-tc33>. The web site is constantly updated and improved. Professor Briaud is in charge of the web site. This contributes to term of reference no.4.
- **Establishment of an email list server** to facilitate the exchange of view points between committee members (and the friends of the committee). This list sever is maintained by Dr. Richard Whitehouse in the UK. This contributes to term of reference no.4.
- **Meeting of the committee in Singapore** Minutes of this November 2004 meeting can be found on the web site. This contributes to term of reference no.4.
- **Request** One of the big hurdles in the last four years has been the difficulty for experts on scour and erosion which are not geotechnical engineers to be part of our committee. TC33 needs a number of people from Hydraulics and Structures because of the very interdisciplinary nature of the topic. There is a need to revisit that issue under the next 4 year cycle to try to make that process possible because without it our committee cannot fully bloom. One of the steps which would help would be to have an agreement with IAHR (International Association of Hydraulic Engineering and Research) and allow TC33 to have members from both organizations.

3 MAIN REPORT

- 3.1 **2002 First International Conference on Scour of Foundations (Appendix C) at Texas A&M University, USA (Professor Jean-Louis BRIAUD Chaired the conference).**



Prior to this event, TC33 organized an International Symposium on Scour of Foundations in Melbourne, Australia on November 19, 2000. The table of content is reproduced in Appendix A.

Three volume Proceedings are available for purchase on the web site

(http://tti.tamu.edu/conferences/scour/order_proceedings.stm). Approximately 27 different countries and 200 participants including nearly all the most well known names in the world of scour of foundations were present at that conference. Over 80 authors from 27 different countries contributed articles to the proceedings and gave lectures at the conference. There were 3 plenary sessions and 18 concurrent sessions. 9 invited lectures were delivered in the plenary sessions and an additional 18 special lectures were presented at the beginning of each concurrent session. The articles were collected in a three volume set of proceedings. The third volume was dedicated to a prediction event where participants were asked to send their prediction of the depth of the scour that would develop in a set of prescribed experiments. The predictions were collected and then the experiments were performed, all this before the conference.

At the conference, the results were presented and discussed. At the conclusion of the conference, recommendations were made to address the future needs in scour of foundations. The proceedings were published by Texas A&M University in bound paper form and in an addressable CD format. The CD won an award. At the end of the conference the participants were treated to an evening of fun and friendship at Professor Briaud's home. This event addressed the terms of reference no. 1, 2, and 3.

3.2 Meeting of the committee at Texas A&M University

Minutes of this November 2002 meeting can be found on the web site (<http://www.civil.tamu.edu/Research/Scour-tc33/Geotechnics%20of%20Soil%20Erosion/index.htm>). At that meeting, the committee decided to award the next conference to Singapore and give Professor Chiew the responsibility of chairing the conference. The committee also decided to form three sub-committees because the topic of the committee had been broadened from Scour of Foundations (1997-2001) to Geotechnics of Soil Erosion (2001-2005). The three subcommittees would address

1. Scour of Foundations chaired by Dr. Chiew from Singapore
2. Dam Erosion chaired by Dr. Annandale from USA
3. Surface Erosion chaired by Dr. Blight from South Africa

3.3 2004 Second International Conference on Scour and Erosion (Appendix D) in Singapore (Professor Yee-Meng CHIEW Chaired the conference).



Two volume proceedings are available for purchase on the web site (<http://www.icse2004.org/>). Approximately 100 participants attended the conference including nearly all the most well known names in the world of scour and erosion. The dis-

tribution was 39% from Asia and Oceania, 31% from Europe, 17% from America, and 13% from other regions. 7 invited keynote lectures were presented as well as 75 papers collected in a two volume set of proceedings. Both hard copy volumes and a CD were distributed to the participants at the conference. The proceedings were published by Nanyang Technological University and edited by Chiew, Lim, and Cheng. During the entire event and its preparation, Dr. Chiew did a remarkable job and received a plaque from the TC33 Chair Professor Briaud (signed by Professor Van Impe) as a token of appreciation from the TC33 Committee for all his work. This event addressed the terms of reference no. 1, 2, and 3.

3.4 Meeting of the committee in Singapore

Minutes of this November 2004 meeting can be found on the website (<http://www.civil.tamu.edu/Research/Scour-tc33/Geotechnics%20of%20Soil%20Erosion/index.htm>). At that meeting, the committee discussed the results of ICSE-2 and noted that the participation was relatively well distributed. The committee also reviewed proposals for ICSE-3, decided to award the next conference to The Netherlands and give Dr. Gijs Hoffmans the responsibility of chairing the conference. The committee also decided to form an email listserver and associated address so that the members of the committee can discuss easily all appropriate concerns. A single email address will reach all members of TC33 and enhance our communication. The system is under preparation by Dr. Richard Whitehouse.

3.5 2006 Third International Conference on Scour and Erosion planned for Amsterdam

This conference will likely take place during the Fall of 2006. Dr. Gijs Hoffmans of The Netherlands will Chair the conference helped by Dr. Heibaum of Germany and Dr. Witte of Germany). Dr. Hoffmans can be reached at: g.j.c.m.hoffmans@dww.rws.minvenw.nl. This event will address the terms of reference no. 1, 2, and 3.

3.6 Update of the web site at

<http://www.civil.tamu.edu/Research/Scour-tc33>

In 2001, the name of the committee changed from "Scour of Foundations" to "Geotechnics of Soil Erosion". Since we did not want our previous work to be lost we decided to keep the same address but have two headings on the web site: one that would identify our work from 1997 to 2001 and one new one which would focus on our work from 2001 to 2005. We created the second web site and kept the same format with buttons for "Home", "Members", "Objectives", "Minutes", "Conferences", "References", "Images". The new web site plays an important role because it takes care of constant advertisement for our conferences, allows members to have each others addresses for contact, is a permanent record of our meeting minutes, and is also a good place to house the results of special projects.

3.7 Establishment of an email list server

To facilitate the exchange of view points between committee members (and the friends of the committee). This list server is maintained by Dr. Richard Whitehouse in the UK. The initial list is derived from the membership and the participants to ICSF-1 and ICSE-2. Any one can elect to be kept out of the email list if they do not wish to receive such emails. This will be a very convenient way to communicate in the future.

3.8 Overall Conclusion

Overall, our committee is doing extremely well considering that our topic exists at the boundary between several disciplines (Geotech, Hydraulic, Structure). Our web site is a solid foundation for our activities; it has not reached its full potential as we can continue to have major references and the results of special projects listed on the site. Our series of ICSE conferences every two years represents a very good incentive for us to meet regularly; they also document the latest in the scour and erosion world for many countries which may not be fortunate enough to be able to attend the conferences. Indeed they can obtain the proceedings (paper or electronic form) after the conference.

3.9 Future Work

We have started a tradition with the series of ICSE conferences and we feel that there is a need for such conferences to continue for a good while to come as the world of scour and erosion is both still in its infancy and very devastating worldwide.

We wish to continue to develop our web site to become a more complete resource for all ISSMGE members worldwide including posting a design, repair, and monitoring manuals with proper permission.

One of the big hurdles in the last four years has been the difficulty for experts on scour and erosion which are not geotechnical engineers to be part of our committee. TC33 needs a number of people from Hydraulics and Structures because of the very interdisciplinary nature of the topic. There is a need to revisit that issue under the next 4 year cycle to try to make that process possible because without it our committee cannot fully bloom. One of the steps which would help would be to have an agreement with IAHR (International Association of Hydraulic Engineering and Research) and allow TC33 to have members from both organizations.



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Appendix A

Table of Content of the
 First Symposium on Scour of Foundations
 Melbourne, Australia,
 Editor : Jean-Louis BRIAUD
 (for copies contact Professor Briaud at: briaud@tamu.edu)

SCOUR OF FOUNDATIONS
Melbourne, Australia
November 19, 2000

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Istanbul Workshop on Scour of Foundations
At the occasion of the 2002 ICSMGE Conference
in August 28, 2002, Istanbul, Turkey.
Editor : Michael HEIBAUM
(for copies contact Dr. Heibaum at : mhb@baw.de)

Three contributions were presented.

In the first paper, Annandale gave a survey of scour to demonstrate the impact of that phenomenon on human life and economy (Annandale, G.; Melville, B.; Chiew, Y.-M.: Scour Case Studies). He began with the many different types of scour, covering not only scours of foundations but also scour of dam structures and coastal and offshore scours. Three case studies of a bridge pier scour, a submarine pipeline scour and tunnel scour showed what can happen, what can be done against scouring and what should not be done.

A state-of-the-art of the practice for bridge scour analysis in the United States was given by Briaud (Briaud, J.-L.; Richardson, E.V.: United States Practice for Bridge Scour Analysis). The presentation did clearly show that there are also now empirical and theoretical approaches to scour calculation. In the paper details are given of the huge knowledge that has been gathered to date in the United States. In the presentation, all these details could not be repeated. Instead pier scour and abutment scour were presented. It was concluded that equations exist for coarse grained soils, that equations are in development for other materials, that research is active, that national guidelines are maturing in some countries, and that international guidelines would be helpful for many countries.

The third presentation concentrated on geotechnical aspect, i.e. the soil-water-structure interaction. (Heibaum, M.: Geotechnical Parameters of Scouring And Scour Countermeasures). Besides the effects of hydraulic loads on the surface of soil and rock, the response of the pore water pressure and the stress regime in the soil has to be considered. With a simple model it was tried to explain the negative effects of excess pore water pressure on the scour process as for example hydrodynamic soil transportation. To build up a sufficient protection, in all permeable scour countermeasures a filter is needed. This often causes problems for both grain filter or geotextile filter. One method to overcome these difficulties is to use geosynthetic containers that are accordingly designed.

Appendix C

Table of Content of the
First International Conference on Scour of Foundations
ICSF-1
Texas A&M University, College Station, Texas, USA
Editors : Hamn-Ching CHEN, Jean-Louis BRIAUD
(for copies contact Professor Briaud at : briaud@tamu.edu)

**Proceedings of ICSF-1 First International Conference on
Scour of Foundations
Texas A&M University
November 17-20, 2002**

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