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Administrative report: TC1 - Offshore and nearshore geotechnical engineering

Compte rendu sur la CT-1

A.R. Koelewijn
GeoDelft, P.O. Box 69, 2600 AB Delft, Netherlands, a.r.koelewijn@geodelft.nl

ABSTRACT
This contribution comprises a report of the activities of Technical Committee 1 of the ISSMGE, on the subject of Offshore and Nearshore Geotechnical Engineering. The activities of the committee have been focussed mainly on producing a document on 'Geotechnical investigations for offshore and nearshore developments'.

RÉSUMÉ
Cette contribution comprend un rapport des activités du Comité Technique 1 de la SIMSG, sur le thème de l'expertise géotechnique en milieu Offshore et Nearshore. Les activités du comité se sont principalement concentrées sur la production d'un document sur 'Les investigations géotechnques pour le developpement de l'Offshore et du Nearshore'.

1 INTRODUCTORY INFORMATION

1.1 *Title of Technical Committee*

The title given to the Technical Committee at its formation at the XVth ICSMGE in Istanbul in 2001 is 'Offshore and nearshore geotechnical engineering, abbreviated as 'TC1' (Note that this is a re-used number).

1.2 *Membership*

The Chairman of the committee is mr. H.J. Kolk from the Netherlands. The secretariat is carried out by both mr. M.B. de Groot and dr. A.R. Koelewijn, both from the Netherlands as well.

Core members are mr. K.H. Andersen (Norway), mr. J.P. Iorio (France), prof. A. Amr Darrag (Egypt), prof. T. Tsuchida (Japan) and mr. M. VandenBroeck (Belgium).

The 'ordinary' members of the committee are prof. M. Achmus (Germany, since May 2004), prof. Sh.M. Aitaliev (Kazakhstan), mr. L. Albert (Italy), dr. D.E. Becker (Canada, until February 2004), mr. B. Casey (Ireland), mr. D. Cathie (Belgium), prof. M. Doubrovsky (Ukraine), dr. V.G. Federovsky (Russia), mr. J.R.C. Mello (Brazil), prof. K. Ozudogru (Turkey), dr. K.S. Prakasha (India), dr. A. Puech (France), prof. M.F. Randolph (Australia), dr. D.R. Shiwakoti (Nepal), mr. N. Smith (United Kingdom), dr. M. Stakev (Bulgaria), mr. M. Sweeney (United Kingdom), dr. H.H. Vaziri (Canada, until February 2004), prof. M. Werno (Poland), prof. P.I. Yakovlev (Ukraine) and prof. K. Zen (Japan).

Within the framework of writing a document on 'Geotechnical investigations for offshore and nearshore developments' (see section 3.4), five subcommittees have been formed, each of them focussing on one main type of projects. The topics of these subcommittees, their chairmen and the other members present in each subcommittee were:

- Anchoring systems, chaired by dr. A. Puech, members: mr. K.H. Andersen, mr. D. Cathie, mr. J.P. Iorio, mr. J.R.C. Mello, prof. K. Ozudogru and prof. M.F. Randolph;
- Offshore platforms, chaired by mr. K.H. Andersen, members: dr. V.G. Federovsky, mr. H.J. Kolk, mr. J.R.C. Mello, dr. K.S. Prakasha, prof. M.F. Randolph, mr. N. Smith, mr. M. VandenBroeck and prof. M. Werno;
- Pipelines and small structures, chaired by mr. J.P. Iorio, members: mr. K.H. Andersen, mr. D. Cathie, mr. J.R.C. Mello, prof. K. Ozudogru, dr. K.S. Prakasha, dr. A. Puech and mr. M. VandenBroeck;
- Nearshore structures, chaired by prof. T. Tsuchida, members: prof. A. Amr Darrag, mr. M.B. de Groot, prof. M. Doubrovsky, mr. J.P. Iorio, mr. J.R.C. Mello, dr. D.R. Shiwakoti, mr. N. Smith and prof. K. Zen; and
- Dredging and reclamation, chaired by mr. M. VandenBroeck, members: mr. M.B. de Groot, prof. K. Ozudogru, dr. D.R. Shiwakoti and prof. K. Zen.

1.3 *Terms of Reference*

The Terms of Reference of TC1 comprised:

1. Liaise with key offshore and nearshore geotechnical committees outside ISSMGE for dissemination of information to and from ISSMGE;
2. Present an overview of the various offshore and nearshore geotechnical committees and conference organisations dealing with offshore and nearshore geotechnics, together with their major achievements;
3. Provide support to ISSMGE member countries requesting dissemination of offshore/nearshore geotechnical expertise from other countries. This can range from providing information as listed above to organising workshops/seminars, depending on facilities which can be provided either by the subject member country or by TC1;
4. Prepare documentation which gives practical information on executing nearshore and/or offshore geotechnical projects. One such document planned for the 2001-2005 term consists of an inventory of geotechnical and geophysical data acquisition techniques available for characterising nearshore conditions. This includes recommended planning schedules for nearshore projects. TC1 committee members may suggest and contribute to other documents.

2 EXECUTIVE SUMMARY

Liaisons with some of the key geotechnical committees outside the ISSMGE have been made through personal contacts of the committees members and by taking part in some of these committees. An overview of the most relevant committees and conference organisations dealing with offshore and nearshore geotechnics has been made available through the ISSMGE website.

The work of the committee has been concentrated mainly on the production of a document on 'Geotechnical investigations for offshore and nearshore developments': a handbook for non-specialists, which has been presented in a workshop organised by the Technical Committee at the 16th ICSMGE.

Apart from the meeting at this conference, after being established after the 15th ICSMGE in Istanbul in August 2001, the committee has had two meetings, one in Prague during the 13th European CSMGE in August 2003 and one in Porto during the 2nd IC on Geotechnical Site Characterisation.

The committee has supported two international conferences, namely was the fifth international conference on Offshore Site Investigation and Geotechnics, organised by the Society of Underwater Technology, in November 2002, and the the International Symposium on Frontiers in Offshore Geomechanics in Perth in September 2005, organised by the Centre for Offshore Foundation Systems.

Having completed the aforementioned document, the committee does not see a relevant role for itself in the near future.

3 REPORT ON TC ACTIVITIES 2001-2005

In this section the activities and achievements of the committee are described more in detail. First, the meetings and the workshop are described, then each of the Terms of Reference is reported upon (taking the first two items together), the overall conclusions are given and finally suggestions regarding any further activities are made.

3.1 *Meetings and Workshop*

The committee has held three meetings and has organised a workshop where the document prepared by the committee has been presented.

The committee has had its first meeting during the XIIIth European Conference on Soil Mechanics and Geotechnical Engineering, held in August 2003 in Prague. Thirteen members were present. Decisions were made on the scope of activities and a start was made on the drafting of the document described in section 3.4.

The second meeting of the committee took place in Porto, during the Second International Conference on Geotechnical Site Characterisation, in September 2004. Eight members were present, as well as the chairmen of ISSMGE-TC 10 and TC 16 and the secretary of the Asian regional technical committee ATC 12.

The third meeting of the committee has been planned during the XVIth International Conference on Soil Mechanics and Geotechnical Engineering in September 2005 in Osaka. This report was, however, written well in advance of the conference.

Right before the third meeting of the committee, a workshop has been planned, where the main product of the committee, a document on geotechnical investigations for offshore and nearshore developments was to be presented by several contributors and a guest speaker from the Asian regional technical committee ATC 12.

3.2 *Other relevant committees*

Liaisons with some of the key geotechnical committees outside the ISSMGE have been made through personal contacts of the committees members and by taking part in some of these committees. As the majority of the geotechnical issues in offshore and nearshore geotechnical engineering is related to the oil and gas industry, cables for telecommunication and –to a significantly lesser extent- power industry, shipping and harbour works (breakwaters, dredging and reclamation) and coastal protection (seawalls, slope protection and sand suppletion), these issues are generally treated in technical committees dealing with offshore and nearshore facility designs which are organised outside of the ISSMGE. Examples include API (American Petroleum Industry) committees, ISO (International Standardisation Organisation), SUT (Society for Underwater Technology, UK), MMS (Minerals Management Service, USA), PIANC (Permanent International Association of Navigation Congresses) and WODA (World Organisation of Dredging Associations).

By the nature of such committees, a complete overview will hardly be achievable. A description of some of the major (international) committees has been made by the committee in one-page forms, which have been made available on the ISSMGE website www.issmge.org (navigate to 'Technical Committees' in the menu on the left, then to 'TC 1', then explore the menu further).

In addition to these committees, numerous commercial and non-commercial organsiations host conferences in which offshore and nearshore geotechnical engineering is one of the important areas. Examples include OTC (Offshore Technology Conference), BOSS (Behaviour of Offshore Structures), ICCE (International Conference on Coastal Engineering), ISOPE (International Offshore and Polar Engineering Conference), PIANC congresses, and numerous commercial specialty conferences for the oil and gas industry and for the telecommunication industry.

Within the ISSMGE, contacts were made with TC 4 on earthquake geotechnical engineering and seismic slope stability, in relation to offshore geohazards, TC 5 on environmental geotechnics in relation to dredging issues, TC 10 on geophysical testing in goetechnical engineering and TC 16 on ground properties from in-situ testing in relation to characterising nearshore and offshore soil conditions, TC 18 on deep foundations on design criteria for pile types used both onshore and nearshore/offshore, and with TC 33 on geotechnics of soil erosion in relation to scour criteria for nearshore and offshore structures. In addition to the international technical committees of the ISSMGE, a survey has been made whether there were any relevant regional committees of the ISSMGE. Next, contacts were made with the Asian regional technical committee ATC 12 on land reclamation and coastal structures in Asia, which turned out to be the only relevant regional committee regarding the scope of TC 1. The contact resulted in co-operation with respect to the workshop at the 16th ICSMGE.

3.3 *Support to ISSMGE member countries*

Apart from organising the workshop at the 16th ICSMGE in Osaka, TC 1 has given its support to two international conferences in order to support the dissemination of offshore/nearshore geotechnical expertise.

The first conference supported by TC 1 was the fifth international conference on Offshore Site Investigation and Geotechnics (OSIG), organised by the British Society of Underwater Technology (SUT), with the theme 'Diversity and Sustainability'. The conference was held in November 2002. Over 30 papers were submitted, with the following titles: Geotechnical Solutions for the Offshore: Synergy of Research and Practice; Deepwater Canyon Slope Stability; Adding Value to Site Specific Geohazards Investigations from Regional Studies - Examples from the North-West European Margin; Study of the Effects of Gas Hydrates on the Seafloor Slope Instability in the Lower Congo Basin: a Thermodynamic Chemical Approach; Gravity Base Design for Subsea Structures; The Pros and Cons of Different Foundations Used for the Åasgard Field Development; Girassol: Geotechnical Design Analyses and Installation of Suction Anchors; Geotechnical Aspects of the Maureen Gravity Platform Removal; Optimising Integrated Site Investigation for Offshore Wind Farm Projects; Continuous Burial Assessment of Pipelines and Cables: a State-of-Practice; Cemented Hardgrounds on the Norwegian Continental Shelf and their Impact on Submarine Cable Installation; Reducing Backfilling Risks; Accurate Detection of Buried Pipelines in River Crossings and Inshore Areas by Magnetic Methods; Ormen Lange Geoborings - Geological and Geotechnical Site Investigations in the Storegga Slide Area; The Storegga Geomodel and its use in Slide Risk Evaluation: Geological and Geotechnical Site Investigations in the Storegga Slide Area; Slope Stability at Ormen Lange; Integrating Geophysics and Geotechnics: Two Cases; An Integrated Deepwater Site Investigation: Southern Green Canyon, Gulf of Mexico; Quantifying Geohazards Through Advanced Visualisation and Integration in the Terang-Sirasun Development, Kangean Psc. Indonesia; SE Asia Jack-up Punchthroughs: the Way Forward?; Assessing the Effects on Jack-up Structures of Eccentric Installation Over Infilled Craters; Axial Capacities of Jetted Well Conductors; A Calibrated Model for the Interpretation of Cone Penetration Tests (CPTs) in North Sea Quaternary Soils; The Cyclic Resistance of Calcareous Sediments; Correlation Between Compressive Seismic Velocity and Cone Resistance at Shallow Penetration in Sands; Shear Wave Velocity Integrated in Offshore Geotechnical Practice; Wireline Logging for Deepwater Geohazard Assessment; Excess Pore Pressures Induced by Installation of Suction Caissons in NC Clays; Very High Resolution Marine 3D Seismic Method for Detailed Site Investigation; Implementation of GIS within the Offshore Community; and Managing Geotechnical Risk in Deepwater.

The second conference supported by TC 1 is the International Symposium on Frontiers in Offshore Geomechanics (ISFOG) in Perth in September 2005 and organised by the Centre for Offshore Foundations Systems. A list of papers was not available in time for this report.

3.4 *Documentation*

The main achievement of the committee has been the writing of a document on 'Geotechnical investigations for offshore and nearshore developments': a handbook for non-specialists as a kind of textbook, rather than a book describing 'standards'. It comprises of a description of the requirements for soil and rock investigations, a general description of the available techniques and the advantages and disadvantages, limitations and pitfalls of each technique. The 'book' has been published on the Internet site of the ISSMGE (www.issmge.org, under 'TC 1') and on a CD-ROM made available to participants of relevant recent conferences.

Apart from the major undertaking of writing a handbook, documentation on recent research projects has been made available by the committee through informative forms which can be downloaded from the ISSMGE website (www.issmge.org, under 'TC 1')

3.5 *Conclusions*

The work of the committee has been concentrated mainly on the production of a document on 'Geotechnical investigations for offshore and nearshore developments': a handbook for non-specialists. Apart from that, various sources of information were summarized and made available through the ISSMGE website.

3.6 *Suggestions for further activities*

As the current major task dealt with by the committee would be more or less completed with the presentation of the handbook at the Osaka conference, the future of the committee has been discussed during the meeting in Porto in September 2004, after which the discussion remained open through the communication channel commonly used within the committee, namely by e-mails to all members. The only topic which has been mentioned to concentrate on in the near future comprised landslides. The committee agreed that it does not have the ideal composition to concentrate on that topic. Other topics are very well dealt with within committees outside the ISSMGE, as mentioned in section 3.2. Therefore, there does not seem sufficient reason to continue TC 1 in its present form.