

INTERNATIONAL SOCIETY FOR SOIL MECHANICS AND GEOTECHNICAL ENGINEERING



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The paper was published in the proceedings of the 20th International Conference on Soil Mechanics and Geotechnical Engineering and was edited by Mizanur Rahman and Mark Jaksa. The conference was held from May 1st to May 5th 2022 in Sydney, Australia.

TC201 report (2017–2023)

Rapport TC201 (2017–2023)

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TERMS OF REFERENCE:

1. Discussion state of the art and developing the science and engineering in order to increase fundamental understanding and modelling of strength, deformation and erosion behaviour of soils and failure processes of dikes, dunes, (underwater) dams, reclaimed land, man-made islands and ports in river and coastal zone.
2. Contributions to the international congresses of the society to increase the quality of design by including experience, such as large scale tests, case histories, failures, measurements, simulations and artificial knowledge.
3. Encouraging international collaboration of experts in multidisciplinary developments of new techniques for constructing and maintaining safe and reliable protection works.

Producing technical reports and encouraging international training and meeting in this research field and exchange experience and ideas on improving communication to other researchers, public and politics for more alertness and awareness.

1 COMPOSITION OF TC201

Members:

1) M.K. Sharp (USA), 2) Y. Watabe (Japan), 3) M. Van (Netherlands), 4) C. Zwanenburg (Netherlands), 5) T. Abdoun (USA), 6) E. Asanza (Spain), 7) L. De Vos (Belgium), 8) R. Hutchison (UK), 9) A. Kort (Norway), 10) N.P. López Acosta (Mexico), 11) K. Maeda (Japan), 12) L. Nagy (Hungary), 13) D. Peluso (USA), 14) P. Smith (UK), 15) A. Tarantino (Italy), 16) J.A. Teeuw (Netherlands), 17) R. Tourment (France), 18) A. Pinto (Portugal), 19) J. Vlaanderen (Portugal), 20) E. Imre (Hungary), 21) H. Mori (Japan), 22) M. Pohl (Germany), 23) P. Mengé (Belgium), 24) B. Trak (Turkey), 25) D. Zhang (Australia), 26) L. Tonni (Italy), 27) G. Gottardi (Italy), 28) Y. Higo (Japan), 29) D. L. Shah (India), 30) S. Das (India), 31) X. Li (China), 32) J. Ji (China), 33) M. Achmus (Germany), 34) F. Mathijssen (Netherlands), 35) H. Jitno (Indonesia), 36) M. Sottile (Argentina), 37) P. Simonini (Italy), 38) E. Koch (Hungary), 39) J. Wang (Hong Kong), 40) I. Muhammad Alatas (Indonesia), 41) D.S. Park (South Korea), 42) S. Cola (Italy), 43) A. Dabska (Poland), 44) T. Le (UK).

2 ACTIVITIES PRIORITIZED BY TC201

2017

- TC201 meeting in Seoul, South Korea during the 19th International Conference on Soil Mechanics and Geotechnical Engineering.
- Workshop on seepage at Imperial College London, United Kingdom.

2018

- Paper “Lessons learned from dike failures in the past” was published in the International Journal of Geoengineering Case Histories.
- European working group on levees under ICOLD (EUCOLD).

2019

- TC201 Workshop during the 16th Pan American Conference on Soil Mechanics and Geotechnical Engineering, Cancun November 2019.
- TC201 Session in the 17th ECSMGE 2019
- TC201 Workshop during the 17th ECSMGE 2019.
- TC201 Committee meeting during the 17th European Conference on Soil Mechanics and Geotechnical Engineering (17th ECSMGE) Reykjavik, September 1st - 6th, 2019.
- European working group on levees under ICOLD/EUCOLD.

2020

Due to the COVID-19 pandemic, planned public events were canceled. In the background TC201 started to work on the joint report on failure paths for levees, which was finalized in 2022.

2021

- on line TC201 meeting via Microsoft Teams on Tuesday, June 15th, 2021, including the presentation of the ISSMGE Time Capsule Project 2021.
- Online meeting EWG-IE 2020 “Internal erosion at the field scale” on Thursday, February 4, 2021.
- working on report *Failure Paths for Levees*.

2022

- Finalizing joint report *Failure Paths for Levees*, DOI: 10.53243/R0006
- Joining the Time Capsule initiative
- On line TC201 meeting via Microsoft Teams on Tuesday, June 14th, 2022
- Session in the ISSMGE conference, Sydney
- Start new joint report on upgrading and retrofitting needs for levees.

3 REPORT ON ACTIVITIES

3.1 2017

3.1.1 *TC201 meeting in Seoul, South Korea during the 19th International Conference on Soil Mechanics and Geotechnical Engineering*

The 19th ISSMGE conference was held in Seoul during September 17th to 22nd 2017. One session was dedicated to dikes and levees. In total, 8 papers were selected for a presentation out of 13 submitted papers. In total an audience of 40 people visited the session. The presented topics showed a wide range of topics of interest for our working field. In total 11 papers were presented for which a TC-201 member is author or co-author.



3.1.2 *Report on findings of ISSMGE survey on State of Practice (SoP) versus State of the Art (SoA) in respect to TC201*

The aim of the survey is to bring academics and industry together. The results gave an interesting view on the differences between state of the art and state of practice. Regarding the working field of TC-201, the differences between SOA and SOP are felt very differently for the different respondents. For example, on the question on the cooperation between universities and industry, respondents answered in the range of non-existent to very intense.

3.1.3 *Workshop on seepage at Imperial College London, United Kingdom*

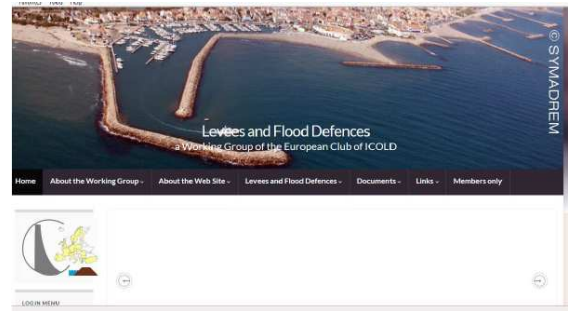
On August 31 and Sept 1 a workshop on seepage induced instabilities was held at Imperial College London.

- Seepage Workshop
- Seepage Induced Geotechnical Instability
- Workshop exploring recent developments considering seepage and instability in cohesionless soil.

This workshop was run in conjunction with the ISSMGE Technical Committees: TC105 Geo-Mechanics from Micro to Macro, TC201 Dykes and Levees, TC213 Scour and Erosion. The workshop launched the EPSRC funded research project. Delegates included academics, civil engineering consultants and representatives from some UK dam owners.

3.1.4 *European Levee Community of Practice Initiative*

The European Levee Initiative was launched. An important item will be the library/database of case histories, which is also presented in the workshop as the SAFElevee initiative-wg4. This initiative was supported by the European working group on levees under ICOLD (EUCOLD). TC201 actively supported this initiative and was encouraged TC members to come forward with relevant cases.



3.2 2018

3.2.1 *“Lessons learned from dike failures in the past” paper published in the Int. Journal of Geoengineering Case Histories.*

One of the TC201 ambitions is to encourage writing (joint) publications. As announced in previous newsletters a selection of TC201 members has produced a joint paper entitled: “Lessons learned from dike failures in the past” for the *ISSMGE International Journal of Geoengineering Case Histories*.



Fig. 1. Failed canal dike at Wilnis, August 2003.

3.2.2 *European working group on levees under ICOLD (EUCOLD)*

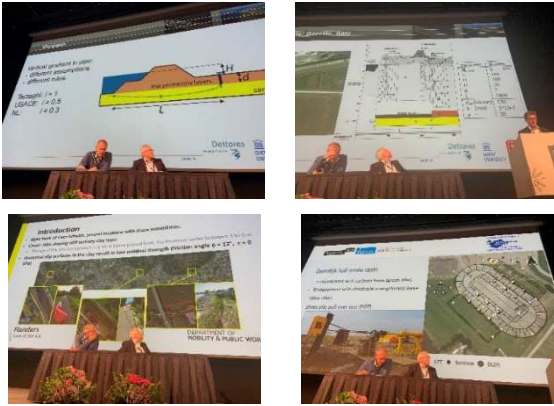
TC201 continuously participated actively in this initiative and was encouraged TC members to come forward with relevant cases.

3.3 2019

3.3.1 *TC201 Session in the 17th ECSMGE 2019*

During the 17th European Conference on Soil Mechanics and Geotechnical Engineering (ECSMGE-2019) in Reykjavik, Iceland, TC201 organized a session on dikes and levee. The 17th ECSMGE was held on September 1st – 6th, 2019 (<http://www.ecsmge-2019.com/>). The organizing committee received about 37 papers that by the authors themselves were indicated to fall in the TC201 interest. The Technical Discussion Session took place on Wednesday 4th September 2019, from 16:10 to 18:00 h.



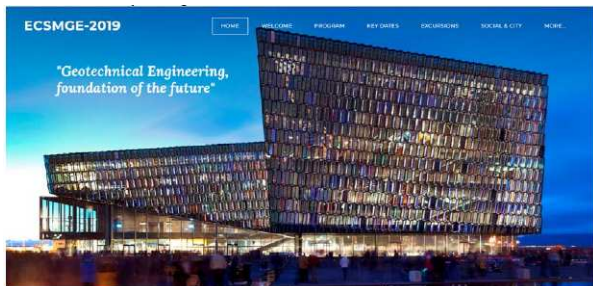


The workshop took place on Wednesday November 20th, 2019 in room Coral, from 10:15 to 16:15 h, with the following program:

Lectures	Title	Lecturer
10:15-11:45	"Small dams: some case histories" "The International Levee Handbook" "Experimental testing on levees"	Ivan Vaníček Maureen Corcoran Anne Lemnitzer
14:45-16:15	"Geomembrane sealing systems for the construction of new embankment dams" "Lessons learned from full scale tests" "Risk assessment on levees subjected to flooding through fragility curves"	Pascual Perazzo Cor Zwanenburg Norma Patricia López-Acosta

3.3.2 *TC201 Workshop during the 17th ECSMGE 2019*
TC201 had also given the opportunity to organize a workshop in advance of the Reykjavik conference. The titles of the papers sent in for the TC201 session in the 17th ECSMGE-2019 conference suggested that some of the contributions with regard topics that are open for discussion. The workshop had the following program:

- Ulrich Föster:
Large scale experiments with a coarse sand barrier as part of a multi-scale investigation of a novel remediation technique against backward erosion piping.
- Rémy Tourment:
I. Levees breaching scenarios and the different deterioration/damage mechanisms; link with failure modes analysis and risk analysis.
II. Levee and dike survey using drones: the DIDRO project.
- Joost Bredeveld:
The impact of the Eemdijk full-scale field test programme.
- Jonathan Black:
Internal erosion of earth flood embankments.



3.3.3 *TC-201 Workshop during the 16th Pan American Conference on Soil Mechanics and Geotechnical Engineering, Cancun November 2019*
TC201 organized a workshop during the XVIth Panamerican Conference on Soil Mechanics and Geotechnical Engineering. The workshop was held on Wednesday, November 20th. The workshop was concentrated around five topics:

- a) The international levee handbook
- b) Codes and Standards
- c) Historical case studies
- d) Evaluation and of instability
- e) Experimental test

3.3.4 *European working group on levees under ICOLD/EUCOLD*

The ICOLD/EUCOLD levees group participated on a dams – levees comparison with a workshop in Paris, 12-13 February. This report is, with the levees situation report, a major basis for future activities on levees in ICOLD.

The ICOLD/EUCOLD levees group organized two events in this year:

- 2-4 Oct 2019, European Club Symposium Crete, preliminary symposium themes:
Topic A. Dam Safety and Risk Management. Social impact and awareness.
Topic B. Dams to address Climate change issues.
Topic C. European directives on dams and the water sector.
Topic D. Managing ageing infrastructure.
Topic E. Dam monitoring /surveillance and rehabilitation.
Topic F. Advances in dam engineering.
<https://www.eurcold2019.com>
- 9-14 June 2019, ICOLD Annual Meeting 2019 Ottawa,

abstract deadline is 15/9/2018.

Conference Theme is “Safety and Environment for Global Benefit”. <http://icolddcigb2019.ca/>

All TC members were invited to join the above mentioned events.

3.4 2020

Due to the COVID-19 pandemic, planned events were canceled.

3.5 2021

3.5.1 Virtual TC201 meeting via Microsoft Teams on Tuesday June 15th, 2021 Virtual TC201

Last June 15, 2021 (7:00 h Mexico/ 14:00 h Delft/ 22:00 h Seoul) the members of the TC201 Technical Committee had an online meeting, with the following agenda:

- I. Opening
- II. Minutes of last TC201 meeting
- III. Presentation joined document on failure paths
- IV. TC201 activities
 - a) 20th ICSMGE-2022 (May 1 to 5, 2022, Sydney, Australia)
 - o A pre-conference workshop
 - o A conference session
 - o Our annual meeting
 - b) Field trip to water retaining structures in Australia (additional activity during the 20th ICSMGE-2022)
- V. The time capsule project
- VI. Any other business
 - o New members
 - o 6th International Conference on Geotechnical and Geophysical Site Characterization 26-29 September 2021, Congress Center, Budapest, Hungary.

VII. Closing

The attendants were:

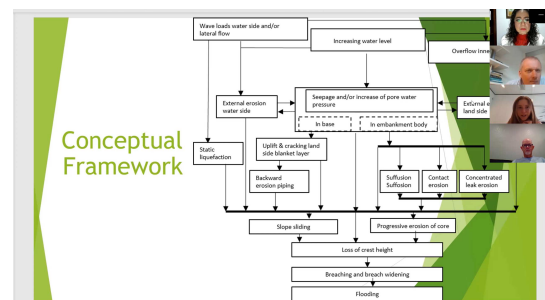
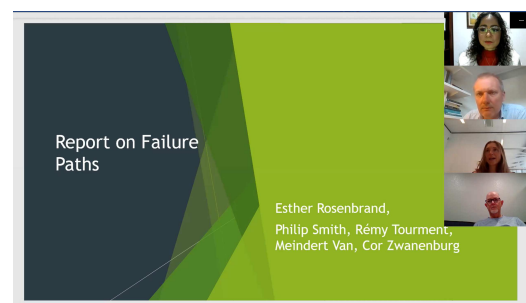
- | | |
|--|--|
| 1. Cor Zwanenburg (Chairman TC201), The Netherlands | 10. Emőke Imre, Hungary |
| 2. Norma Patricia López-Acosta (Secretary TC201), Mexico | 11. Hirotooshi Mori, Japan |
| 3. Meindert Van, The Netherlands | 12. Leen Vincke, Belgium |
| 4. Michael K. Sharp, USA | 13. Patrick Mengé, Belgium |
| 5. Philip Smith, United Kingdom | 14. Adda Athanasopoulos-Zekkos, USA |
| 6. Rémy Tourment, France | 15. Thibaut Mallet, France |
| 7. Alexandre Pinto, Portugal | 16. Esther Rosenbrand, The Netherlands |
| 8. Joana Vlaanderen, Portugal | 17. Jean-Jacques Fry, France |
| 9. Alessandro Tarantino, United Kingdom | |

The TC201 committee members very well received the virtual meeting. It seems a good idea to hold virtual meetings in the meantime for the next face-to-face conferences.

During this virtual TC201 meeting the chairman Cor Zwanenburg showed a presentation about the ISSMGE Time Capsule Project (TCP) 2021, which intend connecting and interacting with individual members of the ISSMGE all around the world about the work of the ISSMGE (past, present and future). The ISSMGE Time Capsule 2021 has been conceived to

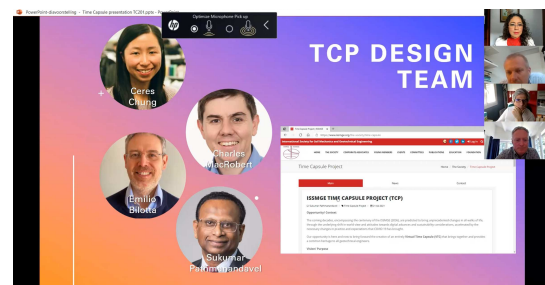
help achieve this aim. Many paths to communicating with individual members already exist: Web site/App, Library (open source), Bulletin, Geoworld, Virtual University, Technical Committees, Member Societies, Young members (YMPG), Corporate Associates (CAPG), Time Capsule blog. And additionally, ISSMGE affiliated Conferences (4 year international, 4 year regional, individual technical committee, Local/sub regional).

Rémy Tourment says that TCP is a very interesting project but is too ambitious in terms of time, because dates are very close.



5. The time capsule project

On line TC2021 meeting Tuesday June 15th 2021 (7:00 h Mexico/ 14:00 h Delft/ 22:00 h Seoul)



ISSMGE a) New TC201 members

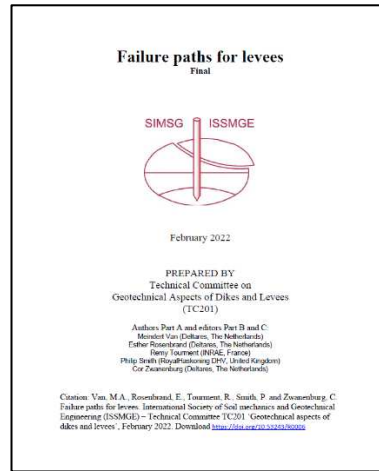
The **Hungarian Geotechnical Society** has nominated three members to TC201 (since January 2022):

Corresponding member:	Nominated members:
László Nagy lacinyag@bme.hu	Edina Koch koche@szs.hu
	Emoke Imre imreemok@hotmail.com

The **Chinese member Society** has nominated the following two members (since May 27, 2022):

Nominated members:
Xu Li lianhong.zhang
Jian Ji lianhong.zhang

We warmly welcome all these new TC201 members



3.5.2 Online meeting EWG-IE 2020 “Internal erosion at the field scale” on Thursday February 4, 2021

Due to the COVID-19 pandemic, the annual meeting of the European Working Group on Internal Erosion (EWG-IE) was replaced by a series of online meetings. This working group, which was set up in 1993 and is linked to the ICOLD Technical Committee on Embankment Dams, consists of internal erosion experts and scientists from over 30 countries in Europe and all other countries. The group facilitates knowledge exchange between practitioners and scientists, and between experts, young engineers and researchers.

3.5.3 Final draft of the “Failure paths for levees” report

The final draft of the “Failure paths for levees” report was shared with TC201 members. This report can be downloaded in the TC201 sub-website.

This TC201 report was made possible by the TC201 member contributions and the fruitful discussion at the TC201 meeting in June. With our group, Rémy Tourment, Philip Smith, Meindert Van, Cor Zwanenburg and Esther Rosenbrand spent a lot of time thinking about terminology and the overall framework and we hope that this report helps to facilitate the use of failure paths.

3.6 2022

3.6.1 Finalizing joint report

In the first quarter of 2022 the joint report “Failure paths for levees” was finalised. The report is made traceable on the internet by: <https://doi.org/10.53243/R0006>, hosted by the ISSMGE website.

The report was also presented in the conference Geohazards 8, Quebec, Canada, June 2022. (Van M.A., Rosenbrand E., Wopereis L., Zwanenburg C. (2022) Failure paths for levees, an international framework. In Proc. GeoHazards 8 Quebec Canada).

3.6.2 Time Capsule Project

TC201 joined the Time Capsule Project by sending the report “Failure paths for levees”.

3.6.3 New joint report

With the finalization of the report on failure paths a new initiative for a joint report was started. The new joint report will focus on upgrading and retrofitting techniques. The idea was launched in 2022. The activities started in 2023 with an inventory.

3.6.4 On-line TC201 meeting

Last June 14th, 2022 (7:30 h Mexico/ 14:30 h Delft/ 22:30 h Seoul) the members of the TC201 Technical Committee had an online meeting, with the following agenda:

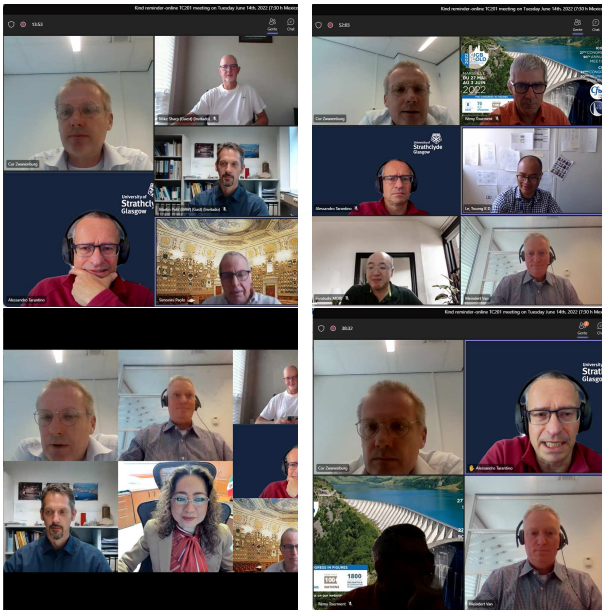
- I. Opening
- II. Minutes of last TC201 meeting
- III. Brief concluding comments on the final joined document on failure paths
- IV. TC201 next activities
 - a) XXXI Mexican National Conference on Geotechnical Engineering (XXXI MNCGE) to be held in Guadalajara, Jalisco, Mexico in Friday November 18th, 2022 (15:30 - 17:30 h).
 - b) XVII Panamerican Conference on Soil Mechanics and Geotechnical Engineering (XVII PCSMGE).
- V. Any other business
 - o Members suggestions
 - o New members
- VI. Closing

The attendants were:

- | | |
|--|---|
| 1. Cor Zwanenburg (Chairman TC201), The Netherlands | 9. Alessandro Tarantino, United Kingdom |
| 2. Norma Patricia López-Acosta (Secretary TC201), Mexico | 10. Imre Emőke Mária, Hungary |
| 3. Meindert Van, The Netherlands | 11. Hirotohi Mori, Japan |
| 4. Michael K. Sharp, United States | 12. Truong K. D. Le, United Kingdom |
| 5. Martin Pohl, Germany | 13. Edina Koch, Hungary |
| 6. Rémy Tourment, France | 14. Simonini Paolo, Italy |
| 7. Francois Mathijssen, The Netherlands | 15. Guido Gottardi, Italy |
| 8. Joana Vlaanderen, Portugal | 16. Yosuke Higo, Japan |

The TC201 committee members very well received the

virtual meeting. It seems a good idea to hold virtual meetings in the meantime for the next face-to-face conferences.



3.6.5 Participation in Sydney ICSMGE 2022 (1-5 May, 2022)

Last May 5th, 2022 (9:45 – 10:45 h Australia) the TC201 Technical Committee had a virtual technical session in the ICSMGE 2022:

- The virtual session was named “Latest developments in dyke technology”.
- Cor Zwanenburg chaired this session.
- A large portion of the presentations were held virtually.
- The virtual session included 5 presentations of 10 min each and they were available, on-demand, throughout the conference, and for 6-months afterwards for participants who registered for the on-line conference.
- This virtual session was successful.

3.7 2023

3.7.1 TC201 management meeting 2023

Due to the great success of the previous on-line meetings in 2021 and 2022, it is intended to have the next meeting as an on-line meeting. This meeting will be held on June 27th, 2023 (7:30 h Mexico/ 14:30 h Delft/ 22:30 h Seoul).

Details of this meeting as well as an invitation to the on-line meeting will follow later.

3.7.2 Announcement of TC201 activities during the XVII Panamerican Conference on Soil Mechanics and Geotechnical Engineering (La Serena, Chile)

We notify you that during the XVII PCSMGE-2024, the TC201 will organize activities:

- A technical session, if this is possible, of our TC201 technical committee on "Dykes and levees". With this objective, we invited the TC201 members to send abstracts for this session.
- A pre-conference workshop "Dykes and levees". We invite you to send us suggestions for this workshop.
- Our annual meeting (both face-to-face and online).

Important information about this conference is provided below:

- The XVII Panamerican Conference on Soil Mechanics and Geotechnical Engineering (XVII PCSMGE) will be held

from November 12 to 17, 2024, in La Serena, Chile.

- Website: <https://panamgeochile2024.cl/>
- Preliminary general program:
Tuesday 12: Workshops/Short courses/Ice breaker
Wednesday 13 to Friday 15: XVII PCSMGE
Saturday/Sunday 16 to 17: Sightseeing/technical visits
- Papers:
Presentation of abstracts: June 2023
Acceptance of abstracts: July 2023
Presentation of papers: November 2023
Acceptance/comments papers: January 2024
Deadline for final version of papers: April 2024

3.7.3 New members

- Prof. Dąbska Agnieszka (Poland, since April 14, 2022)
- Prof. Le Truong K. D. (United Kingdom, London; since April 21, 2022)
- Msc Ing. Mauro Sottile (SAIG, Argentina)

We warmly welcome all these new TC201 members.

3.7.4 Newsletter from the EUCOLD WG on Levees and flood defences, issue number 10 (ICOLD TC LE)

The ICOLD TC LE last issue of the newsletter can be downloaded from the following link <https://lfd-eurcold.inrae.fr/index.php/wg-newsletter/>

3.7.5 Some upcoming events

- ASCE Geo-Congress 2023. Los Angeles, California, USA, 26th – 29th March 2023. <https://2023.geocongress.org/>
- 8th International Conference on Unsaturated Soils, Milos island, Greece between the 2nd and 5th of May 2023. Contact person: Dr Michael Bardanis (mbardanis@edafos.gr)
- 9th International Congress on Environmental Geotechnics, Chania, Crete island, Greece, between the 25th and 28th of June 2023, <https://iceg2023.org>
- XX Technical Dam Control International Conference, Safety of hydraulic structures, the jubilee edition of the conference.

The conference will be held from 12 to 15 September 2023 in Hotel Diament Arsenal Palace in Chorzów, in the Silesia region of southern Poland, near Katowice. The conference is organized in a hybrid formula, with the possibility of online or in-person participation. Participants will have the opportunity to take part in a technical tour to the Goczałkowice reservoir located in the Silesia region, as well. Registration for participation in the conference has just been opened. You can register via the conference website: <https://tkz.is.pw.edu.pl/registration/>.

The deadline for registration and submission of abstracts expires on February 28, 2023. The template of the abstract you can find on the website: <https://tkz.is.pw.edu.pl/templates/> You can submit an abstract via the conference website: <https://tkz.is.pw.edu.pl/manuscripts-form/>. Submitted papers will be published in journals: "Energetyka Wodna", "Gospodarka Wodna", "Inżynier Budownictwa", "IMGW Monograph" series, and for an extra charge in "Archives of Civil Engineering" and "Journal of Water and Land Development".

Detailed information about the conference is available at: www.t kz.is.pw.edu.pl

- 5th International Conference on Geotechnics for Sustainable Infrastructure Development, Vietnam, Hanoi, between the 14th and 15th of December 2023, <https://geotechn.vn/>

3.7.6 *Next TC201 Newsletter*

The next newsletter will be sent in June 2023. Please provide all available information, like TC related publications, academic papers, news, research, among others, to the Secretary TC201 Norma Patricia López-Acosta, nlopeza@iingen.unam.mx

4 FINAL COMMENTS

Currently, the TC201 is made up of 44 members who actively participated in several conferences and symposiums around the world during the period 2017-2022.

Despite the global contingency due to COVID-19 pandemic, the TC201 continued working and disseminating research with the publication of articles, technical reports and presentations in conferences through digital platforms and virtual events.