ICTMT 15 – third announcement

Making and strengthening “Connections and Connectivity” (C & C) for teaching mathematics with technology

ICTMT 15 - at a glance

<table>
<thead>
<tr>
<th>Website</th>
<th>conferences.au.dk/ictmt15</th>
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<tbody>
<tr>
<td>Dates</td>
<td>13 to 16 September 2021</td>
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<tr>
<td>Place</td>
<td>Danish School of Education (DPU), Aarhus University (campus Emdrup)</td>
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<tr>
<td>Address</td>
<td>Tuborgvej 164, 2400 Copenhagen, Denmark</td>
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<tr>
<td>Plenary lecturers by</td>
<td>Chronis Kynigos</td>
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<td>Anna Baccaglini-Frank</td>
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<td>Shai Olsher</td>
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<td>Dan Meyer</td>
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Photos: Jørgen Weber, Søren Kjeldgaard / AU-foto, Poul Ib Henriksen
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Presentation

The 15th International Conference on Technology in Mathematics Teaching (ICTMT 15) takes place in Copenhagen in September 2021. The conference is organised by the Danish School of Education (DPU), Aarhus University, and its venue is on campus Emdrup, located in Tuborgvej 164, 2400 Copenhagen, Denmark.

ICTMT series
The ICTMT conference series is unique in bringing together lecturers, teachers, educators, curriculum designers, mathematics education researchers, learning technologists, and educational software designers who share an interest in improving the quality of teaching and learning. Through its character, the conference provides a forum for researchers and practitioners in this field to discuss and share best practices, research approaches and results, theoretical know-how, innovation and perspectives on educational technologies and their impact on the teaching and learning of mathematics.

This biennial conference began in Birmingham, UK, in 1993, under the influential enterprise of Bert Waits from Ohio State University. The previous instance was held in Essen, Germany, in 2019.

Conference programme
The ICTMT 15 programme starts on Monday 13th September 2021 at noon and ends on Thursday 16 September 2021.

The programme includes scientific activities (plenary lectures, paper presentations, poster sessions and workshops) and social arrangements (excursions and conference dinner).

Format
All activities are planned to take place in person. Participants can find all relevant information and guidelines regarding travelling to Denmark on covidtravelrules.dk.
Themes

The ICTMT 15 overarching theme is making and strengthening “Connections and Connectivity” (C & C) for teaching mathematics with technology. This general frame is split into four main themes:

Designing technology
for mathematical learning and its assessment – a focus on theoretical or actual ‘designs’ with contributions from researchers, industry and teachers.

Making sense of “classroom” practice
with and through technology – a focus on the work of teachers and lecturers, where the classroom might be geographically located or mobile. Again, contributions could be both theoretical and practical.

Fostering mathematical collaborations
with and through technology – a focus on the communications’ aspect of technology, including assessment strategies.

Innovating with technologies
for mathematical learning – a focus on highly innovative approaches in the early stages of development for constructive critique by the community.
Plenary lectures

Theme 1: Designing technology
Embedding mathematics in Socio-scientific games: The case of the mathematical in grappling with Wicked Problems
Chronis Kynigos
National and Kapodistrian University of Athens, Greece
Linnaeus University, Sweden

Theme 2: Making sense of “classroom” practice
Shifts from teaching mathematics with technology to teaching mathematics through technology: a focus on mathematical discussion
Anna Baccaglini-Frank
University of Pisa, Italy

Theme 3: Fostering mathematical collaborations
Te(a)ching to collaborate: Automatic assessment based grouping recommendations and implications for teaching
Shai Olsher
University of Haifa, Israel

Theme 4: Innovating with technologies
Pixels are Pedagogy
Dan Meyer
Desmos, Oakland, CA, USA

Abstracts
All abstracts for plenary lectures are available on the conference website.
Scientific activities

Aside from plenary lectures, the scientific programme includes paper presentations, a poster session and workshops. Full papers, and posters and workshop proposals are available in the Book of Accepted Contributions on the conference website.

Paper sessions
Authors have the chance to present and discuss their submitted papers with participants. On each 90-minute session, there will be three paper presentations led by one chair, who will make sure to introduce the authors and the papers and guide the discussion. Authors should aim for a 15 to 20-minute presentation followed by a 10 to 15-minute discussion.

Poster session
The poster session will take place on Monday 13 September, 17:00-18:30. Authors are welcome to set up their posters (recommended size: A0) in the Festsalen (A220) upon arrival. Posters can stay throughout the rest of the conference. The poster session will be coupled with a wine reception sponsored by Maplesoft. Therefore, participants will have the chance to socialise their research in a friendly setting.

Workshops
There will be two workshop sessions: Tuesday 14 September at 14:30-16:00 and Wednesday 15 September at 13:30-15:00. They aim to engage participants in research-based hands-on activities. Participants can sign up for workshops during the poster session on Monday 13 September. Authors will receive the list of participants at the end of that day.
Social activities

Walk and talk
After lunch, on **Tuesday 14 September**, participants will split into groups and go for a walk-and-talk near campus. The suggested route is Bispebjerg Parkallé, leading to a visit to **Grundtvig’s Church**. The groups and conversation themes will be announced in Festsalen (A220), from where we will depart.

Excursion
The conference excursion will be a ferry tour throughout the canals in Copenhagen on **Wednesday 15 September**. A bus will depart from campus Emdrup at 15:00 and take the participants to the starting point. The last stop of the trip will be **Christianshavn**, within walking distance of the conference dinner venue.

Conference dinner
The conference dinner will take place on the evening of **Wednesday 15 September** starting at 18:45. The venue is the restaurant **Spiseloppen**, located in the free town **Christiania**. The street address is Bådmandsstræde 43, 1407 Copenhagen.
## Schedule: summary

<table>
<thead>
<tr>
<th>Monday 13 September</th>
<th>Tuesday 14 September</th>
<th>Wednesday 15 September</th>
<th>Thursday 16 September</th>
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<tbody>
<tr>
<td>9:00 - 9:30</td>
<td>Plenary: Anna Baccaglini-Frank (9:00 – 10:00)</td>
<td>Plenary: Shai Olsher (9:00 – 10:00)</td>
<td>Paper session 5</td>
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<td>9:30 - 10:00</td>
<td>Coffee break</td>
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<td>10:00 - 10:30</td>
<td>Coffee break</td>
<td>Paper session 2 (10:30 – 12:00)</td>
<td>Paper session 6 (11:00 – 12:30)</td>
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<td>10:30 - 11:00</td>
<td>Paper session 5 (10:30 – 12:00)</td>
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<td>Lunch (12:00 – 13:00)</td>
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<td>12:00 - 12:30</td>
<td>Registration and lunch</td>
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<td>13:00 - 13:30</td>
<td>Opening ceremony</td>
<td>Walk and talk (13:00 – 14:30)</td>
<td>Workshops 2 (13:30 – 15:00)</td>
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<td>13:30 - 14:00</td>
<td>Paper session 1 (14:15 – 15:45)</td>
<td>Workshops 1 (13:30 – 15:00)</td>
<td>Plenary: Chronis Kynigos (13:30 – 14:30)</td>
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<td>14:15 - 14:30</td>
<td>14:15 - 15:45</td>
<td>14:00 - 16:00</td>
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<td>14:30 - 15:00</td>
<td>Coffee break (14:30 – 16:00)</td>
<td>14:00 - 17:00</td>
<td>Excursion: Canal trip (15:00 – 18:00)</td>
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<td>15:00 - 15:45</td>
<td>Plenary: Dan Meyer (16:00 – 17:00)</td>
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<td>16:00 - 16:30</td>
<td>Poster session and wine reception (17:00 – 18:00)</td>
<td>Paper session 3 (16:30 – 18:00)</td>
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<td>16:30 - 17:00</td>
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<td>Conference dinner (17:00 – 18:00)</td>
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Day 1: Monday 13 September

12:00-13:30 – Registration and lunch
Aulaen (A141)
Time for checking in; receive credentials and materials, and having lunch

13:30-14:00 – Opening ceremony
Festsalen (A220)
Uffe Thomas Jankvist, IPC chair – Danish School of Education, Aarhus University, Denmark

14:15-15:45 – Paper session 1
Festsalen (A220)
- Rogier Bos and Winand Renkema: Metaphor-based algebra animation
- Philipp Larmann, Simon Barlovits and Matthias Ludwig: MCM@home: Analysing a learning platform for synchronous distance education
- Lena Frenken and Gilbert Greefrath: Successful modelling processes in a computer-based learning environment
  **Chair:** Morten Blomhøj

Auditorium (D174)
- Francesca Ferrara, Giulia Ferrari and Ketty Savioli: Children in movement towards STEAM: Coding and shapes at kindergarten
- Melanie Platz: “… Then it looks beautiful” - Preformal proving in primary school
- Susanne Podworny and Yannik Fleischer: An approach to teaching data science in middle school
  **Chair:** Julie Vangsøe Færch

15:45-16:00 – Coffee break
Aulaen (A141)

16:00-17:00 – Plenary lecture
Festsalen (A220)
Dan Meyer – Desmos, Oakland, CA, USA
**Theme 4: Innovating with technologies**
- Pixels are pedagogy
  **Chair:** Alison Clark-Wilson
17:00-18:30 – Poster session and wine reception
Festsalen (A220)

- Domenico Brunetto: StreetMath: Supporting young migrants empowerment
- Ben Davies, Eirini Geraniou, Cosette Crisan and Manolis Mavrikis: Undergraduates’ experiences with automated assessment in STACK (cancelled)
- Morten Elkjær: Equation Lab: Teaching equation solving in Virtual Reality using a modified dynamic balance model (cancelled)
- Francesca Ferrara, Giulia Ferrari, Elvira Fernández-Ahumada and Natividad Adamuz-Povedano: Gamifying CLIL within the mathematical context of fraction learning
- Julie Vangsøe Færch: Development and evaluation of primary school students’ mathematical competencies via dynamic online learning environments
- Inge Olav Hauge and Johan Lie: Contributions of computational thinking and computer programming for development of critical democratic competence: Empowerment and agency
- Ayse Kilic, Zeger-Jan Kock and Birgit Pepin: Connectivity related issues in a modularised course involving mathematics
- Kinga Szücs: Finding theorems and their proofs by using a calculator with CAS in university-level mathematics
- Laura Wirth and Gilbert Greefrath: Examining heuristic worked example videos in a collaborative setting: The conception of the project MoVie
- Filip Moons, Ellen Vandervieren and Jozef Copaert: Atomic, reusable feedback: A technology-mediated solution for assessing handwritten math tasks?
Day 2: Tuesday 14 September

09:00-10:00 – Plenary lecture
Festsalen (A220)
Anna Baccaglini-Frank – University of Pisa, Italy
Theme 2: Making sense of ‘classroom’ practice
Shifts from teaching mathematics with technology to teaching mathematics through technology: A focus on mathematical discussion
Chair: Hans-Georg Weigand

10:00-10:30 – Coffee break
Aulaen (A141)

10:30-12:00 – Paper session 2
Room A401
• Rikke Maagaard Gregersen: How about that algebra view in GeoGebra? A review on how task design may support algebraic reasoning in lower secondary school
• Cecilie Carlsen Bach and Angelika Bikner-Ahsbahs: When a digital tool guides mathematical communication
• Annalisa Cusi, Agnese Ilaria Telloni and Katia Visconti: Design of digital resources to scaffold metacognitive activities: Focus on students’ reflections (cancelled)
Chair: Anna Baccaglini-Frank

Room A405
• Katrin Klingbeil, Fabian Rösken, Daniel Thurm, Bärbel Barzel, Florian Schacht, Ulrich Kortenkamp, Kaye Stacey and Vicki Steinle: SMARTA – Online diagnostic to reveal students algebraic thinking and enhance teachers diagnostic competencies
• Reinhard Oldenburg: Relational thinking supported by an algebraic modeling tool on the web
• Simeon Schwob and Paul Gudladt: Successful communication as a part of teaching and learning mathematics in remote settings (cancelled)
Chair: Stine Gerster Johansen

12:00-13:00 – Lunch
Aulaen (A141)
13:00-14:30 – Walk and talk
Festsalen (A220)
Walk tour in groups with a visit to Grundtvig’s Church.

14:30-16:00 – Workshop session 1
Room A100a
• Chaim Ballin, Anatoli Kouropatov and Ofir Shafirovitz: Workshop: Interactive digital environment for teaching and learning deductive geometry (FullProof): Design principles, functionality, pedagogy and results of implementation (Part I)
Room A104
• Theo van den Bogaart and Rogier Bos: Heuristic trees hackathon: Designing and implementing support for mathematical problem solving (Part I)
Room A201
• Kendal Bahadirgil and Knud Nissen: Maple Mathematics Suite - essential tools for STEM education
Room A203
• Lena Frenken: Discovering the Possibilities of a Computer-Based Learning Environment on Mathematical Modelling
Room A408
• Mats Brunström, Maria Fahlgren, Mirela Vinerean and Yosief Wondmagegne: Workshop on the design of tasks and feedback utilizing a combination of a dynamic mathematics software and a computer-aided assessment system
Room A412
• Yannik Fleischer and Susanne Podworny: Teaching machine learning with decision trees in middle school using CODAP
Room A416
• Allan Tarp: Develop children’s innate mastery of many by bridging outside existence to inside essence in full sentences

16:00-16:30 – Coffee break
Aulaen (A141)

16:30-18:00 – Paper session 3
Auditorium (D174)
• Raimundo Elicer and Andreas Lindenskov Tamborg: Nature of the relations between programming and computational thinking and mathematics in Danish teaching resources
• Liv Nøhr, Morten Misfeldt and Andreas Lindenskov Tamborg: Teacher development in computational thinking and student performance in mathematics: A proxy-based TIMSS study
• Eleonora Faggiano and Federica Mennuni: Grasping sense and building meanings in mathematical distance contexts: The role of the teacher
Chair: Mathilde Kjær Pedersen
Room D170 (cancelled)

- Scott Courtney: Exploring teachers’ attempts to differentiate instruction in remote learning environments: The case of Claudia (cancelled)
- Eirini Geraniou and Cosette Crisan: Adapting classroom based practices to online teaching: A mathematics teacher’s reflections (cancelled)
- Melih Turgut, Iveta Kohanová, Jørn Ove Asklund, Øistein Gjøvik, Marit Buset Langfeldt and Hermund André Torkildsen: Fourth graders explore a computational thinking task using Robot Emil: A multimodal analysis of pupils’ thinking (cancelled)
Day 3: Wednesday 15 September

09:00-10:00 – Plenary lecture
Festsalen (A220)
Shai Olsher – University of Haifa, Israel
**Theme 3: Fostering mathematical collaborations**
Te(a)ching to collaborate: Automatic assessment based grouping recommendations and implications for teaching
Chair: Alison Clark-Wilson

10:00-10:30 – Coffee break
Aulaen (A141)

10:30-12:00 – Paper session 4
Festsalen (A220)
- Frederik Dilling and Julian Sommer: Virtual Reality in Mathematics Education – Design of an Application for Multiview Projections
- Alice Barana: Understanding linear functions in an interactive digital learning environment
- Cintia Scafa Urbaez Vilchez and Alice Lemmo: A videogame as a tool to orchestrate productive mathematical discussions
Chair: Eleonora Faggiano

Auditorium (D174)
- Manuela Subtil, António Domingos and Maria Alessandra Mariotti: Graphing calculator in the connection between geometry and functions with the contribution of semiotic mediation
- David Reid, Angelika Bikner-Ahsbahs, Thomas Janßen and Estela Vallejo-Vargas: Forms of epistemic feedback
- Zelha Tunç-Pekkan, Eylem Sayar and Isıl Ozturk: Affordances of university based online laboratory school: Types of feedback
Chair: Marianne Thomsen

12:00-13:30 – Lunch
Aulaen (A141)
13:30-15:00 – Workshop session 2

Room A100a
- Chaim Ballin, Anatoli Kouropatov and Ofir Shafirovitz: Workshop: Interactive digital environment for teaching and learning deductive geometry (FullProof): Design principles, functionality, pedagogy and results of implementation (Part II)

Room A104
- Theo van den Bogaart and Rogier Bos: Heuristic trees hackathon: Designing and implementing support for mathematical problem solving (Part II)

Room A203
- Filip Moons and Ellen Vandervieren: Workshop - Writing atomic, reusable feedback to semi-automatedly assess handwritten math tasks

Room A405
- Philipp Larmann, Simon Barlovits and Matthias Ludwig: MCM@home: An approach for synchronous distance learning with mobile devices

Room A414
- Frederik Dilling and Julian Sommer: Mixed reality in mathematics education

Room A416
- Francesca Ferrara, Giulia Ferrari and Keyy Savioli: Spatial and computational thinking at kindergarten through the aid of an educational robot

Room D166
- Douglas Butler: Comparing the user interfaces of dynamic software (cancelled)

15:00-18:00 – Excursion
Parking lot between buildings A and C
Ferry tour to the Copenhagen canals.
A bus will be expecting us on the campus parking lot.
The last stop of the tour will be Christianshavn, at a walking distance to the conference dinner.

18:45 – Conference dinner
Restaurant Spiseloppen
Address: Bådmandsstræde 43, 1407 Copenhagen (Christiania)
Day 4: Thursday 16 September

09:00-10:30 – Paper session 5
Festsalen (A220)
• Dimitris Diamantidis and Chronis Kynigos: Digital media as tools fostering teacher creativity on designing tasks around an area of mathematical concepts
• Bjarnheíður Kristinsdóttir, Freyja Hreinsdóttir and Zsolt Lavicza: Developing silent video tasks’ instructional sequence in collaboration with teachers
• Tim Lutz: Machine learning model for automated text classification of mathematical tasks
  Chair: Rikke Maagaard Gregersen

Room A203
• Marianne Thomsen and Uffe Thomas Jankvist: Mathematical thinking in the interplay between historical original sources and GeoGebra
• Maria Fahlgren, Mats Brunström, Mirela Vinerean and Yosief Wondmagegne: Designing tasks and feedback utilizing a combination of a dynamic mathematics software and a computer-aided assessment system
• Mathilde Kjær Pedersen: The use of digital technologies for mathematical thinking competency
  Chair: Andreas Lindenskov Tamborg

10:30-11:00 – Coffee break
Aulaen (A141)

11:00-12:30 – Paper session 6
Festsalen (A220)
• Zelha Tunç-Pekkan, Rukiye Didem Taylan, Bengi Birgili and İbrahim Burak Olmez: An examination of pre-service mathematics teachers’ experiences at an online school
• Andreas Lindenskov Tamborg, Uffe Thomas Jankvist and Morten Misfeldt: Comparing programming and computational thinking with mathematical digital competencies from an implementation perspective
• Simone Jablonski, Eugenia Taranto, Matthias Ludwig and Maria Flavia Mammana: Go online to go outdoors – a MOOC on MathCityMap
  Chair: Cecilie Carlsen Bach
Room A203

- Maxim Brnic and Gilbert Greefrath: Does the gender matter? The use of a digital textbook compared to printed materials
- Alexander Schüler-Meyer: The purpose of handwriting with tablet-computers and smartpens in mathematical group work over distance
- Stine Gerster Johansen: A Review on Allgemeinbildung and Digital Technologies in Mathematics Education
  Chair: Raimundo Elicer

12:30-13:30 – Lunch
Aulaen (A141)

13:30-14:30 – Plenary lecture
Festsalen (A220)
Chronis Kynigos – National and Kapodistrian University of Athens, Greece; and Linnaeus University, Sweden
Theme 1: Designing technology
Embedding mathematics in socio-scientific games: The case of the mathematical in grappling with Wicked Problems
Chair: Hans-Georg Weigand

14:30-15:00 – Closing ceremony
Festsalen (A220)
Uffe Thomas Jankvist, IPC chair – Danish School of Education, Aarhus University, Denmark
Directions to the conference venue
Campus Emdrup is located by Emdrup Station of the S-train circuit in Copenhagen. A complete map of the S-train circuit can be found here. Alternatively, bus lines 18 and 21 also stop by the venue. You can plan your trip from the airport or otherwise visiting rejseplanen.dk.

Denmark has an integrated public transportation system, with trains, metro, S-train and buses. Find ticket options on the public transportation website. For total flexibility, we recommend buying a City Pass upon arrival.

Campus map
Conference activities will take place in buildings A and D.
## ICTMT 15 – organization

### International Programme Committee (IPC)

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<thead>
<tr>
<th>Name</th>
<th>Country</th>
<th>Role</th>
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<tbody>
<tr>
<td>Uffe Thomas Jankvist</td>
<td>Denmark</td>
<td>IPC chair</td>
</tr>
<tr>
<td>Alison Clark-Wilson</td>
<td>UK</td>
<td>IPC co-chair</td>
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<tr>
<td>Hans-Georg Weigand</td>
<td>Germany</td>
<td>IPC co-chair</td>
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<tr>
<td>Gilles Aldon</td>
<td>France</td>
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<td>Ivan Kalas</td>
<td>Slovakia</td>
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<td>Eleonora Faggiano</td>
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<td>Susana Carreira</td>
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<td>Florian Schacht</td>
<td>Germany</td>
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<tr>
<td>Ingi Heinesen Højsted</td>
<td>Faroe Islands</td>
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<td>Sonia Palha</td>
<td>The Netherlands</td>
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### Local Organising Committee (LOC)

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<thead>
<tr>
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<tbody>
<tr>
<td>Uffe Thomas Jankvist</td>
<td>LOC chair</td>
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<tr>
<td>Marianne Thomsen</td>
<td>LOC co-chair</td>
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<tr>
<td>Raimundo José Elicer Coopman</td>
<td>LOC co-chair</td>
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### Photo credits

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