

# Twenty Years of Computational Science.

## Preface for ICCS 2020

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### 1. Introduction

Welcome to the 20th Annual International Conference on Computational Science (ICCS - <https://www.iccs-meeting.org/iccs2020/>).

During the preparation for this 20<sup>th</sup> edition of ICCS we were considering all kinds of nice ways to celebrate two decennia of computational science. Afterall when we started this international conference series, we never expected it to be so successful and running for so long at so many different locations across the globe! So we worked on a mind-blowing line up of renowned keynotes, music by scientists, awards, a play written by and performed by computational scientists, press attendance, a lovely venue ... you name it, we had it all in place. Then Corona hit us.

After many long debates and considerations, we decided to cancel the physical event but still support our scientists and allow for publication of their accepted peer-reviewed work. We are proud to present the proceedings you are reading as a result of that.

ICCS 2020 is jointly organized by the University of Amsterdam, NTU Singapore and the University of Tennessee.

The International Conference on Computational Science is an annual conference that brings together researchers and scientists from mathematics and computer science as basic computing disciplines, as well as researchers from various application areas who are pioneering computational methods in sciences such as physics, chemistry, life sciences, engineering, arts and humanitarian fields, to discuss problems and solutions in the area, to identify new issues, and to shape future directions for research.

Since its inception in 2001, ICCS has attracted increasingly higher quality and numbers of attendees and papers, and this year is not an exception, with over 350 papers accepted for publication. The proceedings series have become a major intellectual resource for computational science researchers, defining and advancing the state of the art in this field.

The theme for ICCS 2020, "**Twenty Years of Computational Science**", highlights the role of Computational Science over the last twenty years, its numerous achievements, and its future challenges. This conference will be a unique event focusing on recent developments in: scalable scientific algorithms; advanced software tools; computational grids; advanced numerical methods; and novel application areas. These innovative novel models, algorithms and tools drive new science

through efficient application in areas such as physical systems, computational and systems biology, environmental systems, finance, and others.

This year we had 719 submissions (230 submissions to the main track and 489 to the thematic tracks). In the main track, 101 full papers were accepted (44%). In the thematic tracks, 249 full papers (51%). A high acceptance rate in the thematic tracks is explained by the nature of these, where many experts in a particular field are personally invited by track organisers to participate in their sessions.

ICCS relies strongly on the vital contributions of our thematic track organizers to attract high quality papers in many subject areas. We would like to thank all committee members from the main and thematic tracks for their contribution to ensure a high standard for the accepted papers. We would also like to thank *Springer*, *Elsevier*, and *Intelligibilis* for their support. Finally, we very much appreciate all the local organizing committee members for their hard work to prepare this conference.

We are proud to note that ICCS is an A-rank conference in the CORE classification.

We wish you good health in these troubled times and hope to see you next year for ICCS 2021.

June 2020

The ICCS 2020 Organizers:

Valeria V. Krzhizhanovskaya  
Gábor Závodszy  
Michael Lees  
Jack Dongarra  
Peter M.A. Sloot  
Sérgio Brissos  
João Teixeira

## 2. Thematic Tracks and Organizers

### **Advances in High-Performance Computational Earth Sciences: Applications and Frameworks – IHPCES**

Takashi Shimokawabe, Kohei Fujita, Dominik Bartuschat

### **Agent-Based Simulations, Adaptive Algorithms and Solvers – ABS-AAS**

Maciej Paszynski, David Pardo, Victor Calo, Robert Schaefer, Quanling Deng

### **Applications of Computational Methods in Artificial Intelligence and Machine Learning – ACMAIML**

Kourosh Modarresi, Raja Velu, Paul Hofmann

### **Biomedical and Bioinformatics Challenges for Computer Science – BBC**

Mario Cannataro, Giuseppe Agapito, Mauro Castelli, Riccardo Dondi, Rodrigo Weber dos Santos, Italo Zoppis

### **Classifier Learning from Difficult Data – CLD<sup>2</sup>**

Michał Woźniak, Bartosz Krawczyk, Paweł Ksieniewicz

### **Complex Social Systems through the Lens of Computational Science – CSOC**

Debraj Roy, Michael Lees, Tatiana Filatova

### **Computational Health – CompHealth**

Sergey Kovalchuk, Stefan Thurner, Georgiy Bobashev

### **Computational Methods for Emerging Problems in (dis-)Information Analysis – DisA**

Michal Choras, Konstantinos Demestichas

### **Computational Optimization, Modelling and Simulation – COMS**

Xin-She Yang, Sławomir Koziel, Leifur Leifsson

### **Computational Science in IoT and Smart Systems – IoTSS**

Vaidy Sunderam, Dariusz Mrozek

### **Computer Graphics, Image Processing and Artificial Intelligence – CGIPAI**

Andres Iglesias, Lihua You, Alexander Malyshev, Hassan Ugail

### **Data-Driven Computational Sciences – DDCS**

Craig C. Douglas, Ana Cortes, Hiroshi Fujiwara, Robert Lodder, Abani Patra, Han Yu

### **Machine Learning and Data Assimilation for Dynamical Systems – MLDADS**

Rossella Arcucci, Yi-Ke Guo

### **Meshfree Methods in Computational Sciences – MESHFREE**

Vaclav Skala, Samsul Ariffin Abdul Karim, Marco Evangelos Biancolini, Robert Schaback, Rongjiang Pan, Edward J. Kansa

### **Multiscale Modelling and Simulation – MMS**

Derek Groen, Stefano Casarin, Alfons Hoekstra, Bartosz Bosak, Diana Suleimenova

### **Quantum Computing Workshop – QCW**

Katarzyna Rycerz, Marian Bubak

**Simulations of Flow and Transport: Modeling, Algorithms and Computation – SOFTMAC**

Shuyu Sun, Jingfa Li, James Liu

**Smart Systems: Bringing Together Computer Vision, Sensor Networks and Machine Learning – SmartSys**

Pedro J. S. Cardoso, João M. F. Rodrigues, Roberto Lam, Janio Monteiro

**Software Engineering for Computational Science – SE4Science**

Jeffrey Carver, Neil Chue Hong, Carlos Martinez-Ortiz

**Solving Problems with Uncertainties – SPU**

Vassil Alexandrov, Aneta Karaivanova

**Teaching Computational Science – WTCS**

Angela Shiflet, Alfredo Tirado-Ramos, Evguenia Alexandrova

**Uncertainty Quantification for Computational Models – UNEQUIvOCAL**

Wouter Edeling, Anna Nikishova, Peter Coveney

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