Message from the ICCSA 2011 General Chairs

This volume contains an outstanding collection of refereed workshop papers, short papers, Ph.D. showcase papers and poster papers selected for the 11th International Conference on Computational Science and Its Applications - ICCSA 2011, held in Santander (Spain), June 20-23 2011. We cordially invite you to visit the ICCSA website http://www.iccsa.org where you can find all relevant information about this interesting and exciting event.

ICCSA’2011 marks the beginning of the second decade of this conference. Previous ten editions in this series of highly successful International Conferences on Computational Science and Its Applications (ICCSA) were held in Fukuoka, Japan (2010), Suwon, Korea (2009), Perugia, Italy (2008), Kuala Lumpur, Malaysia (2007), Glasgow, UK (2006), Singapore (2005), Assisi, Italy (2004), Montreal, Canada (2003), and (as ICCS) Amsterdam, The Netherlands (2002) and San Francisco, USA (2001).

As we enter in the second decade of ICCSA, we realize the profound changes and spectacular advances in the world of Computational Science. This discipline plays a unique role in fostering new technologies and knowledge, and is crucial for most of the present researches, industrial and commercial activities. We believe that ICCSA has contributed to this change by offering a real opportunity to explore innovative approaches and techniques to solve complex problems. Reciprocally, the Computational Science community has enthusiastically embraced the successive editions of ICCSA, thus contributing to make ICCSA a focal meeting point for those interested in innovative, cutting-edge research about the latest and most exciting developments in the field. We are grateful to all those who have contributed to the current success of ICCSA with their continued support over the past ten years.

ICCSA 2011 would not have been made possible without the valuable contribution from many people. We would like to thank all session organizers for their diligent work, which further enhanced the conference level and all reviewers for their expertise and generous effort which led to a very high quality event with excellent papers and presentations. We specially recognize the contribution of the Program Committee and Local Organizing Committee members for their tremendous support and for making this congress a very successful event.

We would like to sincerely thank our keynote speakers who willingly accepted our invitation and shared their expertise through illuminating talks, helping us to fully meet the conference objectives.

We highly appreciate the University of Cantabria for their enthusiastic acceptance to host the conference in its main campus, their logistic assistance and additional financial support. The conference has been held in the Faculty of Sciences of the University of Cantabria. We thank the Dean of the Faculty of Sciences, Prof. Ernesto Anabitarte, for his support before and during the congress, and for providing the venue of the conference and the use of all needed facilities.

ICCSA’2011 has been jointly organized by the Department of Applied Mathematics and Computational Sciences and the Department of Mathematics, Statistics and Computation of the University of Cantabria, Spain. We thank both departments for their encouraging support to this conference from the very beginning. We would like to express our gratitude to the Local Organizing Committee for their persistent and enthusiastic work towards the success of this conference.

We owe special thanks to all our sponsors: the Faculty of Sciences, the University of Cantabria, The Municipality of Santander, the Regional Government of Cantabria and the Spanish Ministry of Science and Innovation, for their continuous support without which this conference would not be possible. We also thank our publisher, the IEEE Computer Society’s Conference Publishing Services (CPS), for their
acceptance to publish the proceedings and for their kind assistance and cooperation during the editing process.

Finally, we thank all authors for their submissions and all conference attendants for making ICCSA'2011 truly an excellent forum on Computational Science, facilitating exchange of ideas, fostering new collaborations and shaping the future of this exciting field. Last, but certainly not least, we wish to thank our readers for their interest in this volume. We really hope you find in these pages interesting material and fruitful ideas for your future work.

Andrés Iglesias  
Bernady O. Apduhan  
ICCSA 2011 General Chairs

The Wisdom of Ancient Masters

In 1879, Marcelino Sanz de Sautuola and his young daughter María incidentally noticed that the ceiling of the Altamira cave was covered by images of bison and other animals, some as old as between 25,000 and 35,000 years ago. They had discovered what came to be called the Sistine Chapel of Paleolithic Art. When the discovery was first made public in 1880, many experts rejected it under the belief that prehistoric man was unable to produce such beautiful and elaborated paintings. Once their authenticity was later confirmed, it changed forever our perception of prehistoric human beings.

Today, the cave of Altamira and its paintings are a symbol of the wisdom and ability of our ancient ancestors. They recall us that our current technological development is mostly based on the work, genius and efforts of our predecessors over many generations.

The cave of Altamira (UNESCO World Heritage Site) is located in the region of Cantabria, near the city of Santander (ICCSA’2011 conference venue).

“After Altamira, all is decadence” (Pablo Picasso, famous Spanish painter)