Preface

This book, *The Science of Solar System Ices*, has its origins at The Oxnard Workshop, organized in Oxnard, California, May 5–8, 2008, entitled “The Science of Solar System Ices: A Cross-Disciplinary Workshop.” The long delay in publishing the proceedings of this conference is a consequence of the large number of activities that have kept the planetary ice community busy for the last 3 years, heavily involved in planetary flagship mission reviews (2009), planetary decadal survey white papers and reviews (2009–2010), and finally the planetary decadal survey report (March 7, 2011). We thank the authors who were the first to submit their chapters for their patience and those authors who submitted their chapters last for their persistence. With due apologies for the delay, we are very pleased to present you with this book, which, we hope, would help the solar system ice community in the coming decade, or further, as a single source of reference, similar to the earlier book *Solar System Ices* (Schmitt, de Bergh, Festou, Kluwer, 1998), a result of an international symposium “Solar System Ices” held in Toulouse, France in 1995. About a decade earlier was the NATO international workshop on “ices in the solar system” held in Nice, France.

The Oxnard Workshop was unique in several aspects. It marked the first attempt to focus on the importance of laboratory work in bringing the three different communities (observers, modelers, and laboratory experimentalists) together into a small group of close to 120 international participants and give them a platform to talk to each other. This workshop covered all fields related to ice properties in the context of planetary science and solar system exploration: surface chemistry, volatile trapping, optical properties, planetary surface characterization, physical properties, and geophysics and geology of icy bodies. There were successive talks from an observer, a modeler, and a laboratory experimentalist on the same or similar topic. This method enabled rigorous discussions, new ideas, and a focused approach to future directions and needs. It was immediately clear at the end of the workshop that a book should be published that could cater to the needs of the wider solar system ice community. In its final form today, this book is a compilation of 18 chapters that crystallize the state of the art in ice physics and ice chemistry as of 2011. The review of the field is particularly timely, as the National Research

Council has highlighted experimental work as a major component of planetary exploration in the decadal survey "Visions and Voyages for Planetary Science in the Decade 2013–2022" and other advocacy groups are also emphasizing the importance of experimental research as an instrumental component of space exploration. We felt the need for this in 2007, which resulted in The Oxnard Workshop. We also felt the importance of how different communities learn to understand and speak the "science language of each other" and collaborate with colleagues with complementary expertise. We are pleased that we achieved this during the workshop and hope such cross-cutting meetings continue in the future.

The need for laboratory measurements on ices is tied to new discoveries by Earth-based and spaceborne observations. We know that the majority of solar system bodies contain icy materials. Increasing our knowledge of ice properties at the laboratory scale is necessary to increase the science return of past and ongoing space missions and support the definition and planning of future missions. Recent technological advances in instruments and their performance have made the unthinkable a realistic goal in space sciences and the exploration of previously uncharted conditions increasingly relevant to icy bodies in the solar system and beyond. In order to undertake next-generation exploration of solar system icy bodies, which may have more secrets pertaining to the birth and death of stars, solar systems, and habitability within these bodies, we need stronger laboratory research (and support) and sustainable programs that fund and encourage collaboration among the three communities of solar system explorations: the observers, the modelers, and the laboratory experimentalists.

In order to sustain and encourage space exploration, the science and technology that took humanity beyond the imaginable in the past 65 years (to mention a few, the Voyagers crossing the solar system, Spirit and Opportunity tweeting from Mars, Cassini diving less than 50 km into Enceladus plumes from its surface at 10 AU and sniffing the plume molecules, and Hubble reaching to the beginning of the universe), we need to stress on three vital "game change" plans:

1. Providing strong and healthy support to basic research that builds on the past and leads us into the future.
2. Strengthening the programs that support new "out of the box" instrument concepts from very low technology readiness levels (TRL) for future space explorations.
3. Bringing nations and people of this world together – through their partnership in expanding our horizons through science, knowledge, and creativity.

Let the space sciences be the common grounds for humanity to ride planet Earth, and perhaps other planets, comets, asteroids through robotic or human explorations, together in peace.

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