Space Sci Rev (2013) 176:1–2
DOI 10.1007/s11214-013-9998-1

Foreword

Bernd Heber · József Kóta · Rudolf von Steiger

Published online: 1 June 2013

After more than a decade had passed since the first ISSI Workshops dedicated to cosmic rays in the heliosphere took place in 1996–1998, several of the participants of the time felt that the time was ripe for a second workshop. A full solar cycle has passed since the first, and there have been significant developments in our understanding of cosmic rays in the heliosphere. Both observational evidence and theoretical understanding advanced considerably beyond their status in 1998. In addition to further, more-detailed near-Earth observations, Ulysses has continued its latitudinal studies for almost two full consecutive 11-year sunspot cycles, with the important change in the magnetic field sign. The Voyagers crossed the heliospheric termination shock and entered the heliosheath, providing the first firm measure of the size and global structure of the heliosphere. IBEX is providing additional information on the global structure of the heliosheath. Concomitant modeling and theoretical advances have also provided important new insights and capabilities. Furthermore, the unusual long solar minimum before the current weak cycle offers a unique possibility to gain new insights into the process of cosmic ray modulation.

The goal of the Workshop was to assess the current state of our understanding of the spatial and temporal variations of galactic and anomalous cosmic rays in the heliosphere, and their relation to effects of the Sun. The main objective was to understand the spatial and temporal variation of galactic and anomalous cosmic rays in the light of recent observations, theory and modeling:

- Identify the key mechanism(s) of cosmic ray modulation and how changes on the Sun relate to changes in the observed characteristics of cosmic rays in the heliosphere.
- Examine the current long-lasting solar minimum and understand its implications for solar-cycle variations and long-term variations.
- Interpretation of long term variations of cosmogenic radionuclides in terms of solar variability and climate change on Earth.

B. Heber · J. Kóta · R. von Steiger (✉)
International Space Science Institute, Bern, Switzerland
e-mail: vsteiger@issibern.ch

The workshop was convened by Jürg Beer, Bernd Heber, Randy Jokipii, József Kóta, Frank McDonald, Harm Moraal, and Rudolf von Steiger, who invited some 45 participants and composed a program divided into an introductory section, three topical sections on mechanisms and modeling, the current solar minimum, and cosmic rays and cosmogenic nuclides, respectively, followed by a conclusion session.

We should like to thank all those who have made this successful workshop and its publication possible. We thank the ISSI Science Committee and Directorate for selecting this science theme and sponsoring the workshop. We also thank the workshop participants for writing these important contributions, and the referees for their reports, which have contributed significantly to the quality of the papers. Finally, we thank the ISSI staff for the local organization and support with the same dedication and professionalism that makes each ISSI workshop a memorable experience.

We are saddened by the fact that Frank McDonald did not live to see this volume appear. He passed away in August 2012 while doing what he always loved best for his entire life: Attending a scientific meeting, giving a talk and discuss with fellow scientists the meaning of it all. We wish to dedicate this volume to his memory.