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# Outer Magnetospheric Boundaries: Cluster Results

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# OUTER MAGNETOSPHERIC BOUNDARIES: CLUSTER RESULTS

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# Foreword

The present 20th volume of the ISSI Space Science Series is devoted to the results obtained by ESA's Cluster mission regarding the outer boundaries of Earth's magnetosphere. These boundaries and their environs are rich in exciting processes in collisionless plasmas, such as shock formation, magnetic reconnection, particle acceleration and wave-particle interactions. They are interesting in their own right, but also because they are prototypes of similar structures and phenomena that are ubiquitous in the universe, having the unique advantage that they are accessible to in situ measurements. This book represents the first synthesis of new results on this topic obtained in the first few years of the Cluster mission.

ISSI's involvement with Cluster began in March 1996 with the first meeting of a working group that wrote what is now considered the reference book on multi-spacecraft data analysis methods. It was natural then that Cluster would become the focus of an ISSI workshop series, with the working title *Magnetospheric Boundaries and Turbulence: Cluster Results*, once the data analysis had progressed beyond a certain basic stage. The first workshop, held in March 2003 with nearly 40 invited participants, defined the objectives of the project and provided a first outline of the book, based on inputs from three Working Groups (solar wind/foreshock/magnetosheath; bow shock; magnetopause/cusp). A second workshop in November 2003, and a final meeting by the main authors in June 2004, reviewed the available material, defined the remaining work, and started the editing process. The meetings were organized by a coregroup consisting of A. Balogh, Imperial College, London; P. Décréau, LPCE/CNRS, Orléans; M. Goldstein, Goddard Space Flight Center, Greenbelt; C. P. Escoubet, ESTEC, Noordwijk; M. Scholer, MPE, Garching; S. J. Schwartz, Queen Mary College, London. G. Paschmann, ISSI, Bern, was the project leader. A total of 45 authors from 9 different countries finally contributed to the book. G. Paschmann, S. J. Schwartz, P. Escoubet, and S. Haaland served as the Editors.

ISSI's involvement in Cluster was also personal. The founding directors, Johannes Geiss and Bengt Hultqvist, played key roles in making Cluster part of the first cornerstone of ESA's Horizons 2000 program. B.H. was also one of the proposers of the mission. Of the present directors, G.P. was among the mission proposers, and later became a PI of one of the instruments. R.M.B., as ESA's Director of Science, accompanied Cluster through its long history, including its resurrection after the 1996 catastrophic loss.