

Space Weather: Physics and Effects (Springer Praxis Books)


By Volker Bothmer, Ioannis A. Daglis

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The editors present a state-of-the-art overview on the Physics of Space Weather and its effects on technological and biological systems on the ground and in space. It opens with a general introduction on the subject, followed by a historical review on the major developments in the field of solar terrestrial relationships leading to its development into the up-to-date field of space weather. Specific emphasis is placed on the technological effects that have impacted society in the past century at times of major solar activity. Chapter 2 summarizes key milestones, starting from the base of solar observations with classic telescopes up to recent space observations and new mission developments with EUV and X-ray telescopes (e.g., STEREO), yielding an unprecedented view of the sun-earth system. Chapter 3 provides a scientific summary of the present understanding of the physics of the sun-earth system based on the latest results from spacecraft designed to observe the Sun, the interplanetary medium and geospace. Chapter 4 describes how the plasma and magnetic field structure of the earth's magnetosphere is impacted by the variation of the solar and interplanetary conditions, providing the necessary science and technology background for missions in low and near earth's orbit. Chapter 5 elaborates the physics of the layer of the earth's upper atmosphere that is the cause of disruptions in radio-wave communications and GPS (Global Positioning System) errors, which is of crucial importance for projects like Galileo. In Chapters 6-10, the impacts of technology used up to now in space, on earth and on life are reviewed.

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Editorial Review

Review

From the reviews:

"The volume surveys the broad expanse of space weather through 14 chapters contributed by 20 expert practitioners. ... its extensive reference lists at the end of each chapter are extremely valuable. I believe the book functions best by sitting on the library reference shelf where it can be readily consulted as needed." (Thomas J. Bogdan, *Physics Today*, December 2007)

"Space Weather: Physics and Effects is an attempt to summarize the entire field of space weather. ... It is generally well produced, includes an exhaustive table of contents and has nearly 40 pages of prefatory materials including a four-page list of acronyms, and what seems like an adequate index." (W. Jeffrey Hughes, *EOS*, March, 2009)

From the Back Cover

This book is a state-of-the-art review on the physics of space weather and on space weather impacts on human technology, including manned spaceflight. With contributions from a team of international experts, this comprehensive work covers all aspects of space weather physical processes, and all known aspects of space hazards from humans, both in space and on Earth.

Space Weather - Physics and Effects

- provides the first comprehensive, scientific background of space storms caused by the sun and its impact on geospace
- focuses on weather issues that have become vital for the development of nationwide technological infrastructures
- explains magnetic storms on Earth, including the effects of EUV radiation on the atmosphere
- is an invaluable aid in establishing real-time weather forecasts
- details the threat that solar effects might have on modern telecommunication systems, including national power grid systems, aircraft and manned spaceflight.

Users Review

From reader reviews:

Nathan Ware:

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William Henderson:

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