

Space Weather, Environment and Societies

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by

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INTRODUCTION

Space Weather, Environment and Societies illustrates the unexpected effects of solar activity on human activity. Although the characteristics of our star have, on the whole, remained pretty well unchanged throughout the history of mankind, lately its mood swings, and considerably varying ejection of matter and radiation have had disruptive effects on our technology-based society. Data and energy are transmitted using the same vehicles as in nature: charged particles and electromagnetic waves. This means that whole areas of our technical environment are concerned: telecommunications, production and transmission of electricity, transportation of oil, railways, positioning systems, airplanes, satellites... Incidents and accidents are on the rise, hence the need to forecast solar activity with precision and to quantify the response from the terrestrial environment: this is the objective of space weather.

The first chapter of the book introduces the Sun and explains its emissions of electromagnetic waves and particles, particularly in the direction of the Earth. The second chapter explains how the ionized environment and the magnetic characteristics of the Earth form natural barriers against fatal radiation and showers of particles. The third chapter shows how fragile our industrialized societies, with their electrical networks, pipelines, airplanes and so on, have become in the face of natural phenomena.

A well informed or hurried reader can read *Space Weather, Environment and Societies* in one sitting. This would be akin to reading a novel illustrated with diagrams and wonderful photographs. Included with the text are footnotes that provide historical, technical and scientific details. More detailed explanations are to be found in the 23 appendices. Some of these are aimed at the reader whose scientific level corresponds to the first cycle of university with the aim of consolidating his comprehension of a physical phenomenon. Others, given here purposely to avoid overloading the main part of the text, provide further information on the relationship between the Sun and the atmosphere of other planets or the detection apparatus required for space weather. The meanings of words or symbols can be found in the glossary. The bibliography of websites and books, the index and the table of contents are intended for the reader who will use this work as a reference tool.

We hope that *Space Weather, Environment and Societies* will go toward furthering the knowledge of and respect for the wonderful world that surrounds us.

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The authors

To my family, to Geneviève, Lola and Maël

J. L.