

Textbooks and Monographs Related to Space Weather and Space Weather Science

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Abstract: We compile a list of English-language textbooks, popular texts and topical monographs, related to the science of space weather and published since 1990. This list was originally prepared as input to the 15th Conference on Space Weather at the 2018 American Meteorological Society Meeting. This document describes textbook resources available to space weather practitioners, broadcasters, meteorologists, scientists and engineers. It has been updated to 2020.

Format: Textbooks with imbedded or end of chapter questions and/or problems are shown in tabular form. More general exposition-texts are shown as hanging-indent text entries.

The degree of difficulty, as indicated, ranges from basic (popular) to intermediate (undergrad-professional development) to advanced (graduate student and researcher)

Books related to Space Weather and Space Environment of the Heliosphere

An Introduction to Space Weather	Basic	M. Moldwin	(2008) On line (2012)
Introductory text on space weather aimed at non-science majors	Cambridge University Press	ISBN: 978-0-521-71112-8	

Introduction to the Space Environment	Intermediate	T. Tascione	(2010) 2 nd Ed
Textbook on most facets of space weather and its impacts	Krieger Publishing, Malabar, FL, USA	ISBN 0894640712	

Space Weather and the Physics Behind It	Intermediate	D. J. Knipp	(2011)
Textbook on most facets of space weather and its impacts.	McGraw Hill	ISBN 9780073408903	

Space Physics: An Introduction	Intermediate	C. T. Russell, J. G. Luhmann, R. J. Strangeway	(2016) 2 nd Ed
A textbook describing the physical basis of space weather	Cambridge University Press	ISBN 9781107098823	

Space Physics: An Introduction to Plasmas and Particles in the Heliosphere	Intermediate	M.-B. Kallenrode	1998 2004 3 rd Ed
A textbook describing the physical basis of space weather	Springer-Verlag Berlin Heidelberg	ISBN 978-3-642-05829-5	

Basic Space Plasma Physics	Intermediate	W. Baumjohann and R. Treumann	(2012) 2nd Ed
Textbook-like exposition on space plasma physics	Imperial College Press	ISBN 978-1-84816-895-4	

The Solar-Terrestrial Environment: An Introduction to Geospace - the Science of the Terrestrial Upper Atmosphere, Ionosphere, and Magnetosphere	Intermediate	J. K. Hargreaves	1992 1995 Paperback
A textbook describing the physical basis of space weather	Cambridge University Press	ISBN 978-0-521427371	

Science of Space Environment Wave Summit Course	Intermediate	edited by T. Ondoh and K. Marubashi	(2000)
Publication covering most aspects of space weather resulting from a specialized course	Ohmsha Press, Tokyo, Japan,	ISBN 978-1-58603-097-1	

The Space Environment: Implications for Spacecraft Design	Intermediate	A. C. Tribble	(2004) 2 nd Ed
A textbook about space weather and space environment effects on spacecraft	Princeton University Press, Princeton, NJ.	ISBN 978-0-691102993	

Physics of Space Storms: From the Solar Surface to the Earth	Intermediate to Advanced	H. E. J. Koskinen	(2011)
A textbook about the physical basis of space weather disturbances	Springer, Heidelberg	ISBN 978-3-642-00319-6	

Physics of Solar System Plasma	Intermediate to Advanced	T. E. Cravens	(1997) Hardback (2004) Soft Cover
A textbook about the physical basis of space weather disturbances	Cambridge University Press	ISBN 978-0521611947 ISBN 0521611946	

<https://doi.org/10.1017/CBO9780511529467>

Physics of the Earth's Space Environment	Intermediate to Advanced	G. Proiss	(2003) And E-book
A textbook about the physical basis of space environment and geospace storms	Springer	ISBN 3-540-21426-7	

Physics of the Space Environment	Advanced	T. I. Gombosi	(1998) Softcover (2009) E-book
Comprehensive exposition of the physics of the space environment	Cambridge University Press	ISBN 9780511529474	

<https://doi.org/10.1017/CBO9780511529474>

The Space Environment and Its Effects on Space Systems	Intermediate to Advanced	V. L. Pisacane	(2018) 2 nd Ed
A textbook about the physical basis of space weather and space environment effects on systems	AIAA Education Series	ISBN-10: 1624103537	

<https://doi.org/10.2514/4.103537>

Heliophysics Series	Advanced Textbook series	Edited by K. Schrijver, G. Sisco, F. Bagenal, and J. Sojka	2012-2017
A textbook series about the physical basis of space weather in the heliosphere	Cambridge University Press	See ISBNs below	

- a. Heliophysics I: plasma physics of the local cosmos, ISBN 9780521110617
- b. Heliophysics II: space storms and radiation: causes and effects ISBN 9780521760515
- c. Heliophysics III: evolving solar activity and the climates of space and earth ISBN 9780521130202
- d. Heliophysics IV: active stars, their astrospheres, and impacts on planetary environments ISBN 9781107090477
- e. Heliophysics V: space weather and society (online only, currently FREE ACCESS), <https://cpaess.ucar.edu/sites/default/files/heliophysics/documents/HSS5.pdf>

Space Weather Explanation, Exposition and History

Storms in Space, J. W. Freeman, (2001) Provides details of Earth's space environment, space weather effects of solar activity and forecasting challenges, Cambridge University Press, New York, ISBN 0-521-66038-6, Popular book (Basic)

Solar Storms: 2000 Years of Human Calamity, S. Odenwald (2015) Reveals the history of space weather via stories and anecdotes, CreateSpace Independent Publishing Platform, Washington, Soft cover, ISBN 9781505941463, Popular book (Basic)

Storms from the Sun: The Emerging Science of Space Weather, M. J. Carlowicz and R. E. Lopez (2002) Overview of space weather storms and the underlying science, including stories and anecdotes, J. Henry Press, Washington, DC, ISBN 0-309-07642-0 Popular book (Basic)

Sentinels of the Sun, Forecasting Space Weather, Barbara Poppe, (2006), Johnson Books, Big Earth Publishing, Boulder CO USA. ISBN 1-55566-379-6, Popular book (Basic)

The Sun, The Earth and Near-Space Environment, A Guide to the Sun Earth System, John Eddy, (2009) A basic overview of the space weather system, including sources, intermediaries and effects. (NASA), ISBN 978-0-16-08308-8; e-book at https://lwstrt.gsfc.nasa.gov/images/pdf/john_eddy/SES_Book_Interactive.pdf (Basic) Exposition

The Sun Kings, Stuart Clark, (2009), Details the rise of space weather after the first great solar storm that affected modern technology, Princeton University Press, ISBN 9780691141268, Popular book (Basic)

The Sun and Space Weather, A. Hanslmeier, (2007), 2nd Edition, An exposition about space weather and space environment impacts, E-book, Softcover, Hardcover <https://doi.org/10.1007/978-1-4020-5604-8>

Space Weather, M. Hapgood, (2017) IOP Publishing, An introduction to space weather and associated critical research topics, ISBN 978-0-7503-1372-8 (ebook), DOI 10.1088/978-0-7503-1372-8, FREE ACCESS

Aurora: In Search of the Northern Lights, M. Windridge (2016). Harper Collins; ISBN-13: 978-0008156091

Books Related to Specific Regions where Space Weather Develops and/or Impacts Technological Systems

Physics of the Solar Corona - An Introduction	Advanced	M. Aschwanden	(2005)
	Springer	ISBN 978-3-540-30766-2	

<https://www.springer.com/gp/book/9783540307655>

Principles of Heliophysics: a description of the universal processes behind planetary habitability	Advanced	K. Schrijver et al	(2018)
		arXiv:1910.14022	Pre-print Free Access

Magnetohydrodynamics of the Sun	Advanced	E. Priest	(2014)
	Cambridge University Press	eBook ISBN: 9781107776760 HB ISBN: 978-0521854719	TOC at URL below

<https://doi.org/10.1017/CBO9781139020732>

Basics of the Solar Wind	Advanced	N. Meyer-Vernet	(2007)
	Cambridge University Press	ISBN 9780511535765	TOC at URL below

<https://doi.org/10.1017/CBO9780511535765>

Introduction to Geomagnetically Trapped Radiation	Advanced	M. Walt	(2005)
A textbook about the radiation belts	Cambridge University Press	ISBN: 9780521616119	

Ionospheres: physics, plasma physics, and chemistry	Advanced	R. Schunk and A. Nagy	2 nd Ed (2018)
A textbook about the physical basis of space weather in Earth's ionosphere	Cambridge University Press	ISBN 978 1108462105	

The Ionosphere: Communications, Surveillance, and Direction Finding	Intermediate-Advanced	L. F. McNamara	(1991) Hardcover
A textbook about uses of the ionosphere and space weather that occurs there	Krieger Publishing, Malabar, FL, USA	ISBN 0-89464-040-2	

Physics and Chemistry of the Upper Atmosphere	Advanced	M. H. Rees	(1989) Online 2011
	Cambridge University Press	ISBN 9780511573118	TOC at URL below

<https://doi.org/10.1017/CBO9780511573118>

The Sun from Space, K. Lang, Kenneth, (2009), Springer, ISBN 978-3-540-76953-8 (Intermediate)

Sunspots and Starspots, J. Thomas, and N. Weiss, (2008) Cambridge: Cambridge University Press,
doi:10.1017/CBO9780511536342

Solar and Stellar Magnetic Activity, C. Schrijver, C., and C. Zwaan, (2000), Cambridge University Press,
<https://doi.org/10.1017/CBO9780511546037>

Energetic Particles in the Heliosphere, Simnett, George M., Springer, (2017), ISBN 978-3-319-43495-7

The Dynamic Loss of Earth's Radiation Belts, Edited by A. Jaynes and M Usanova (2019), Elsevier, ISBN: 9780128133996

The Earth's Plasmasphere, J. F. Lemaire, K. I. Gringauz, (2005), Cambridge University Press, ISBN: 9780521675550,

The Earth's Ionosphere: Plasma Physics and Electrodynamics, M. Kelley, (2009), Academic Press ISBN: 9780120884254,
<https://doi.org/10.1016/B978-0-12-404013-7.X5001-1>

The Dynamical Ionosphere, M. Materassi, B. Forte, A. Coster, S. Skone, (2019) Elsevier, ISBN: 9780128147825

The High-Latitude Ionosphere and its Effects on Radio Propagation, R. Hunsucker and J. Hargreaves, (2002)
Cambridge: Cambridge University Press, doi:10.1017/CBO9780511535758

Ionospheric Prediction and Forecasting, B. Zolesi and L. R. Cander, (2014), Springer-Verlag Berlin Heidelberg, ISBN 978-3-662-50766-7, DOI: 10.1007/978-3-642-38430-1_3

Solar Activity and Earth's Climate, R. Benestaed, (2002), Springer-Praxis, ISBN 3-54043-302-3

Ionospheric Space Weather, L. R. Cander, (2019) Springer Nature Switzerland AG, ebook ISBN 978-3-319-99331-7,
DOI 10.1007/978-3-319-99331-7

Radio Wave Propagation in Ionosphere, K. Merriman, (2016) Willford Press, ISBN 9781682850572

Spacecraft-Environment Interactions, D. Hastings and H. Garrett, (1996), Cambridge: Cambridge University Press,
doi:10.1017/CBO9780511525032

Space Weather and Telecommunications, J. M. Goodman (2005, Exposition of the effects of the Sun and ionosphere on communications. Springer-Verlag US, softcover 978-1-4419-3651-6, (eBook) 978-0-387-23671-1, Intermediate to Advanced

Space Weather, Environment and Societies, J. Liliensten and J. Bornarel (2006). Book dealing with space environment and societal impacts. Springer, Heidelberg, Hardcover, Ebook, ISBN 978-1-4020-4332-1 (Intermediate)

Introduction to Geomagnetic Fields, W. Campbell, (2003) Cambridge University Press, doi:10.1017/CBO9781139165136

The Earth's Electric Field, M. Kelley (2013), Elsevier Science, ISBN: 9780123978837

Books Related to Plasma Physics & Magnetohydrodynamics

(Sampling only)

The Physics of Plasmas	Advanced	T. Boyd, T., & J. Sanderson	(2003)
	Cambridge University Press	ISBN 9780511755750	TOC at URL below

<https://doi.org/10.1017/CBO9780511755750>

Introduction to Modern Magnetohydrodynamics	Advanced	S. Galtier	(2016)
	Cambridge University Press	ISBN 9781316665961	TOC at URL below

<https://doi.org/10.1017/CBO9781316665961>

Introduction to Plasma Physics With Space and Laboratory Applications, D. A. Gurnett and A. Bhattacharjee, (2005), Cambridge University Press, ISBN 9780511809125, <https://doi.org/10.1017/CBO9780511809125>

Magnetic Reconnection: MHD Theory and Applications, E. Priest, and T. Forbes, Cambridge University Press, 2000, ISBN: 9780511525087, TOC at <https://doi.org/10.1017/CBO9780511525087>

Reconnection of Magnetic Fields: Magnetohydrodynamics and Collisionless Theory and Observations
Edited by J. Birn and E. Priest, Cambridge University Press, 2007, doi:10.1017/CBO9780511536151

Monographs, Edited Volumes and Meeting/Conference Proceedings

Space Storms and Space Weather Hazards. Edited by I. Daglis, (2001) *NATO Science Series, Series II: Mathematics, Physics and Chemistry* 38. Proc. inst., Hersonissos, Crete, June 2000. Kluwer Academic, Norwell, Mass., ISBN 1-4020-0030-8)

Space Weather: The Physics Behind a Slogan, Edited by K. Scherer, H. Fichtner, B. Heber, and U. Mall. (2005) Proceedings from a space weather conference with emphasis on physical processes. (Springer, Heidelberg). ISBN 978-3-540-22907-0

Space Weather: Physics and Effects, Edited by V. Bothmer and I. A. Daglis (2007), Publication resulting from an international space weather conference, Springer Praxis Books, Heidelberg, ISBN 978-3-540-23907-9, TOC at <https://link.springer.com/book/10.1007/978-3-540-34578-7>

Handbook of the Solar-Terrestrial Environment, Editors: Y. Kamide and A. Chian, (2007), Springer Verlag, ISBN 9783540463146 Intermediate to Advanced, <https://link.springer.com/book/10.1007/978-3-540-46315-3>

Auroral Physics, Ed. C. I. Meng, M. J. Rycroft, L. A. Frank, (2012), Cambridge University Press, (1991) ISBN: 9780521157414, re-issue softcover (2012)

Solar Origins of Space Weather and Space Climate, Edited by I. González Hernández, R. Komm, A. Pevtsov, and J. Leibacher, (2014), Based on the presentations given at the 26th National Solar Observatory (NSO) Summer Workshop 2012, Springer, ISBN 978-1-4939-1182-0

Space Weather Fundamentals, Edited by George V. Khazanov, (2016), A monograph about the physical basis of space weather, CRC Press, ISBN 9780367875558

Space Weather of the Heliosphere: Processes and Forecasts, Edited by C. Foullon and O. E. Malandraki, (2018), International Astronomical Union Symposium 335, Cambridge University Press, ISBN 9781107192409

Geomagnetism, Aeronomy and Space Weather, Edited by M. Manda, M. Korte, A. Yau and E. Petrovsky, (2020) A monograph about the interacting systems of space weather and special publication to mark the centenary of IUGG, Cambridge University Press, ISBN 978-1-108-41848-5 and DOI: 10.1017/978110829013

Machine Learning Techniques for Space Weather, Edited by E. Camporeale, S. Wing and J. Johnson (2018), Elsevier, ISBN: 9780128117880, eBook ISBN: 9780128117897

Extreme Events in Geospace, Origins, Predictability, and Consequences, Edited by N. Buzulukova, (2018), Elsevier eBook ISBN: 9780128127018

The Human Factor in a Mission to Mars: An Interdisciplinary Approach, Edited by Konrad Szocik (2019), Individual chapters devoted to space weather/environment, Springer, ISBN 978-3-030-02058-3, eBook: ISBN 978-3-030-02059-0

Extreme Solar Particle Storms: The hostile Sun, Edited by F. Miyake, I. Usoskin and S. Poluianov, (2020) IOP Publishing Ltd, Online ISBN: 978-0-7503-2232-4

Ionospheric Multi-Spacecraft Analysis Tools Approaches for Deriving Ionospheric Parameters, Edited by M. W. Dunlop, and H. Lühr, (2020) Springer, ISBN 978-3-030-26731-5

Series Related to Space Environment, Plasma and Heliospheric Physics

This list covers regions and processes that may relate to space weather. It is not comprehensive

AGU Geophysical Monograph (Since 2000, Space Weather Titles Emphasized)
<https://agupubs.onlinelibrary.wiley.com/series/5064>

[Vol. 248, Dayside Magnetospheric Interactions](#)

[Vol. 244, Geomagnetically Induced Currents from the Sun to the Power Grid](#)

[Vol. 235, Electric Currents in Geospace and Beyond](#)

[Vol. 230, Dawn-Dusk Asymmetries in Planetary Plasma Environments](#)

[Vol. 222, Magnetosphere-Ionosphere Coupling in the Solar System](#)

[Vol. 220, Ionospheric Space Weather: Longitude and Hemispheric Dependences and Lower Atmosphere Forcing](#) Edited by T. Fuller-Rowell, E. Yizengaw, P. H. Doherty, S. Basu, (2016),, Print ISBN: 9781118929209

[Vol. 216, Low-Frequency Waves in Space Plasmas](#)

[Vol. 215, Auroral Dynamics and Space Weather](#) Edited by Y. Zhang and L. J. Paxton (2015), AGU Geophysical Monograph Series, Print ISBN:9781118978702 | DOI:10.1002/9781118978719

[Vol. 207, Magnetotails in the Solar System](#)

[Vol. 201, Modeling the Ionosphere-Thermosphere System](#), edited by J. Huba, R. Schunk, and G. Khazanov, (2014), ISBN:978-0-87590-490-0,

[Vol. 199, Dynamics of the Earth's Radiation Belts and Inner Magnetosphere](#)

[Vol. 197, Auroral Phenomenology and Magnetospheric Processes: Earth and Other Planets Perspective](#)

[Vol. 181, Midlatitude Ionospheric Dynamics and Disturbances](#)

[Vol. 169, Magnetospheric ULF Waves: Synthesis and New Directions](#)

[Vol. 167, Recurrent Magnetic Storms: Corotating Solar Wind Streams](#)

[Vol. 165, Solar Eruptions and Energetic Particles](#)

[Vol. 156, Particle Acceleration in Astrophysical Plasmas: Geospace and Beyond](#)

[Vol. 155, The Inner Magnetosphere: Physics and Modeling](#)

[Vol. 142, Disturbances in Geospace: The Storm-Substorm Relationship](#)

[Vol. 141, Solar Variability and Its Effects on Climate](#)

[Vol. 133, Earth's Low-Latitude Boundary Layer](#)

[Vol. 125, Space Weather](#), Edited by P. Song, H. J. Singer and G L. Siscoe, (2001), ISBN:9780875909844

[Vol. 118, Magnetospheric Current Systems](#)

Space Sciences Series of ISSI, (Since 2000, Space Weather Titles Emphasized) Many of these titles have published as topical reviews in Space Science Reviews, <https://www.springer.com/series/6592>

[Vol 67, The Scientific Foundation of Space Weather](#), Edited by D. Baker, A. Balogh, T. I. Gombosi, H. E. J. Koskinen, A. Veronig and R. von Steiger, (2019), Hardcover ISBN 978-94-024-1587-2, Softcover ISBN 978-94-024-1659-6

[Vol 60, Earth's Magnetic Field](#)

[Vol 57, Solar Magnetic Fields](#)

[Vol 53, The Solar Activity Cycle](#)

[Vol 52, Plasma Sources of Solar System Magnetospheres](#)

[Vol 50, The Magnetodiscs and Aurorae of Giant Planets](#)

[Vol 48, Helioseismology and Dynamics of the Solar Interior](#)

[Vol 43, Cosmic Rays in the Heliosphere](#)

[Vol 42, Dynamic Coupling Between Earth's Atmospheric and Plasma Environments](#)

[Vol 38, Multi-Scale Physics in Coronal Heating and Solar Wind Acceleration](#)

[Vol 36, Terrestrial Magnetism](#)

[Vol 32, The Origin and Dynamics of Solar Magnetism](#)

[Vol 29, Comparative Aeronomy](#)

[Vol 23, Solar Variability and Planetary Climates](#)

[Vol 22, Solar Dynamics and its Effects on the Heliosphere and Earth](#)

[Vol 21, Coronal Mass Ejections](#)

[Vol 20, Outer Magnetospheric Boundaries: Cluster Results](#)

[Vol 15, Auroral Plasma Physics](#)

[Vol 11, Solar Variability and Climate](#)

[Vol 10, Cosmic Rays and Earth](#)

Astrophysics and Space Science Library Series, Springer (Since 2000, Space Weather Titles Emphasized) Tables of Contents for the titles below can be accessed at <https://link.springer.com/bookseries/5664>

Vol 458, [New Millennium Solar Physics](#)

Vol 455, [Physics of Magnetic Flux Tubes](#) 2nd Ed

Vol 449, [First Ten Years of Hinode Solar On-Orbit Observatory](#)

Vol 448, [Magnetic Fields in the Solar System](#)

Vol 444, [Solar Particle Radiation Storms Forecasting and Analysis](#)

Vol 438, [Energetic Particles in the Heliosphere](#), G.M. Simnett, Springer, (2017), ISBN 978-3-319-43495-7

Vol 427, [Magnetic Reconnection](#)

Vol 415, [Solar Prominences](#)

Vol 405, [Solar Cosmic Rays](#) 2nd Ed

Vol 403, [Dynamics of Magnetically Trapped Particles](#)

Vol 400, [The Coronas-F Space Mission](#)

Vol 392, [Plasma Astrophysics, Part II](#),

Vol 391 [Plasma Astrophysics, Part I](#),

Vol 376, [Coronal Mass Ejections](#)

Vol 375, [Fine Structure of Solar Radio Bursts](#)

Vol 365, [Solar Neutrons and Related Phenomena](#)

Vol 363, [Under the Radar](#) The First Woman in Radio Astronomy: Ruby Payne-Scott

Vol 361, [The Sun Recorded Through History](#)

Vol 358, [Cosmic Rays in Magnetospheres of the Earth and other Planets](#)

Vol 353, [Hydromagnetic Waves in the Magnetosphere and the Ionosphere](#)

Vol 347, [The Sun and Space Weather](#) A. Hanslmeier (2007), 2nd Ed, ISBN 978-1-4020-5604-8

Vol 344, [Space Weather](#), J Lilinsten (2007) Springer, ISBN 978-1-4020-5446-4

Vol 341, [Plasma Astrophysics](#)

Vol 278, [Exploring the Secrets of the Aurora](#)

Vol 339, [Cosmic Ray Interactions, Propagation, and Acceleration in Space Plasmas](#)

Vol 331, [Ultraviolet Radiation in the Solar System](#)

Vol 325, [Kristian Birkeland](#)

Vol 320, [Solar Magnetic Phenomena](#)

Vol 317, [The Sun and the Heliosphere as an Integrated System](#)

Vol 314, [Solar and Space Weather Radiophysics](#), Edited by D. E. Gary & C. U. Keller (2005), ISBN 978-1-4020-2814-4

Vol 303, [Cosmic Rays in the Earth's Atmosphere and Underground](#)

Vol 297, [Radiation Hazard in Space](#)

Vol 294, [An Introduction to Plasma Astrophysics and Magnetohydrodynamics](#)

Vol 293, [Physics of the Solar System](#)

Vol 279, [Plasma Astrophysics](#)

Vol 270, [Dayside and Polar Cap Aurora](#)

Vol 249, [The Neutral Upper Atmosphere](#)

Vol 259, [The Dynamic Sun](#)

Vol 242, [Cosmic Perspectives in Space Physics](#)