



# Contents

---

<b>Foreword</b>	<b>vii</b>
<b>Acknowledgments</b>	<b>ix</b>
<b>Physical Data, Solar Parameters and Solar Geometry</b>	<b>xi</b>
<b>1 Introduction</b>	<b>1</b>
<b>2 Below the Atmosphere—The Solar Interior</b>	<b>7</b>
2.1 Introduction	7
2.2 Thermal Energy	7
2.3 Kinetic Energy	11
2.4 Magnetic Energy	20
References	26
<b>3 The Cool Atmosphere—The Non-magnetic Photosphere</b>	<b>28</b>
3.1 Introduction	28
3.2 The Radiative Photosphere	29
3.3 The Dynamical Photosphere	41
References	54
<b>4 The Cold Atmosphere—The Magnetic Photosphere</b>	<b>55</b>
4.1 Introduction	55
4.2 Magnetic Elements	57
4.3 Sunspots	63
4.4 The Photospheric Network and Faculae	74
References	77

<b>5</b>	<b>The Warm and Hot Atmospheres—The Chromosphere and Corona</b>	<b>78</b>
5.1	Introduction	78
5.2	Physical Processes in Low Density Gases	80
5.3	Observed Properties of the Solar Chromosphere and Transition Region	89
5.4	Interpretation of the Solar Chromosphere and Transition Region	94
5.5	The Solar Corona	103
	References	110
<b>6</b>	<b>The Evolving Atmosphere—Solar Activity</b>	<b>111</b>
6.1	Introduction	111
6.2	Mechanisms of Magnetic Field Evolution	114
6.3	The Formation of Active Regions — The Emergence of the Field	118
6.4	The Development of Active Regions — The Reorganisation of the Field	121
6.5	The Decay of Active Regions — The Loss of the Field	131
6.6	Epilogue	137
	References	138
<b>Appendix</b>	<b>An Introduction to the Theory of Plasmas and Radiation</b>	<b>139</b>
A.1	Introduction	139
A.2	Symbols and Units	140
A.3	The Microscopic or Individual Particle Description	140
A.4	The Collective Microscopic Description	143
A.5	The Kinetic Description	144
A.6	The Fluid Description	148
A.7	The Hydromagnetic Description	153
	References	159
	<b>Bibliography</b>	<b>160</b>
	<b>Index</b>	<b>163</b>

