

# Contents

Foreword: A fruitful collaboration between geospatial and atmospheric communities. . . . .	ix
Acknowledgments . . . . .	xiii
<b>Part 1 Representations of atmospheric phenomena</b>	
Chapter 1 Multidimensional data in ArcGIS . . . . .	3
Chapter 2 Meteorological data in a geodatabase . . . . .	11
Chapter 3 The shape of the earth: Spatial referencing in weather and climate models . . . . .	25
<b>Part 2 Observations</b>	
Chapter 4 Weather radar: Urban application . . . . .	41
Chapter 5 Atmospheric satellite observations and GIS. . . . .	51
Chapter 6 Climatological products . . . . .	65
Chapter 7 Social media . . . . .	77
<b>Part 3 Models</b>	
Chapter 8 Exploring future climates in a GIS . . . . .	91
Chapter 9 Downscaling of climate models . . . . .	105
Chapter 10 Climate applications at the NOAA Climate Prediction Center . . . . .	113
Chapter 11 Particle tracking in ocean and atmospheric studies. . . . .	129

<b>Part 4 Integrated analyses of models and observations</b>	
Chapter 12	Joplin tornado damage analysis . . . . . 141
Chapter 13	Integrating weather, climate, and demographic data . . . . . 151
Chapter 14	Integrating remote sensing observations and model results for weather studies . . . . . 165
Chapter 15	Lightning applications. . . . . 175
<b>Part 5 Web services</b>	
Chapter 16	Weather-based web map services . . . . . 189
Chapter 17	Interoperability interfaces. . . . . 201
Chapter 18	METOC web services . . . . . 211
<b>Part 6 Tools and resources</b>	
Chapter 19	NetCDF and related information sources. . . . . 227
Chapter 20	NetCDF tools . . . . . 233
Chapter 21	Space-time visualization . . . . . 245
Chapter 22	Python scripting . . . . . 255
Chapter 23	The Weather and Climate Toolkit. . . . . 261
Afterword	. . . . . 279
Contributors	. . . . . 287
Index	. . . . . 299