PREFACE

I designed this book for students and professionals who want to understand and apply basic meteorological concepts, but who don't need to derive equations.

To make this book accessible to more people, I converted the equations into algebra. With algebraic approximations to the atmosphere, you can see the physical meaning of each term and you can plug in numbers to get usable answers.

No previous knowledge of meteorology is needed — I start from the basics. Your background should include algebra, trig, and classical physics. This book could serve the fields of Atmospheric Science, Meteorology, Environmental Science, Engineering, Air Quality, Climatology, and Geography.

This book is designed to be both a textbook and a reference. As a textbook, the end of each chapter includes extensive homework exercises in categories inspired by Bloom's taxonomy of learning actions: "Broaden Knowledge & Comprehension"; "Apply"; "Evaluate & Analyze"; and "Synthesize".

Although a hand calculator can be used for some of the homework exercises, other exercises are best solved on a computer spreadsheet such as Excel or using a mathematical program such as MATLAB, R, Mathematica, or Maple. I used Excel for my Sample Applications and most of my graphs.

As a reference, I included in this book many tables, figures and graphs, and have a detailed index. Also, appendices include values of key constants and conversion factors.

Readers like you asked to see solved examples, to enhance your understanding and speed your ability to apply the concepts to your own situations. To fill this need, I added "Sample Application" boxes for almost every equation in the book.

The body of the text runs mostly in the inside columns of each page. The outside columns on each page contain the supporting figures, graphs, tables, and sample applications. Other special boxes in these outside columns include supplementary "Info" and "A Scientific Perspective". At the request of some readers, I added "Higher Math" boxes that use calculus, differential equations and other advanced techniques, but you may safely ignore these boxes if you wish.

For instructors, I inserted a bullet next to the most important equations, to help focus the learning. The book contains too much material to cover in one term, so instructors should select the subset of chapters to cover.

Starting in 2017 (book version 1.02), numbering been added to section and subsection headers, as requested by instructors. Also, color was added to most of the figures, to better engage online readers.

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Many students have used earlier drafts, allowing me to fix typos thanks to their careful scrutiny. Any remaining errors are my own.

I thank the faculty and staff at the University of Wisconsin - Madison and the University of British Columbia - Vancouver, who were very supportive while I wrote earlier drafts during my tenures as professor. Storm photographs are reproduced with permission of the copyright holders: Warren Faidley, Gene Moore, and Gene Rhoden. The Space Science and Engineering Center (SSEC) at the University of Wisconsin - Madison granted permission to use their wonderful satellite images. Other images are publicly available from US Government and other sources.

I especially thank my wife Linda for her patience and understanding.

– Roland Stull

INFO • About the Author

Roland Stull holds a Ph.D. in Atmospheric Science and a Bachelor's degree in Chemical Engineering. He is a Certified Flight Instructor (CFI) and a Certified Consulting Meteorologist (CCM) in the USA.

Stull is a professor of Atmospheric Science at the University of British Columbia, Canada. He is a fellow of both the American Meteorological Society (AMS) and the Canadian Meteorological and Oceanographic Society (CMOS). He is author or co-author of over 100 scientific journal papers, and he wrote two single-author meteorology textbooks.