
Preface

Most meteorology and climatology students require a basic grounding in the principles and practical consequences of atmospheric radiation but do not necessarily intend to specialize in radiation or remote sensing. I have written this textbook with those students in mind. My goal is to cultivate a firm (if basic) grasp of “how radiation works,” without overwhelming the student with a mass of technical details. Although it is impossible to avoid a substantial reliance on mathematics in a book on this subject, I have tried to emphasize physical insight rather than blind reliance on equations. My measure of this textbook’s success will be not how much students *could have learned* had they been sufficiently diligent in picking their way through a vast thicket of facts and equations, but rather how much they *still remember*, and can correctly explain to others, a year or more after the course has ended.

Consequently, a great deal of material that is found in other widely used textbooks on atmospheric radiation has been deliberately omitted. My decisions concerning what to include were guided by the following two questions: “What does the *non-specialist* really need to know about atmospheric radiation in order to appreciate its essential (and pervasive) role in modern meteorology and climatology? Which topics are better left to advanced courses designed for future remote sensing or radiation specialists?” Wherever I give a cursory (and often over-simplified) overview of a complex topic, I try to also cite the relevant sections of other textbooks offering a more complete and nuanced treatment.

Whenever possible, key concepts are illustrated by reference to observable phenomena encountered both in everyday life and in “real world” meteorology, climatology, and remote sensing. Homework problems are

interspersed throughout each chapter rather than being grouped at the end in the traditional manner. These are designed not to stump the student but rather to facilitate his/her internalization of the immediately preceding material. Boxed equations highlight key results or relationships that deserve special attention. The appearance of a dagger (†) after a chapter or section heading warns of more advanced material that may be skipped in an undergraduate-level course.

A word on notation and terminology: There is no standard system of symbols, terms, and units for radiative transfer quantities; each radiation subcommunity has its own distinctive and mutually incompatible traditions. In the end, I settled on a set of symbols that seemed reasonably compatible with the recent literature in mainstream atmospheric science while minimizing ambiguity.

Both in my own education in atmospheric radiation and in the preparation of this book I have referred to lecture notes and other unpublished materials by S.A. Ackerman, Harshvardhan, Conway B. Leovy, Gary E. Thomas, and Stephen G. Warren, as well as the published textbooks cited at the end. I am grateful to Ryan Aschbrenner, Jason Brunner, Monica Harkey, and David Santek for their invaluable assistance with proofreading. Any errors of fact or interpretation are of course my own responsibility. Last but not least, I owe much to Prof. Ronald Rinehart, whose willingness to share his experience with self-publishing *Radar for Meteorologists* gave me the confidence to follow his example.

Despite having now been committed to print for the sake of this year's generation of students, this first edition remains very much a work in progress. I intend to undertake revisions and corrections with each new print run, following a model that more nearly resembles that of regular software updates rather than traditional textbook publishing. Comments, corrections and suggestions for future revisions are therefore encouraged and may be sent to the author c/o Sundog Publishing (see contact information on copyright page). Errata, as well as supplemental resources, will be posted on the publisher website at www.sundogpublishing.com.

GRANT W. PETTY

One should write not to be understood, but rather so as to make it impossible to be misunderstood. - Marcus Fabius Quintilianus