Earth Sciences : Atmospheric Sciences

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Fundamentals of Boundary-Layer Meteorology

- Presents sets of questions and solutions based on fundamental governing equations
- Examines micrometeorological phenomena over time and in isolation from atmospheric phenomena at larger scales. This scale-insolation approach is critically examined
- Injects rigor to the field that so far has been mostly empirical in nature

This textbook introduces a set of fundamental equations that govern the conservation of mass (dry air, water vapor, trace gas), momentum and energy in the lower atmosphere. Simplifications of each of these equations are made in the context of boundary-layer processes. Extended from these equations the author then discusses a key set of issues, including (1) turbulence generation and destruction, (2) force balances in various portions of the lower atmosphere, (3) canopy flow, (4) tracer diffusion and footprint theory, (5) principles of flux measurement and interpretation, (6) models for land evaporation, (7) models for surface temperature response to land use change, and (8) boundary layer budget calculations for heat, water vapor and carbon dioxide. Problem sets are supplied at the end of each chapter to reinforce the concepts and theory presented in the main text. This volume offers the accumulation of insights gained by the author during his academic career as a researcher and teacher in the field of boundary-layer meteorology.

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