

Special Issue

Observations, Modeling, and Theory of the Atmospheric Boundary Layer

Message from the Guest Editors

The atmospheric boundary layer (ABL), characterized by direct interaction with the Earth's surface and dominant turbulent motions. A deeper understanding of this complex system relies on the integrated and synergistic advancement of observations, numerical modeling, and theoretical analysis. State-of-the-art observational techniques provide foundational data for theory and are crucial for model validation. Multiscale numerical simulations reveal underlying processes and bridge observational gaps. Theoretical innovation, in turn, guides observational campaigns and advances parameterization schemes. This Special Issue is dedicated to showcasing how observations, modeling, and theory mutually inspire and constrain each other, leading to novel insights into ABL processes. We welcome original research exploring the intersections and feedbacks among these three pillars. Potential topics include, but are not limited to, the synergy of observations, modeling, and theory in ABL studies; multiscale processes and interactions within the ABL; ABL parameterization and model development; and key applications and challenges in ABL research.

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About the Journal

Message from the Editor-in-Chief

Continued developments in instrumentation and modeling have driven atmospheric science to become increasingly more complex with a deeper understanding of concepts, mechanisms, and interactions. This is the field that innovation built and it has led to a better appreciation for the complexity with atmosphere. Human life is intertwined in this complexity as we strive to better understand our atmosphere. Climate change is constantly stretching the limits of our thinking and forcing new ideas and concepts to be played out. Welcome to the Anthropocene!

Editor-in-Chief

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