

Special Issue

High-Performance Computing for Atmospheric Modeling (2nd Edition)

Message from the Guest Editors

We invite scientists to contribute original research and review articles on future directions for HPC for atmospheric modeling. Topics of interest include, but are not limited to, the following:

- Computational complexity and efficient HPC implementation of numerical algorithms used to simulate the behavior of the atmosphere;
- Scalability of highly parallel codes, requiring careful load balancing, minimization of communication overhead, and optimization of data transfer between computing units;
- Code optimization to exploit the full potential of HPC systems, including specialized hardware features such as vectorization, multi-core processors, and accelerators such as GPUs or FPGAs;
- Studies on software complexity, considering that atmospheric models are large, complex software systems with many interacting components;
- Efficient data transfer and storage techniques for terabytes to petabytes of data, including meteorological observations and simulation results;
- Integrating machine learning and AI-driven approaches for model parameterization, data assimilation, uncertainty quantification, and computational efficiency improvements.

Guest Editors

Dr. Lars Hoffmann

Jülich Supercomputing Centre, Forschungszentrum Jülich, 52425 Jülich, Germany

Prof. Dr. Yi Heng

School of Computer Science and Engineering, Sun Yat-sen University, Guangzhou 510006, China

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Atmosphere
Editorial Office
MDPI, Grosspeteranlage 5
4052 Basel, Switzerland
Tel: +41 61 683 77 34
atmosphere@mdpi.com

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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

Dr. Daniele Contini

Institute of Atmospheric Sciences and Climate (ISAC), National Research Council (CNR), Str. Prv. Lecce-Monteroni km 1.2, 73100 Lecce, Italy

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