

Special Issue

Synergy of AI and Numerical Weather Prediction: Observations, Modeling, and Forecasting

Message from the Guest Editors

The field of meteorology is undergoing a profound transformation, driven by the rapid advancements in Artificial Intelligence (AI) and machine learning. However, traditional Numerical Weather Prediction (NWP) systems (e.g., GFS, WRF, RegCM) and classical objective analysis methods (e.g., OI, Barnes, STMAS) remain the foundational backbone of operational forecasting. This Special Issue aims to explore the synergy between these paradigms. We seek cutting-edge research that not only showcases AI-native innovations but also demonstrates how AI can enhance, correct, or hybridize with physics-based models. Contributions establishing rigorous benchmarks between AI approaches and standard dynamical models are highly encouraged. A unique focus of this Special Issue will be on addressing practical challenges in the Global South (including South America, Africa, Central and Southeast Asia). We welcome submissions applying these hybrid or AI-driven techniques in data-sparse environments for high-impact sectors like agriculture, renewable energy, and disaster risk reduction.

Guest Editors

Dr. Lei Bai

Schools of Ecology, Hainan University, Haikou, China

Dr. Gang Wang

School of Ecology, Environment and Resources, Guangdong University of Technology, Guangzhou, 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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