How AI/ML Improve Our Understanding of the Magnetosphere-Ionosphere-Theromosphere-Troposphere?

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Message from the Guest Editors

Dear Colleagues,

The aim of this Special Issue is to provide recent advancements in the field of upper atmosphere modeling using ML/AI approaches, including magnetosphere, ionosphere, and thermosphere (M–I–T) systems. This topic encompasses innovative modeling methods, model applications, and extreme condition analysis. Other physical and empirical model methods can also be considered.

Topics of interest for the Special Issue include but are not limited to:

- Forecasting ionospheric parameters using machine learning and data assimilation;
- Thermosphere density estimation and satellite drag analysis using data-driven modeling techniques;
- Geomagnetic field modeling using data-driven modeling to forecast GIC risks;
- M–I–T coupling and response to extreme space weather events;
- M–I–T modeling with uncertainty-quantification (UQ)-based AI/ML.

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Special Issue

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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!

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