Editorial: Impacts of global warming on ecology and meteorology and the related physical mechanisms, evaluation and prediction

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Editorial on the Research Topic
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Global warming refers to changes in climate over a period of time in which the temperatures of the atmosphere and seas on Earth dramatically rise due to the greenhouse effect, and it plays a dominant role in climate change, rising sea levels, increasing frequency and intensity of extreme events, ecological imbalances, and loss of biodiversity [1–4]. Consequently, global warming has an adverse effect on meteorology and ecology, both of which inevitably affect human life and social development. As a result, how we can effectively mitigate global warming has become an urgent problem for the survival and development of mankind. In this sense, analysis of the features of meteorological and ecological change, quantification of the influence of climate warming on ecology and meteorology, and the uncovering of the underlying physical mechanisms contribute to a much deeper comprehension of the impact of global warming.

This Research Topic accepted many manuscripts across multiple research fields, including mathematics, meteorology, and ecology. These research studies mainly focus on construction or using models to quantify influence and predict future trends. For instance, Zhao et al. have, based on the CMIP6 model, evaluated the performance of wind speed in China, providing available guidance for wind prediction in specific regions; Hou et al. developed a model based on a three-dimensional Copula function to quantify the effects of drought on cropland area and assess the risk of drought, which is important for understanding and reducing the negative effects associated with drought; Feng et al. used a

nonlinear time series analysis method of phase space reconstruction to quantify the snow depth over the Tibetan Plateau; Chou et al. proposed an economic climate model to quantify the effects of climate change on the economy; Wang et al. utilized Earth system model simulations to assess oceanic CO_2 uptake, surface temperature, and acidity for Zhejiang offshore; and, to investigate the influence of saturated water absorption on vegetation systems, Li et al. established a vegetation-water model with a saturated water absorption effect.

This Research Topic has also received some papers that use a variety of data to analyze the characteristics of meteorological elements. Su et al. used a multi-dataset to analyze trends—seasonal and irregular variations of actual evapotranspiration. Wang et al. analyzed the climate change characteristics of coastal wind energy resources in Zhejiang Province based on ERA-medium-term data. Based on wind speed data and machine learning, Yan et al. studied the daily characteristics of wind speed changes in Beijing and analyzed the spatial and temporal characteristics of wind speed diurnal changes, which is conducive to predicting pollutant emissions.

We also collected some papers on the physical mechanisms of climate change. Guo et al. utilized Chinese meteorological station data and reanalysis data to explore the physical mechanism behind the variation of precipitation cycling rate in the middle and lower reaches of the Yangtze River. Zhao et al. explored the dominant factors causing the subtropical atmospheric anomaly in the western Pacific.

The situation of global warming is becoming more and more serious, and the impact on ecology and meteorology is intensifying, which means human beings and our development are facing unprecedented threats. The purpose of this research topic is to use a variety of methods to analyze the characteristics of meteorological and ecological changes in the context of global warming, quantify the impact of extreme events on agriculture, meteorology, and oceans, and reveal the physical mechanisms of their changes. We hope that this Research Topic will provide a platform to promote multidisciplinary and integrated research at a deeper level in the fields of meteorology, ecology, epidemiology, and mathematics.

Author contributions

G-QS wrote the manuscript. YW, B-LL, and YG contributed to the manuscript edits. All authors read, contributed to the research design, and approved the final manuscript.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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