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Editorial

Editorial for the Special Issue "Vegetation and Climate Relationships"

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The study of the relationships between climate change and the vegetation of terrestrial ecosystemsis the core topicof biometeorology research [1,2]. As an important part of terrestrial ecosystems, vegetation plays a key role in maintaining ecosystem functioning and protecting biodiversity [3,4]. In recent years, vegetation in most regions of the world has undergone significant variations due to climate change, which mayin turn influencethe regional or global climate [5–7]. To promotethe developmentof biometeorology, it is necessary to fully explore the relationships between vegetation and climate in the context of global change. In order to better understand vegetation and climate interactions, we need to further clarify the spatiotemporal changes invegetation and climate in vegetation regions, the responses of vegetation to climate change, and the effects of vegetation changes on climate. In addition, the advances and challenges in climate and vegetation research should also be further discussed and explored to promote the development of the research on climate and vegetation relationships.

To better understand the interaction between vegetation and climate in the context of global climate change, this Special Issue of the open access journal *Atmosphere* addresses the topicof "Vegetation and Climate Relationships". The core questions are how climate conditions can affect vegetation and how vegetation changes can regulate climate conditions. Topics of interest for this Special Issue include, but are not limited to: climate change in vegetation regions; vegetation changes under the background of climate change; advances in vegetation and climate research; responses of vegetation to climate change; feedbacks of vegetation on climate change; relationships between climate change and vegetation, etc. This Special Issue received 14 submissions and finally published 8 of them. This collection of papers covers several aspects, and the contributions of each specific paper are summarized as follows.

The published articles studied vegetation changes and their responses to climate change in different regions. For example, Shi et al. [8] found that from 2000 to 2019, the fractional vegetation cover (FVC) in the Yellow River Basin has improved significantly, with an average annual growth rate of 0.65%, and the green line of vegetation has moved approximately 300 km westward. Moreover, the study showed that climate, ecological control, and afforestation are important factors affecting the dynamic changesinvegetation in this region. Guo et al. [9] reported that the net primary productivity (NPP) in the Mongolian Plateau exhibited upward trends in different seasons, and the degree of drought also showed increasing trends in each season. They found that the NPP ofvegetation was positively correlated with the standardized precipitation evapotranspiration index (SPEI) in summer but was negatively correlated with the SPEI in the other seasons. Furthermore, the impact of drought on the NPP of vegetation in growing season showed a lag effect. Hussain et al. [10] investigated the temporal and spatial changes incrop growth in Pakistan and their relationships with climate change. The results showed that temperature had negative impacts on sugarcane, rice, and cotton crops during the Rabi season, and the precipitation during the Kharif season in the study area had positive impacts on sugarcane, rice, and cotton crops. By redefining vegetation sensitivity to precipitation (VSP) and

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Citation: Shen, X.; Liu, B. Editorial for the Special Issue "Vegetation and Climate Relationships". *Atmosphere* **2022**, *13*, 1881. https://doi.org/10.3390/atmos13111881

Received: 3 November 2022
Accepted: 8 November 2022
Published: 10 November 2022

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vegetation sensitivity to temperature (VST), Liu et al. [11] explored the variations in the VSP and VST across the Tibetan Plateau. They found that climate change has significant effects on the VST in summer and on the VSP in both spring and winter.

The other articles in this Research Topic discussed the characteristics of forest vegetation changes and their responses to climate change in different regions of the world. Ivanova et al. [12] reported that climate warming led to regular regeneration of the tree species in the mountain tundra of the Northern Urals. They predicted that over 20–25 years, the mountain tundra in the studied Northern Urals plateau could develop a mosaic formation of primary underground-closed forest communities with characteristic forest relationships, in addition tocommunities with multiple root systems interweaving over 40–50 years. Ugarković et al. [13] compared climate data and bioclimate properties in three vegetated areasin the Mediterranean, mainly composed of forests. They found statistically significant differences between the main climatic elements and most bioclimatic indices in the vegetation zones. Considering that direct measurement of transpiration would increase researchers' ability to accurately assess the responses of vegetation to climate change, Salas Acosta et al. [14] measured the transpiration of tropical dry deciduous forests in the Yucatan Peninsula (Mexico). They found that transpiration changes were much higher in the rainy season. Afuye et al. [15] found that the relationships between vegetation and climatic variables were relatively low across vegetation types and seasons in the Amathole District Municipality in the Eastern Cape Province of South Africa. As an essential climate component, they found that the wind could affect carbon fluxes by changing carbon uptake and emission rates and by transporting moisture and temperature from one area to another.

This Special Issue belongs to the Section "Biometeorology" and deals with the interactions between climatic conditions and vegetation in an interdisciplinary manner. The Special Issue provides new insights into the responses of vegetation to climate change, as well as the effects of vegetation changes on climate. The findings reported are helpful infurther understanding the relationships between vegetation and climate. We hope that the contents of this Special Issue can make extensive contributions to further understanding the relationships between global changes and terrestrial ecosystems. At the same time, it is suggested that more research should be carried out in the future on the impacts of vegetation changes on climate.

Author Contributions: X.S.; writing—original draft preparation, B.L.; writing—review and editing, X.S.; funding acquisition. All authors have read and agreed to the published version of the manuscript.

Funding: This research is supported by the Youth Innovation Promotion Association, Chinese Academy of Sciences (2019235).

Conflicts of Interest: The authors declare no conflict of interest.

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