

Editorial

# Special Issue Editorial: Hydroclimate in a Changing World: Recent Trends, Current Progress and Future Directions

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The sixth report of the Intergovernmental Panel on Climate Change (IPCC) has confirmed that human-induced climate change is already affecting many weather and climate extremes in every region across the globe [1]. Increasing evidence of observed changes in extremes such as heatwaves, heavy precipitation, droughts, and tropical cyclones have emerged, and point to human influence. Under all emissions scenarios considered, global surface temperature will continue to increase until at least the mid-century [1]. A warmer atmosphere holds more moisture thus global warming leads to strengthening moisture transport via atmospheric circulation and makes areas of moisture convergence wetter and areas of moisture divergence drier [2,3]. Global warming also causes the interannual variability in the hydroclimate to intensify, which induces more droughts and floods. These changes are imposing tremendous challenges upon human lives and other lives on Earth.

Observations have shown that precipitation patterns are changing globally. While some regions experience increased rainfall and more intense precipitation events, others are facing prolonged dry spells and increased drought conditions [4,5]. These changes have significant implications for water resources, agriculture, and ecosystems. Rising temperatures have led to reductions in snowpack and accelerated the melting of glaciers in many mountainous regions [6]. This affects the availability of water resources, especially in regions that depend on snowmelt for freshwater supply and irrigation. There is a growing body of evidence suggesting an increase in the frequency and intensity of extreme hydroclimatic events such as hurricanes, floods, and heatwaves [1]. In some places, drought conditions may extend well into the next few decades [7]. These events can have severe societal and environmental consequences, and they are leading to extremes such as crop failure, infrastructure damage, and even humanitarian crises.

It has become increasingly evident that present-day human activity is driving the global warming that induces global climate change. In turn, a changing global climate is impacting human lives. On one hand, we need to mitigate the level of warming; on the other hand, we must adapt to the continued increase in global temperature and the changing hydroclimate. We need to deepen our understanding of human-induced global warming, natural variability, and the subsequent changes in the hydroclimate, including extreme floods, droughts, and storms. This will enable a better prediction of these events so that society can make more informed choices to accommodate our changing physical environment.

This Special Issue of *Atmosphere*, “Hydroclimate in a Changing World: Recent Trends, Current Progress and Future Directions”, is devoted to further understanding and better predicting hydroclimatic changes across the globe. Many thanks to the enthusiastic authors who have made contributions to this Special Issue and the many anonymous reviewers and editors from the Editorial Office who have made this successful.

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