FOREWORD

Climate change is the greatest challenge facing humanity and biodiversity today and represents an existential threat to us and future generations. With efforts to halt temperature rise off-track, ambitions of individual countries lagging, and climate disasters becoming ever more severe, it is increasingly urgent to provide a means and platform for climate research. The *Cambridge Journal of Climate Research*, produced by the Cambridge Climate Society, is playing a role in that endeavour.

The concentration of CO_2 in the atmosphere is increasing (so far ~50% above the pre-industrial level), resulting in warming of the atmosphere, land and ocean. In 2024 the average global temperature reached 1.55°C above pre-industrial levels. This warming is human induced. Warming is already having immediate effects on food security, health, water supplies and biodiversity. The longer-term outlook is even more dire: the latest UN Emissions Gap Report suggests we may be heading for warming of 2.6 to 3.1°C, which will have severe consequences for humanity and all life on this planet.

It is increasingly clear that in order to avoid the worst effects of climate change, the world must reach net zero as soon as possible. Net zero by 2050 requires transformation of our energy portfolio, along with technological transformation of the infrastructure in place to store and transport it. It seems certain that as well as reducing emissions, efforts must also be accelerated to remove carbon from the atmosphere, through a range of carbon capture and storage mechanisms.

I am honoured to have the opportunity to pen this Foreword introducing a collection of impactful articles dealing with the myriad challenges associated with climate change. In this issue, a range of papers explore a number of physical and social science and political topics linked with the impacts of climate change and society's priorities for the future. Climate governance increasingly takes centre stage in multilateral climate discussions and this forms the basis of an article by Saoudy looking at the mechanisms by which less powerful actors, such as those from the Global South, are heard. Specific countries face specific challenges: Asgarian explores how Iran navigates climate change and its impact under the influence of international sanctions. Pacific Small Island Developing States have long been at the forefront of climate change and Tang discusses how they can achieve influence in the global climate debate. More developed countries arguably have a greater responsibility for financing the sustainable development of less developed countries as regards climate change mitigation given their greater historical contribution to global emissions, argues Macleod. Climate injustice is a theme continued by Rice, who shows that information gaps fuel failures in climate-related financial markets. DiSera et al. discuss how climate information is communicated, trusted and used by farmers in Colombia; and León Báez looks back at how Iberian thinkers rationalised climate change in the historical past.

The future will require innovation and investment across the energy sector. Obeng-Akrofi examines the different ways in which countries tackle innovation, with a focus on nuclear fusion. Sikes targets hydropower and the human history behind it in the American West. Pinto and Hritsyshyna discuss

whether hydrogen has a role to play in the delivery of climate objectives. Song examines how the aviation sector will adapt and become climate-sustainable, and the key challenges. The impacts of climate change are many and varied, but one aspect that is increasingly dominant in global news is flooding. Bikakis examines the nature and resilience of the mortgage market in flooding-prone areas, highlighting the role of shadow banking the wake of flood events. Extreme rainfall is becoming more common, and less predictable at the same time. Aladalli tests climate models that aim to describe extreme rainfall events, showing that the complexity of the physics is a key aspect in their success.

As 2025 draws to a close, we mark the end of a remarkable life—that of Dr Jane Goodall, who passed away in October 2025. On Earth Day 2025, Dr Goodall said: "I do believe there is a window of time when we can at least slow down climate change and loss of biodiversity. But only if we get together and take action now. And without hope we will fall into apathy and do nothing. Then we are doomed".

This message of hope is an important one. And 2025 certainly has brought us some measures of hope. Wind, solar and other renewable power sources overtook coal as the world's leading source of electricity this year, largely driven by China, where CO_2 emissions over 12 months fell for the first time. Brazil hosted COP30 this year, in the Amazon rainforest, where an ambitious roadmap to end deforestation by 2030 was announced, supported by 90 countries. Building resilience to climate change is now arguably front and centre of the international agenda, with finance increased for both climate adaptation and the transition to a low carbon economy. The rights of Indigenous peoples in the context of climate impacts are increasingly recognised and valued. However, major unresolved challenges remain that require academe, industry, governments and all of humankind to work together to effect change.

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