



**ATS/CIRA Colloquium**

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from ETH Zurich

**Hosted by James Hurrell**

**3 p.m. Thursday, June 1**  
**ATS 101 and Zoom**

**Climate extremes in a warming climate: Why every year matters**

In this presentation, I will provide an overview of recent developments on research on climate extremes, including the main conclusions of the 6<sup>th</sup> Assessment Report of the Intergovernmental Panel on Climate Change (IPCC AR6). For the first time, a full chapter of an IPCC assessment report was dedicated to the topic of weather and climate extremes (Seneviratne et al. 2021). The newest evidence shows that changes in extremes are observed in all regions of the world, and that human influence strongly contributed to observed trends. With every increment of global warming, changes in extremes become larger, with important implications for changes in heatwaves, heavy precipitation, droughts, and tropical cyclones depending on the region.

The evidence on observed and projected changes in droughts and heatwaves has particularly strengthened in recent years. All regions are projected to be affected by multiple changes in climate extremes and other climatic impact drivers with increasing global warming, in particular at 2°C of global warming and above. Limiting global warming to close to 1.5°C, as set as aim in the 2015 Paris Agreement, would be critical to avoid impactful increase in climate extremes, and would require immediate decreases in greenhouse gas emissions and fossil fuel burning. The latest evidence suggests that the first needed steps can be achieved but need immediate political action.

Finally, I will also present recent new evidence on the possible impact of changes in climate extremes for low-emissions pathways. Integrated assessment models (IAMs) used to derive emission scenarios used in IPCC assessments include limited consideration of changes in climate, although these can affect decision making, for instance regarding risks for afforested areas to be affected by droughts, fire weather, or other climate extremes (Seneviratne et al. 2018a,b). I will in particular highlight the potential use of Earth

System Model emulators (e.g. Beusch et al. 2022; Quilcaille et al. 2022) to assess limitations to nature-based solutions in mitigation pathways, and possible underestimated drought-carbon cycle feedbacks in Earth System Models (Humphrey et al. 2018, Liu et al., in press).

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