



Part of LMU Sustainability Week

Modelling Past Climate Trends and Implications for Near-Future Climate Risk

Sebastian Sippel

(Leipzig University)

11/11/2026, 4:15 pm

Department of Statistics, Ludwigstr. 33, Seminar Room 144

and online via Zoom [\[Link\]](#)

(Meeting-ID: 631 1190 7291; Password: StatsCol)

The global mean surface temperature record—combining sea surface and near-surface air temperatures—is essential for understanding climate variability and change. Understanding of the past record is also key to constrain the uncertainty around future climate projections. In my talk, I will present a recent study (Sippel et al., 2024) that aims to improve our understanding of the past record; and I will discuss implications and avenues to constrain near-future climate risk.

Past temperature record: The early temperature record (before around 1950) is still uncertain due to evolving measurement methods, incomplete documentation, and sparse spatial coverage; and presents thus an interesting statistical problem. Using independent reconstructions from land and ocean data, we find that historical ocean temperatures were likely measured too cold by about 0.26°C compared with land-based estimates, despite strong agreement in other periods. This cold anomaly is not explained by internal climate variability, and multiple lines of evidence—including climate attribution, timescale analysis, coastal observations, and palaeoclimate data—support a substantial cold bias in early ocean records. While global warming estimates since the mid-19th century remain unchanged, correcting this bias would yield a smaller early-20th-century warming trend, lower global decadal temperature variability, and closer alignment between models and observations.

Constraining near-future climate risk: I will further discuss the implications of these findings for constraining near-future temperature projections. Moreover, I will present ongoing work on simulating physically plausible worst-case extreme events at the regional scale, using climate model simulations and so-called rare event simulation algorithms.

About the Speaker:

Sebastian Sippel is a Junior Professor for Climate Attribution at the Leipzig Institute for Meteorology with a key research interest in improving our understanding of climate variability, extremes and their changes at global and regional scales. His research interests also include the implications of global climate changes for impact-relevant variables such as the hydrological cycle at regional scale, ecosystem water-carbon cycling, and society at large. The bulk of his research is closely linked to climate change detection and attribution. He employs modern empirical-quantitative statistical and machine learning methods to address these broad research questions, integrating various climate and Earth science data streams such as gridded climate observations and climate model simulations.

References:

Sippel, S., Kent, E.C., Meinshausen, N. et al. Early-twentieth-century cold bias in ocean surface temperature observations. *Nature* 635, 618–624 (2024). [[Journal article](#)]
