Abstract
Ocean–cryosphere interactions play a fundamental role in regulating Earth's climate and ocean circulation across timescales. I will present results from fully coupled climate model simulations spanning past, present, and future climates, focusing on the roles of sea ice, ocean circulation, and climate forcing. I will highlight how sea ice influences Southern Ocean upwelling, Arctic sea ice, and AMOC variability over the past 3 million years, including changes across the Mid-Pleistocene Transition. Building on this work, my future research will investigate Antarctic sea ice variability, its influence on Southern Ocean dynamics, and teleconnections between Antarctic sea ice and the tropics under past and future climate conditions.