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Call for Papers

Antarctic and Southern Ocean Climate: From the Geological Past, Through the Present, to a Warming Future

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The Antarctic and Southern Ocean region is a key component of the Earth's climate system, where the atmosphere, sea ice, ocean, ice shelves and ice sheets, and solid Earth processes are intricately linked. These components interact across a wide range of scales, controlling the redistribution of heat and freshwater, the stability of the Antarctic Ice Sheet, and ultimately global sea level. In the context of warming climates from the geological past to the projected future, this region is undergoing rapid transformations—including sea-ice decline, accelerated ice-sheet mass loss, and weakening ocean overturning—all of which are dynamically connected through nonlinear feedbacks. These changes also influence biogeochemical cycles, with implications for carbon storage, nutrient fluxes, and marine ecosystems. Understanding these changes—from recent observations to geological records—is critical for anticipating future responses of the Antarctic and Southern Ocean climate system and their broader impacts on the Earth's climate, including sea-level rise.

This Special Issue explores the Antarctic and Southern Ocean climate system across past, present, and future timescales. We welcome studies on the drivers and impacts of climate variability, including paleo records, modern processes, and model projections. Interdisciplinary work linking atmosphere, ocean, cryosphere, solid Earth, and biogeochemical dynamics is especially encouraged to assess system resilience and tipping-point risks.

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