

Sea level rise caused by ice sheet melt

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The polar climate system, consisting of atmosphere, ocean, and cryosphere, plays important roles in shaping the global environments through its vast exchange and storage of heat and freshwater. The accelerating ice mass loss in the Greenland and West Antarctica is a significant process affecting the global climate and the understanding of the ice-ocean interaction there is of primary importance. In contrast, the status of ice mass change in East Antarctica is still in debates. Recent studies show some fingerprints of huge mass loss in the past warming world and the ice mass loss from the glaciers including Totten Glacier in East Antarctica is increasing. However, the processes of heat supply and sequent ice-ocean interaction are poorly known for both continental ice sheets.

Now, we need to understand their individual processes in polar regions through observation and modeling, and to investigate the actual states and mechanisms of various interactions. In addition, integrated researches need to be conducted, contributing to the future projection of the global environmental change driven by the polar oceans and continental ice sheets. Toward these goals, we need to clarify the state and interactions between the ocean, ice sheet, crust, ecological system, greenhouse gases, etc. and their variations from the past to the future through the field observations and analyses of samples and conduct various kinds of modeling in cooperation with the observations.