Toward understanding the cause and mechanism of catastrophic collapse of Antarctic ice sheets during the last interglacial

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Ongoing global warming could cause various influences to our lives. One of the most serious concerns caused by the global warming is sea level rise due to large scale collapse and melting of polar ice sheets. Recent observation revealed that the fastest melting rate of polar ice sheets ever observed is ongoing and there is growing concern of greatly rise of sea level in the future. Knowledge of sea level fluctuations in the past warm period provides useful information to better understand future sea level changes. Geological records have shown that sudden and abrupt rises in sea level (6 m rise within hundreds of years) were happened during the last interglacial (13,000-11,500 years ago) when global mean sea surface temperature (SST) was slightly higher (0.5 degree C) than the preindustrial level. If this were really happening, there is a critical ice sheet stability threshold resulting in the catastrophic collapse of polar ice sheets and substantial rapid sea-level rise in the interglacial climate condition. Since the Greenland ice core record showed a 2 m eustatic component from the Greenland ice sheet during the last interglacial, the Antarctic ice sheet greatly contributed to eustatic rise of sea level at that time. Given that the current global mean SST already reached the last interglacial level, it is urgent issue to evaluate whether massive collapse of the Antarctic ice sheets could occur in the future. For that purpose, it is necessary to investigate whether a massive collapse of the Antarctic ice sheet actually happened during the last interglacial or not. However, variability of the Antarctic ice sheets during the period has not been investigated. In this presentation, I will talk about an importance of research on the variability of the Antarctic ice sheets during past warm period such as the last interglacial to better understand the presence of “tipping point” into the new and irreversible melt regime of Antarctic ice sheets.

Keywords: Antarctic ice sheet, last interglacial, sea level rise

