

Reconstruction of late Quaternary East Antarctic Ice Sheet fluctuations, and consideration of relation to global sea-level changes

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Quaternary climate change is characterized as the glacial - interglacial cycle that induced from changes in global ice volume variations. The record of global ice volume can be deduced from studies on sea-levels and hence understanding mechanisms among ice volume, sea-level and climate is crucial. In particular, the rise in sea-level is anticipated due to ongoing global warming caused by melting of both/either Greenland ice sheet and/or Antarctic ice sheet. However little is known for the past fluctuations of their volume because of difficulties to obtain data at Antarctica such as lack of datable materials, radiocarbon reservoir ages, and severe environments in the Southern Ocean.

Traditionally, reconstruction of past Antarctic Ice Sheet changes has been using radiocarbon dating method. However, using this method to samples that were taken from vicinity of Antarctica has several problems. Therefore, research of Antarctic Ice Sheet changes have to use better dating method. Cosmogenic radionuclide (CRN) dating method will tell us direct exposure history of rocks remained around glaciers. The aim of this study is to reconstruct of East Antarctic Ice Sheet fluctuations using CRN dating method, and to discuss relation between ice sheet fluctuations and global sea-level changes.

The concentration of in situ produced cosmogenic nuclides in quartz provides the cumulative exposure time of the rock. This study used ^{10}Be (half-life = 1.36 Myr) and ^{26}Al (half-life = 0.70 Myr). Also, the ratio (e.g. $^{26}\text{Al}/^{10}\text{Be}$ ratio) of two cosmogenic nuclides provides buried histories of rock. Samples were obtained from ice-free area of the Lutzow-Holm Bay, East Antarctica. We collected gneiss samples from bedrock and erratic. Ages of erratic indicate time of the last deglaciation. From comparison between age of bedrock and that of erratic, it can show that whether or not to retreat of ice sheet before the last glacial period.

The following was the conclusions from present work. (1) The timing of deglaciation of the Lutzow-Holm Bay was ca. 9 - 3 ka. (2) The volume of East Antarctic Ice Sheet repeatedly changed at the late Quaternary. (3) The sea-level rise is the cause of the East Antarctic Ice Sheet retreat in this region. (4) The East Antarctic Ice Sheet is not susceptible to global sea-level changes compared with the West Antarctic Ice Sheet and the Antarctic Peninsula Ice Sheet.