Geological reconstruction of Antarctic Ice Sheet deglaciation on Soya Coast, East Antarctica since the Last Glacial Maximum

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A robust understanding of the history of ice retreat in East Antarctica since the Last Glacial Maximum (LGM) is important in order to validate ice sheet and glacial-isostatic adjustment models and to anticipate their contribution to global sea-level rise. Geomorphological studies and surface exposure dating (SED) will provide direct evidence of the timing and the history of ice retreat on coastal oases and nunatak regions in East Antarctica. Recent studies have reported retreat ages based on surface exposure dating (SED) in Skarvsnes, southern part of Soya Coast, East Antarctica. However, the history of ice retreat remains unclear, because a limited number of surface exposure ages were reported by a previous study, and the results were not interpreted based on field-based geomorphological survey In this study, we reconstruct the last history of ice retreat of the Skarvsnes based on the field-based geomorphological survey and newly obtained SED samples. As results of the field survey, we distinguish three Phase of the ice sheet retreat at the Skarvsnes. The basement rocks at the highest peak (ca. 400 masl) to ca. 250 masl area of the Skarvsnes was weathered extensively, whereas weathering of the basement rocks below ca. 250 masl was relatively weak. The extensively weathered basement rock feature is quite similar to that of the northern part of Soya Coast, where ^{14}C dating of fossil shells in the raised beaches suggests that the area had remained ice-free throughout the LGM. Therefore, the differences in weathering feature are thought to indicate the upper limit of ice sheet height at LGM at the Skarvsnes (Phase 1). In the other area of Skarvsnes, glacial striations including cross-cutting set were clearly observed. That is, the ice sheet flow direction was changed with ice sheet thickness thinning under the influence of the basement topography after the LGM (Phase 2). Eventually, the ice sheet was flowing down divided in North and South obstructed by the 362 masl mountain (Shirasuso-Yama) near the current ice sheet margin (Phase 3). Several surface exposure ages were obtained from rocks sampled at sites of different altitudes and distances from the current ice margin. These ages are consistent with the above geomorphological interpretation and it suggests that near current ice sheet margin has been exposed from ice about 9 ka. These data are almost consistent with retreat ages at Mac. Robertson Land in East Antarctica.

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