

Deep ice corings in Antarctica and Greenland

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The studies of deep ice cores and boreholes have provided records of past climatic and environmental changes on various time scales, as well as evidences on how the both polar regions have interacted through atmosphere and ocean to affect global climate. Understanding the processes and sensitivities that underlie the changes, through the ice-core analyses as well as in combination with climate and ice-sheet modeling, will underpin better understanding of the climate system and projections of its future change. In the next phases of Antarctic glaciological research, National Institute of Polar Research together with Dome Fuji Ice Core Consortium (ICC) and Third Dome Fuji Drilling Project plans to perform various activities related to the third deep ice-core drilling in the vicinity of Dome Fuji, in order to obtain an ice core with age much older than 800 kyr. This is also a contribution to International Partnership in Ice Core Sciences (IPICS) “Oldest ice core project” . During the JARE Phase IX, we have been investigating glaciological conditions (ice sheet surface, englacial and subglacial conditions) of the candidate area, and we will determine the exact location of the drilling site and start pilot hole drilling and casing to enable deep drilling. The deep drilling must then follow to actually recover the old ice. In Greenland, we currently participate in the East Greenland Ice Core Project (EGRIP) to better understand the dynamics and past changes of the fastest-flowing Northeast ice stream and to reconstruct the climate and environment changes during the past warm periods and during abrupt warmings during the last glacial period. After the EGRIP drilling is finished, the next Greenland deep ice coring will be carried out to obtain spatial variabilities of climate and ice sheet changes. By studying the ice core records from both polar regions, we can understand the mechanisms and global impacts of the polar climate changes such as glacial-interglacial transition and abrupt climate changes.

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