Environmental change study based on the physical-chemical analysis of permafrost core

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Analysis of ice-sheet core can provide paleoenvironmental information that is needed for the future climate change and global warming prediction. However, the application of ice-sheet core analysis is restricted in Arctic and Antarctic regions where ice-sheet still exists [IPCC 4th Report (2007)]. Therefore new method that can extract paleoenvironmental record in non ice-sheet area is required. Permafrost that is widely distributed in north hemisphere's terrestrial area has focused as paleoenvironmental record source in recent years since permafrost shows long-term variation [Schuur et al. (2015), Nature]. Permafrost has varied in mid-term and local climate change after last glacial period, so that the internal properties and freezing-thawing history have 100 - 1000 years scale climate record. Furthermore, quantitative understandings of permafrost components and physical properties such as heat conductivity or ice volume content are necessary for the high accuracy prediction of climate changes.
We have bored permafrost at Spitsbergen, Svalbard and Mt. Fuji and obtained permafrost cores with 1-2 m length. Cores reflect environment such as climate and aggradation condition, so that internal structures and properties of permafrost are greatly different at each boring site. In this presentation, we discuss the environmental dependence of permafrost, and the possibility of paleoenvironmental reconstruction from the physical-chemical analysis of permafrost core.

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