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Paleo-permafrost Dynamics in the late Quaternary -Potential distribution in Japan-

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Due to small portion of terrestrial areas of Japan compared to the typical grid scale in the large-scale climate models (denoted as GCMs below), the results from GCMs, especially those integrated on coarse resolutions, have not been widely used in geographical or geomorphological investigations and applications. The field survey was intensively conducted until the 1990s to determine the distribution of frozen ground (permafrost and seasonally-frozen ground) in Japan islands during the Quaternary. However, integrated research is still needed on relationship and characteristics of the frozen ground distribution and the paleo-climatic conditions in Japan. We demonstrated that the large-scale frozen ground distribution on the large scale can reasonably be reconstructed through the mapping from the near-surface thermal conditions (i.e. freeze and thaw index, as the cumulative degree-day values below and above the freezing point, respectively), despite simplifications of the determining factors of permafrost in the reality. The methodology was also applied to South America with down-scaling of the horizontal resolution, in which high-resolution topography data were used to correct the surface air temperature with the elevation effect. In this presentation, I will demonstrate the down-scaling results for Japan islands to show the potential distribution of frozen ground at the last glacial maximum (LGM) and Holocene optimum derived from the multiple GCMs. The analysis on relationship between the potential frozen ground type and environmental conditions (e.g., latitude and altitude) will be presented.

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