

Chemical Characteristics of Ice Wedge Developed into Permafrost on Seymour Island and James Ross Island, Antarctic Peninsula Regions

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In Seymour Island and James Ross Island, located in the Weddell Sea, there exists ice free ground. Under severe climatic condition, permafrost developed on the ice free ground with various levels on the sea water. As that region was under the effect of upheaval of the land during Holocene, marine terraces were formed. The mean sea bottom temperature maintains as -2°C or higher and under the surface boundary temperature higher than -2°C , no permafrost developed into the ground. Once the land upheaval above sea level, the surface of the ground was subjected so severe temperature that permafrost tends to penetrate into the ground. During the process of permafrost formation, the contraction crack occurred due to the shrinkage of the subsurface of permafrost in mid winter. Melt water in succeeding summer percolated into the open crack and froze in crack. Repeated cycles of cracking and filling water into it developed ice wedge into permafrost. Present authors analyzed the geochemical and oxygen isotopic profiles of ice wedge and compared with those obtained from Arctic regions. Highly concentrated salt layers were traced in the profiles indicating the arid environments in the past. The depth of permafrost was detected by means of geo-electrical soundings survey and the ice wedge pattern was also surveyed. Based on the results of field data, unique ice wedge formation during past glacial period was reconstructed. Even under present environment, some ice wedge tends to grow with small value of growth than in Arctic region.