

The Timing of Local Glacial Retreat in King George Island, Shetland Islands, West Antarctica Revealed by Quartz OSL Dating of Sorted Circles

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During the deglaciation period, the glaciers dump moraine sediments as they melt away, thus the depositional ages of these sediments provide important information on the timing of glacial retreat (the commencement and the duration of the local deglaciation). However, in many cases, direct dating of moraine sediments is not readily possible because of a lack of suitable material for conventional dating methods, except where ¹⁴C dating is applicable. In addition, optical dating on these sediments has not been successful because most glacial deposits usually have little chances of being exposed to sufficient sunlight, which results in significant overestimation in optical ages. The moraine sediments, however, sometimes form a diagnostic geomorphic structure, referred to as *sorted circle*, through repeated freeze-thaw cycles on flat areas in periglacial regions. In the course of its formation, the soil particles above the permafrost layer may move up and down actively, and therefore some of these particles are presumed to have chances to be exposed to sufficient sunlight for the latent OSL signals to be completely bleached, which is one of the most important prerequisite process for reliable optical dating. To test this hypothesis, we collected sediment samples from sorted circles in King George Island, South Shetland Islands, West Antarctica. Quartz grains extracted from these sediments have various undesirable OSL properties for routine SAR-based optical dating. For instance, the OSL signals of those quartz grains do not have fast OSL component that is the usual signal for OSL dating. In dose recovery test using both LM-OSL SAR and conventional SAR procedure, the recovered doses were lower than the given dose by 10 % consistently. The OSL ages obtained were 10-15 ka. Considering the dose underestimation observed in the dose recovery test, this may imply that deglaciation in this region has occurred around or before 10-15 ka.