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Chronostratigraphy of Larsen blue ice, East Antarctica, and a tentative reconstruction of surface temperature and accumulation rate during the last deglaciation

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Ice coring in blue ice areas (BIAs) serves as an alternative to deep ice core drilling, allowing collection of large-sized old ice samples in a cost-effective way because old ice samples are outcropped to the surface. However, the stratigraphy in many blue ice areas can be complicated due to complex ice flows. Based on ice layers defined by dust bands and ground penetration radar (GPR) surveys, we show that Larsen BIA has a surface transect of ice with an undisturbed horizontal stratigraphy from mid- to downstream side ice. However, the upstream ice exhibits a potential repetition of ages on scales of tens of meters. Correlating $\delta^{18}O_{ice}$, $\delta^{18}O_{atm}$, and CH_4 records of Larsen ice with existing ice core records indicates that the analyzed gas age and ice age ranges between 9.2–23.4 ka BP and 5.6–24.7 ka BP, respectively. Radiometric ^{81}Kr dating of one of the cores confirms the estimated gas ages within uncertainty. A tentative reconstruction based on a simple analytical framework suggests a warming of 15 ± 5 □ during the last deglaciation that we attribute to the retreat of the Ross Ice Shelf, and an increase in snow accumulation by a factor of 1.7–4.6 that we attribute to the increased penetration of snow-bearing storms. Exact estimation of the original deposition site and updated ice ages may enhance the tentative climate reconstructions in future studies. Our study shows that BIAs in Northern Victoria Land may contribute to obtain high-quality paleoclimate proxy records through the last deglaciation.