



## **Massive Ice Layer Formed by Refreezing of Ice-shelf Surface Melt Ponds: Larsen C Ice Shelf, Antarctica**

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Surface melt ponds now form frequently on ice shelves across the northern sector of the Antarctic Peninsula in response to regional warming and local föhn winds. A potentially important, but hitherto unknown, consequence of this surface melting and ponding is the formation of high-density near-surface ice from the refreezing of that water. We report the discovery and physical character of a massive subsurface ice layer located in an area of intense melting and intermittent ponding on Larsen C Ice Shelf, Antarctica. We combine borehole optical televiewer logging and ground-based radar measurements with remote sensing and firn modelling to investigate the formation and spatial extent of this layer, found to be tens of kilometres across and tens of metres deep. The presence of this ice layer has the effect of raising local ice shelf density by  $\sim 190 \text{ kg m}^{-3}$  and temperature by 5 - 10 degrees C above values found in areas unaffected by ponding and hitherto used in models of ice-shelf fracture and flow.