Subglacial till body underneath a contemporary grounding zone

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We report a subglacial wedge near the contemporary grounding line of an ice-rise (Derwael ice rise) surrounded by ice shelves along the Princess Ragnhild Coast in eastern Dronning Maud Land (DML), Antarctica. Three 2-MHz ground-based radar profiles were made together with kinematic GPS surveys aligned roughly parallel to the ice-rise's local ice-flow direction. The first two profiles face the outlet of Western Ragnhild Glacier, whereas the third profile is oblique to the regional shelf-ice flow. Along the two profiles facing the glacier outlet but 2.5 km away from each other, we discovered a subglacial wedge of 3 km long and 200 m high. The bed elevation at both sides is nearly equal. The wedge has a very steep slope (~20^{o}) at its landward side, a plateau for about 1 km, and a gentle slope (~2.5^{o}) at the seaward side. Analyses of both the radar power returned from the bed as well as the shape of the upper ice interface indicate that the ice becomes afloat less than 0.5 km seaward of this wedge. Therefore, this wedge is at least 2.5 km wide along the shore and locates within or immediately landward of the contemporary grounding zone. Such grounding zone wedge was found neither along the third profile oblique to the glacier outlet nor along other profiles across the grounding zone of another ice rise in the western DML, which do not face outlet of a fast-flowing glacier. We argue that this wedge is a till body that was developed when the ice sheet was extended beyond the Derwael ice rise.