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An extensive subglacial lake and canyon system in Princess Elizabeth Land, East Antarctica

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The subglacial landscape of Princess Elizabeth Land (PEL) in East Antarctica is poorly known due to a paucity of ice thickness measurements. This is problematic given its importance for understanding ice sheet dynamics and landscape and climate evolution. To address this issue, we describe the topography beneath the ice sheet by assuming that ice surface expressions in satellite imagery relate to large-scale subglacial features. We find evidence that a large, previously undiscovered subglacial drainage network is hidden beneath the ice sheet in PEL. We interpret a discrete feature that is 140 $\times$ 20 km in plan form, and multiple narrow sinuous features that extend over a distance of $\sim$1100 km. We hypothesize that these are tectonically controlled and relate to a large subglacial basin containing a deep-water lake in the interior of PEL linked to a series of long, deep canyons. The presence of 1-km-deep canyons is confirmed at a few localities by radio-echo sounding data, and drainage analysis suggests that these canyons will direct subglacial meltwater to the coast between the Vestfold Hills and the West Ice Shelf.