



## **Derwael ice rise and a migrating divide: An archive for changing ice dynamics in eastern Dronning Maud Land (Antarctica)?**

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Ice rises are grounded topographic highs in the coastal margin of Antarctica. They originate from a locally elevated bedrock topography and are typically enclosed by fast-flowing ice shelves. Near the dome and below the ice divides the internal stratigraphy often arches upwards due to the non-linear ice rheology which stiffens ice at low deviatoric stresses. The arch- (or Raymond Bump-) characteristics allow to deduce the history of the divide position – and with it the history of the flow regime including a potential change in the dynamics of the surrounding ice shelves. We investigate Derwael Ice Rise ( $70.5^{\circ}\text{S}/26.5^{\circ}\text{E}$ ) which buttresses and deviates the Western Ragnhild Glacier, one of the main ice streams in Dronning Maud Land. In 2010/11 and 2012/13 we collected a suite of high-frequency and low-frequency radar profiles which allow to visualize the bedrock as well as the internal stratigraphy three-dimensionally. We observe a flat bedrock, a spatially varying accumulation as well as multiple isochrone arches with a varying bump-amplitude vs. depth function below the current divide. More importantly, we also observe relict arches in the flanks which indicate that the divide most likely migrated to its current position. Using numerical models (higher-order and full Stokes) together with the radar stratigraphy and the derived accumulation rates we aim to explain the relict arches as a result of changing boundary conditions induced by a changing geometry of the surrounding Roi Baudoin ice shelf. We hypothesize that the relict arches bear witness to a larger scale change in ice flow which may encompass variations of the Western Ragnhild Glacier. If this holds true, this sector of east Antarctica may be more susceptible to changes than previously assumed.