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Distribution of wet and dry ice base in Dronning Maud Land, Antarctica

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The basal conditions of the ice sheet are of crucial importance for the dynamics of the ice, as they determine the sliding at the ice base. Since the base is hardly accessible for in-situ observations, indirect measurements of the basal properties are of large interest. The change in the dielectric contrast between ice and bedrock lead to differences in the basal reflection coefficient at the interface for wet and dry bases and thus allows to study the conditions at the base. We present inferences of wet and dry basal conditions along about 120,000 km of radio echo sounding (RES) profiles ranging from tributaries of the Filchner Ice Shelf towards central Dronning Maud Land, Antarctica. The AWI RES system operates at 150 MHz and transmits burst of 60 and 600 ns duration and has a sampling interval of 13.33 ns. For estimating the basal reflection coefficient, we determined the absorption loss rate of the radar signal within the ice. The absorption loss depends the conductivity, which itself is a function of temperature and acidity. We estimate the temperature at each location from ice sheet modeling using the Parallel Ice Sheet Model PISM run on 20km resolution. The dependence on the acidity is estimated using dielectric profiles from both the EDML and EDC ice core. We found ice stream areas which show a high reflectivity indicating a wet ice base, as well as an area in Coats Land, which has exhibited in former basal roughness studies to be a location of smooth bed, which is also exhibiting high reflectivity.