

Subglacial Rivers and Thermal Structure in Dome A, East Antarctica

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Subglacial water both effects and is affected by the basal shear stress, mass balance, and thermal structure of continental ice sheets. We have used two different methods to locate subglacial water in the Gamburtsev Subglacial Mountains (GSM) in central East Antarctica from radio-echo sounding (RES) measurements. Manual picks and automatic reflectivity anomalies both indicate water in subglacial valleys upstream of the source regions for previously reported valley head accretion ice plumes, as well as in a number of other areas within the survey domain. The water bodies tend to cluster into networks defined by pathways in hydraulic potential, suggesting a transport system better described as subglacial rivers than as subglacial lakes. Many of these water networks have a complex morphology, with characteristic widths on the order of a kilometer and portions which appear to meander. In addition, simple one-dimensional thermal models suggest that the observed distribution of bed echo power with ice thickness is best fit by a warm-bedded model. This provides further support for the concept of basal accretion, and also implies that the geothermal flux in the GSM is higher than previously believed, although closer to the global continental average.