We present a method for using a 500 MHz ground penetrating radar (GPR) system for estimating snow accumulation and compaction rates over large areas in Antarctica. We process this data to produce radargrams with unambiguous layers which can be observed and tracked in repeat GPR measurements made one year apart. Our processing methodology is a deterministic deconvolution via the Fourier domain using an estimate of the emitted waveform from direct measurement. Using the processed radargrams from two measurement sites near Scott Base, Antarctica, we can extrapolate point measurements of average accumulation from snow pits and firn cores on the ice shelf (Windless Bight) and in the lower area of Mt. Erebus to a larger area by identifying a dateable dust layer in the firn profiles with a reflection in the radargram. In Windless Bight we find an average accumulation of 280 ± 30 kg m$^{-2}$ a$^{-1}$ over an 800 m x 800 m area. The second site shows higher overall accumulation of 450 ± 80 kg m$^{-2}$ a$^{-1}$ and considerably greater local variability related to the undulating terrain. Tracking several internal reflection horizons along the profile lines and calculating the average change in separation of horizon pairs between two field seasons allows estimating compaction rates for snow between 2 m and 13 m depth. The derived compaction rates range from 7 cm m$^{-1}$ a$^{-1}$ at a depth of two meters, down to no measurable compaction at 13 meters depth, and compare well to published values from point measurements.