A MODEL FOR THE DIELECTRIC ABSORPTION OF THE CENTRAL WEST ANTARCTIC ICE SHEET AT RADAR SOUNDING FREQUENCIES. J. A. Doebbler[1], D. D. Blankenship[1], D. L. Morse[1] and M. E. Peters[1], [1]University of Texas Institute for Geophysics, Austin, TX 78759 (blank@ig.utexas.edu)

The problem of characterizing the subglacial water systems of Earth's Antarctic ice sheet may be analogous to those for characterizing any sub-ice water systems on Mars. On Earth, an important component of the dynamics of the West Antarctic ice sheet is the evolution of subglacial water systems that form at the transition from the thick slow-moving ice of the interior to the thinner fast-moving ice streams which drain the interior. Similarly, understanding the formation and migration of water beneath the thickest portions of the East Antarctic ice sheet will be essential for understanding the evolution of subglacial lakes.

Active electromagnetic sounding of ice sheets at radar frequencies (10's to 100's of MHz) has proven to be a useful tool for the detection of large-scale subglacial water bodies (i.e., lakes and sea water). The echo strength and horizontal extent of the return from the subglacial interface has proven to be a consistent indicator of large water bodies, however, the detection and characterization of smaller scale subglacial water systems will rely more heavily on the accurate interpretation of radar echo strengths alone.

With possible exception of scattering at the interface, the largest uncertainty in determining the subglacial material composition from these echo strengths is establishing the dielectric absorption of the overlying ice sheet. Furthermore, the dielectric absorption is largely a function of the vertical temperature profile within the ice. Because of this, our efforts have focussed on studying the sensitivity of the dielectric absorption to the boundary conditions (i.e., surface temperature and accumulation rate as well as geothermal flux) and ice flow characteristics (i.e., vertical versus horizontal advection) for portions of the East and West Antarctic ice sheets where these subglacial water systems are likely to evolve. Based on this sensitivity analysis our objective is to present a computationally efficient model of the dielectric absorption with an accuracy sufficient to support the unambiguous detection of small scale water systems in typical airborne and ground-based radar sounding experiments.