

The Whillans Ice Stream Subglacial Access Research Drilling (WISSARD) Project

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WISSARD is an NSF-funded project which involves 14 PIs at 8 institutions that will use an interdisciplinary science approach to study the subglacial environment of the Whillans Ice Stream in West Antarctica. It is split into three sub-projects: LISSARD (Lake and Ice Stream Subglacial Access Research Drilling); RAGES (Robotic Access to Grounding-zones for Exploration and Science); and GBASE (GeomicroBiology of Antarctic Subglacial Environments). LISSARD focuses on investigating the role of active subglacial lakes in controlling temporal variability of ice stream dynamics and mass balance. RAGES concentrates on stability of ice stream grounding zones which may be perturbed by increased thermal ocean forcing, filling/drainage cycles of subglacial lakes, and/or internal ice stream dynamics. GBASE addresses metabolic and phylogenetic diversity, and associated biogeochemical transformations in subglacial lake and grounding zone environments. These sub-projects are connected scientifically through common interest in coupled fluxes of ice, subglacial sediments, nutrients and water, as well as by the common need to characterize and quantify physical, chemical and biological processes operating subglacially. The project will focus on the lower Whillans Ice Stream, where three hydrologically connected subglacial environments that lie within close geographical proximity can be accessed: a subglacial lake (Lake Whillans); wet subglacial sediments including the grounding-zone wedge; and the sub-ice-shelf cavity. Direct sampling will yield seminal information on the glaciological, geological and microbial dynamics of these environments and test the overarching hypothesis that active hydrological systems connect various subglacial environments and exert major control on ice sheet dynamics, geochemistry, metabolic and phylogenetic diversity, and biogeochemical transformations of major nutrients within glacial environments.