A new Deep Ice Sheet Coring (DISC) drill for coring to the bed at the WAIS Divide site

C. R. Bentley
Affiliation: Ice Coring and Drilling Services, Space Science and Engineering Center, University of Wisconsin-Madison, 1225 W. Dayton St., Madison, WI 53706

As a contribution to IPY 2007-2008, the U.S. ice core research community, supported by the National Science Foundation, plans to core through the West Antarctic ice sheet (WAIS) at the ice-flow divide between the Ross Sea and Amundsen Sea drainage systems ("WAIS Divide"). To accomplish the coring a Deep Ice Sheet Coring (DISC) drill is being built at the University of Wisconsin. The modular design of the bore-hole assembly (sonde) provides a high level of flexibility to produce a 122 mm diameter ice core to depths of 4,000 m with maximum core lengths of 4 m. The DISC drill has a rotating outer barrel that can be used without or without an inner non-rotating barrel designed to improve core recovery in brittle ice. The drill utilizes separate and independent motors for the pump and drill allowing cutter speeds from 0 to 150 rpm and pump rates from 0 to 140 gpm. A high speed data acquisition system allows the "real time" monitoring of 30 parameters for operational and scientific use. Data are transmitted from the sonde to the surface through optical fibers contained in the drill cable, which also provides power to the sonde. The drill incorporates a user-friendly "expert" control system. The Quick connectors allow for fast core removal and sonde servicing. The drill tower is a tilting tower utilizing modular truss construction for flexibility and portability. The drill is scheduled for testing in Greenland in the summer of 2006 and for first drilling at the WAIS Divide site late in the 2006-07 austral field season. Our hope is to reach the bed in the 2009-2010 season. Beyond that we plan to develop means for drilling into the bed and for retrieving replicate cores in depth sections of particular interest.