

NEW TECHNOLOGY FOR SCIENTIFIC DRILLING

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Drilling for scientific purposes often has different requirements than commercial contractors provide the geotechnical, hydrocarbon and minerals industries. One of the most important scientific needs has been the ability to collect high-quality core from deep boreholes. Conventional rotary coring systems, used in the hydrocarbon industry, core with a relatively high weight on bit and low rotational speeds. To retrieve the core, the entire string must be tripped. Diamond wireline coring, typically used by the mining industry, collects very high quality core using relatively high rotational speeds and low weight on bit. The core is retrieved to the surface using a wireline, while the drilling string remains in the hole. The mining industry, however, is seldom interested in collecting deep (2000 m) core. To achieve the scientific requirement for deep high-quality core, DOSECC, with funding from the National Science Foundation, has designed a hybrid coring system (DHCS) that uses the strengths of both rotary and diamond coring technology. A hydraulic top drive powers the coring system and attaches to the elevators of a host rotary rig. The top drive is used for coring while the rotary rig is used to open hole, set casing and trip the drill string. Another area where scientific objectives exceed the capability of existing equipment is the drilling of recent lakes for paleo-climate information. Existing systems do not have the depth capability to sample the long term (5 Ma) high-resolution climate record that is available in the world's large tropical lakes. To satisfy this need, DOSECC has proposed construction of the GLAD800 system that is capable of collecting core to 800 m (water + sediment) in recent lakes. The system is designed for remote operations and is highly mobile.