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Advantages and limitations of remotely operated sea floor drill rigs

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A variety of research targets in marine sciences including the investigation of gas hydrates, slope stability, alteration of oceanic crust, ore formation and palaeoclimate can be addressed by shallow drilling. However, drill ships are mostly used for deep drillings, both because the effort of building up a drill string from a drill ship to the deep sea floor is tremendous and control on drill bit pressure from a movable platform and a vibrating drill string is poor especially in the upper hundred meters.
During the last decade a variety of remotely operated drill rigs have been developed, that are deployed on the sea bed and operated from standard research vessels. These developments include the BMS (Bentic Multicoring System, developed by Williamson and Associates, operated by the Japanese Mining Agency), the PROD (Portable Remotely Operated Drill, developed and operated by Benthic Geotech), the Rockdrill 2 (developed and operated by the British geological Survey) and the MeBo (German abbreviation for sea floor drill rig, developed and operated by Marum, University of Bremen). These drill rigs reach drilling depths between 15 and 100 m. For shallow drillings remotely operated drill rigs are a cost effective alternative to the services of drill ships and have the major advantage that the drilling operations are performed from a stable platform independent of any ship movements due to waves, wind or currents.
Sea floor drill rigs can be deployed both in shallow waters and the deep sea. A careful site survey is required before deploying the sea floor drill rig. Slope gradient, small scale topography and soil strength are important factors when planning the deployment. The choice of drill bits and core catcher depend on the expected geology. The required drill tools are stored on one or two magazines on the drill rig. The MeBo is the only remotely operated drill rig world wide that can use wire line coring technique. This method is much faster than conventional drilling. It has the advantage that the drill string stays in the drilled hole during the entire drilling process and prevents the drilled hole from collapsing while the inner core barrels comprising the drilled core sections are hooked up inside the drill string using a wire.