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Advanced Pressure Coring System for Deep Earth Sampling (APRECOS)

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Nowadays the recovery of cores from boreholes is a standard operation. However, during that process the mechanical, physical, and chemical properties as well as living conditions for microorganisms are significantly altered.

In-situ sampling is one approach to overcome the severe scientific limitations of conventional, depressurized core investigations by recovering, processing, and conducting experiments in the laboratory, while maintaining unchanged environmental parameters. The most successful equipment today is the suite of tools developed within the EU funded projects HYACE (Hydrate Autoclave Coring Equipment) and HYACINTH (Deployment of HYACE tools In New Tests on Hydrates) between 1997 and 2005.

Within several DFG (German Research Foundation) projects the Technical University Berlin currently works on concepts to increase the present working pressure of 250 bar as well as to reduce logistical and financial expenses by merging redundant and analogous procedures and scaling down the considerable size of key components.
It is also proposed to extend the range of applications for the wireline rotary pressure corer and the sub-sampling and transfer system to all types of soil conditions (soft to highly-consolidated). New modifications enable the tools to be used in other pressure related fields of research, such as unconventional gas exploration (coal-bed methane, tight gas, gas hydrate), CO2 sequestration, and microbiology of the deep biosphere.

Expedient enhancement of an overall solution for pressure core retrieval, process and investigation will open the way for a complete on-site, all-purpose, in-situ equipment. The advanced assembly would allow for executing the whole operation sequences of coring, non-destructive measurement, sub-sampling and transfer into storage, measurement and transportation chambers, all in sterile, anaerobic conditions, and without depressurisation in quick succession. Extensive post-cruise handling and interim storage would be dispensable. The complete core processing and preparation of in-situ sample sections for worldwide shipping could be conducted within hours after retrieval.