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# New tools and applications for the retrieval of cores under *in situ* pressure

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When a sediment sample is recovered from underground or beneath the sea floor and brought to the surface, the initial *in situ* pressure is released. As a result of this depressurisation, physical and chemical properties of the sample are significantly altered. In addition, gases and fluids may disappear during the retrieval of the sample.

This is a critical limitation in the investigation of marine gas hydrates which decompose rapidly under atmospheric conditions.

Various systems for the retrieval of cores under *in situ* pressure have been developed for the investigation of offshore gas hydrate deposits. The systems comprise of tools for the coring of the upper few meters of the seabed as well as wireline systems for use within the drill string for the investigation of gas hydrates buried several hundred meters below seabed. The Technical University Berlin (TUB) has been active in the development of pressure coring systems for many years. The developments include coring tools as well as systems for the transfer, sub-sampling, and analysis of cores under *in situ* pressure.

All of these systems have been deployed over the last 10 years on several offshore research cruises; from drill ships, like the IODP research vessel JOIDES Resolution, to smaller research vessels. The expeditions yielded valuable scientific insights related to the occurrence, distribution, and formation of gas hydrates in the seabed and how they respond to environmental changes.

In recent years, new systems have been developed at TUB in order to increase the volume of cores, reach greater depth, and enhance reliability.

However, there are many other fields of scientific study where the preservation of *in situ* pressure and the original content of fluid and gases may be crucial for the results of the investigation. The new fields of application consist of, but are not limited to, unconventional energy resources like coal bed methane, shale gas and oil, tight gas and the investigation of the deep biosphere. Also, exploration of conventional oil and gas fields may benefit from pressurized cores.

The latest designs at TUB encompass further developments in wireline pressure corers and a new drill string conveyed tool, which is not limited to the internal diameter of the drill string. Both tools are suitable for deployment from land based or offshore drilling rigs and can be adapted for specific needs in terms of pressure rating, core length and diameter, and geological formation. In addition, a newly developed transfer system allows for the transfer, cutting and subsequent analysis or storage of the core.