Scientific Application

The Advanced Piston Corer (APC) is crucial for high-resolution climate and paleoceanographic studies. The APC is a hydraulically actuated piston corer designed to recover relatively undisturbed samples from very soft to firm sediments. Such sediments cannot be recovered well by rotary coring.

(Above) Comparison of core quality between rotary and piston coring.

(Right) Schematic of the APC before and after stroking out.
Operation
The APC core barrel is run to bottom on the coring wireline. Pump pressure is then applied to the drill pipe, which severs shear pins and strokes the core barrel 9.5 m into the sediment. The inner core barrel, containing the core, is then retrieved by wireline. After core retrieval, the bit and bottom-hole assembly (BHA) are advanced 9.5 m, and the process is repeated.

Features
Compatibility
The APC inner core barrel is deployed in the same BHA as the Extended Core Barrel (XCB). Both tools are interchangeable depending on formation and no time is spent for bit trips.

Wireline Deployment
The APC core barrel is deployed using the coring wireline to avoid premature release of the shear pins.

Core Orientation
For paleomagnetic studies, the APC core can be oriented with respect to the Earth’s magnetic field by running a downhole orientation tool above the core barrel.

In Situ Temperature Measurement
Special APC shoes (APCT-3) can be run to record the in situ formation temperature while taking a core.

Specifications
Core Diameter
6.2 cm (2.44 in)

Maximum Length
9.5 m (31.16 ft)

Piston Force
23,000 – 28,000 lb at 2300 – 2800 psi pump pressure

Typical Operating Range
Formation
Very soft to firm sediments

Depth Range
Seafloor to +300 m below seafloor (mbsf)

Mean Recovery
~100% in soft sediments (see Limitations)

Rate of Penetration
9.5 m to ~38.0 m of core/hr (depends on depth/wireline time). Rate of penetration typically decreases with depth.

Quantity of Cores on Deck
1 to 4 cores/hr depending on water depth and formation.

Limitations
Does not penetrate or recover granular formations (such as sand) or hard ground. Core barrel may stick in firm sediments and require drillover.