**Coring Devices**

For more information or a price quote visit us on the web at laccore.org or contact us at laccore@umn.edu

**Ekman Dredge**

Max Sediment: ~0.15 m (mixed)
Max Water: limited by rope length
Rental

Ekman dredges (Ekman, 1911) are essentially metal cubes and a pair of spring-gate doors that are held open during deployment and closed during recovery. The box is lowered into the sediment via rope. The operator slides a messenger down the rope, which closes the doors, and the sample is returned to the surface. Recovered sediments are assumed to be mixed.

**Hongve Corer**

Max Sediment: 0.15 m, 2 cm Ø
Max Water: limited by rope length
Rental

The Hongve corer (Hongve, 1972) is a lightweight, mini gravity corer, easily carried by hand and deployed in remote field locations for recovering the uppermost sediments. The corer is deployed with a rope, and lowered into the sediment under its own weight, or more weight can be added as needed. A one-way ball valve at the top of the core barrel provides the suction needed for recovering cores.

**MUCK Corer**

Max Sediment: 1.5 m, 7cm Ø PC tube*
Max Water: limited by rope length
Rental or purchase

The LacCore MUCK (Multi-Use Coring Kit) can function as a gravity corer (self-activated or messenger-activated) or as a rod-deployed piston corer. In gravity mode the MUCK is deployed on a rope, and lowered into the sediment under its own weight to recover an undisturbed sample of the near-surface sediments. Penetration depth is determined by the amount of weight on the core head, which can range from 5 to 40kg. A valve in the core head closes when the deployment rope becomes slack (or can be configured to close when a messenger is sent down the rope), and provides suction during recovery. In drive rod mode the corer couples the drive rods to the tube, and prevents the piston from coming out the top of the tube.

**Nesje Corers**

Max Sediment: 6-9 m, variable Ø
Max Water: ~100m
Rental or purchase

The Nesje corer (Nesje, 1992) is a single-drive, cable-deployed percussion coring system with a piston, and is operable by two people—although three to four are preferable, particularly as core lengths increase. The core head consists of a steel cylinder to which the core tube is bolted; a rod extending from the top of the head guides a slide hammer (another steel cylinder of ~10-40kg) as the operator repeatedly lifts the weight a short distance and allows it to drop onto the core head. This system is relatively effective at penetrating clastic and/or coarse-grained sediments. As with all single-drive corers, the length of the tube limits the potential coring depth. Like all percussion corers, the Nesje can cause disturbance to the recovered sediment, particularly in sediments of continuously alternating density or grain size (e.g. clastic varves).

**HTH Corer**

Max Sediment: 0.5 m, 7cm Ø PC tube*
Max Water: limited by rope length
Rental

The HTH sediment corer is a rope-deployed gravity corer for collecting soft surface sediments without disturbance. A wide valve at the top of the core barrel prevents sediment thinning and closes automatically with a strong spring after penetration. The robust extruding device allows for easy sub-sampling in the field even by a single person.

**Freeze Corer**

Max Sediment: 1.2 m, 15 cm width
Max Water: limited by rope length
Rental or purchase

LacCore freeze corers consist of a steel wedge 1.5m tall. The wedge is filled with a mixture of dry ice and alcohol, and lowered into the sediment via rope or standard Livingstone drive rods. The corer remains in this position for ~10 minutes while sediment freezes to the outside of the wedge, then returned to the surface. The dry-ice alcohol slurry is poured out and the frozen slabs of sediment on the outside of the corer are removed. Freeze corers produce exceptional samples of watery, gassy near-surface sediments, which can be difficult to recover without disturbing the fragile sedimentary structures. Corer length determines the maximum depth of recovery.

**Ekman Dredge**

Max Sediment: ~0.15 m (mixed)
Max Water: limited by rope length
Rental

Ekman dredges (Ekman, 1911) are essentially metal cubes and a pair of spring-gate doors that are held open during deployment and closed during recovery. The box is lowered into the sediment via rope. The operator slides a messenger down the rope, which closes the doors, and the sample is returned to the surface. Recovered sediments are assumed to be mixed.

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Livingstone and Bolivia Corers
Max Sediment: 15-20 m, variable Ø
Max Water: 30 m
Rental or purchase

The Livingstone-type drive rod piston corer (Livingstone, 1955; Wright, 1967) can be used to collect successive one-meter drives of soft to consolidated lake sediment, which are collected in a 2-inch (5 cm) diameter steel barrel and extruded between drives into split tubes or other containers for storage. Two people at a minimum (preferably four or five) are required to operate this system, as repeatedly pushing the corer into the sediment and pulling it back to the surface are more efficient and effective with additional hands.

A modification to the Livingstone, called the Bolivia corer, replaces the steel barrel with standard polycarbonate tube, eliminating the need to extrude cores and providing superior retention of upper watery sediments. When a depth is reached at which sediments are too resistant for the polycarbonate tube, it only takes a few minutes to switch to the steel barrel and continue coring in the same hole. The Bolivia can also be deployed with a square rod long enough to take 1.5-meter drives, increasing efficiency in both coring time and polycarbonate tubing utilization. Casing pipe facilitates coring at greater water depths, and is important for re-entering holes for successive drives. Other Livingstone corers are specially modified for coring through fibrous material such as peat.

Kullenberg Coring System
Max Sediment: 14 m, 7cm Ø PC tube*
Max Water: limited by wire rope length
Rental or purchase

The Kullenberg corer (Kullenberg, 1947; Kelts et al., 1986) is a single-drive, cable-deployed piston corer that is dropped into the sediment from a short distance (typically 0 to 3m), propelled by the momentum of the heavy (~1000 pounds/450 kg) lead weights on the core head. Cores are recovered in steel barrels lined with plastic tubes (standard polycarbonate for the LacCore system). The corer drop is triggered when a gravity corer, suspended on a second cable to the side of the Kullenberg corer, enters the sediment and ceases downward travel—thus most Kullenberg cores have an accompanying gravity core that captures the upper sediments that are disturbed by the long corer. Deployed from a wire, the range of water depths is limited only by the length of wire on the winch. However, the immense weight of the system requires a substantial secondary apparatus to handle the corer. A heavy-duty winch and hydraulic system or power supply must be employed to raise and lower the corer, and if long core barrels are used to increase the depth of recovery, a tower or A-frame must be available for deployment and recovery. The LacCore R/V KRKII is a large platform consisting of two 19-foot (5.5m), 950-pound skiff boats bolted together with aluminum deck plates and beams. It can be disassembled and towed behind a heavy-duty truck or shipped in a standard 20-foot shipping container.

Vibracoring System
Max Sediment: 15-20 m, variable Ø
Max Water: 30 m
Rental or purchase

To overcome obstacles posed by coarse-grained layers, Livingstone corers can be used with the LacCore vibracoring system that attaches to the drive rods at the surface. This allows coring through thicker coarse-grained units (sands/gravels, tephas), which are notoriously difficult to push through without vibration or percussion.

Global Lake Drilling (GLAD) System
Max Sediment+ Water: 1500m
Contact DOSEC for more information

The GLAD drilling tools and platforms were designed to collect long, high-quality cores in lake sediments. The drill rig can operate from multiple floatation systems or can be truck-mounted for use on land. A specially-configured barge can be anchored in shallower water depths or configured with a dynamic positioning system for deep-water drilling. LacCore provides scientific and logistical support to lake drilling projects.