Università di Trieste
LAUREA MAGISTRALE IN GEOSCIENZE
Curriculum Geofisico
Curriculum Geologico Ambientale

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Geologia Marina

Parte II

Modulo 2.3 Metodi diretti: Sondaggi superficiali ed analisi dei sedimenti

Relatore
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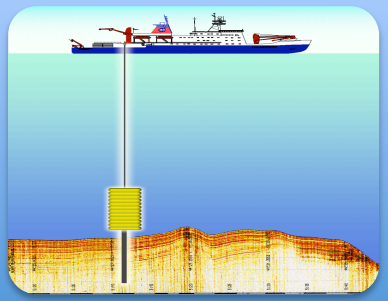
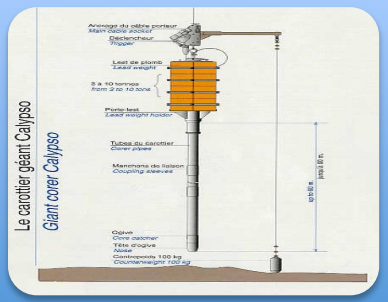
BOTTOM SAMPLING SYSTEMS



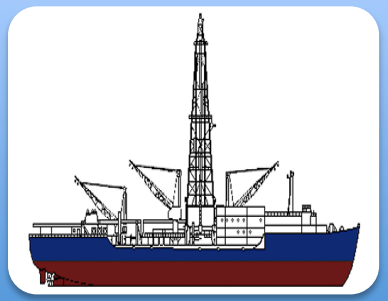
Gravity corer

- classic gravity corer (Emery and Dietz, 1941; Hvorslev and Stetson, 1946)
- box corer
- kastenlot corer
- multi-corer



Piston corer

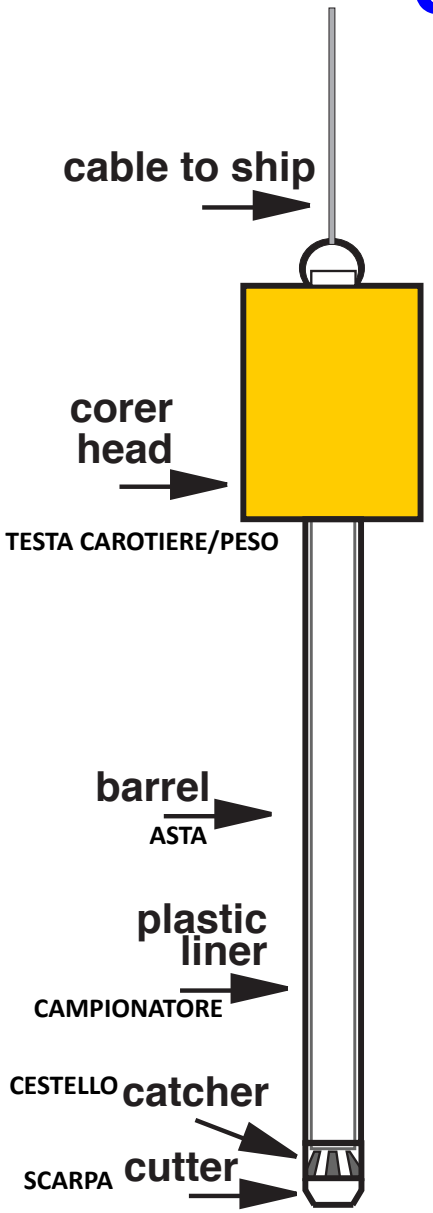
- classic piston corer (Kullenberg, 1947; 1955)
- long piston corer
  - Calypso piston corer (e.g. R/V Marion Dufresne, G.O. Sars)
  - Jumbo piston corer (e.g. R/V Araon)



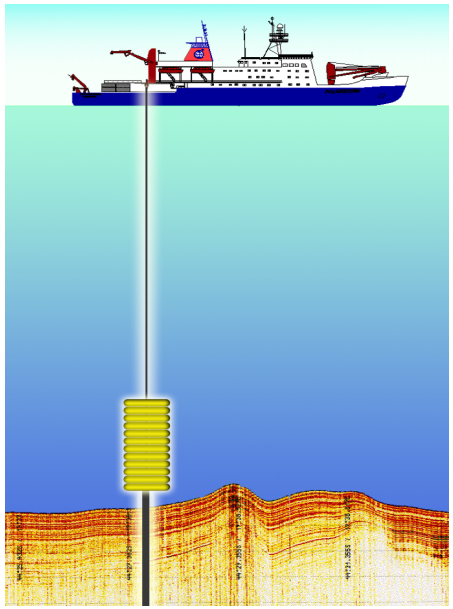
Drilling systems

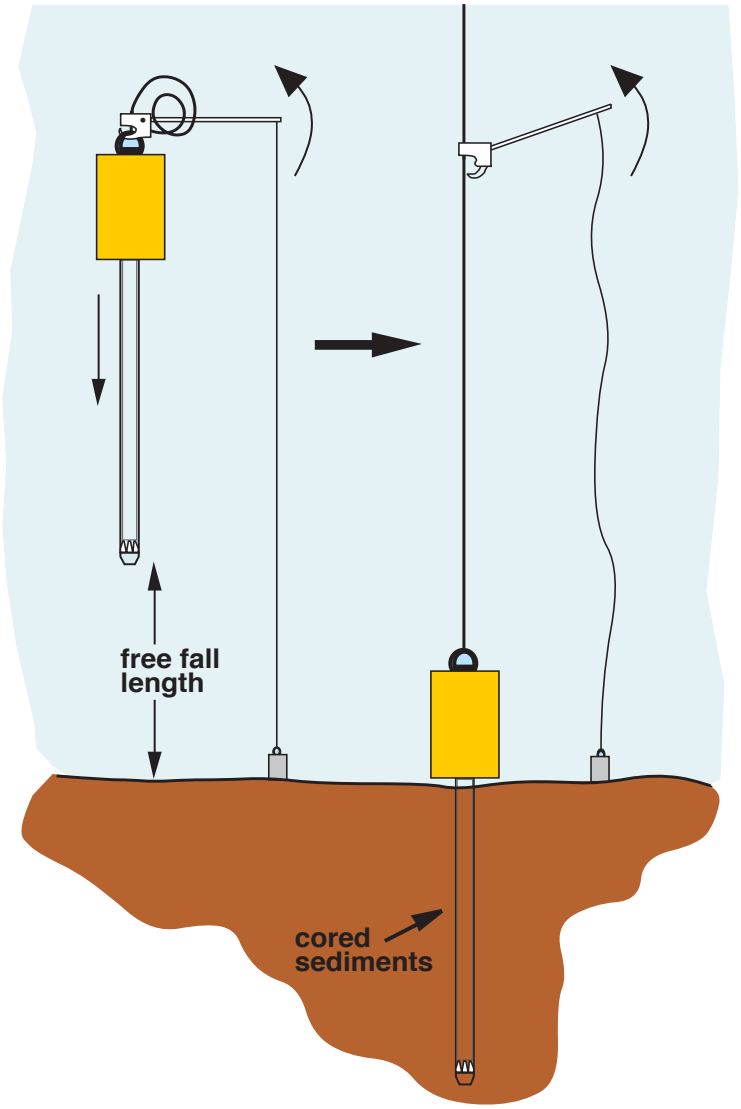
- ocean floor drilling systems (e.g. IODP-drilling vessels & semi-automated MeBo system)
- ice drilling systems (e.g. EPICA-European Progect for Ice Coring in Antarctica & NorthGRIP- North Greenland Ice Core Project)

Classic gravity core system (Emery and Dietz, 1941)

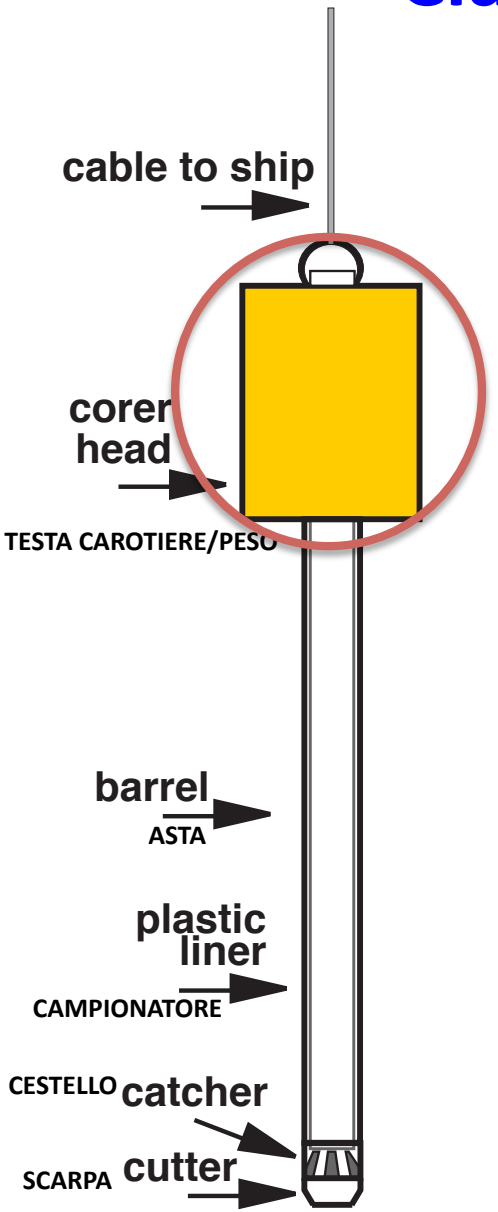


It is the simplest coring device in which the weight of the coring equipment is used to force the barrel into the sea bottom. This system can work with or without a triggering system (sistema di sgancio)



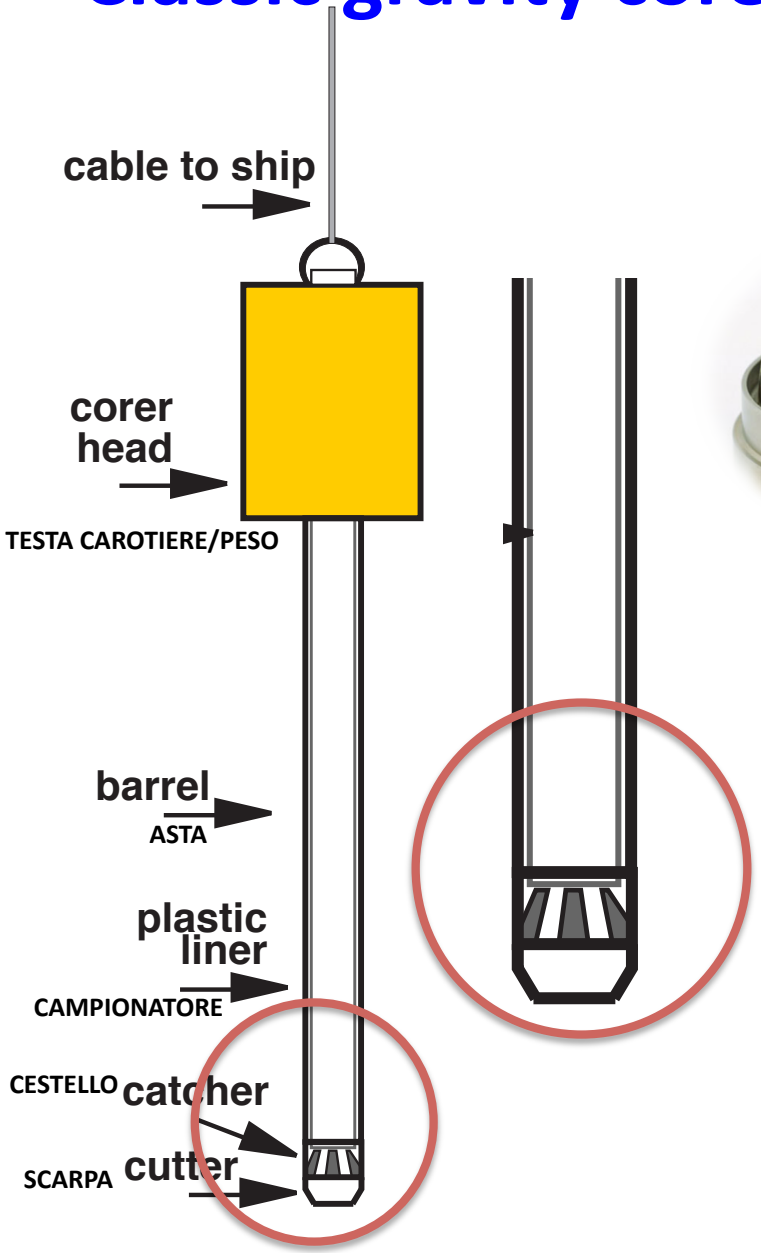


Classic gravity core system: corer head



weigth 600-800 kg
6000 kg

Classic gravity core system: core catcher and cutter



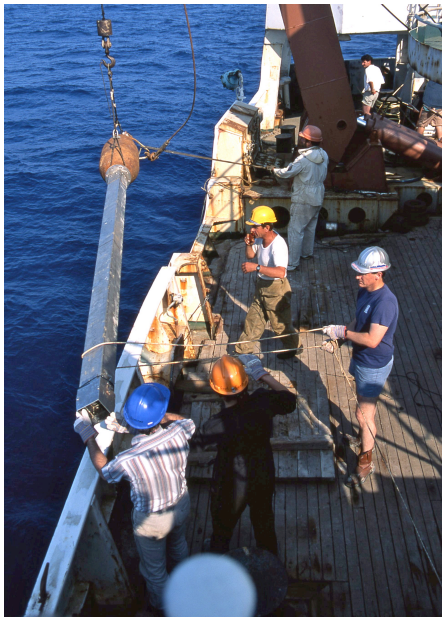
core catcher (cestello)

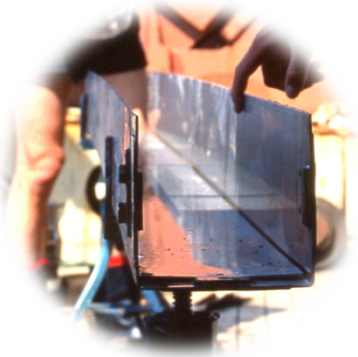
core cutter (scarpa)

core cutter and catcher

Additional gravity core systems: Kastenlot corer

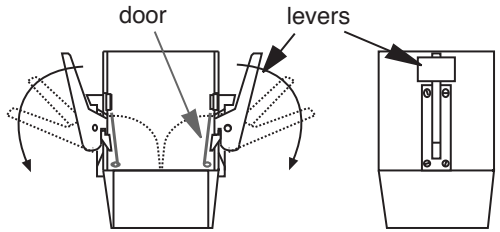
The kastenlot (kastens) corer was originally designed by Kögler (1963) it was improved and modified by Zangger and McCave (1990). The barrel, of variable lengths, is square in section (15x15 cm) and it contains a base plate that can be raised to reveal a new cleaned core surface





Square section of barrel

Core cutter and catcher

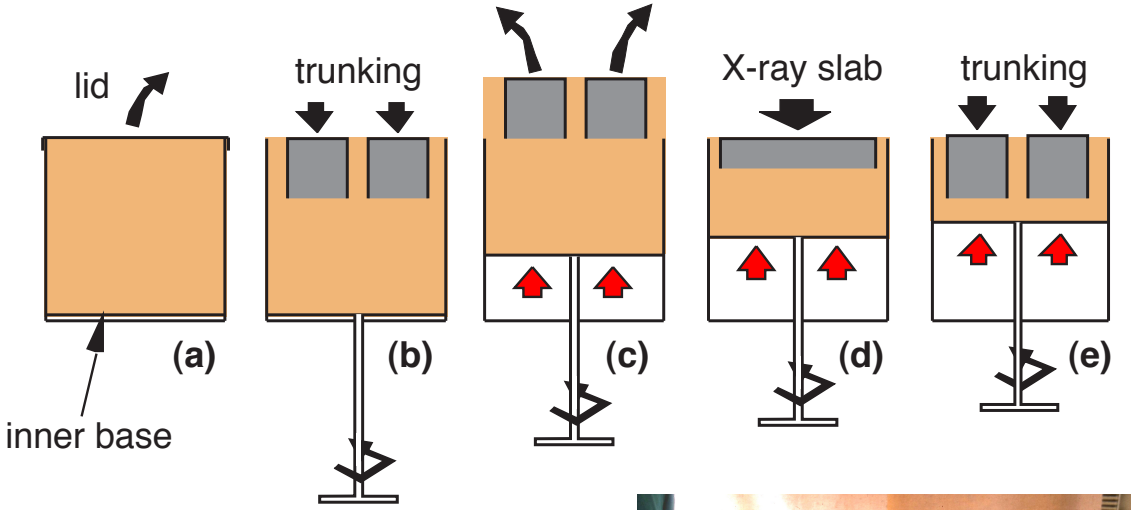


Head of kastens corer →

The core catcher has a shutter-like closure consisting of two square doors held under tension and blocked in a retracted position by two levers located on the outside. During the corer pullout, the pressure of the surrounding sediments pushes down the two levers closing the doors.

Sampling of Kastens cores

(a) removal of the barrel lid to reveal the core surface;
(b) two PVC trunkings are pushed into the sediments
(c) the inner base is moved upward to expose the trunkings that are cut at the base and removed from the main core using a cheese wire;
(d) sampling with x-ray slabs, and a further set of trunkings (e). Each time the sediments are lifted upward and withdrawn with a cheese wire



Additional gravity core systems: BOX-corer

Designed for minimum disturbance of the sediment surface, ideal for coarse/stiff sea floor sediments, it allows the recovery of bottom waters.

lateral surface

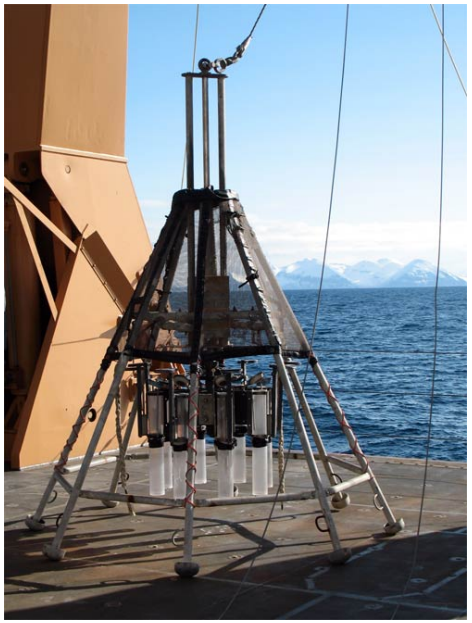
coral sampling

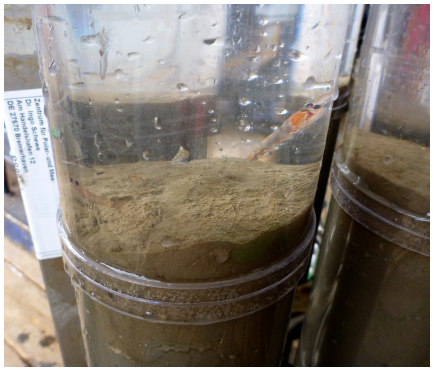
sampling of glacigenic sediments

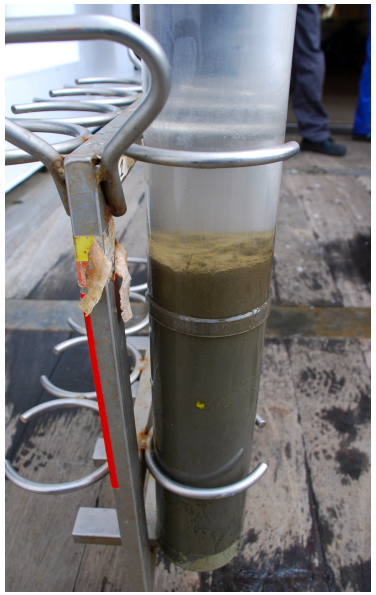
Box core sampling

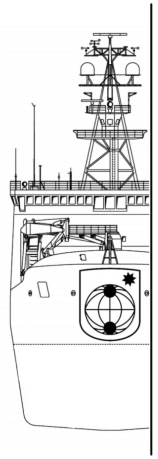
Additional gravity core systems: Multi-corer

Especially designed for the sampling of sea bottom sediments-water interface, it permits to recover low disturbance sediment. Ideal for geochemical and biological sediment and water analysis.

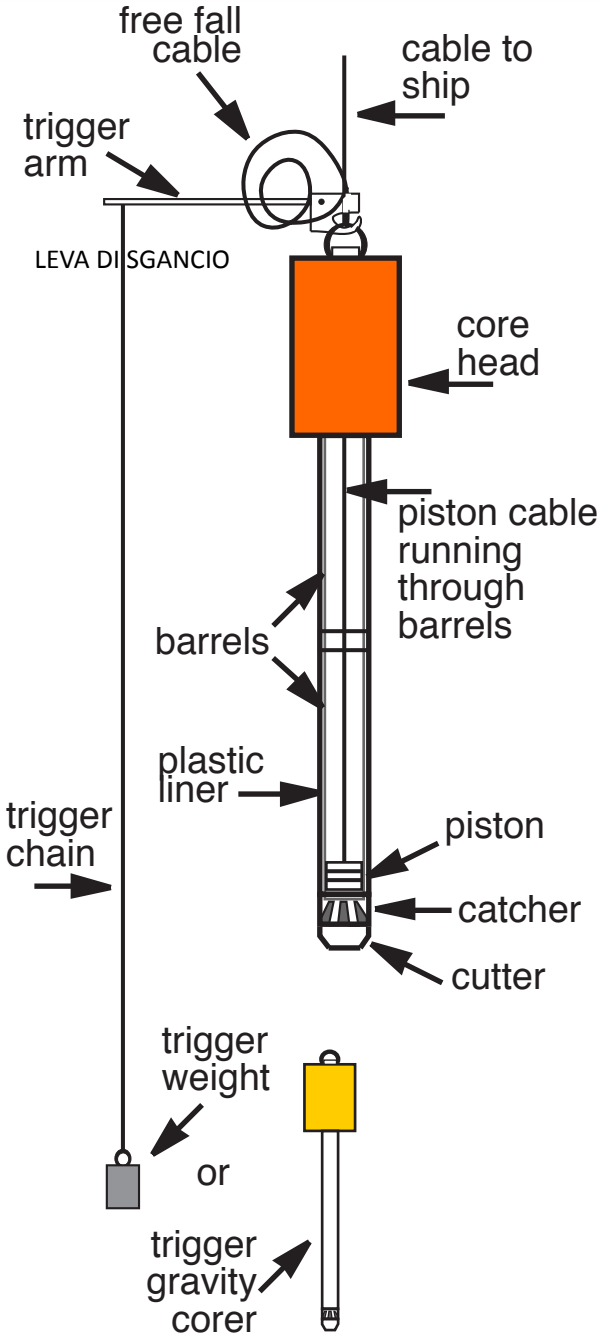






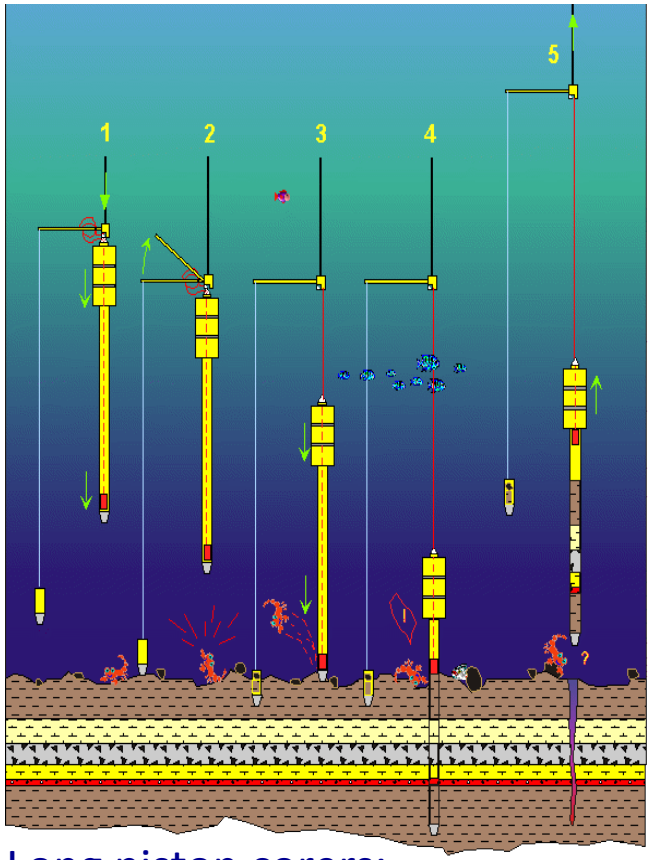


Kullenberg piston corer system



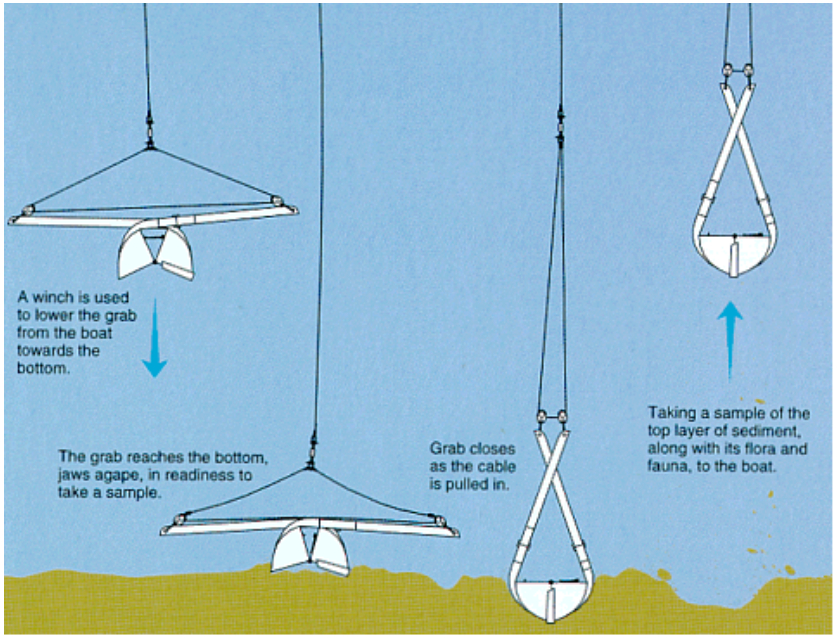
Standard assemblage for piston coring. The core barrel penetration is maximised by the action of a piston located in the lower barrel (or into the lower plastic liner if present) that helps to overcome the friction between sediments and the coring tube by generating Vacuum behind the cutter. The sediment cores obtained are less compacted and distorted than gravity cores. This system is always used coupled with a trigger mechanism.

Specifications	Kullenberg piston corer	Long piston corer
headweight	600 kg	6000 kg
barrel length	6 m	13 m
barrel inner diameter	65 mm	140 mm
barrel thickness	5 mm	5 mm
plastic liner outer diameter	63 mm	113 mm
plastic liner thickness	3 mm	5 mm
maximum cable length	5000 m	10000 m
cable diameter	12 mm	30 mm
freefall	4-5 m	1.5 m

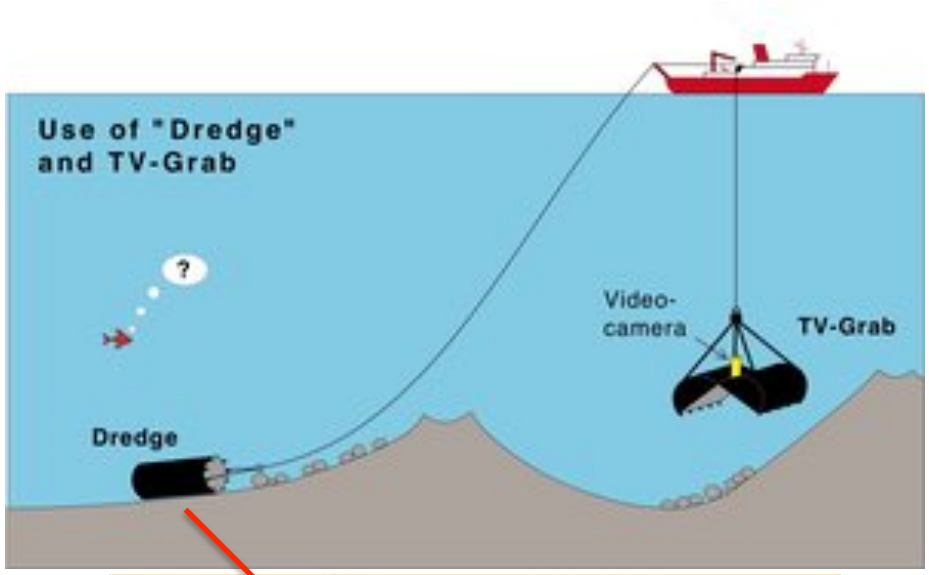


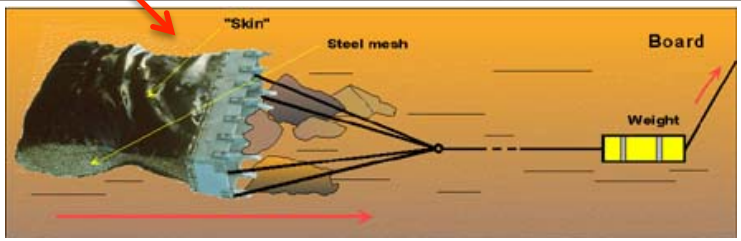
Long piston corers: Claypso, Jumbo etc.

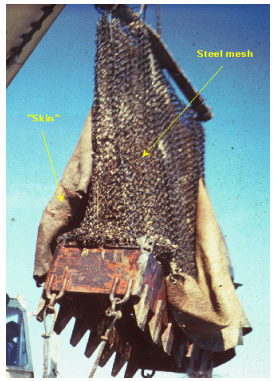
Grab (benna)

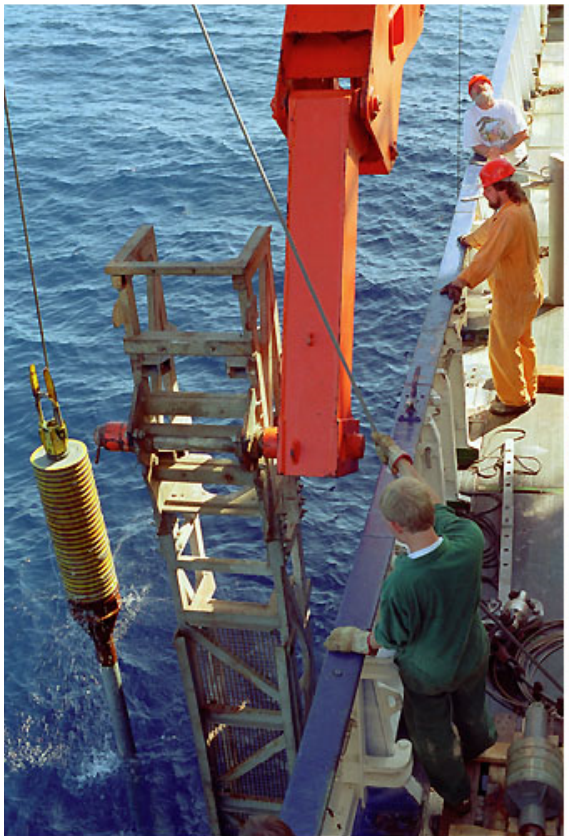


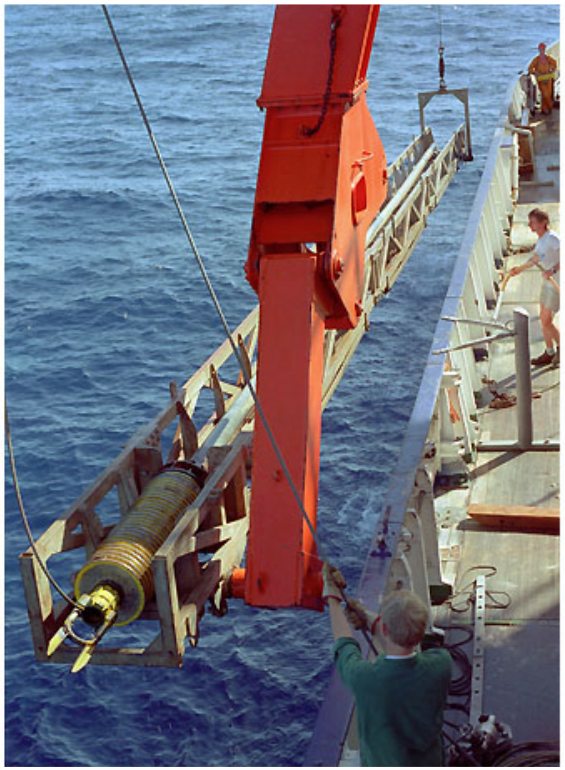
Dredge (draga)









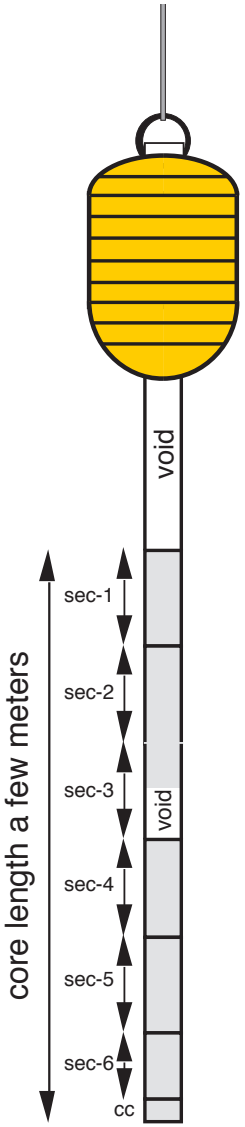


CORE ON DECK!

CUT INTO SECTIONS

SECTIONS' LABELING

The plastic liner is estracted from the barrel and cut into sections 1-1.5 m-long

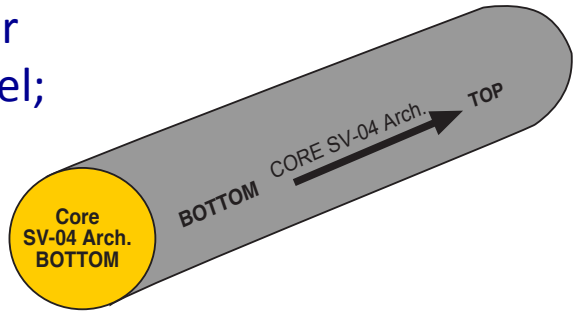


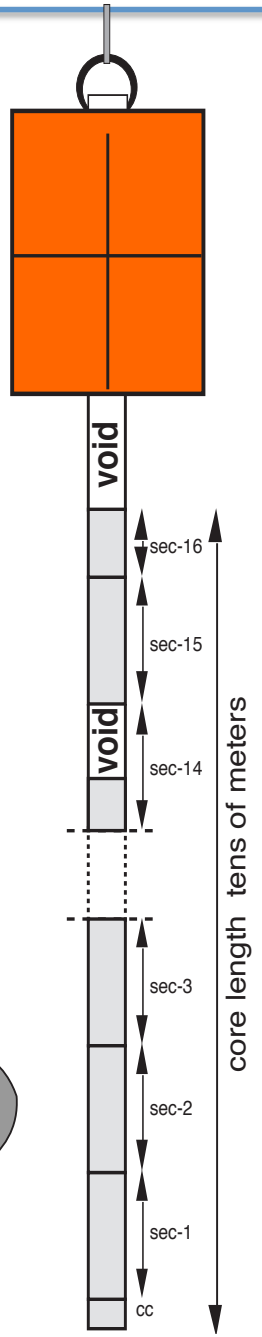
The sections are numbered consecutively from bottom to top of the core or *vice versa* depending on the total length of the core.

Short cores are numbered consecutively from top to bottom.

Long cores are numbered consecutively on removal from the barrel from bottom to top of core.

Each section is labeled with a code indicating the the name of the project and/or the name of the research vessel; the core number; the section number, and stratigraphic orientation (top-bottom)





CORE OPENING AND SEDIMENTS ANALYSIS

The plastic liner of each section is cut longitudinally. The plastic liner is cut by means of an elettric saw/microvibro saw, while the sediments are cut using a "cheese wire". The two splitted half-sections are labeled as **working section** and **archive section** and will undergone a different analitycal process:

ARCHIVE SECTIONS: not distructive analyses

- X-radiographs
- multi-sensor core logger
- XRF core-scan
- photographs

WORKING SECTIONS: visual logging and sub-sampling

Half-sections' labeling