a maximum penetration of 2 m, which is typical in sandy sediments using the standard vibracoring technique. When standard vibracoring results in less penetration, more core tube is needed; if penetration is greater, less core tube is required.

Retrieving long vibracores from depositional environments dominated by sand involves taking a series of short, closely spaced cores and starting each consecutive core at a deeper elevation. A water pump is used to jet sand out of 3-inch-diameter core tube, which then serves as casing for the next (2-inch-diameter) core. The process is illustrated in Figure 1.

First, a 3-inch-diameter vibracore is taken (Fig. 1A) employing the standard technique (Lanesky et al. 1979). Typically, 2–3 m are recovered in water-saturated sand. After this core is carefully measured, labeled, and stored, another vibracore tube of the same length and diameter is prepared. A smaller diameter (2-inch) PVC pipe of approximately the same length is connected to the water pump and inserted inside this core tube. Both are then hoisted vertically, at least 2 m away from the first core hole so as to avoid any effects of “caving-in” of the first hole. Making sure that the vibracore is covered to keep it from getting wet, the vibracore and water pump are started simultaneously. The scouring of sediment by the water jetting out of the PVC tube allows the core tube and PVC pipe to drop rapidly into the sediment.

Since the water jet disturbs the sediment ahead of it, it is necessary to discontinue the operation of the pump when the depth of this disturbance is equal to, or less than, the depth of the previous core (Fig. 1B). The amount of sediment disturbed, but not removed by the water jet, is variable and dependent on the force of the water jet, sediment grain size, and degree of compaction. It is important to determine this accurately to avoid disturbing uncored sediment, or to core unnecessarily previously cored sediment. An initial estimate can be made by visual inspection of the scour created by the jet on the sediment surface, but only after trial-and-error can the depth of disturbance be accurately determined. It is best first to overestimate the amount of disturbance to ensure that uncored sediment is not disturbed. The massive appearance of the disturbed sand is relatively easy to identify in the core, and the depth of disturbance (the “overburden”) can then be measured. In water-saturated, fine-grained sand using a 3-hp pump, the depth of disturbance is approximately 50 cm. After the PVC pipe is removed, it is necessary to measure the depth to which the sand in the core tube has been washed out, since this will be the elevation of the top of the next core. The 3-inch-diameter core tube serves as casing for the next core, which is taken with a 2-inch-diameter core tube (Fig. 1C) using the standard technique (Lanesky et al. 1979). Usually, when the core is retrieved, it pulls the casing out of the ground with it. Thus, the casing can be reused, and there is no “litter” left behind.

The process of “jetting” another 3-inch-diameter core tube is then repeated at a nearby area (Fig. 1D) to the depth of the previous core, to serve as casing for another 2-inch-diameter core (Fig. 1E). In this manner, consecutive, closely spaced cores are taken to the desired depth. The maximum core length of 12 m obtained by the author was limited by the inability of longer core tubes to remain intact when hoisted vertically during the core retrieval process.

**DISCUSSION**

This technique is best suited for areas with easy access to a large water supply. It is possible to transport a water supply, but this limits the portability of the vibracore apparatus. In addition, the operators usually get wet saturated during the “jetting” process, which might prove uncomfortable in cold weather. The greatest limitation of this procedure is that it can be quite time consuming. The average time to recover a 10-m core is approximately 6–8 hours.

Since the amount of sediment disturbed by the water jet cannot be determined accurately until some cores are opened and described, it is best to overestimate the amount of disturbance, even though this involves coring through a thicker “overburden.” Also, in cores of massively bedded sands, it might be difficult to distinguish the undisturbed from the disturbed sediments. After some experience coring different types of sediment, the depth of disturbance can be predicted accurately.

Despite these problems, this modification of the vibracoring technique results in slightly offset, but otherwise undisturbed composite vibracores up to 12 m in length in depositional environments that are dominated by sand-sized sediment. Previously, deep vibracore penetration was restricted to environments dominated by muddy sediments. Even though some additional equipment is required, the vibracore apparatus is still very portable and relatively inexpensive.

**REFERENCES**


---

**THE USE OF A MULTIPLE-DISC VIBRATING SAW FOR CUTTING THE LINERS OF SEDIMENT CORES**

H. Kawohl and H. R. Kudrass

Federal Institute for Geosciences and Natural Resources

Postfach 51 01 53

3000 Hannover 51

Federal Republic of Germany

**INTRODUCTION**

Unconsolidated sediments are usually sampled using gravity, piston, or vibracorers. All of these devices use core barrels with plastic liners so that undisturbed cores can be retrieved. Various methods are used to open the liners so that the core can be examined.

A rotating saw mounted on runners is often used to cut the PVC liners. This saw is noisy and hazardous, and only a single longitudinal cut can be made at a time. For the next cut, the saw or core has to be repositioned. Moreover, large amounts of sawdust are generated and spread about the laboratory by the rotating disc or pressed into the core. Liners are also sometimes cut with a sharp knife. This method avoids several disadvantages of the rotating saw, but it requires heavy and bulky equipment to hold the liner in place during the cutting.

**DESCRIPTION OF THE VIBRATING SAW**

A vibrating saw is commonly used to cut curves in sheet metal or to remove plaster casts. The saw discs, made of hardened steel, are similar to those used for rotating saws. The teeth are symmetrical and sharpened on both sides. The disc vibrates about its center at circa 300 Hz with...