

Sediment Sampling Protocol

Overview:

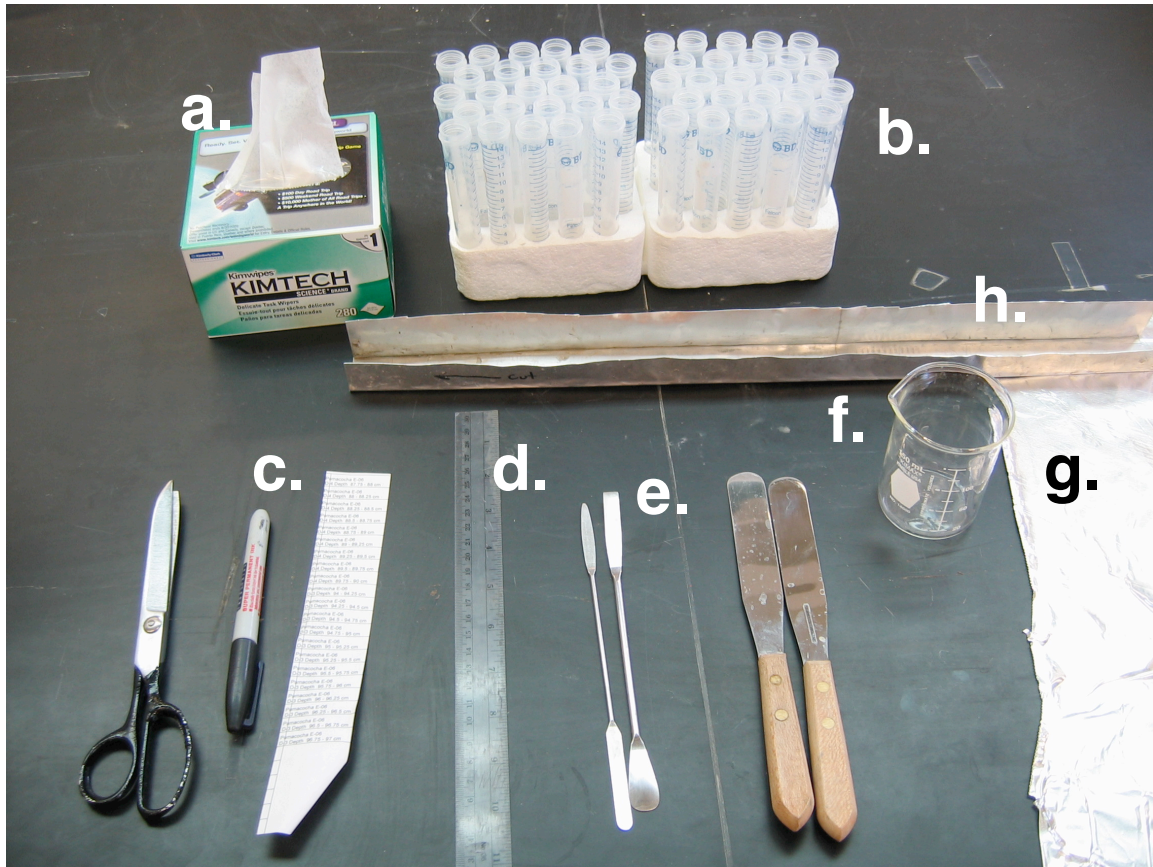
Although each step in processing cores is important, sampling is one of the most important because what is done in this step lays the foundation for the quality of your results. Therefore, **PAY ATTENTION TO EVEN THE SMALLEST DETAIL WHEN SAMPLING** and write down your thoughts, notes, etc... Also, it is exceedingly important to have a **CLEAN WORKING SURFACE**. This should be achieved by wiping down the area where you will be working with methanol and paper towels and then, if necessary, placing a sheet of new aluminum foil on the counter.

Procedure

Sampling

- a. Prior to sampling, you will have split your core following the “Core Splitting Protocol.” One half of the split core will be archived, and the other will be designated the “work half.” The work half of the split core is the **ONLY** part of the core that is to be sampled. **DO NOT SAMPLE THE ARCHIVE HALF OF THE SPLIT CORE WITHOUT EXPLICIT CONSENT FROM YOUR SUPERVISOR.**
- b. Also prior to sampling, you will need to have photographed your core. This will either be performed in house with our stationary camera that is housed in a light box, or at the Limnological Research Center at the University of Minnesota with a high-resolution line scanning digital camera.
- c. Next, you must decide what the appropriate resolution is to sample your core. For this, you must consider the sedimentology of your core. Are there fine laminations? Are your sediments massive? Finer scale sedimentology may mean that your sediments are preserving high-resolution climate signals (annual to decadal), in which case, you will want to sample at the finest scale possible (realistically ~ 1 mm intervals). Not every sample may be run at this resolution, but the option will be available. Remember, once you have sampled, you cannot go back, so you must get it right the first time. For sediments that are massive, a lower sampling resolution may be warranted, perhaps 0.25 cm or 0.5 cm.
- d. Once you have decided at what resolution to sample your core, prepare the necessary items you will require for sampling. These include:
 - a. Kimwips
 - b. Sample containers, such as falcon tubes or scintillation vials
 - c. Printed labels for your sample containers
 - d. Clear plastic ruler
 - e. Sampling tools such as small spatulas, knives, etc...
 - f. 150 ml glass beaker with DI H₂O
 - g. Plastic or aluminum foil to place on the working surface to ensure cleanliness

- h. Sample slicer
- i. Photographs of your cores



High-Resolution Carbonate Sampling

Various methods are used to sample at fine scales, but the one used to sample the varved Pumacocha core is described here. For this process you will need the items outlined above as well as the I-shaped aluminum sediment holder (~30 cm long) and a clear plastic ruler with metric measurements.

- a. Prior to sampling your core for carbonate minerals, you must have sampled for LOI and bulk density. If you have not done this yet, **STOP**, and sample for these first.
- b. Select the interval that you want to sample, usually you will want to start at the top and work your way down. This section should be equal to or less than 30 cm. Do not sample more than 30 cm at a time. Identify and mark the section that you are selecting for sampling on the photograph of the core. Identify the time and date on the photograph.
- c. You will sample only $\frac{1}{2}$ of the split core, or $\frac{1}{4}$ of the whole core. Place a meter stick on the core so that the meter stick covers $\frac{1}{2}$ of the split core.

- d. Take a knife or wooden handled spatula and slice 30 cm lengthwise down the core. Cut ~1 cm further down the core than the interval that you are going to sample.
- e. Make widthwise cuts at the top (0 cm) and bottom (30 cm) of the lengthwise section that you just cut
- f. Place the 30-cm-long clear plastic ruler in the lengthwise cut of the sample section.
- g. Use the wooden handled spatulas to gently pry out the 30-cm-long sediment section that is being supported by the clear plastic ruler.
- h. Place the sample section (still on the ruler) on the clean working surface.
- i. Take a razor blade and clean the sediment section so that there is no material contamination that will be incorporated into the samples. Do this for all three sides.
- j. Align the 30-cm-long sediment sample with the 0 mm mark on the clear plastic ruler.
- k. Place the sediment and ruler in the I_I shaped aluminum sediment sampler with the 0 mm mark flush with the lip of the sampler on the end that is marked "cut here."
- l. Advance the ruler 1 mm and use a razor blade to slice the sample. Make sure to dip the razor in water before slicing the sample. This will reduce friction and smearing of the sample. Also, make sure to clean the razor between samples.
- m. Advance the ruler at 1 mm increments and slice the samples until the 30-cm-long section is consumed.
- n. Mark the location of each sample on the core photograph.

NOTE A sediment sampler that is capable of sampling the entire core at 1 mm intervals should be designed so that analyses can be run on sub-samples of one sample. However, problems may be encountered when fine-scale laminations or sediment structures are not parallel. Future innovation should address this issue.

Lower-resolution sampling