Standard Operating Procedures

Geochemistry & Radisotope Analysis & Computation Laboratory
(GRACkLe)

CURRENTLY UNDER DEVELOPMENT

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Introduction

Introductory text forthcoming.

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Field methods

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Chapter 1

Ostracods

1.1 Sediment disaggregation

1.1.1 Silt to sand

Sieve cleaning and storage: Thoroughly rinse sieves after each use to remove excess stuck sediments To rinse turn sieve over and run water over under side to remove particles without forcing them through the sieve. When rinsed dry the sieves to remove most of the water Use ethanol or isopropyl alcohol in squeeze bottle and spray over bottom of sieves Place cleaned sieves in oven to dry overnight Store in dry area

Preparing Sediments for Sieving: Find clay sediment samples stored in buckets in lab refrigerator and remove a handful sized chunk of clay Place clay in large glass beaker and add water to midway in the beaker Break up large clumps of clay by hand and stir with long glass stirbars Once the clay is fully broken up and there are no large clumps in the beaker, the sediment mixture is ready for sieving

Wet Sieving: Place wet sieves in the sink Ensure that sieves are aligned with the 200mm sieve on top and the large 75µmm sieve on the bottom. Carefully and slowly pour clay slurry from the beaker onto the top 200mm sieve After the clay/water mixture is poured, use a plastic hose with low water flow to rinse the top sieve until it is clear of fine particles and only large grains remain Remove 200mm sieve and place it aside Often fine clay particles clog the 75µmm sieve so it may be necessary to move water through the sieve by disrupting the water To clear clear clay you can also use water (very gently through the hose) to move the clay through the sieve *Note* if the 75µmm sieve is clogged do not try to force sediments through the sieve and when using hand or stir bar to clear sieve do not put too much pressure on or scratch the sieve

Once water is drained from the 75µmm sieve, rinse several times with the hose and gentle water flow to removethe last of the clay so that only sandy particles remain. (The sandy material will generally look like white/black particles, while the clay will generally be grey

or red) Prep a clean empty beaker Use the hose to flush the sandy particles from the bottom of 75µmm sieve into the beaker *Note* Be careful when rinsing the 75µmm sieve we do not want to lose any of this material When you rinse sediments into the beaker, you will have a mix of sandy sediments and water in the beaker. Allow this to settle and pour off as much of the clean water as possible without losing any of the sediments (you just want most of the water out) Continue sieving and collecting sediments in the beaker *Note* be sure that you are only sieving the sediments from one site, and do not use all of the sediments from a single site set aside 200-500 grams of sediment from each site in bag or storage container

Drying Sediments:

The beaker of collected, sieved, sandy sediment that has been decanted and prepped with Isopropanol can now be dried. Place the glass beaker in the oven at 60°C allow to dry for several hours Move dried sediments to a bag or container properly labeled with the sediments collection site name.

1.1.2 Clay

1.2 Sieving

Chapter 2

Sediment cores

2.1 Splitting and cleaning coers

Coming soon…

2.2 Core imaging

Core imaging is accomplished by taking sequential digital photographs along the length of a core and stitching the individual images into a single continuous core scan.

2.2.1 Image collection

After cores are split and the surface is cleaned and prepared for imaging, place the split core in the core imaging box, aligning the bottom edge of the core with 0 cm on the scale. Replace the box cover and slide it to a position roughly over the midpoint of the core.

Remove the lens cap and turn on the camera, ensuring the core and scale are fully within the field of view. The camera shutter speed (1/50?[1])and ISO (80) are set to optimize clear images with appropriate contrast for the lighting array. **Do not adjust these settings.**

Image both split halves of a core, labelling the respective halves 'a' and 'b'.

1. With the camera positioned over roughly the midpoint of the core. Press the Autofocus button ("AF ON") and allow the camera to focus on the core surface until a green circle appears in the lefthand corner of the display. Collect an image and visually confirm its quality. Delete this image and begin imaging the core.
2. Collect the first image at the upper extent of the core.

[1]Graham needs to double check this so do not change if it is incorrect

3. Collect images—progressing downcore—at 10 cm increments, using the subtle resting points of the imaging box as you slide the top along its track. Ensure that sequential images overlap by $\geq$1 cm.

4. Repeat this process for subsequent core-halves, keeping careful track of the image sequence corresponding to each core-half.

Once you have completed a session of image collection, transfer the RAW image files to a computer. Distribute images to directories corresponding to individual core-halves, using the following directory hierarchy, for example for images from a core-half 'a'.

```
ResarchProjectFolder > core-scans > CoreName > a > {images}
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2.2.2 Image processing

Optics corrections

Stitching the core scan

Chapter 3

Uranium-series chemistry

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Aliquots of the solution, containing nanogram amounts of U will be added to PFA vials containing geologic material and a mixture of HNO3 (± HF) for mineral digestion. After sample digestion and a series of drydown-reflux procedures, U and Th isotopes will be separated by ion chromatography, dried just to dryness and shipped in sealed vials to a collaborating laboratory for isotopic analysis.

Part III

Analytical methods

Part IV

Computational methods

Part V

Appendices

Appendix A

U-Th mixed-spike preparation

SRM 4328d and IRMM-3636 will be mixed into a PFA dropper bottle at ppm levels of U (and lower concentrations of Th) for use as a tracer solution for isotopic analysis.