EarthScope Student Geochronology Program, Lab Educational Plan
USGS Luminescence Geochronology Lab, Denver, CO

Shannon A. Mahan, Lab Director
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Lab Description

The USGS Luminescence Geochronology Lab is a modern luminescence dating facility with many capabilities including Quartz Single Aliquot Optically Stimulated Luminescence (OSL), Quartz Single Grain OSL, and feldspar Infrared Stimulated Luminescence (IRSL) including specialized techniques such as post-IR IRSL, thermal transfer OSL, and TL dosimetry. We operate 3 luminescence readers; an automated Risø TL/OSL-DA-15 with a single grain laser attachment for single grain dating, a Daybreak Model 2200 OSL Reader, and a new Risø TL/OSL-DA-20 will be delivered to the lab in June 2015. Our lab is fully equipped with dark-room sample preparation capabilities along with in-house gamma spectroscopy, neutron activation, and ICP-MS for elemental concentration analyses. We also have portable gamma spectrometry equipment that can be deployed to nearby sites. We have worked on many varied projects for dating sediments involving tectonics, paleoseismology, climate change, archaeology, and paleontology.

Expected Time Frame

Students are expected to coordinate a time frame with the lab director for a one to two week period. During this time the student will learn (or perform) sample preparation such as sieving, weak acid treatment, magnetic separation, and heavy liquid density separation. Students will receive one-on-one training from laboratory staff and will obtain a theoretical perspective on luminescence dating and modeling. Training will also include hands-on data and uncertainty analysis and will learn about the measurement of equivalent dose for age determination. Students will leave with a strong grasp of luminescence dating basics and the confidence to include luminescence in their future research.

Expected costs

Sample analysis costs are $500 per sample for quartz small aliquot OSL and $900 per sample for quartz single grain OSL analysis. Costs for feldspar fine-grained (polymineral) procedures are also $500 per sample but costs for k-spar single aliquot are determined based on geological origin of the samples and the amount of analyses time needed; costs start at $900 per sample but are negotiable based on laboratory scheduling and how much we like you. Sample collection should be done with consultation with the analyzing lab if possible. Students should budget $1000 for the two-week visit to the laboratory.

Preparation for Visit / Expected Lab Availability/ Data Processing and Interpretation

Students must contact the lab one month in advance to schedule the laboratory visit. Students must bring their complete samples including sample tubes, water content sample, and dose rate sample. Generally the lab is very flexible in accommodating students at various times of the year. Students will learn sample preparation techniques and will be instructed on data analysis. Final reports including final age results will be constructed by lab personnel and approved by the lab director. Due to the slow nature of luminescence dating, samples take approximately 9-12 months until the final report is released.

Relevant Laboratory Staff

The USGS Luminescence Geochronology lab is directed by Shannon Mahan (smahan@usgs.gov) and currently staffed by one technician, Harrison Gray and a summer intern from NAGT/USGS. All inquiries should be directed to (smahan@usgs.gov). Both Shannon and Harrison will assist with and coordinate sample preparation and training.