

**EarthScope Student Geochronology Research and  
Training Program Laboratory Overview  
UT Austin Radiogenic Isotope Laboratory**

**03/14/15**

**Lab Description:** The University of Texas at Austin Radiogenic Isotope Laboratory includes all of the facilities required to prepare and analyze rocks and minerals for Rb-Sr, Lu-Hf, Sm-Nd, and Pb-Pb geochronology. Equipment includes two class 100 clean rooms with hepafiltered air for dissolution of silicate samples, spiking for isotope dilution and isolation of elements of interest by standard ion exchange chromatography procedures. Work is completed in one of three laminar flow benches that re-filter already filtered room air to provide even cleaner works spaces. The lab routinely processes minerals, silicate rock powders, and chips for Rb, Sr, Pb, Nd, Sm, Re, Os, Lu, and Hf isotopic measurements by TIMS and ICPMS. Full procedural blanks for complete dissolution and separation procedures used for 20-50 mg of whole-rock powder are typically less than 20 pg for Pb, Sr and Nd, indicating that the contamination contributed by the lab processing is insignificant relative to typical sample size.

Samples will be analyzed on a Thermo Scientific Triton multicollector thermal ionization mass spectrometer (Sr, Nd, Sm, Pb, Os), Thermo Scientific Element 2 high resolution multicollector ICP MS (Rb), or a Thermo Scientific Isoprobe multicollector ICP MS (Hf, Lu, Re).

Nd analyses are conducted using double Re filaments. The mean  $^{143}\text{Nd}/^{144}\text{Nd}$  value of 13 analyses of Ames Nd measured over 6 months is 0.512070 with a two standard deviation of 0.000010. In run precision is typically better than 0.000006, 2 sigma standard error. Sr analyses are conducted using a tantalum fluoride activator on single Re center filaments. The mean  $^{87}\text{Sr}/^{86}\text{Sr}$  value of 35 analyses of NBS987 over 6 the last months is 0.710221 with a two standard deviation of 0.000020. In run precision is typically better than 0.000006, 2 sigma standard error. Common Pb analyses are conducted using silica gel activator on single Re center filaments. The double spike method of fractionation correction is used resulting in higher precision analyses. Typical absolute 2 sigma standard error on measurements of  $^{206}\text{Pb}/^{204}\text{Pb}$  is less than 0.003.

For additional information, go to: <http://www.geo.utexas.edu/isochem/facilities/default.htm>

**Time Frame:** Students should expect to spend a minimum of two to three weeks visiting our lab for chemical dissolution of samples, isolations of specific elements by ion chromatography and analysis by mass spectrometry of 12-16 samples. Samples will be processed in batches of 8-12. Dissolution takes approximately a week, starting with 1-2 full days of activity, followed by several days wait time with short periods of lab activity. Depending on the elements of interest, the necessary column chemistries to isolate the elements of interest require 2-3 full days of lab work with a day in between each to dry samples and prepare them for the next column. Mass spectrometry will take 2-5 days depending on the number of samples, elements to be analyzed and the mass spectrometers used.

Students will be involved in every step of the process. They will be trained and guided by lab personnel but each student will conduct his/her own analyses.

**Lab Expenses:** The Radiogenic Isotope Laboratory has per sample (whole rock or mineral separate) rates based on which elements are analyzed. Rb-Sr and Lu-Hf analyses are \$200 per whole rock or mineral separate, requiring 4 or 5 mineral separates to define an isochron (\$800-\$1000). Sm-Nd and high precision Pb isotope analyses are \$175 per whole rock or mineral separate.

**Preparation prior to visit:** Students should prepare samples for dissolution prior to arrival. Whole rock samples may be pulverized into homogeneous powders using a mortar and pestle or mill. Fine grained samples may be crushed to submillimeter rock chips. For analysis of individual mineral grains, students should prepare clean hand-picked mineral separates prior to their visit. Crushing and processing of rocks may be done at the University of Texas at Austin, but would require more time and additional cost.

**Laboratory Staff:** The lab is under the direction of Dr. John Lassiter and managed by Dr. Staci Loewy. Both Drs. Lassiter and Loewy may be involved in data evaluation and interpretation. Dr. Loewy will directly supervise student activity in the lab. Dr. Lassiter's graduate students may also assist visitors.

**Post-analysis data processing:** The lab maintains spreadsheets for offline data processing after analyses are complete. Students will be given their own copies of these spreadsheets and will be assisted in processing their own data so that they understand the strengths and limitations of their data sets.

**Waiting time:** We do our best to accommodate the schedules of visiting students. They will be given priority to equipment to facilitate completion of analyses during their visit. Scheduling a visit 2 months prior to a visit will provide the student with ample time to prepare samples and best ensure the smoothest laboratory experience. Faster scheduling may be possible, depending on the types of analyses, number of samples and their state of preparation.

**Contact Info:** If you are interested in conducting analyses at the Radiogenic Isotope Laboratory at the University of Texas at Austin, please contact:

Dr. Staci Loewy, [sloewy@jsg.utexas.edu](mailto:sloewy@jsg.utexas.edu)

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