Nevada Isotope Geochronology Laboratory

University of Nevada, Las Vegas

EarthScope Student Geochronology Laboratory Education Plan

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Instrumentation Overview: The Nevada Isotope Geochronology Laboratory (NIGL) houses an NGX-600 rare gas multicollection mass spectrometer and has been in operation for over 20 years. The NGX, its extraction line, and auxiliary equipment are computer automated using a combination of ArArSuite and IsoLinX software. The NGX contains a 9x faraday cup setup with an ion counting electron multiplier that allows for the measurement of ^{36}Ar on either the faraday cup with ATONA amplifiers or an ion counting discrete dynode electron multiplier. This mass spectrometer is connected to a high-vacuum extraction line with automated pneumatic valves, and a residual gas analyzer for monitoring gas species prior to admission to the mass spectrometer. Sample gas extraction is achieved through a double vacuum resistance furnace capable of heating samples to 1600°C ± 1-2°C as well as a laser extraction system with two sample holder chambers and a Synrad Flyer 30W CO_2 laser.

Sample Preparation: Students are advised to contact our lab several months in advance to discuss their project and if mineral separations will be performed by the student or by our laboratory. Our laboratory is equipped to perform any required mineral separation. For most materials, the rock is crushed, washed, sieved, magnetically separated and/or separated through heavy liquids, acid-leached and hand-picked for purity. Prepared mineral separates by the student reduces the turnaround time, but unless a high-standard of purity is adhered to, it may result in an unsuccessful age determination. Samples are irradiated in a cd-line tube at the OSU TRIGA reactor and are usually returned to us from the reactor in three to four weeks. We then require the sample to 'cool-down' for a couple months prior to analyses. The student will be expected to arrive sometime after we received the irradiated samples for radiation safety training and laser safety training. Students should plan on spending one to two weeks in the laboratory. This time frame depends on how many samples they have.

Analytical Costs: Costs are currently $500 for furnace or CO_2 laser step heat analyses. MDD analyses cost $800 per sample. Mineral separation by our laboratory is $200 per sample. We also provide a rush fee, $200 per sample for clients who would like their samples prepped and analyzed as soon as possible. These samples will go to the head of the line when they return from the reactor. These prices are subject to change so please contact us before drafting a budget.

Student Visitors: Samples and scheduling should be discussed with Kevin or Kathy prior to the first stage of sample preparation. Laboratory training will begin when the student arrives to analyze their samples. They should take the radiation and laser safety courses online before they arrive. The training can be found at (https://rms.unlv.edu/radiological/). Kevin and Kathy will train and oversee the student while they operate the lab equipment and analyze their samples. Kevin will work with the student on regressing their data and potentially writing a draft methods and results section of a manuscript. We will work with the student and strive to have their analyses completed on schedule for their presentations, conferences or graduation.