Nevada Isotope Geochronology Laboratory
University of Nevada, Las Vegas

EarthScope Student Geochronology Laboratory Education Plan

1. The Nevada Isotope Geochronology Laboratory houses a MAP 215-50 rare gas mass spectrometer and has been in operation for over 20 years. The MAP 215-50, its extraction line, and auxiliary equipment are computer automated using LABVIEW software, initially developed by Bruce Idleman at Lehigh University. The MAP is a high sensitivity, low background machine featuring a triple collector assembly with Faraday cup, standard electron multiplier, and quiet electron multiplier with pulse counting electronics. 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 rare gas mass spectrometer. Sample manipulation is accomplished by an automated x-y stage with up to 221 individual samples for laser analysis, or a motorized furnace sample dropper capable of running up to 16 sequential samples. Argon extraction can be accomplished by a double vacuum resistance furnace capable of heating samples to 1600 °C ± 1-2 °C, or a 20W CO_2 Merchantek laser.

2. 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. If needed, we have a rock lab equipped with rock crushing devices and sieves. Mineral separations can be performed in our mineral separation laboratory by hand picking or heavy liquid separation. Prepared mineral separates by the student reduces the turnaround time by approximately 2 weeks. Irradiated samples are usually returned to us from the reactor in three to four weeks. 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.

3. Costs are currently $500 for furnace step heat analyses up to 15 steps and $500 for CO2 laser analyses up to 20 single crystals. 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.

4. Samples should be discussed at the prior to the first stage of sample preparation. The student should arrive having a basic knowledge in mass spectrometry and 40Ar/39Ar dating method. 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/).

5. The Laboratory Manager, Kathleen Zanetti, will train and oversee the student while they operate the lab equipment and analyze their samples.

6. Computer automated operation of the sample stage, laser, extraction line and mass spectrometer as well as final data reduction and age calculations are done using LabSPEC software written by B. Idleman (Lehigh University). Data is plotted using Isoplot by K. Ludwig

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(UC, Berkeley). The Lab Manager will oversee training, data analysis, reduction and interpretation.

7. Our turnaround time is usually 6 months after receiving the samples. Scheduling will be discussed during the initial contact with the Co-Directors or Laboratory Manager. We will work with the student and strive to have their analyses completed on schedule for their presentations, conferences or graduation.

8. Contact Professor Wanda Taylor, Acting Co-Director at wanda.taylor@unlv.edu, Professor Michael Wells, Acting Co-Director at michael.wells@unlv.edu or Kathleen Zanetti, Laboratory Manager at kathleen.zanetti@unlv.edu for initiating a new project.