Department of Geology
MCMICKEN COLLEGE OF ARTS AND SCIENCES

SUMMER RESEARCH OPPORTUNITIES
FOR UNDERGRADUATE WOMEN

APPLICATION DEADLINE: March 3, 2008

The Department of Geology is pleased to offer the following research project for the summer of 2008. Interested students are urged to contact the faculty member(s) directing the project that most interests them. By contacting the faculty member, you can discover more about the project, learn what your responsibilities will be and, if possible, develop a timetable for the twelve-week research period.

CRYSTAL SIZE DISTRIBUTION IN THE KILAUEA MAGMA, HAWAII

Professor Attila Kilinc
Department of Geology
Room 611 GEO-PHYS Bldg.
P. O. Box 210013
University of Cincinnati
Cincinnati, OH 45221-0013
Tel: (513) 556-5967
Fax: (513) 556-6931
E-Mail: attila.kilinc@uc.edu

Project Description

Evaluating the dimensions and longevity of magmatic systems is not only of fundamental interest to volcanologists, but it is of vital concern to assessing the probability of volcanic hazards. Magma residence time (the time between successive eruptions) is critical to the evolution of volatiles from magma, which ultimately determines whether magma will erupt explosively or effusively. In addition, magma residence time controls the dynamic interplay between nucleation and crystal growth, which in turn, determines textures of rocks.

Kilauea volcano in Hawaii started its current eruption in 1983. Samples collected from the 1986 eruption of the Kilauea volcano will be studied for evaluating the magma residence time prior to eruption, using Crystal Size Distribution (CSD) theory.

The research project involves learning how to use the Image Analysis System to measure the dimensions of plagioclase crystals. The student researcher will be shown how to operate the equipment and make measurements. Once the measurements are collected, 2-D measurements will be converted to 3-D and logarithm of number of crystals per given size range per volume ($\ln(n)$) will be plotted against the length (L) of the plagioclase crystals. This usually results in a linear distribution of ℓn(n) versus L, with a slope that depends on the crystal growth rate G (10^{-10} cm/sec) and the magma residence time τ.

Hypothesis to be tested: If plagioclase crystal growth is related to magma residence time, then calculated magma residence time should be identical to the period between two consecutive eruptions.

Interested students should contact Professor Attila Kilinc.