**Luminescence Research Dating Laboratory at Stony Brook University**

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The Luminescence Dating Research Laboratory at Stony Brook University focuses on developing precise and reliable luminescence-based dating methods to improve the chronology of human evolution. The lab director, Dr Marine Frouin, has more than ten years of experience in the luminescence dating of sediments and archaeological materials. In addition, she has over fifteen years of experience carrying out fieldwork and research at a wide range of archaeological sites in Africa, North and South America, Asia, and Europe.

The lab construction began in March 2020 and was finally completed in June 2021. The Luminescence Dating Research Laboratory seeks talented and motivated visitors to take advantage of this new facility. The group is committed to promoting an inclusive, equitable and anti-racist environment. All visitors are welcome, regardless of race, ethnicity, gender identity, sexual orientation, creed, disability status, and country of origin.

**Lab Description**

The Luminescence Dating Research Laboratory is part of the Department of Geosciences. The facility consists of six rooms, three equipped with standard lighting conditions (hereafter referred to as "white rooms") and three utilizing dim, filtered amber-light conditions (hereafter referred to as "dark rooms"). The white rooms comprise two wet laboratories and one meeting room with hot desks for visitors and students. A revolving door provides access to three dark rooms: a storage room, a wet laboratory, and a machine room.

Each room is equipped with the following state-of-the-art instrumentation. The first white room wet laboratory hosts a laser diffraction particle size analyzer (*Mastersizer2000*), a solar simulator (*Honle SOL2*), and six microscopes (stereo and polarizing). The second white room wet laboratory hosts the low-background high-resolution Broad Energy Germanium Detector (BE3830) equipped with electrical cooling (*CRYO-PULSE 5 PLUS*) from *Mirion Technologies* (Canberra) to record low levels of radiation in sediment. This instrumentation allows the laboratory to conduct high-resolution gamma spectrometry measurements on sediment samples for accurate and precise dose rate determination. The dark room wet laboratory is dedicated to sample preparation. It has all the facilities necessary to extract quartz and feldspar grains, including three fume hoods for chemical treatment (including HF) air extraction. The machine room hosts two Risø OSL/TL DASH luminescence readers to stimulate and detect the light emissions from minerals. In addition, one reader can perform XRF measurements, and the second has a single-grain attachment for quartz and feldspar.

**Expected time frame**

Students should contact the lab director as early as possible before collecting samples. Together, they will determine the best strategy for sampling, preparing and dating the samples to answer the student research questions.

The samples can be sent in advance to the laboratory so that the lab personnel can prepare them for gamma spectrometry or ICP-MS/AES for elemental concentration analyses. Before beginning work in the laboratory, the students must complete online laboratory safety training. In the laboratory, training will be conducted by Dr Frouin and graduate students. Students should plan for a two-week visit minimum, during which they will gain experience in the following:

- conducting standard sample preparation, which includes:

    - wet-sieving of sediment,
    - heavy liquid density separation of minerals
    - chemical digestions,
    - aliquot preparation of luminescence measurement.
- using equipment, such as:
    - microscopes,
    - laser diffraction particle size analyzer,
    - magnetic separator,
    - low background high-resolution Broad Energy Germanium Detector,
    - Risø OSL/TL DASH luminescence readers.
- analyzing and interpreting data using:
    - Excel
    - Analyst software
    - DRAC calculator
    - R luminescence package
- reporting and presenting data for publication.

Students should expect that it could take 9-12 months before age results are complete.

**Costs**

The students are expected to prepare and process their own samples. The cost per sample is $400, which includes all analytical expenses regardless of the type of analysis. There are no extra fees for training.

For more information on the lab, visit www.marinefrouin.com.