



Improving equivalent dose and dose rate for trapped charge dating

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Przyjęte założenia

In trapped charge dating, the precision of age estimation is calculated using the formula: Age (years) = Equivalent dose (Gy) / Environmental dose rate (Gy/year). The overall uncertainty in the age calculation depends on the uncertainties in both the equivalent dose and the environmental dose rate where the dose rate is calculated using grain size. The grain size is estimated from sieved fraction.

Osiągnięte cele

They have been created automated method to measure grain sizes from delivered pictures to determine the uncertainty of the environmental dose rate.

Zastosowane metody realizacji

Coding was performed in Python with libraries such as NumPy and OpenCV for automatic grain size measurements. Quartz samples was sourced from routine measurements, while feldspar samples were provided by the Luminescence Laboratory at Lund University. Manual grain size measurements were conducted in collaboration with students from Lund University.

Osiągnięte wyniki

A Python program using a neural network called U-NET has been created. That neural network was taught to recognize the disks with the grains and the grains on the disks from sent pictures. Learning process was achieved with a picture and corresponding masks. There was manually made many sets of said pictures and masks to further improve program ability to fulfill designed task.

Inne informacje o projekcie

As a part of the project implementation between June 9 and 11 four students (Aleksandra Tomala, Piotr Lesiecki, Kacper Wojaczek and Julia Bulanda) with scientific supervisor Konrad Tudyka took a visit at Lund University in Sweden. They saw a highly specialized luminescence laboratory with technologies not available at Silesian University of Technology. Lund University is one of the leading scientific institutions, classified as one of the top 100 best universities in the world (according to QS and THE 2025 rankings).