Geological Walk Around Campus

Lab Report (Lab #1)

Submitted to:
Professor Simone Dumas

For the course
Introduction to Earth Materials
(GEO1115)

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Introduction

This laboratory took place in the form of a guided geological walk around the campus of the University of Ottawa, on September 12, 2019, between 2:30 and 5:20 PM. The temperature on that day was between 20 and 17 degrees Celsius. The geological sites visited were all present in the science faculty stretch of the University of Ottawa campus, including the decorative granite wall outside of Marion Hall and off D'lorio, as well as bricks, cement and concrete present in the pathway beneath the Biosciences Complex. The asphalt concrete just outside of Vanier Hall, the steel behind the STEM building and the fossiliferous limestone Marion Hall were also visited in the duration of this laboratory.

Objectives

The objectives of this laboratory were, firstly, to develop connections between everyday life and geology and thus, understand its relevance. The second objective of the laboratory was to write a geological lab report according to the guidelines found in the Lab Manual.

Answers to the questions

The first construction material to be examined is granite. This particular granite was composed of pink, white, black and grey visible crystalline minerals. This property identified the granite as an intrusive igneous rock. Igneous rocks are formed when magma reaches the crust as lava, cooling to form rocks. Since granite is an intrusive igneous rock, this means that the magma from which it was formed never managed to reach the surface, but was instead trapped about 10 km down from the crust. The deeper one goes into the Earth, the hotter it gets, usually by a margin of about 10 km. This is called a geothermal gradient. Therefore the magma that was trapped below the Earth cooled more slowly than if it had reached the surface, surrounded by hot rocks. This slow cooling made the resulting rock coarsely crystalline, with the crystals bigger, visible to the naked eye. The pink, grey, black and white minerals were identified to be potassium feldspar, plagioclase feldspar, quartz and mica, respectively. Potassium feldspar has a chemical composition of potassium, aluminium, silicon and oxygen. Over time, it can become chemically altered, losing its potassium to become a white powder rock called kaolinite; a secondary mineral, or a clay mineral. Kaolinite itself can be altered with time, losing its silicon to become bauxite, a major aluminium ore used for construction of window frames, etc. Secondary minerals (or alteration minerals) are most often found in tropical climates. For example, as potassium feldspar loses its potassium, the element turns the soil potassium-rich, affecting plants like bananas.

The second construction material to be examined is cement. Cement is composed of clay minerals, water and lime to make a wet, muddy, mixture which later solidifies. Clay minerals, (also secondary or alteration minerals) are formed from rocks that have been chemically altered with time. An example of this is the transformation of potassium feldspar into kaolinite. Lime is

obtained from limestone, a sedimentary rock made up of the shells (or fossils) of sea creatures that had accumulated at the bottom of the ocean, locked into a sedimentary cycle. This type of rock is called fossiliferous limestone. It is composed of calcite (calcium carbonate), which releases carbon dioxide when exposed to acid. To extract the lime necessary for cement, the limestone is pulverized, then fired, releasing carbon dioxide and leaving lime behind. Adding water to the clay minerals and lime makes the cement wet and muddy, in this case “muddy” meaning that it is made up of very fine particles, homogenous to the naked eye.

Conclusion

Over the course of this laboratory, a link between common construction materials and their geological significance was established. The class was able to learn about the formation of various rocks and their industrial uses, such as igneous and sedimentary rocks, clay minerals, limestone and more. Through the observation of granite, bricks, cement, concrete,asphalt concrete, steel and fossiliferous limestone, a greater understanding of Earth materials was gained.

Conclusion