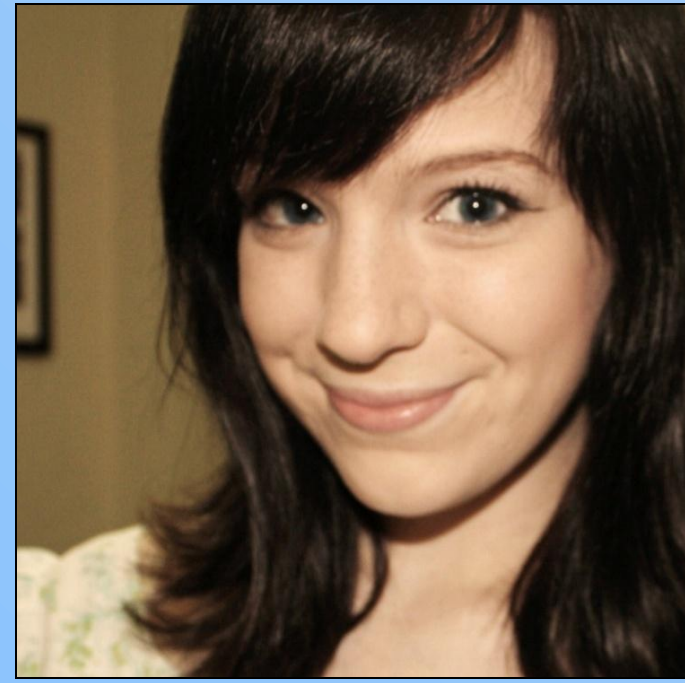


Mineralogy of speleothems in Víðgelmir lava tube, Iceland



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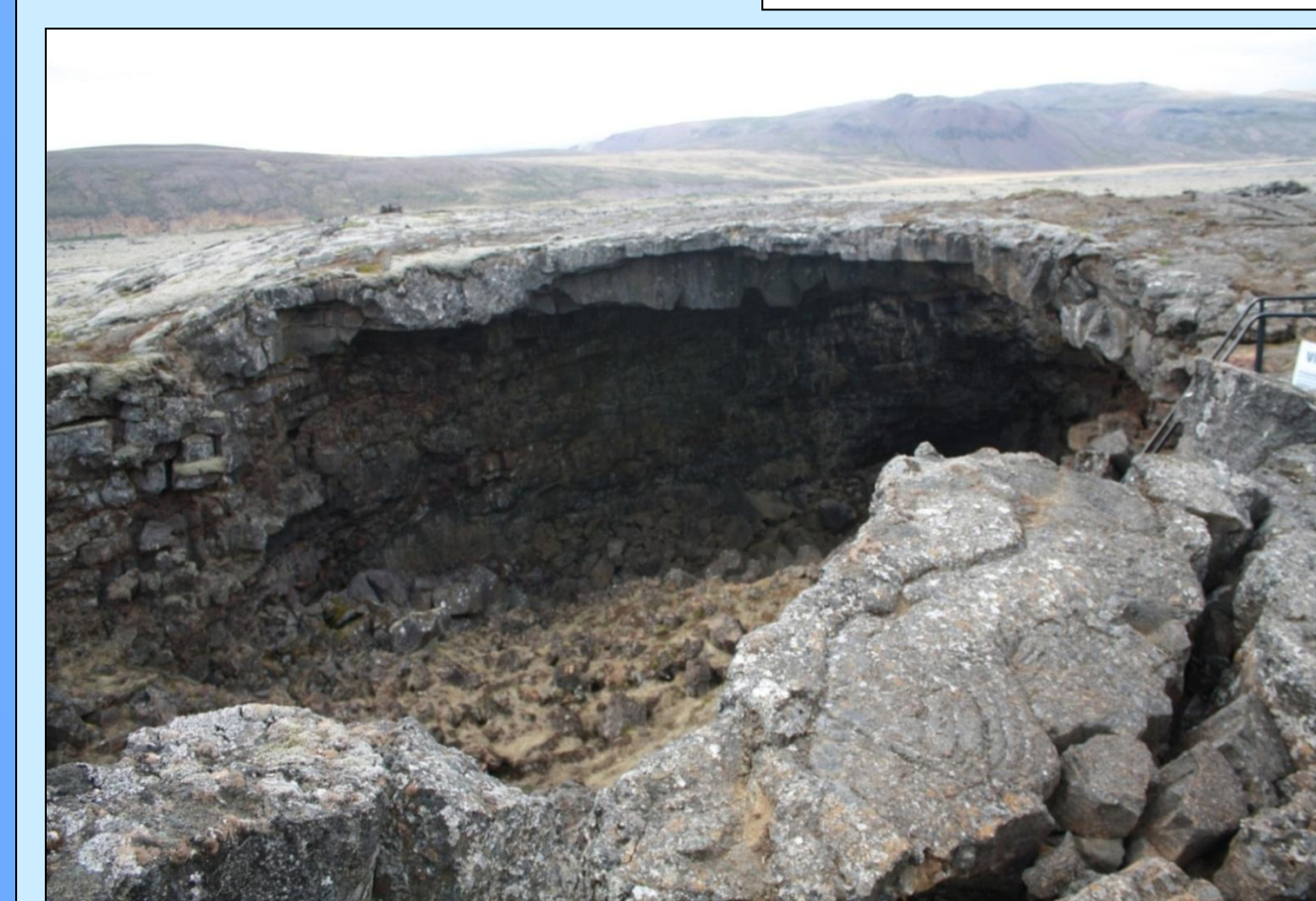
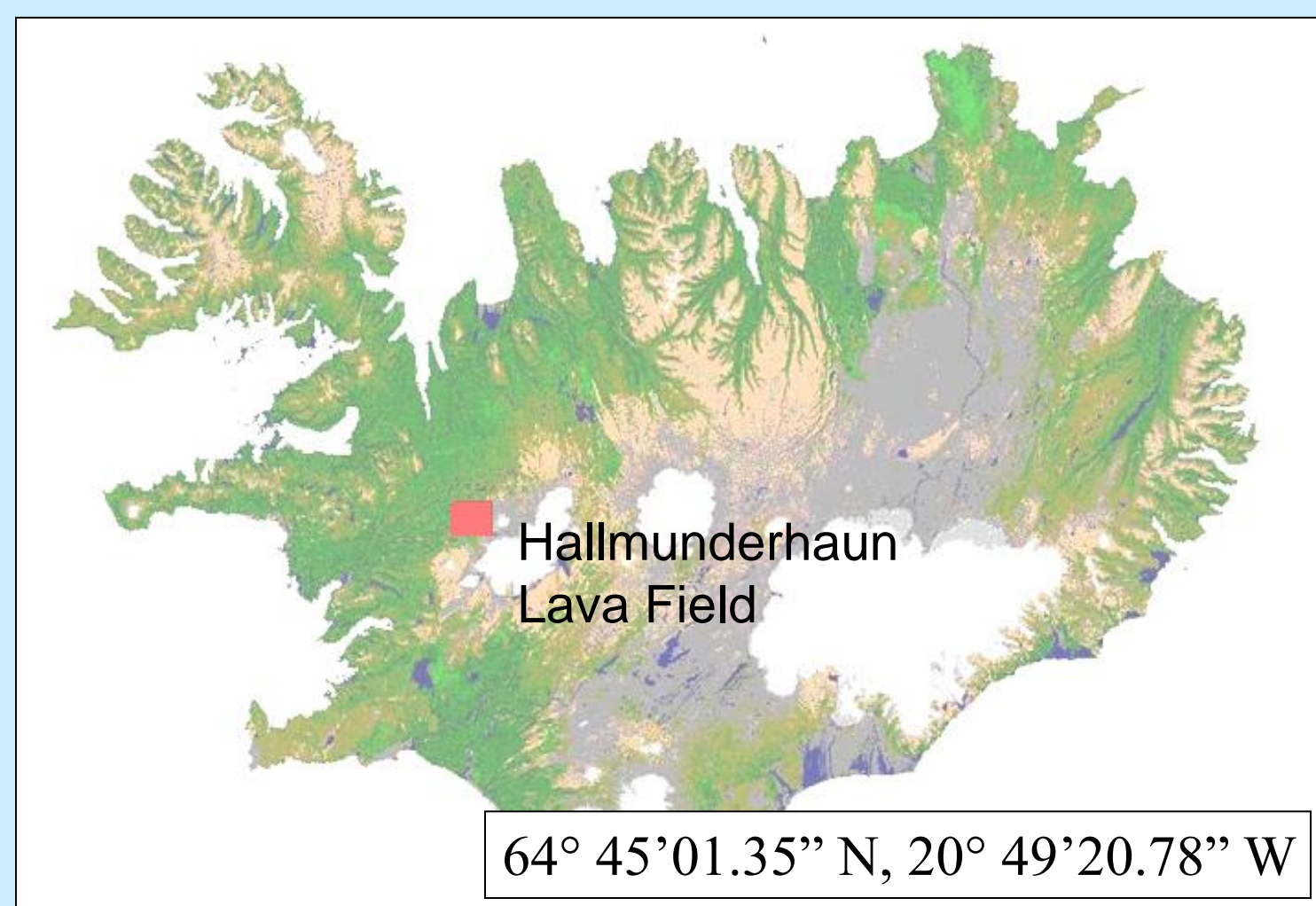


ABSTRACT

Víðgelmir lava tube is one of the longest and largest caves by volume in Iceland and a highly capacious and untouched area in which little formal cave mineralogy has been conducted. The purpose of this study was to collect a series of speleothem specimens throughout the tube and perform a mineralogical analysis through x-ray diffraction and thin section interpretation. The minerals in Víðgelmir can be attributed to fissure eruptions and are an integral part in indentifying the lava processes and origins of the igneous speleothems throughout the cave. Since its formation in approximately year 930, Víðgelmir holds a series of residual fluid formed stalagmites and tubular stalactites. Because these speleothems were formed from a torpid pahoehoe lava cover, a series of mineral contaminations have affected their growth and led to novel mineral types. A mineral structure has been identified by analyzing a number of drill cores collected from the site using quantitative x-ray diffraction powder analysis methods and obvious intensity peaks were examined from three different geographical depths of Víðgelmir. Plagioclases and pyroxenes are locally abundant in the basaltic formations throughout the cave, walls and floor. Based on these calculations, it is possible that Víðgelmir was formed gradually from leaching of feldspars and tectosilicate minerals during the pahoehoe lava flow movement.

LOCATION

Víðgelmir lava tube is part of the Hallmunderhaun lava field. It's located in western Iceland, southeast of Fljótstunga farm in Borgarfjörður.



Víðgelmir lava tube is more than 1.5 km long, the highest point is 15.8 m. The volume is 148.000 km³, making it the largest cave in Iceland.

METHODOLOGY



In the tube, I measured the 15 samples that I was going to drill. Samples were obtained from three different depths of the tube.

Once measured, I constructed water retention barriers (PlayDoh) to place over the samples while drilling.



The finished product was a core about an inch in diameter. Samples were then pulverized and run through an x-ray diffraction machine.



I drilled directly into the samples, making sure to keep the drill bit lubricated.



A thin section was made of the samples and then interpreted through the use of a polarizing microscope.

RESULTS



Photographs taken from a polarizing microscope (Fig. 1 & 2) revealed the presence of pyroxene and plagioclase minerals abundant within the thin section.

A distinct fracture was observed from the thin section, which may have occurred during the cooling process of the lava and formation of Víðgelmir.

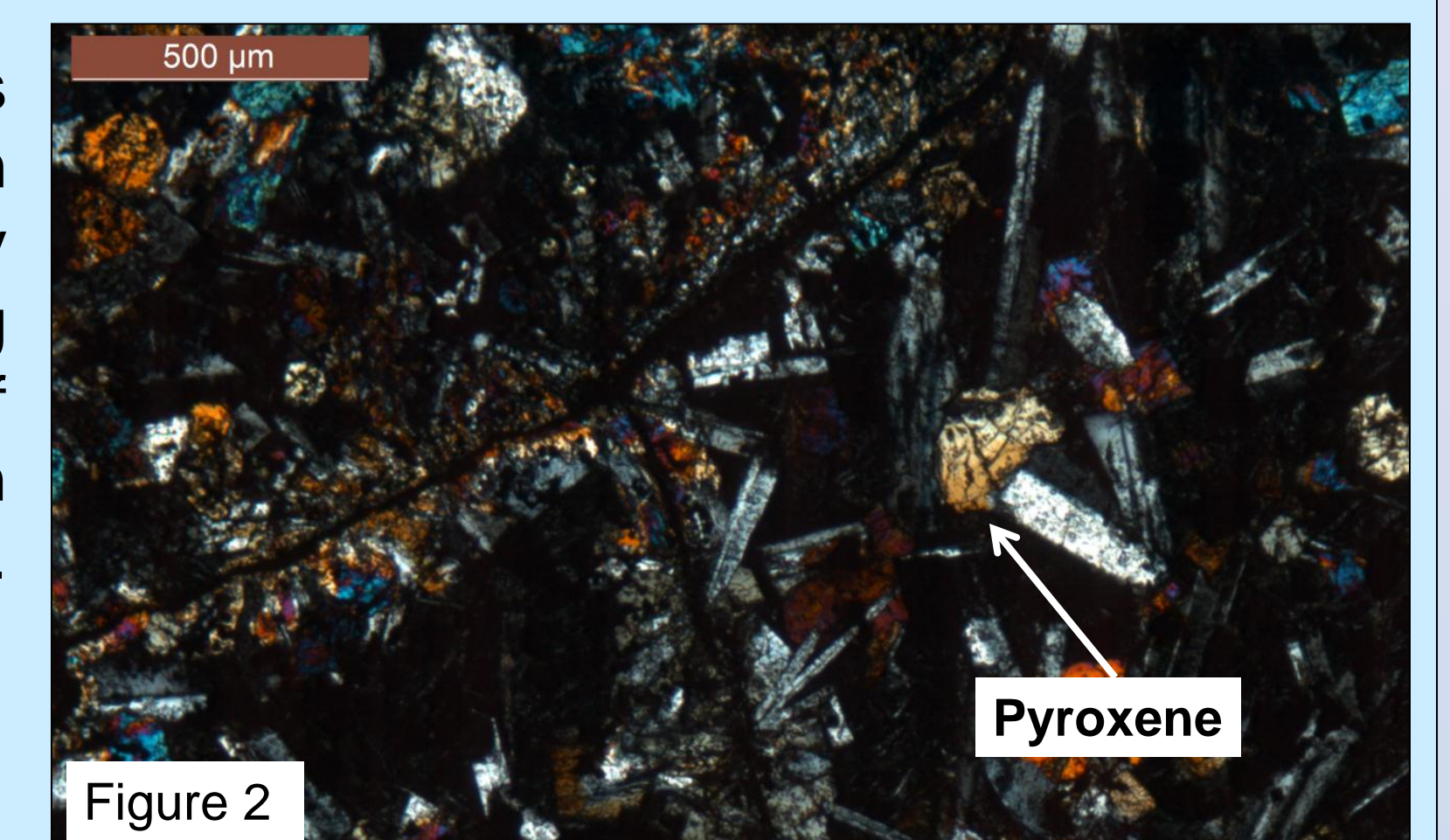
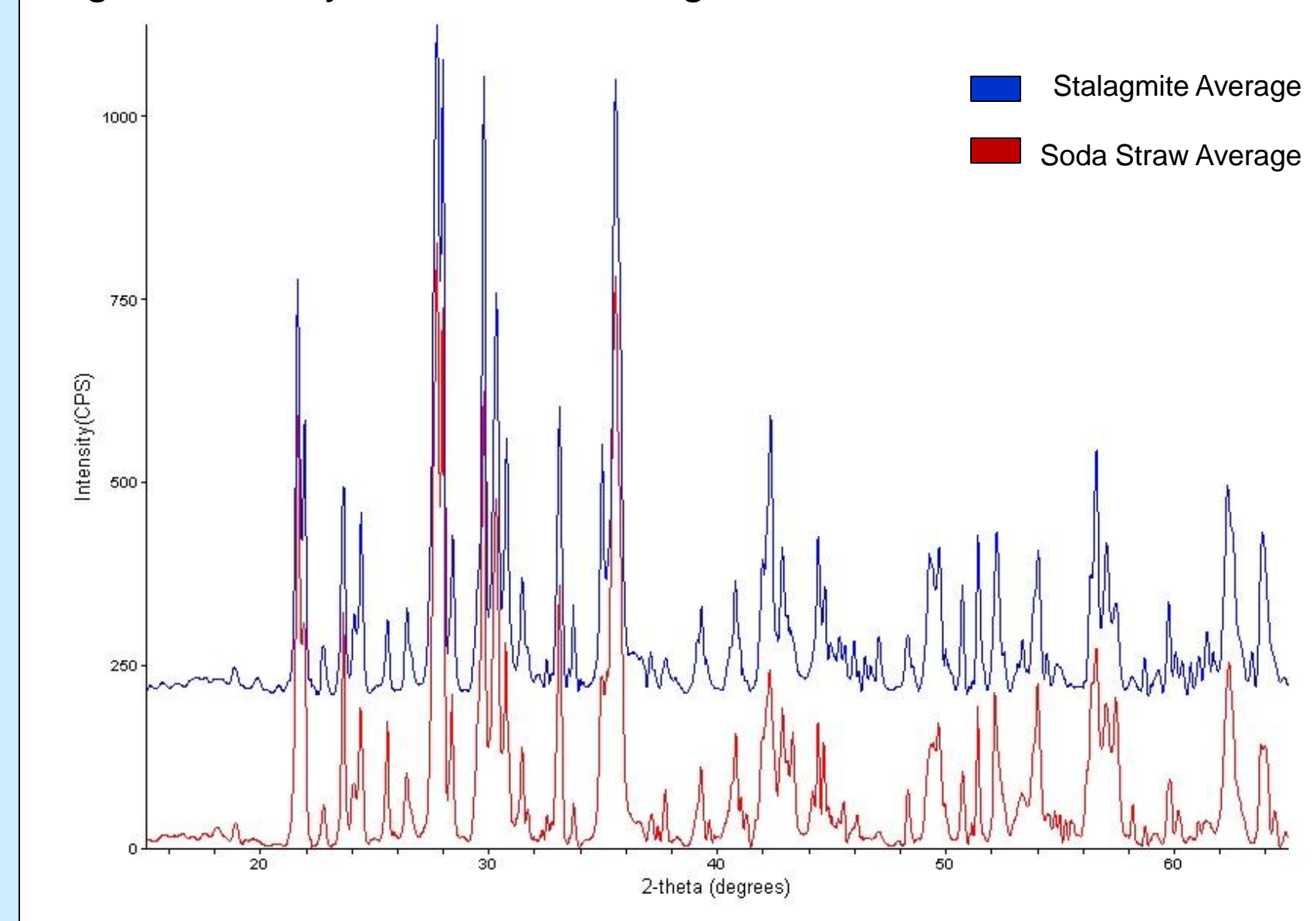


Figure 3: X-ray diffraction averages



Average intensity peaks (Fig. 3) from x-ray diffraction indicated the presence of plagioclases and pyroxenes within each pulverized sample taken from the tube.

There was no apparent differences in speleothem samples throughout the tube, therefore indicating similar formation conditions. Víðgelmir was formed from multiple episodes of drip during the lava movement which explains the deposition of plagioclases and pyroxenes in the tube. These mineralogy results are very common to many other lava tubes in Iceland.

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