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‘Terrestrial lava tubes as analogues for Mars – a review of the mineralogy and biosignatures of lava tubes from Iceland and the Terceira islands.’

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Lava tubes have been detected on Mars and because of their subsurface nature are shielded from the harsh conditions at the surface. If water intersects with the Martian lava tubes, a life nurturing environment may exist locally in these tubes. Lava tubes on Iceland and the Azores may support similar conditions as lava tubes on Mars and have been shown to contain a wide variety of microbes. [Planetary Analogues and Lava Tube] (PELE) field expeditions have been setup to understand the relationship between microbes and substrate and the preservation of microbes in deep time within these systems. Within such systems biogenic and hydrothermal alteration processes are not necessarily mutually exclusive and a good understanding of the mineralogy helps distinguish one from the other. Here, I have performed an analytical study analysing basalt mineralogy from recent lava flows from Iceland and Azores islands, attempting to distinguish between biogenic and hydrothermal signatures. I used a workflow of semi quantitative analysis using viewing thin sections under a light microscope to understand textural information. This was supplemented by ImageJ software and using SEM+EDX for point analysis of regions of interest to shed light on our areas of interest. My results showed some ambiguous features linked to alteration in a sample in the north of Iceland related to clays or spherulites, in the Azores vesicle infill of clays or devitrified glass were seen with potential bio signatures including carbon, calcium and phosphorous. These results may indicate environmental factors leading to location specific alteration or related to lava rock mineralogy. Contamination effects cannot be ignored and must be taken into consideration when reviewing these results. Overall these analyses will contribute to the larger PELE outcome by providing a complimentary workflow that can be used to assess biosignatures and specific regions of interest within lava tube rocks.