Aerobic-anaerobic biogeochemical cycling of cobalt and nickel in lateritic soils associated with the Santa Elena ophiolite

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The Santa Elena ophiolite is an ultramafic unit mainly composed by peridotites in the nortwestern Pacific coast of Costa Rica. Due to its tropical location, the area is exposed to active lateritization processes, where a pronounced dry-wet seasonality and warm annual temperatures deliver the climatic conditions required to develop laterites. However, despite of their well-studied geology, the indigeneous microbial communities and biogeochemical cycles occurring in the metal rich laterites have not been studied to date.

This research aims to address this key knowledge gap, aiming to study the biogeochemical cycling of cobalt and nickel in lateritic soils associated with the Santa Elena ophiolite, contributing to improvements in our understanding of natural lateritic systems. To deliver a better understanding of the microbial processes that could potentially operate within lateritic soils, microcosm experiments were conducted using samples collected from across the ophiolite area, and reflecting seasonal geochemical changes expected (e.g. oxygen status, carbon inputs and local soil geochemistry).

Results of microcosm experiments will be presented, focusing in the variations occurred both in the mineralogy of the soils and their aqueous geochemistry during anaerobic-aerobic incubactions after stimulation with a range of carbon sources. Additionally, those changes will be correlated with the microbial community composition, identified using 16S rRNA gene profiling, highlighting microbial influences on the solubility of cobalt and nickel within the lateritic soils.