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Orgamineral Precipitation Occurring in Laguna Timone Maar Crater, Pali Aike Volcanic Field National Park, Chilean Patagonia

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There are only a few modern environments where primary carbonate precipitates in a volcanic crater on the Earth's surface. One of the examples is located in the southern part of Chile - South America, 50 km east of the Andean mountains and north of the Strait of Magallanes, a quaternary volcano-tectonic complex dominates Pali Aike Volcanic Field. Laguna Timone is a closed system the main sources fed are groundwater and rainwater. The annual precipitation around to 200 mm and the strong winds are responsible for high evaporation rates per year. The water at the lagoon is alkaline, hypersaline, cold (close to 0°C), and rich in calcium, magnesium, sodium, potassium, nitrate, nitrite, sulfate, and phosphates. Carbonate crust precipitated on the surface of clasts, remnants thrombolites and microbial activity are present around the maar. Carbonates, extracellular Polymeric Substances and microbial mats were characterized. The main goal of this research was characterized microbial communities around of the maar crater and understand the role of microorganisms in carbonates minerals precipitation. Bacterial and fungal biodiversity was examined using Illumina sequencing of PCR-amplified 16s rRNA and ITS genes from total extracted DNA. The results show that the Proteobacteria, Bacteroidetes, Cyanobacteria and Verrucomicrobia phyla dominated the bacterial communities. *Pseudomonas, Rhodobacter*, *Brevundimonas* and *Oscillatoria* described in the samples has been reported in carbonate precipitation in other sites of similar environment conditions. The calcite crystals precipitated show the evidence organomineral is produced. The $\delta^{13}C_{VPDB}$ (5.63 ‰ to - 6 ‰) values indicate physico-chemical and biochemical processes in the precipitation. The $\delta^{18}O_{VPDB}$ values (2.12 ‰ to -8.01 ‰) are associate to evaporation processes and meteoric influences. The evaporation induces calcite supersaturation of the water and subsequent precipitation. In conclusion, the combination of physiochemical, biological and geological context furnishes to diversity nutrients to developed of microorganism and consequently carbonate precipitation in a site with critical conditions. These exceptional conditions offer sites of extraordinary scientific value for research on microbiological characterization and carbonate- precipitation that involves the interaction of volcano-tectonic processes with glaciers and marine events under extreme climate conditions.