Endolithic and hypolithic soil-like systems in Larsemann and Thala Hills oases of East Antarctica

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Microprofiles established due to the activity of endolithic and hypolithic communities inside the solid rocks and under gravel pavements have been studied in Larsemann and Thala Hills oases of East Antarctica. The following aspects of these soil-like systems will be reported:

- structural organization at meso, micro and submicro levels based on optical microscopy, SEM/TEM and high resolution X-ray microtomography data;
- biomineralization processes, formation of Al, Si, Fe, K, Ca, Na, Mg, C, S-containing microfossils, deposition of carbonates and oxalates due to biofilm/primary minerals interaction;
- 14C “age”/average residence time of organic matter in endolithic and hypolithic organo-mineral horizons;
- biomarkers of endolithic and hypolithic systems;
- spatial patterns of these soil-like bodies in East Antarctica oases.

Morphology of endolithic systems observed on different hierarchical levels and microtomography data indicate that different layers of these bodies are connected with the fracture network serving for the elements transfer in the subsurface part of solid rocks. Examined profiles in granites with high quartz content had clear eluvial-illuvial differentiation patterns similar to macroprofile of a common Podzol (Spodsol) on loose substrates. It is shown, that subaerial segment of hard rocks is not sealed and is potentially permeable for dissolved products of endolithic weathering and pedogenesis. As a unique result - the soil-like pattern is established inside the massive-crystalline rock.

Understanding modern processes in endolithic and hypolithic soil-like systems is of fundamental importance to decrypt paleosol record, as such systems may be the closest modern analogues of protosoils that existed on our planet before the higher vascular plants with root systems established.

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