Diversities of microbiomes from South African arid and natural soils

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Arid or dry environments represent one fifth of the Earth's land surface, a third of all the terrestrial biomes and ~80% of South Africa's land surface. Models show that through intensive land usage and Global Change, hot desert and arid land surfaces will undoubtedly increase in size. Therefore, understanding Desert ecosystems is crucial to better apprehend the Earth's present and future global functioning. In such environments, where the macro-fauna and -flora are sparsely distributed, microbial communities are the dominant life form and the main ecosystem engineers as they mediate most of the ecosystem processes (particularly in the Carbon and Nitrogen biogeochemical cycles).
Consequently, understanding their phylogenetic and functional diversities in multiple soil biotopes is a prerequisite to properly evaluate how these vast and microbially-driven environments function.
This research project therefore aims to decipher edaphic microbial communities' diversities in South African natural terrestrial environments located in different aridity zones. Three methodological approaches will be performed:
- Phylogenetic/bar-coding data will be recovered by use of next-generation amplicon sequencing of relevant phylogenetic markers; i.e., 16S rRNA genes for Bacteria and Archaea and ITS region for Fungi.
- Full shot-gun metagenomes of different desert soil biotopes will be generated to evaluate and define their microbial functional potentials and diversities.
- Original, i.e. never employed in arid terrestrial biotopes) strategies, will be implemented to isolate and characterize novel microbial strains.
Altogether, this study will create new foundational biodiversity knowledge by generating vast amount of data on arid land microbial diversity in South Africa.