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General

A set of **bentonite samples** (selected according to strategic research agenda of the project)

These amples colonized by **selected lithotrophic bacteria** involved in MIC

Heavily compacted to **particular dry density values**

- bentonite swelling pressure
- plasticity index
- *anaerobic conditions*
- *temperature*
- *porous water*

- permerability
- degree of saturation
- thermal conductivity

All samples characterized from **microbiological** inhabitation (survival, impact on their metabolic activities)

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Methods

- Usage of special **production infrastructure** for differently compacted bentonite samples
- NGS and separation of DNA from live and dead cells
- Anaerobic geomicrobiology
- Usage of **special research facility ROCKLAB** in order to maintain and simulate such conditions, which seem to be most similar to natural conditions
- Usage of **intact sampling** to prevent unwanted exposition od air, humans, etc.

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Experimental strategy

Preparation of compacted bentonite with different properties **(dry density, degree of saturation, composition)**, which will be known

During the **bentonite homogenization process**, some samples inhabited by selected corrosion active microorganisms (especially those, which are equipped by survival mechanisms and adapted to harsh conditions in rock environment)

All experimental activities will be carried out under **controlled and defined conditions** (anaerobic atmosphere, other microorganisms, etc.) – **ROCKLAB infrastructure**

Particular compacted bentonite samples will be going to analyzed in order to provide a complex view on MIC risks – estimation of **surviving** microorganisms, analyses of their **physiological state and fitness**, the range of survival mechanism employed during experiments)

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Expected outputs

- Impact of different **survival mechanisms** (encapsulation, endospore) of microorganisms involved in MIC in compacted bentonite environment

- Application of methods, which may deal with both phenomena: **VBNC** (non-culturable bacteria) and precise **distinguishing of living and dead** cell DNA

- **Coupling** of technological and physical issues (compacted bentonite) with geomicrobiological issues (microorganism in bentonite) – another view on compacted bentonite issue for practical usage