Potential of uranium removal from post-uranium mining heaps by indigenous bacteria

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In Poland until 1925 there was no information about existence of uranium ore. First uranium mine was established in Kowary in 1948 and after that uranium ore exploitation in Poland had lasted to 1967. Nowadays low-grade uranium heaps exist in Southern Poland posing potential danger to surrounding environment and human beings. The traditional methods of bioremediation are well known but they are costly and inefficient, moreover they require the use of large volumes of acids which can cause irreversible environmental damages.

Alternative environmental friendly methods can be developed. Indigenous microorganisms can participate in pollution mobilisation and the resulting leak can be collected into the drainage system. Identification of indigenous microorganisms existing in the environment of piles is the first step in the assessment whether the process can take place.

Five sites containing waste with uranium concentration in the range from 112.75 to 2986 mg/L were chosen as a potential places for isolation of microorganisms, metagenomic DNA and *16S rRNA* gene analysis to define microbiological potential. Bacteria from the genus of *Halothiobacillus, Sphingomonas, Pseudomonas* and *Acidithiobacillus* were found as dominant. They are well known as microorganisms able to indirect transformation of uranium compounds.

After 14 days of incubation, indigenous bacteria in acidic conditions (starting pH 2.5) mobilized 0 - 60% of uranium (depending of the type of waste) in comparison to sterile control in which 0-50% of uranium was mobilized respectively.

These preliminary results clearly show that construction of passive bioremediation system is possible and may be efficient.

Gaussberg leicitites – new data on mineralogical and geochemical composition

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New geochemical data on Quaternary magmatism of the Gaussberg volcano (Antarctica) confirms the unique features of ultra-potassium alkaline magmatism developed under exclusively continental conditions. Volcanic cone is located on the within Gaussberg rift zone possibly being a part of Lambert fracture zone. The crystallization sequence of Gaussberg volcano lavas is Ol → Ol + Cpx → Ol + Cpx + Lc. Two different types of clinopyroxene phenocrysts were detected: high TiO_2, low Al_2O_3 group (1) and high Al_2O_3 and low TiO_2 group (2). Rare element patterns for whole-rocks are similar to [1]. Rare element distribution for Cpx 1 demonstrates specific signature showing higher LILE values and appreciably lower $D^{Cpx/Lq}$ (two orders of magnitude) then in [2]. These features can be a result of fluid impact on magmatic system. Gaussberg volcano mantle source is enriched in $^{207}Pb/^{204}Pb$ and $^{208}Pb/^{204}Pb$ while it has low $^{206}Pb/^{204}Pb$ (≈17.5) value. High $^{87}Sr/^{86}Sr$ (≈0.707-0710) taken together with low $^{143}Nd/^{144}Nd$ (≈0.5119) ratios suggest LOMU-type of primary mantle source.

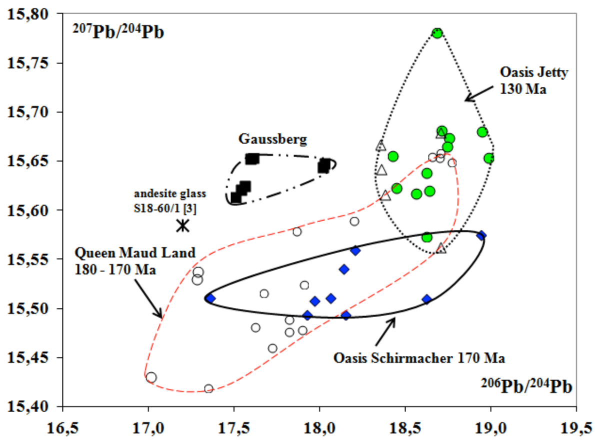

Figure 1: Isotopic data reveal that Gaussberg volcano melts source was the ancient Gondwana lithosphere but not the Antarctic mantle source (Mesozoic plumes)

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