# Evaluation of prokaryotes and community dynamics in Alvord Desert Hot Springs

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The Alvord Desert, located in southeastern Oregon, is composed of springs which are near neutral and/or basic, and are driven by tectonic dilation of range-front faults. The thermal springs within the Alvord Desert discharge sodium-bicarbonate-chloride type water and maintain high concentrations of sulfate and chloride. Microbiological enrichments have resulted in the culturing of several organisms with biogeochemical significance including sulfate-reducing bacteria, and YeAs-1, a novel arsenic-reducing Archaea. Strain AlSe is a novel selenium-reducing thermophilic bacterium that is only 96% similar to *Carboxydocella thermoautotrophica*,; AlSe has the ability to utilize organic carbon. A strain of Thermus spp., OPOC, was isolated, and can oxidize As(III) and reduce As(V), as well as respire on Fe(III). Zymography and proteomics confirms the expression of both arsenite oxidase (Aio) and respiratory arsenate reductase (Arr), as well as large-mass c-type cytochromes that may serve as electron transport components for Fe(III) respiration. Aerobic prokaryotes, including multiple species of *Anoxybacillus,* methanogen and methanotroph organisms have also been isolated. Together these efforts show that this ecosystem maintains a broad diversity of uncultivated microorganisms and metabolic pathways. It is expected that with continued mining of organisms, there is potential for discovering novel metabolisms that have significant implications for next-generation technologies, including carbon sequestration, biofuels, and the development of bioconversion processes yet to be conceived.

# Age, geochemistry and Sr-Nd-Pb isotopes of alkaline lavas from Northern Victoria Land and Ross Sea Region, Antarctica

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We present new K/Ar ages, geochemical and isotope results (Sr, Nd, Pb) on submarine basalts dredged from Victoria Land Basin of the Ross Sea, Antarctica. Subaerial samples were also collected from two areas near Mt. Melbourn in Northern Victoria Land for comparison. The volcanic rocks studied are alkaline raging from basanite to trachybasalt. Chemically, they show the OIB-like patterns of trace element distribution and are characterized by a prominent depletion in K and Pb relative to other highly incompatible elements when normalized to primitive mantle. K/Ar ages of basalts from group A in Mt. Melbourn area range from 0.16 to 0.33 Ma and those of group B are from 1.25 to 1.34 Ma. The K/Ar determination result for submarine lavas also shows similar ranges of eruption ages from 0.46 to 0.57 Ma. In spite of their distinctly different ages of group A and B subaerial samples from Mt. Melbourn area, they show similar geochemical and isotopic features indicating common mantle sources and magma processes being shared in their magma generation. The Sr, Nd and Pb isotopic compositions of the group A and B basalts from Mt. Melbourn area display a range of values for $^{87}Sr/^{86}Sr$ (0.70306 to 0.70398), $^{143}Nd/^{144}Nd$ (0.51284 to 0.51293) and $^{206}Pb/^{204}Pb$ (18.498-19.667). They show a considerably higher range of $^{206}Pb/^{204}Pb$ contrast to limited compositional variations of $^{87}Sr/^{86}Sr$ and $^{143}Nd/^{144}Nd$. Submarine lavas dredged from Victoria Land Basins (VLB) show slightly higher ratios of $^{206}Pb/^{204}Pb$ (18.935-19.852) and less radiogenic $^{87}Sr/^{86}Sr$ (0.70299-0.70340) and $^{143}Nd/^{144}Nd$ (0.51290-0.51297) isotope compositions compared to group A and B Mt. Melbourn basalts. The $(La/Yb)_N$ in submarine lavas ($[La/Yb]_N$ = 15.4 – 19.9) are slightly higher than those in group A and B volcanics ($[La/Yb]_N$ = 9.8– 15.7), suggesting lower degrees of partial melting in submarine lavas. The stronger HIMU signature (higher $^{206}Pb/^{204}Pb$ and less radiogenic $^{87}Sr/^{86}Sr$ and $^{143}Nd/^{144}Nd$ ratios) in submarine lavas appears to be related with smaller degrees of partial melting of them, suggesting preferential sampling of the HIMU component in small degrees of melts in the Cenozoic NVL magmatism.

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