

Microbial DNA tells route of groundwater

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Investigation of microbial DNA retrieved from spring and well water in the foot of two volcanic mountains, Mt. Fuji and Mt. Aso in Japan, shows exciting data that cold (10 to 15 degree Celsius) water contains clones of thermophilic microbial DNA in some sampling sites. Estimate of the source and residence time of the groundwater using isotope signatures and chemical analyses provide essential information of the examined groundwater, but they don't tell anything about the route from which depth the water comes. A trial has been conducted to estimate strength or duration of water-rock interaction from stable isotope signature of ⁸⁷Sr/⁸⁶Sr. However, those chemical analyses could tell us just a value of the examined water which had been blended. In contrast to that, microbial DNA tells us the environment where the microbes lived. Findng of thermophilic DNA suggests it comes from the environment e.g. over 40 degree Celsius, which indicates the depth where the water come from.

In cubation experiment of a thermophilic strain with temperature gradient conditions shows they survive over several months. If we elucidate the relative abundance of thermophilic DNA in a given whole prokaryotic DNA, we could estimate blending procedure quantitatively.