

DNA sequencing for the discovery of new ore-deposits

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Microbial communities are acutely sensitive to subtle variability in their surroundings, responding and adapting for optimal growth and metabolism across an extremely wide range of chemical conditions. High-throughput DNA sequencing combined with geomicrobiological knowledge has the potential to transform the mineral exploration industry and the way we sense and interact with geologic materials. Here we report the development and application of a DNA sequencing-based mineral exploration technology that leverages soil microbial communities as trillions of in-situ microsensors that collectively detect environmental anomalies linked to buried mineral deposits. Our results show sequencing microbial DNA from soils effectively diagnoses mineralization buried deep below glacial till overburden. We find that sequence-based anomaly detection is both more sensitive and robust than classical geochemical/geophysical methodologies. Our findings have strong potential to transform the mineral exploration industry, with real capacity to reduce the cost of new resource discovery. In so doing, sequence-based exploration could go a long way towards helping the resource sector meet future demand and support the growing needs of the technology sector. At the same time, our ability to harness sequence information from the environment will continue to enhance our interaction with the Earth system and support the growing global bioeconomy.