9. Conclusions

The kimberlite waters that were sampled show many unusual characteristics compared to most other groundwater studies. The groundwaters in this study have unusually elevated pH and moderately low Eh. A combination of a high pH and Eh values near 0 are consistent with significant water-kimberlite interaction. In conjunction with the pH-K-Mg correlations noted above and the presence of significant dissolved gases (observed during sampling) we suggest that the high pH and low Eh are consistent with low-temperature serpentinization and hydration of ultramafic minerals in the kimberlites.

The delta^{2}H and delta^{18}O data suggest that most of the kimberlite groundwaters fall within the range of modern meteoric waters. However, there is some question as to why groundwaters from kimberlite A4 do not fall along the OMWL. The A4 waters may reflect fractionation by H_2 and CH_4 production (likely only a very minor component), fractionation as a function of increasing OH^-, and/or mixing with older waters recharged under a different climate. The delta^{13}C data are interesting and our initial interpretation is that the process of carbonate dissolution is occurring with an additional source of organic acid likely to explain the most DIC-rich waters.

As this study is still in it's infancy, not all data has been acquired and compiled at present. However the available data is compelling and suggests that aqueous geochemistry may be able to be used as a tool for kimberlite exploration. The aqueous geochemistry when compared to the surrounding Archean rock suggests to us that we may be able to use these geochemical signatures to locate kimberlites downflow of kimberlite. The implications of this study is the possibility of a relatively inexpensive and simple method of kimberlite exploration. Aqueous geochemistry, combined with other tried and tested exploration methods, will allow for more efficient exploration and vectoring to targets.

Additional work remaining includes S isotope analyses, completion of trace metal analyses by ICP-MS and radiogenic isotope analyses. It is hoped that the large difference in age and composition between kimberlites and host lithologies will be evident in the isotopic composition of dissolved Pb and Sr.

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