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PYGEOT: A TOOL TO AUTOMATE MINERAL SELECTION FOR MULTICOMPONENT GEOTHERMOMETRY

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ABSTRACT

Multicomponent solute geothermometry is a useful tool for estimating the temperature of a deep geothermal reservoir prior to exploration drilling. The method uses full water analyses to determine the temperature at which the saturation indices of an assemblage of reservoir minerals reflect equilibrium with the water. One of the challenges with this method is selecting the mineral assemblage to be used for the computations. A new pre- and post-processing tool, PyGeoT, has been developed to answer this question. PyGeoT (i) automates the selection of the mineral phases to be used with the multicomponent geothermometry software GeoT-iGeoT [1] [2] (ii) performs sensitivity analyses, and (iii) graphs the results for visualization of the data. The performance of PyGeoT and several classical solute geothermometers is tested using simulated and real water compositions from low-medium temperature geothermal systems. A reactive transport model reveals that PyGeoT provides reasonable reservoir temperature estimates even when only partial chemical equilibrium is reached, which is an advantage for exploring for low-medium temperature systems. In addition to estimating reservoir temperature, PyGeoT has the potential to identify the silica polymorph controlling SiO_2 solubility and alteration minerals without specific on-site geological knowledge.

REFERENCES

[1] Spycher, N., Peiffer, L., Sonnenthal, E. L., Saldi, G., Reed, M. H., & Kennedy, B. M. (2014). Integrated multicomponent solute geothermometry. *Geothermics*, 51, 113-123.

[2] Spycher, N., & Finsterle, S. (2016). iGeoT v1. 0: Automatic Parameter Estimation for Multicomponent Geothermometry, User's Guide (No. LBNL-1005841). Lawrence Berkeley National Lab. (LBNL), Berkeley, CA (United States).