

Geochemical Study of the Shimabara Peninsula Japan

MWANGI MURAGURI^{1*}, TATSUTO INO², DAHER ALI³

¹Kenya Electricity Generating Company Limited, Kenya.

(*Correspondence: muragurim@kengen.co.ke)

²Kyushu University, Fukuoka, Japan. (tatsuto0730@gmail.com)

³Office Djiboutian Development Energy Geothermal, Djibouti. (daherali12@hotmail.com)

Introduction

This study focuses on the geochemical characteristics of 22 samples from the Shimabara area, a peninsula on Kyushu Island, in the south of Japan. There are 8 hot springs samples, 10 hot and cold spring samples and 4 fumarole gas samples. The temperatures range from 30^o C - 99.1^o C and pH between 6.6-7.5 with the exception of 2 samples which have very low pH values of 2.2 and 2.4. These 2 samples also had very low Na, Mg and Cl values whereas their T-Fe values are much higher as compared to the other samples. The 8 samples were also analysed for δD (H₂O) and $\delta^{18}O$ isotopes to determine the sources of these waters. The 10 spring samples are analysed for Ca, Mg, Cl and B in order to investigate the mixing models.

Results and Discussion

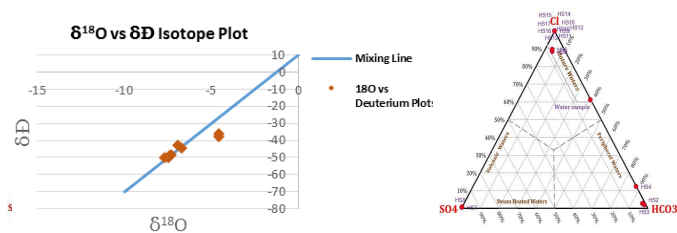


Fig. 1: Plot of δD vs $\delta^{18}O$

There is a positive shift of values away from the mixing line as per Fig. 1 above. The $\delta^{18}O$ has shifted possibly due to the interaction with formation in the reservoir while the δD has an upward shift owing to the combined effects of seawater mixing and rise in temperature.

Conclusion

The results found that there are four types of water; Obama has Cl type, Unzen are SO₄ type, Shimabara has HCO₃ type and the northern area has Cl-HCO₃ type. Cl values between 30 years and now show Cl is slightly decreased, possibly due to infiltration of fresh water. The isotopes also indicate a mixing process.

References

[1] Hakim S., Sachio E., Temperature and chemical changes in the fluids of the Obama geothermal field (SW Japan) in response to field utilization, *Geothermics*, Volume 39, Issue 3, September 2010, Pages 228-241, ISSN 0375-6505. [2] Belhai M., Fujimitsu Y., Bouchareb-Haouchine F. Z., Iwanaga T., Moto M., Nishijima J., Hydrogeochemical and isotope geochemical study of north-western Algerian thermal waters, Algeria. *Arab Journal of Geosciences*, October 2015, DOI 10.1007/s12517-015-2252-