Geophysical Research Abstracts
Vol. 15, EGU2013-12122, 2013
EGU General Assembly 2013

Climate Inferences From Geothermal Measurements in South America

Edmundo Gurza Fausto (1), Robert Harris (2), Alvaro Montenegro (3), Andrés Tassara (4), and Hugo Beltrami (1)

(1) St. Francis Xavier University, Antigonish, Canada (egurza@stfx.ca), (2) Oregon State University, Corvallis, USA (rharris@coas.oregonstate.edu), (3) Ohio State University, Columbus, USA (montenegro.8@osu.edu), (4) Universidad de Concepcion, Concepcion, Chile (andrestassara@udec.cl)

We present the data and analysis of 26 borehole temperature logs from South America. The dataset consists of a combination of 15 new borehole logs measured during 2012 distributed between three sites in Chile. These sites are located near Vallenar, Sierra Gorda and Sierra Limon Verde. Six temperature logs were measured during 1994 at sites near Michilla, Mansa Mina and the region of El Loa (Springer et al., Tectonophysics, 1998). Four logs were obtained from the NOAA Paleoclimatology Borehole Database located in Villa Staff, Toquepala and Talara in Peru.

These data were analyzed for climate variability signals of the surface temperature and changes in the earth's surface energy balance. The analysis suggests regionalized temperature changes in ground surface temperatures with anomalies ranging from -0.1 to -0.3 K for Vallenar, -0.2 to -0.9 K in Sierra Gorda and 0.0 to 0.5 K for Sierra Limon Verde. We place the results within the context of surface air temperature yearly means obtained from existing meteorological and proxy paleoclimatic data between Peru and Northern Chile. The use of geothermal measurements for climate variability studies provides a further understanding of the climatic and energy cycles of the Southern Hemisphere, where meteorological data can be scarce to non-existent.

Analysis of borehole temperature data have contributed significantly to estimating the last millennium surface temperature changes. Additionally, recent analysis have contributed to evaluate the Earth's energy balance by providing a quantitative value for the energy absorbed by the continents in the later part of the 20th century. Knowledge of the surface energy flux is important for understanding the solid Earth – atmosphere boundary condition, land cover changes, and their impact on regional and global climate models.