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Use of ESR for study of geothermal activity

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ESR measurement is very useful in study of geothermal activity to date events, as well as to analyze thermal history. It can be applied other geological features, for example, to evaluate thermal influence at geological disposal sites.

1. Achievements

(1) ESR dating of quartz veins (Mizugaki, 2002)

ESR ages show that a younger hydrothermal event has been superimposed on older event products.

(2) ESR dating of quartz phenocrysts in hydrothermally altered rocks (Mizugaki, 2005)

In an active geothermal field, ESR ages of central silicified zone are younger, while those of peripheral zone are older. Both of them are much younger than original ages, then ESR ages show degrees of annealing by recent thermal activity. One sample shows younger age in peripheral zone, which located on a topographic lineament.It means that a fracture zone exists along the lineament, and hydrothermal fluid flow has been limited in it.

2. Future directions

Where very hot water springs out from a crack in quartz-rich rock, correlation between annealing and distance from the springing crack may be measured using ESR.

References: Mizugaki(2002) Advances in ESR Applications, 18, 181-186; Mizugaki(2005) Abst. 2005 Japan Earth and Planetary Sci. Joint Meeting, G018P-023

Keywords: ESR, electron spin resonance, geothermal activity, hydrothermal activity, thermal history